Armed Conflict, Household Victimization, and Child Health in Côte d'Ivoire[±]

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Abstract

We examine the causal impact of the 2002-2007 civil conflict in Côte d'Ivoire on children's health using household surveys collected before, during, and after the conflict, and information on the exact location and date of conflict events. Our identification strategy relies on exploiting both temporal and spatial variation across birth cohorts to measure children's exposure to the conflict. We find that children from regions more affected by the conflict suffered significant health setbacks compared with children from less affected regions. We further examine possible war impact mechanisms using rich survey data on households' experience of war. Our results suggest that conflict-related household victimization, and in particular economic losses, is an important channel through which armed conflict negatively impacts child health.

Keywords: human capital, child health, conflict, height-for-age, sub-Saharan Africa
JEL classifications: I1, J1, O1

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I. Introduction

The process of human capital accumulation, a key driver of long-run growth, is often derailed when countries experience large shocks such as natural disasters, social strife and armed conflict, adverse terms of trade movements, and economic downturns. Almost one third of developing countries have experienced civil warfare and violence during 2000-2008.[1] Studies on the aggregate impact of conflict show that affected countries and populations adjust relatively fast and often return to their pre-conflict growth trajectories (Davis and Weinstein, 2002; Brakman et al., 2004; Miguel and Roland, 2011). However, a growing body of research on the micro-level consequences of conflict finds that children and young adults are particularly vulnerable to negative shocks.[2] Some of these shocks, especially when experienced during early childhood, have lasting effects on later-life outcomes that are difficult to reverse.

Recent studies establish a robust negative association between armed conflict and child health (Bundervoet et al., 2009; Akresh et al. 2011; Baez, 2011; Akresh et al., 2012; Mansour and Rees, 2012). In this paper we look beyond the causal impact of armed conflict on child health and also explore the channels though which it operates. We make four contributions to the literature. First, we use nationally representative survey data collected before, during, and after the conflict to estimate its impact on child health. This differentiates our work from previous studies that typically use only post-conflict surveys (de Walque, 2011). In addition, our post-conflict survey was run in the year immediately following the end of the conflict, which enhances our confidence in the quality of responses to conflict-related questions. Second, based

[1] Based on data from Marshall (2010).

[2] E.g., Bundervoet et al. (2009), Blattman and Annan (2010), Akresh et al. (2011), Chamarbagwala and Morán (2011), Shemyakina (2011), Minoiu and Shemyakina (2012), León (2012), Mansour and Rees (2012), Verwimp (2012), Swee (2013), and Akbulut-Yuksel (forthcoming).

on unique data on war-related experiences from the post-conflict survey, we construct measures of conflict-related household victimization that allow us to explore the mechanisms by which conflict may impact child health. Third, we determine how the effect of a regional measure of conflict, which we interpret as a covariate shock, varies with that of household-level victimization on child health, an idiosyncratic shock. Specifically, we combine survey data on household victimization with independent information on conflict events drawn from a separate database[3] to identify the population groups that were most affected by the conflict. It turns out these are the children who lived in conflict regions *and* in households that were directly victimized during the war. Fourth, we contribute to the literature on gender bias by examining gender differentials in the estimated impact using different sub-samples and specifications.

The shock under scrutiny is the 2002-2007 conflict in Côte d'Ivoire, a relatively low-intensity but highly disruptive conflict. During this period, access to basic public services such as electricity and water, health clinics, and schools was severely impaired in the conflict-ridden areas of northern and western Côte d'Ivoire. According to surveys analyzed in Fürst et al. (2009), the three most important conflict-related problems reported by households in the western province of Man were health problems (48 percent), lack of food (29 percent), and impaired public services (13 percent). Limited water distribution during the conflict may have compounded existing health problems, with reports that only one fifth of water pumps in the rural north were operational (UNOCHA, 2004). Education services were also disrupted in conflict areas, where half of school-age children were deprived of education by 2004 (Sany,

[3] This approach is relatively new to the literature. Studies that use a mix of household survey data and conflict reports from news outlets and non-governmental organizations to study the impact of conflict on educational outcomes include Justino et al. (forthcoming), Shemyakina (2011), and Verwimp and van Bavel (forthcoming).

2010). It is estimated that 70 percent of professional health workers and 80 percent of government-paid teachers abandoned their posts in the northern and western parts of the country (UNOCHA, 2004; Sany, 2010).

Our outcome of interest is the height-for-age z-score, a commonly-used indicator of long-run nutritional status and health (Martorell and Habicht, 1986).[4] Our identification strategy relies on exploiting both temporal and spatial variation across birth cohorts in exposure to the conflict. We document large health setbacks for children from conflict regions and households victimized by the war. In particular, we find that height-for-age z-scores are on average between 0.2 and 0.4 standard deviations lower for children living in conflict regions compared to same-age children outside conflict regions. In the full sample, the stature deficit is more pronounced for children exposed to the conflict for longer periods of time. We find no systematic differences across genders.

While the absence of longitudinal data does not allow us to examine the well-being of the same households before and after the war,[5] we exploit cross-sectional variation in self-reported household victimization levels to pin down the channels through which the conflict may affect individuals. There is a strong correlation between the covariate and the idiosyncratic shock, which suggests that the likelihood of victimization was higher in conflict regions. Among the shocks we examine, *economic losses* have a negative and statistically significant impact on child health. Children in households whose head reports impaired health and being directly exposed to violence also have a stature deficit, but the estimates are not statistically significant.

[4] All our results are conditional on individuals surviving the conflict and remaining in the country.

[5] Panel data are rarely available for conflict-affected countries. Blattman and Miguel (2010) emphasize the importance of stepping up efforts to collect such data to study the effects of conflict on economic and political outcomes across countries and over time.

Furthermore, the impact of victimization is larger for children living in conflict regions, suggesting that the effects of the idiosyncratic shock are stronger in regions affected by the covariate shock.

While most studies use data collected after the conflict, we are able to control for pre-conflict health differentials using data collected prior to the conflict as well. The surveys we use are the 2002 and 2008 Household Living Standards Surveys (HLSS) and the 2006 Multiple Indicator Cluster Survey (MICS3) for Côte d'Ivoire.[6] The 2008 post-conflict survey provides rich information on household experiences during the war which we use to construct measures of idiosyncratic exposure to the war. The covariate shock is captured with an indicator variable for conflict-affected areas identified using data on the exact dates and locations of conflict events from the Armed Conflict Location and Events Dataset (ACLED) (Raleigh et al., 2010). One caveat of our analysis is that the 2008 post-conflict data, collected shortly after the end of the war, only capture the *short-run* impact of the conflict.[7]

In baseline regressions we control for household head, mother and child characteristics, province fixed effects, and month-of-birth fixed effects. We supplement these with a battery of robustness checks: controlling for province*year-of-birth effects to allow for pre-existing trends in cohort health, alternative definitions of the treatment and control groups, and changes in sample composition, migration, selective fertility, and child mortality. Our results are robust to

[6] See the Data Appendix for more information.

[7] Furthermore, the cross-sectional feature of our data does not allow us to account for potential catching-up effects in children's health. For that, we would need panel data collected at different points in time. For example, Outes and Porter (2013) use the Young Lives Longitudinal Study to show that catching-up in growth is possible, but it declines significantly by the age of five.

these tests. We also apply a placebo test to survey data from an earlier period to address the concern that conflict locations may be non-random. Finally, we look for correlations between self-reported victimization and observables to investigate whether victimized households are a select sample targeted for violence. Again, we find that our results hold up and conclude that we can credibly attribute the identified effects to the armed conflict.

The remainder of the paper is organized as follows. In Section II we relate our study to previous work and describe the historical context of the Ivorian conflict. Section III presents the data, the estimation strategy, our baseline results, and the robustness checks. In Section IV we explore possible conflict impact mechanisms. In Section V we further discuss the results and conclude. Additional results are available in an online appendix.[8]

II. Literature Review and Historical Background

II.1. Previous Studies

Our paper contributes to a large literature that stresses the importance of early childhood conditions for human capital accumulation and adult outcomes (see Currie, 2009; Almond and Currie, 2011 for surveys). For developing countries, Strauss and Thomas (1998) document a positive relationship between height and education, employment, and wages. Glewwe et al. (2001) and Alderman et al. (2006) show that poor nutrition hinders school performance and thereby decreases lifetime income. Martorell (1999) shows that poor nutrition during the early years of life is associated with delayed motor development, impaired cognitive and social skills, and behavioral problems. Looking at the factors that influence child health, Baird et al. (2011)

[8] Available on www.camelia-minoiu.com/civ-onlineappendix.pdf. (Tables and figures are labeled "A" for Appendix).

show that short-term economic fluctuations increase child mortality and female infants face the highest risk according to survey data from 59 developing economies.

Further, our results contribute to the fast growing literature on the negative link between armed conflict and child health.[9] Akresh et al. (2012) examine the consequences of the Ethiopian-Eritrean war on the height of young children in Eritrea and find that children exposed to the war are shorter than the reference population by 0.42 standard deviations. Bundervoet et al. (2009) document an average impact of the Burundian war of 0.35 to 0.53 standard deviations, while Akresh et al. (2011) estimate a slightly larger coefficient of 0.64 standard deviations for children exposed to the pre-1994 Rwandan war. Our baseline estimates of the average effect of conflict on the height-for-age z-score of the war cohort are in the same ballpark as the literature at 0.2-0.4 standard deviations.

We also add to the literature on human capital and economic development in West Africa. Several studies on Côte d'Ivoire focus on health in comparative perspective and provide a useful backdrop for our results.[10] Strauss (1990) shows that in 1985 stunting rates in rural Côte d'Ivoire were half the African average, but twenty times larger than in the United States. Cogneau and Rouanet (2011) examine pre- and post-colonial stature and find that health improvements during the colonial period occurred due to fast urbanization and improvements in

[9] Related studies examine the consequences of armed conflict on the health of young adults. For instance, Agüero and Deolalikar (2012) show that while the negative impact of the Rwandan genocide decreases with age at exposure in a sample of women, the effects are stronger for women who were adolescents during the genocide. Domingues and Barre (2013) find that the impact of the protracted Mozambican war on height is stronger for women exposed to the war earlier in life.

[10] Jensen (2000) examines investments in child education and health in the face of weather shocks to agricultural income in Côte d'Ivoire and finds adverse effects on enrollment and short-run measures of nutritional status.

cocoa production. Other studies focus on macroeconomic shocks. Thomas et al. (1996) quantify the effects of the 1980s adjustment policies in Côte d'Ivoire on child and adult health. Across a range of measures they find that the health of children and adults was hindered by programs of macroeconomic adjustment. Larger negative effects are documented for males, children, and adults. Cogneau and Jedwab (2012) use the 1990 reduction in administered cocoa producer prices as an exogenous shock to farmer welfare and compare child health and education outcomes before and after the event. They find that human capital investments are procylical and that there is greater bias against young girls during times of economic stress.

II.2. Spatial and Temporal Intensity of the 2002-2007 Ivorian Conflict

Côte d'Ivoire, the focus of our study, is the world's leading exporter of cocoa. The country enjoyed a long period of political stability and economic development following its declaration of independence in 1960. With an average real GDP growth rate of 4.4 percent during 1965-1990, Côte d'Ivoire became an economic powerhouse in West Africa and an attractive destination for foreign investment and migrant workers from neighboring countries. By end-1998, more than a quarter of the population consisted of foreign workers. Political unrest followed the death of long-standing President Felix Houphouet-Boigny in 1993 and a number of coups d'état took place during the 1990s. A military coup in December 1999 caused a deep sociopolitical crisis.

The root causes of the 2002-2007 Ivorian conflict can be traced back to widespread discontent over land ownership and nationality laws (in particular, eligibility rules for individuals running for office), and voting rights affecting the large population of foreign origin living in

Côte d'Ivoire.[11] As tensions flared, the armed conflict began in September 2002 with multiple attacks by rebel forces representing mostly the Muslim, northern parts of the country. Violence erupted in several cities, including Abidjan in the south, Bouaké in the center, and Korhogo in the north.[12] Throughout the conflict the country remained essentially split into two, with the northern and western parts of the country under the control of rebel forces and the southern part under government control (UK Home Office, 2007).

While the first years of the conflict were marked by more violence than the latter period, the Ivorian war stands out as a long and relatively low-intensity conflict. Records indicate that it caused some 600 battle fatalities per year in the initial phase compared to ten times as much in the average civil war from the Battle Deaths Dataset (UCDP/PRIO, 2009). It also led to large population movements and a sharp economic contraction. Per capita GDP growth during 2002-2007 was on average −1.5 percent, the second lowest in the region, and poverty rose steeply. Peace talks and negotiations held throughout the conflict culminated in March 2007 with the signature of the Ouagadougou Political Accord, which marked the official end to the conflict.[13]

To identify conflict-affected regions, we use information from the ACLED database on the exact dates and locations of violent incidents during the conflict, including riots, protests, armed battles, and violence against civilians. We match conflict events within each location and for each year to children's province-of-residence (at the time of the survey) and year-of-birth in

[11] The seeds of the conflict were sown in the mid-1990s when the concept of "Ivoirité" (or "Ivoiry-ness") entered the political discourse. As the country has an ethnically-diverse population, a large share of foreign workers, and many naturalized first- and second generation Ivorians, the denial of voting rights, land rights, and hostility towards migrants led to tensions that culminated in the 2002-2007 conflict (Sany, 2010).

[12] See Figure A1 for a map of Côte d'Ivoire.

[13] Figure A2 depicts a timeline of events based on the reports of the UN Mission in Côte d'Ivoire (ONUCI).

the surveys.[14] We define conflict regions as those provinces for which ACLED reports at least one conflict event from September 2002 to November 2007. Figure 1 depicts the spatial distribution of conflict events based on the ACLED dataset. With the exception of Abidjan, the economic capital of Côte d'Ivoire, regions with a higher incidence of violence, shown in darker shades, are concentrated in the rebel-held, northern and western parts of the country.

In Figure 1 the western part of Côte d'Ivoire stands out as the area most affected by high-intensity conflict (based on the frequency of conflict events). There are several reasons behind this pattern. First, fertile cocoa-growing regions of western Côte d'Ivoire had long-standing tensions between indigenous ethnic groups and non-Ivorians (mostly of Burkinabé and Malian origin) over property and land rights (Mitchell, 2011). Second, the region hosts large numbers of Liberian refugees who in the aftermath of the 1999-2003 Liberian Civil War settled in a special refugee zone extending over four western provinces. About one third of the population in these provinces is of foreign origin (Kuhlman, 2002) and foreigners were targeted during the conflict.[15] Third, during the second phase of the conflict, the western regions witnessed a large number of attacks by local militarized groups, including against United Nations bases and property (UNOCHA, 2006a, 2006b).[16]

[14] Although the ACLED dataset reports the exact longitude and latitude coordinates of each conflict event, we perform the matching at the province level because the household surveys used in our analysis are not geo-coded.

[15] In particular, hostilities resurfaced in Côte d'Ivoire between the same ethnic groups which had fought on the Liberian side of the border during the 1999-2003 Liberian War. Several UN documents report hostilities in the Liberian community during the Ivorian conflict (UNOCHA 2003a, 2003b). According to McGovern (2011, pp. 207), both parties to the conflict often attributed especially violent events to Liberian militias.

[16] Chelpi-den-Hamer (2011) provides a detailed account of the motivations and activities of armed factions in western Côte d'Ivoire during the conflict.

III. Data and Methods

III.1. Household Surveys

The three datasets we use, the 2002 and 2008 Côte d'Ivoire HLSS and the 2006 MICS3, provide anthropometric information for 15,421 children aged 6-60 months at the time of each survey. Height-for-age z-scores are calculated using World Health Organization (WHO) Multicenter Growth reference datasets.

Summary statistics reported in Table 1 indicate that during the period of analysis Ivorian children lagged behind the international reference population, with average height-for-age z-scores being lower by almost two standard deviations in the early survey and by 1.5 standard deviations in the later ones. Average height-for-age z-scores are also higher in conflict regions. Average age is between 31 and 37 months and does not differ significantly across surveys or between more and less affected regions. However, there are statistically significant differences in the share of children of various ethnicities and religions inside and outside conflict regions. In conflict and non-conflict regions respectively, 83-84 percent of mothers are married, while 52 and 65 percent of children reside in rural areas. Children from conflict regions are 8 percentage points more likely to come from poorer households. We include most of these variables as controls in our regressions and perform robustness checks to ensure that our results are not driven by these differences.[17]

III.2. Baseline Specification

We follow Bundervoet et al. (2009) in estimating the following baseline specification with province and birth-cohort fixed effects:

[17] Since migration information is unavailable in the 2006 survey, all results that refer to migration status use data from the 2002 and 2008 surveys.

(1) $HAZ_{ijt} = \alpha_j + \delta_t + \beta_1(\text{Conflict Region}_j * \text{War Cohort}_t) + \varepsilon_{ijt}$

where HAZ_{ijt} is the height-for-age z-score of child *i* (aged 6-60 months) residing in province *j* and born at time *t*, α_j are province fixed effects, δ_t are birth-cohort fixed effects (month-year of birth), and ε_{ijt} is a random, idiosyncratic error term. All regressions include dummies for gender and rural residence. The "War Cohort" variable refers to children measured in the 2006 and 2008 surveys who were thus exposed to the conflict at a young age or *in utero*. While the 2008 survey has data only for children born after the conflict, the 2006 survey contains data for children born before or during the conflict and measured during the conflict. Therefore, all children from this survey are included in the war cohort. An important limitation of our empirical approach is that we focus on comparisons across children and provinces *within* Côte d'Ivoire and we are unable to estimate the nationwide effects of the conflict as we do not have an appropriate control group. These nationwide effects will be confounded with the birth cohort effects. However, since the national effects of the conflict are likely to be negative, our main estimates could be lower bounds for the actual impact of the conflict on child health in Côte d'Ivoire.[18]

In Eq. 1, the main coefficient of interest β_1 captures the average impact of residing in a conflict region on the health of children in the war cohort. Controlling for province fixed effects allows us to account for province-specific unobserved characteristics and remove any bias caused by the correlation between these characteristics and exposure to the war. Birth-cohort fixed effects control for global factors that simultaneously affect the health of each cohort.

In line with the literature on the effects of shocks in early childhood on health (e.g., Bundervoet et al., 2009; Banerjee et al., 2011; Akresh et al., 2012), we also estimate the

[18] We thank an anonymous referee for this observation.

specification in Eq. (1) with province*year-of-birth effects, which allows us to control for pre-existing province-level trends in cohort health (λ_{jt}):

$$HAZ_{ijt} = \alpha_j + \delta_t + \lambda_{jt} + \beta_2(\text{Conflict Region}_j * \text{War Cohort}_t) + \varepsilon_{ijt} \quad (2)$$

Then we consider additional specifications to exploit variation in the duration of exposure to the conflict. For instance we replace "War Cohort" with indicator variables for no exposure (reference category), exposure between one and 24 months, and exposure of at least 25 months, as well as a continuous measure of the duration of exposure to the conflict (in months). Children who were conceived or born after September 2002 are assumed to have also been exposed to the shock *in utero*. Thus, total exposure duration for them is the number of months *in utero* during the conflict plus their age in months.[19] To allow for gender differentials in the impact of the conflict, we also estimate all specifications with interaction terms between the variables of interest and a female dummy. Finally, we assess the sensitivity of these baseline results to adding controls for the child, the household head, and the child's mother.

III. Empirical Results

III.1. Baseline Regressions

The baseline OLS regressions, presented in Table 2, indicate that children with *in utero* or early childhood exposure to the conflict who lived in conflict-affected regions had height-for-age z-scores that were 0.250 standard deviations (s.d.) lower than children born during the same period who lived outside conflict regions (column 1). The estimated coefficient increases to 0.414 s.d. and remains statistically significant at the 5 percent level when we control for pre-existing trends in cohort health (column 2). In columns 3-4 we replace "War Cohort" with dummies for the

[19] We obtain similar results (not reported) when we replace this measure with the number of months of exposure *after* birth.

duration of exposure to the conflict. This specification yields impact estimates that are slightly higher for older children and lower for younger ones, which suggests that older children, who had longer exposure to the conflict than younger ones, accumulated a greater height deficit. (However, the difference is not statistically significant.) Next we focus on a continuous measure of exposure to the conflict (columns 5-6) and find that an additional month of exposure reduces height-for-age z-scores by 0.007-0.010 s.d. on average (significant at the 5 percent level), depending on whether we control for province-specific trends. This effect translates into a height-for-age z-score loss of 0.11-0.15 s.d. for a one s.d. (15 month) increase in the duration of exposure to the war.

The estimated coefficients on the triple interaction term with the female dummy are not statistically significant in most specifications (columns 7-12). The estimated coefficient on "Conflict Region*Exposure 0-24 Months*Female" is positive and statistically significant at the 5 percent level (columns 9-10), suggesting that younger girls were affected by the conflict less than boys of the same age. This finding is not surprising in light of other anthropometric studies on sub-Saharan Africa. Unlike the research on child health and famines (Mu and Zhang, 2011) or natural disasters (Rose, 1999) in Asian countries, there is no consistent evidence of sex bias (against females) in child health studies for sub-Saharan Africa, either during tranquil or crisis times (Strauss, 1990; Alderman et al., 2006; Bundervoet et al., 2009; Akresh et al., 2011, 2012).[20]

[20] Evidence of sex bias is more common in the context of shocks other than conflict. Akresh et al. (2011) and Cogneau and Jedwab (2012) find a stronger negative health impact on young girls in the case of crop failure in rural Rwanda and a drop in cocoa prices in Côte d'Ivoire.

Table 3 presents baseline specifications that include additional control variables. In particular, we add child ethnicity and religion, characteristics of the household head (age, gender, education) and characteristics of the child's mother (age, education, marital status). These controls ensure that neither the factors we found to systematically differ for children in exposed vs. non-exposed households (Table 1) nor potential changes in sample composition during the period of analysis bias our results. F-tests for the joint significance of coefficients on the controls show that the only characteristic that does not systematically affect children's health is their ethnic background. In these regressions the average health impact of conflict is of similar magnitude to that in the specifications without controls.[21,22]

III.2. Robustness Checks

III.2.1. Alternative Baseline Cohort

It is possible that certain pre-conflict events affected the health of our baseline cohort and contaminated our main results. One such event is a military coup that led to a change in government in Côte d'Ivoire on December 26, 1999. The coup had a significant impact on the Ivorian economy. In its aftermath, private investment collapsed, public investment projects were postponed, social spending was cut back, and migrant workers fled following ethnic clashes in

[21] We sought to determine the age at which the impact of the conflict is strongest by re-estimating our baseline regression (Table 3, column 2) with the "Conflict region*War cohort" variable spliced by age group. The results (Table A1) indicate that the impact of the conflict on children's health is negative for all age groups, but is only statistically significant for children aged 49-60 months, i.e., those who were exposed to the conflict for the longest period of time.

[22] We also estimated the baseline regressions allowing for differential trends in cohort health across rural vs. urban locations and the results (not reported) largely held up.

the south (Doré et al., 2003). From 1998 to 2002, the national poverty rate rose by five percentage points to almost 40 percent.

It is possible that children born after December 1999 experienced a decline in their well-being as the crisis unfolded. Thus, children born between January 2000 and August 2002 in the pre-war survey may constitute a poor baseline group to study the impact of the 2002-2007 civil conflict.[23] Furthermore, children born during the same period and surveyed in 2006 could also be a poor treatment group as they were exposed to two large shocks—the coup *and* the conflict. As a robustness check, we exclude from the sample children from the 2002 and 2006 surveys who were born between January 2000 and August 2002, the month before the civil conflict erupted. Therefore, our new control group includes only children born *before* the coup and children born after the conflict started who lived *outside* conflict regions.

The results show that children born during the 2002-2007 conflict had significantly worse health compared to the new control group (Table 4). Notably, the coefficient estimates on the interaction terms between the conflict exposure variables and "War Cohort" are at least twice as large compared to the baseline results (Tables 2-3). Our earlier results could thus be interpreted as conservative estimates of the impact of the Ivorian conflict on children's health.

III.2.2. Results across Sub-samples

We explore heterogeneity in the baseline results by separating children from different types of households and by gender. In Table 5 we present estimates for children from poor and non-poor households, girls vs. boys, rural vs. urban areas, and for children from households headed by

[23] The December 26, 1999 military coup led to increased political instability and a sharp economic downturn, making it possible that children born *before* December 1999 also experienced a decline in health. We assume that any such impact was experienced uniformly across the country.

individuals with some education and without any education. Columns 1-2 report results of the baseline regression models by poverty status.[24] Poor households are identified using an assets index that refers to the quality of the dwelling and access to the grid and utilities.[25] We find that children exposed to the war were negatively impacted in both poor and non-poor households, losing on average 0.516 and 0.382 s.d. respectively compared to the reference population.[26]

When we split the sample into boys and girls (columns 3-4), we find that both girls and boys in the war cohort who lived in conflict regions suffered important health setbacks compared to same-age children outside conflict regions. Comparing these results with Table 2, we see that the coefficient estimated on the interaction term between "Conflict region" and "War Cohort" is larger in absolute value for girls, suggesting that young girls born or present during the conflict in more affected regions experienced a larger health setback than same-age girls in less affected regions than was the case for boys. (However, the estimated coefficients in the separate regressions for boys and girls are not statistically different from each other.) When splitting the

[24] Since the 2006 survey did not collect consumption data, we cannot construct consumption-based poverty measures that would be consistent across the three surveys. Instead, we use information on household assets available in all three surveys to construct an assets-based wealth index.

[25] The quality of the dwelling refers to whether the walls and floor are in cement or brick, and whether the roof is in metal, cement, or stone. Access to the grid refers to whether the household has electricity and a phone. Investment in utilities represents access to a toilet and using oil, natural gas, coal or electricity for cooking, rather than wood. The asset index is the first factor extracted using principal component analysis on the seven components and explains 47 percent of their joint variance. Poor households are those with below-average asset index values.

[26] To further investigate whether poverty is driving our results, we split the sample into three groups of children—in the poorest, middle, and richest households—based on the household assets index. We find a statistically significant negative impact of the conflict both for the children from the poorest and the middle wealth categories (Table A2). This result suggests that extreme poverty cannot explain our results.

samples by area of residence (rural/urban) or household head's education (columns 5-8), we find that children from the war cohort who lived in conflict regions were impacted more in rural households and in households headed by individuals without education. Nevertheless, formal tests of the equality of the impact coefficients across sub-samples fail to reject the null of equality except for the rural-urban split.

III.2.3. Selective Fertility and Mortality

Two possible threats to the validity of our main findings are endogenous fertility and selective mortality. These may confound our results insofar as fertility decisions are systematically correlated with mothers' characteristics which may in turn affect child outcomes, or sex ratios. To address these issues, we undertake two exercises. First, we look at fertility decisions during the war by women of fertile age and compare them inside and outside conflict regions. Second, we look for patterns in sex ratios for surviving children. For the first exercise we pool all women from the 2006 and 2008 surveys who were of fertile age and hence could have had a child during the conflict.[27] We perform a set of regressions akin to Akresh et al. (2012) in which the dependent variables (for which we have consistent information across surveys) are women's age, education, and marital status. The covariates include indicators for residence in a conflict region, having a child during the war, and their interaction. The regression results confirm that while women who had a child during the conflict are younger, less educated, and more likely to be married, there are no systematic differences between the two groups across regions differentially affected by the conflict (Table A3). However, these results are conditional on children surviving

[27] Since the surveys provide no or partial information on birth history, when it comes to women who had a child during the conflict, the analysis is confined to surveyed women with resident children and does not account for children who may have left the household or are deceased.

the war and staying in the same household with their mothers, as well as on mothers surviving the war and not leaving Côte d'Ivoire. Next we examine patterns of selective attrition due to mortality or migration outside of Côte d'Ivoire by regressing sex ratios by province and year-of-birth for children with non-missing information on gender and location of current residence (Table A4). Once again we find no systematic differences in sex ratios across regions and over time.

III.2.4. Placebo Test

Our analysis may be vulnerable to the criticism that the estimated impact of the conflict captures pre-existing differences in child health between conflict and non-conflict regions. To alleviate this concern, our last robustness check is a placebo test that uses household- and individual-level data from the 1994 and the 1998/1999 Demographic and Health Surveys (DHS) for Côte d'Ivoire. Households included in these surveys could not have been affected by the war since the data were collected well before the 1999-2000 socio-economic crisis and the 2002-2007 conflict.

The results show that children in the placebo-conflict regions and the placebo war cohort did not have different height-for-age z-scores compared to children of similar age outside placebo-conflict regions and older children (Table 6, columns 1-6). While the girls from placebo-conflict regions and the placebo war cohort appear worse off in terms of health (columns 7-12), the estimated coefficients on "Conflict Region*War Cohort" remain statistically insignificant regardless of the set of controls. Notice also that the standard errors in this table are similar to those in our baseline Table 2. Overall, the placebo test results suggest that pre-existing differences in child health across regions differentially involved in the conflict are unlikely to drive our baseline results.

IV. Household Victimization as a Conflict-Impact Mechanism

IV.1. Measures of Conflict-Induced Victimization

We have so far documented a strong negative impact of the conflict measured as a covariate or a common shock on the health of young children. Our assumption has been that all the households in regions in which conflict events were reported by ACLED were equally exposed to these events. In this section we focus on more granular, idiosyncratic measures of exposure to the conflict. In particular, we examine *household-level* conflict-induced victimization as one channel through which the conflict may have impacted child development.[28]

To create a measure of victimization, we rely on questions asked of household heads in the 2008 survey to assess the impact of the conflict on the population.[29] These questions refer to a wide variety of war-related experiences. We group the questions into four broad categories: "economic losses" such as loss of income, employment and productive economic assets (farm and livestock); "health impairment" reflected in physical and mental ailments (conflict-related illness, anxiety, stress); different types of "displacement" (outright move of the entire household or of the household head, or going into hiding during the conflict); and "victim of violence," which refers to being a direct victim of conflict-related violence (that is, theft, rape, other sexual violence, physical wounds or other troubles), witnessing deaths in the household, or being forced

[28] Related studies analyze the link between conflict-induced victimization and post-war outcomes such as political engagement in Sierra Leone (Bellows and Miguel, 2009) and social capital in Uganda (Rohner et al., 2013).

[29] A seminal study by Miguel et al. (2004) shows that economic shocks *predict* conflict. In our case, conflict-related victimization is a consequence of rather than a cause for the conflict since the data on war experiences were collected in the post-conflict survey with the goal to assess the *effects* of the conflict on households. This goal is reflected both in the title of the survey questionnaire ("Impact of the Conflict on the Population") and in the way in which the questions are phrased ("Because of the conflict,... did [...] happen?").

into begging or prostitution. Table A5 lists the questions used to construct each index. T-tests for the differences in mean values of the components show that economic losses and displacement were more prevalent in conflict regions, while households experienced relatively similar levels of health impairment inside and outside conflict regions.

For the regression analysis we construct household-level indices of victimization. We define both an *overall* victimization index calculated as the average of the indicator variables for affirmative answers to the questions, as well as separate indices for each of group of questions (economic losses, health impairment, displacement, and victim of violence) similarly defined as the averages of indicator variables for "yes" answers to the underlying questions.

Before discussing the results, we caution that the self-reported victimization data may suffer from a number of biases. For instance, some household heads may over-report victimization if they attribute their experiences of post-conflict hardship to the conflict itself. In addition, some individuals could under-report their war-related traumas if they experience memory loss or denial.[30] To the extent that such individuals are less able to care for their families, children from their households could experience worse economic and nutritional outcomes. It is also possible that some households are more eager to report economic forms of victimization if they expect some form of compensation. Economic losses are also easier to verify than, say, health-related impairments, and do not carry the same social stigma associated with the reporting of sexual violence (e.g., Taylor et al., 1983). To our knowledge, the existing literature provides little guidance on the biases associated with self-reported victimization data

[30] The psychology literature suggests that denial is a common reaction to stressful events, and that there is no pattern in how people respond to shocks. Stages of denial are not predictable: some people respond to stressful situations immediately, while others do so after months or even years (American Psychological Association, 2011).

and the extent to which these may systematically be associated with observables. The consequence of this potential reporting bias for our results is that victimization data may be measured with error, leading to an underestimation of its actual impact on child health. In the following section we link the reporting of victimization to several household characteristics and subsequently control for these characteristics in our regressions to alleviate the concern that systematic correlations between the two are contaminating our results.

We spatially examine the experience of war in Figure 2, which shows a victimization map based on the share of households that report at least one type of victimization. Darker shades represent areas with a greater share of victimized households (i.e., responding yes to at least one question within each index). There is a fair degree of visual overlap with the ACLED-based conflict map (Figure 1), with more frequent reports of victimization in the western parts of the country, especially along the border with Liberia, and in Abidjan. The share of households reporting at least one level of victimization is positively related to conflict intensity measured by the number of conflict events in the ACLED dataset (Table 7), with a correlation coefficient of 0.249 (statistically significant at the 10 percent level). For different types of victimization, the correlation coefficients with the ACLED measure are of similar magnitude. The province-level victimization indices are strongly correlated with one another, with the highest correlations found between health impairment and displacement on the one hand, and victim of violence on the other.

It is noteworthy that conflict-related victimization is also reported in the regions for which the ACLED dataset does not report any conflict event. There are several possible explanations for this. First, the effects of conflict can spill over from one community to another (Montalvo and Reynal-Querol, 2007). Second, the ACLED dataset may suffer from

measurement error if certain communities or types of events systematically receive more press coverage than others (Woolley, 2000). Finally, our victimization variables are based only on the experiences reported by the heads of households and the experiences of other household members may differ.

IV.2. Selection into Victimization

Here we address the concern that households that report being victimized may belong to a select sample that was targeted for violence due to their characteristics. To determine the extent to which victimization status is correlated with observables, we regress each victimization index on a comprehensive set of characteristics of the heads of households, including ethnicity and religion, rural residence, age, marital status, education, and gender.

The results (Table 8) reported for the full sample and for non-migrant households, reveal systematic selection into victimization according to certain characteristics. The Southern Mandé, who live primarily in the western regions extensively affected by the conflict, systematically report more of all types of victimization than the Akan ethnic group (reference category). This observation is consistent with the visual examination of the conflict and victimization maps. Married household heads are also more likely to be victimized across all dimensions. These effects are statistically significant at the 1 percent level. In the full sample, Christian household heads are less likely to be victimized (significant at the 5 percent level). When it comes to the components of the victimization index, the ethnicity results are more mixed. Non-migrant naturalized Ivorians, who constitute only 0.3 percent of the dataset, are significantly less likely to report being direct victims of violence. We would have expected the opposite effect as foreigners were targeted during the conflict. However, since many ethnic groups native to Côte d'Ivoire are also found in neighboring countries, ethnic status may not be a good basis for classifying

individuals as outsiders (Levinson, 1998).[31] Further, older heads of households report more conflict-induced health effects (columns 5-6), more educated ones are more likely to report being victims of violence (columns 9-10), and married ones report more of all types of victimization other than health impairment.

In light of these findings, we allow for the possibility that household head's ethnicity and other characteristics may systematically be correlated with victimization (also suggested by the F-tests shown in Table 8) by including controls in most of our specifications such as household head's age, education, and child ethnicity (strongly correlated with head's ethnicity). (For a similar strategy, see Bellows and Miguel, 2009.)

As the Ivorian conflict was characterized by high levels of migration and internal displacement,[32] we also investigate whether households that moved out of conflict areas differ in their observables from those that did not, and whether they are more likely to report being victimized. When we compare household characteristics in conflict vs. non-conflict regions before and after the conflict, we find no systematic changes in the average household profile (Table A6). Further, households that migrated during the conflict, especially those displaced by the conflict, are statistically significantly *more* likely to report victimization than non-migrant

[31] McGovern (2011, pp. 71) points out that in western Côte d'Ivoire, "anyone not born in a village is technically a 'stranger'…" and that men moving 20 or 2,000 kilometers away from their native villages would be treated as foreigners in their new place of residence.

[32] Some reports indicate that by late-2002 the number of war-affected people had reached between 2.7 million (including the internally displaced) and four million (including evacuees and refugees to neighboring countries) (UNOCHA, 2003). Other sources indicate that in the first ten months more than half a million people were displaced (UNICEF, 2003). Martone (2003) provides comparable estimates. Displaced households represent about 20 percent of our post-conflict sample.

households (Table A7). This result holds across alternative definitions of migration, and is conditional on poverty status, area of residence (rural/urban), household head characteristics, and province fixed effects. This finding suggests that there was negative selection into migration and positive selection into staying in conflict regions. Thus, the coefficient magnitudes we document below for the impact of household victimization for the full sample and the non-migrant sub-sample may be viewed as conservative estimates of the true impact of the conflict.

IV.3. Identifying the Mechanisms

To examine household victimization as a possible conflict-impact mechanism, we estimate several specifications. We begin by estimating the cross-sectional impact of conflict-induced victimization on child health using solely the post-war (2008) survey. Our specification is:

$$HAZ_{ijt} = \alpha_j + \delta_t + \beta_3(\text{Victimized}_i) + \varepsilon_{ijt} \quad (3)$$

The coefficient of interest, β_3, captures the *direct* effect of victimization on the health of children in the war cohort. Since non-migrant households are less likely to report victimization, we show the estimates separately for all households and for non-migrant households (Table 9). The coefficient estimates are remarkably stable across sets of controls—for the child, the household head, or the child's mother—and robust to controlling for pre-existing trends in cohort health (λ_{jt}). The estimates for the full sample (Panel A, columns 1-6) suggest that children in households that experienced a higher degree of victimization have lower height-for-age z-scores (statistically significant in all but one specification): at the mean level of victimization (0.17 on a scale from 0 to 1), an increase in the level of victimization by one s.d. (0.16) leads to a decline in the height-for-age z-score by between 0.112 and 0.122 s.d. relative to the reference population.[33] A test for the equality of coefficient estimates across migrant and non-migrant households

[33] Using the estimates in columns 4 and 2 respectively, we have 0.699*0.16=0.112 and 0. 761*0.16=0.122.

indicates that the effects are the same regardless of migration status. As the coefficient estimates are robust to the inclusion of additional controls, omitted variables that may be correlated with selection into victimization are unlikely to be driving our results.

In Table 10 we replace the overall "Victimized" index with its four components capturing forms of victimization such as economic losses, health impairment, displacement, and being a direct victim of violence. We find that the impact coefficients are mostly negative, suggesting that all forms of victimization hinders child health; however, only victimization in the form of economic losses has a statistically significant impact. These results are consistent with the shock impact mechanisms discussed in the context of the Burundian and Rwandan conflicts in Bundervoet et al. (2009) and Akresh et al. (2011), who argue that destruction of economic assets, in particular, theft of livestock and burning of crops, is one of the leading channels through which these wars increased children's vulnerability. Comparing the impact coefficients across migrant and non-migrant households, we notice that there are no statistically significant differences by migration status.

We also assess how the estimated impact of the covariate shock on child health, obtained in our baseline results, varies with the degree of conflict-related victimization reported by households. Doing so allows us to pin down the population group that was most heavily affected by the war and a possible channel through which this occurred. We go back to the baseline specification Eq. (1) and interact the term "Conflict Region*War Cohort" with the "Victimized" variable. Since the latter is only available in the 2008 survey, this procedure amounts to estimating:

(4) $$HAZ_{ijt} = \alpha_j + \delta_t + \beta_4(\text{Conflict Region}_j * \text{Victimized}_i) + \beta_5(\text{Victimized}_i) + \varepsilon_{ijt}$$ [34]

using the pooled sample of children from the pre- and post-conflict surveys. By estimating Eq. (4) we ask whether the covariate shock has a differential impact on child health according to the degree of victimization experienced by the household in which the child resides. The coefficient of interest is β_4. We control for rural and female dummies, and in some specifications we add gender interactions and province-specific trends (λ_{jt}).[35]

The results (Table 11) suggest that the negative impact of the conflict on height is more pronounced for children living in victimized households.[36] This finding holds when we use different sets of controls and for the non-migrant sub-sample (Panel A vs. Panel B). There is no evidence of a gender differential.[37] In the full sample, the estimated coefficients on "Conflict region*Victimized" range between 1.134 and 2.475 s.d. (significant at least at the 10 percent level) in the regressions without gender interactions, and between 1.783 and 2.859 (significant at the 1 percent level) when we add gender interactions.[38] As evidenced by the F-tests on the

[34] As the data on the war experiences are available only in the 2008 survey, this specification implies that "Conflict Region*Victimized*War Cohort"="Conflict Region*Victimized" and "Victimized*War Cohort"= "Victimized".

[35] The estimated coefficients on the interaction terms with the female dummy "Conflict Region*Female", "War Cohort*Female," and "Victimized*Female" are jointly statistically insignificant and are not shown.

[36] We obtain similar results when we use an alternative definition of the victimization index based on principal components analysis (Table A8).

[37] For robustness we also used the alternative control group that excludes children born after January 1999 and thus exposed to the 1999-2000 socio-economic crisis, and obtained similar results (Table A9).

[38] When we estimate the same specifications but replace the overall "Victimized" index with the four sub-component indices (results not reported), the estimated coefficients on the interactions of interest are statistically insignificant, likely because of the high correlation among the indices.

equality of "Conflict Region*Victimized" coefficient estimates in the migrant and non-migrant samples, conflict-induced victimization has an equally strong impact regardless of migration status. This observation suggests that migrant households were unable to mitigate the effects of conflict despite leaving conflict areas, possibly due to a breakdown in insurance mechanisms such as informal networks at the original place of residence (see, e.g., Kondylis, 2010).

What do our estimated coefficients imply for children's longer-run outcomes such as education and lifetime earnings? We focus on two conservative magnitudes that correspond to specifications with province-specific trends, and child and mother controls: 0.476 s.d. for children from the war cohort residing in conflict areas (Table 3, column 8), and 2.475 s.d. for children who also live in victimized households (Table 11, column 6). Previous studies find that a 1 standard deviation decline in height-for-age z-scores is associated with a reduction of 0.678 in the number of grades attained (Alderman et al., 2006). In our context, this translates into an average impact of 0.323 fewer grades for the war-cohort children from conflict regions and 1.678 for children from victimized households. Existing estimates of the rate of return to education in Africa vary significantly, and for Côte d'Ivoire they are based on household surveys from the mid-1980s. These range from 8 percent (Vijverberg, 1993) to 10-12 percent (Schultz, 2003) and 14-21 percent (Berthelemy and Bourguignon, 1996). Using midpoint estimates of 10 percent that are comparable to those for Cameroon and Ghana (Bigsten et al., 2000), the foregone education caused by the Ivorian conflict implies lifetime earnings that are lower by 3.23 percent for children from conflict regions; and 16.78 percent for children from conflict areas who also reside in victimized households.

V. Discussion and Conclusions

We examined the effect of the 2002-2007 armed conflict in Côte d'Ivoire on children's height-for-age z-scores using data from three household surveys collected before, during and after the conflict, coupled with information on the exact date and location of conflict events. Our results show that children aged 6-60 months who lived in conflict-affected areas suffered significant health setbacks compared to those in less affected areas. The negative impact is stronger for children exposed to the conflict for longer periods, for children in rural communities, and for those living in victimized households. In line with other studies of child health in sub-Saharan African countries, we did not find any evidence of sex bias.

The literature on the consequences of armed conflict has proposed several mechanisms through which war affects populations, including destruction of economic assets, lack of access to public infrastructure, and significant population movements. We were able to assess the role of several war impact mechanisms using unusually rich information on households' experiences of war from a post-conflict survey. We found that conflict-related household victimization hinders child health, especially in conflict regions. Furthermore, some types of victimization are more detrimental than others. Children in households that experienced economic losses through the destruction of productive assets (livestock) and properties (farm), loss of employment, and more generally a fall in household revenues, experienced large health setbacks, and the coefficients are statistically significant. Children from households headed by adults who suffered either physical or mental ailments due to the conflict, and who experienced direct violence and deaths in the family, also accumulated a stature deficit, but the coefficients are less precisely estimated. Across a wide range of empirical models, we found no difference in the stature deficit for children from migrant and non-migrant households, suggesting that although pervasive,

internal displacement did not appear to play an additional role in the Ivorian context. Taken together, our findings take a step towards offering direct evidence for the channels through which armed conflict is hypothesized to affect populations.

Some caution is needed, however, in interpreting our results. One reason is that they only pertain to the surviving households that stayed in the country, and may not apply to those that migrated to other countries. Another one refers to the fact that the thrust of our evidence on possible conflict impact mechanisms relies on self-reported information on individual experience of war-related victimization. Such data are highly granular and potentially very informative, but may suffer from bias in reporting, and given available information and earlier studies on the subject, we cannot know whether the bias is systematic. While it is reassuring that our self-reported victimization variables appear to be a strong predictor of children's anthropometric outcomes, our results could be further probed with data on actual destruction of economic assets. As such, they complement those in Akbulut-Yuksel (forthcoming, 2013) and Miguel and Roland (2011), who examine the consequences of armed conflict using regional information on destruction of physical capital, and Verpoorten (2009), who explores household coping mechanisms during war using household-level data on the depletion of assets.

It is also important to note that the conflict impact mechanisms identified in our study are by no means exhaustive. Recent case studies by Fürst et al. (2009) and Betsi et al. (2006) complement our findings by documenting the decline in the state of the health infrastructure during the conflict. Based on household interviews, Fürst et al. (2009) find a significant deterioration in access to health services and a higher incidence of tropical diseases in the conflict-affected western region of Man in 2003. Betsi et al. (2006) report a large reduction in the number of health facilities and personnel (especially doctors) in the central, northern, and

western regions of Côte d'Ivoire around the same time. In the first two years of the conflict, rebel-held regions lost between 75-90 percent of health personnel and 72-90 percent of health facilities due to looting or destruction. Given the relatively poor pre-conflict stock of health infrastructure, conflict-induced losses of health workers and facilities likely had a major impact on the health of children, both directly and through their impact on the adults in the household. In addition, the deterioration of public health infrastructure at a time when it was needed most may have compounded existing health deficiencies.[39]

By documenting several conflict impact mechanisms that explain changes in child health, we can suggest policies that could mitigate the adverse effects of armed conflict. As economic losses appear to be the most relevant channel associated with the decline in child health in the context of Côte d'Ivoire, interventions that target conflict regions, for instance, through cash transfers and employment programs aimed at rebuilding household assets, rehabilitating basic social services, and assisting the return of the displaced, can help alleviate the effects of the conflict and restore economic well-being.

As knowledge on the consequences of large negative shocks on child development accumulates, more research into household coping strategies and best public policy responses is needed. In the context of armed conflict, Arcand and Wouabe (2009) study the effectiveness of a social spending program during the Angolan war. They find that the benefits of the program, namely higher child stature and household consumption, are either constant or increase with conflict intensity, which suggests that even relatively small investments in a post-conflict environment can have a large impact on well-being. When it comes to directly investing in child

[39] To test this idea, data on pre- and post-conflict stock and quality of health infrastructure at the province or community level would be required.

health, programs that focus on the local production of nutritional supplements (e.g., fortified peanut paste) as in Haiti (Rice, 2010), can create jobs in addition to providing access to locally-produced nutritional supplements for malnourished children.

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Data Appendix

Our data sources are:
We use the surveys described below. The HLSS surveys were undertaken by the National Institute of Statistics in Côte d'Ivoire in collaboration with the World Bank, the European Union and UNICEF. For information on how the height data was cleaned, see the online appendix of Minoiu and Shemyakina (2012).[40]

- Household surveys:
  - HLSS-2002. "Enquête sur le Niveau de Vie des Ménages de Côte d'Ivoire." (Household Living Standards Survey), National Statistical Institute, Ministry of Planning and Development of Côte d'Ivoire, World Bank and European Union.
  - HLSS-2008. "Enquête sur le Niveau de Vie des Ménages de Côte d'Ivoire." (Household Living Standards Survey), National Statistical Institute, Ministry of Planning and Development of Côte d'Ivoire, World Bank and European Union.
  - MICS3-2006. "Enquête par Grappe à Indicateurs Multiples." (Multiple Indicator Cluster Survey), National Statistical Institute, Ministry of Planning and Development of Côte d'Ivoire, and UNICEF. URL: http://www.childinfo.org/mics3_surveys.html
  - DHS-1994 and DHS-1998/99. Demographic and Health Surveys for Côte d'Ivoire. URL: http://www.measuredhs.com/
- Armed Conflict Location and Event Data (ACLED) from http://www.acleddata.com/ (see http://www.acleddata.com/archived-data/ for datasets), Raleigh et al. (2010).

Calculation of height-for-age z-scores
Height-for-age z-scores for children in the 2002 and 2008 surveys are calculated using WHO Multicenter Growth reference datasets and the WHO Anthro (version 3.2.2 January 2011) STATA routines (http://www.who.int/childgrowth/software/en/). Observations with biologically implausible z-scores (that is, more than 6 standard deviations away from the international reference population) are dropped from the analysis. The MICS3-2006 survey includes already-calculated height-for-age z-scores using WHO reference datasets. The total number of children with biologically plausible height-for-age z-scores is 15,421 (5,885 in the 2002 survey, 7,232 in the 2005 survey, and 2,304 in the 2008 survey).

Definition of non-migrant households
HLSS-2002. Non-migrant households are defined as those that lived in their current location (as of the interview date in fall 2002) since December 1993. The December 1993 cutoff was chosen because it marks the death of Ivorian president Félix Houphouët-Boigny.
HLSS-2008. Non-migrant households are defined as households that had lived in their current location since August of 2002, that is, before the start of the 2002–2007 armed conflict.
MICS3-2006. Migration data are unavailable.

Definition of rural households
Neither survey provides information on rural/urban sector of (current) residence. We create an indicator variable for children in rural residence based on children's recorded place of birth and migration history. Children from non-migrant households are assigned their sector of birth. For 23 children in the 2008 survey for whom this information is missing, we use instead the

[40] The appendix is available for download from http://www.camelia-minoiu.com/civ-appendix.pdf.

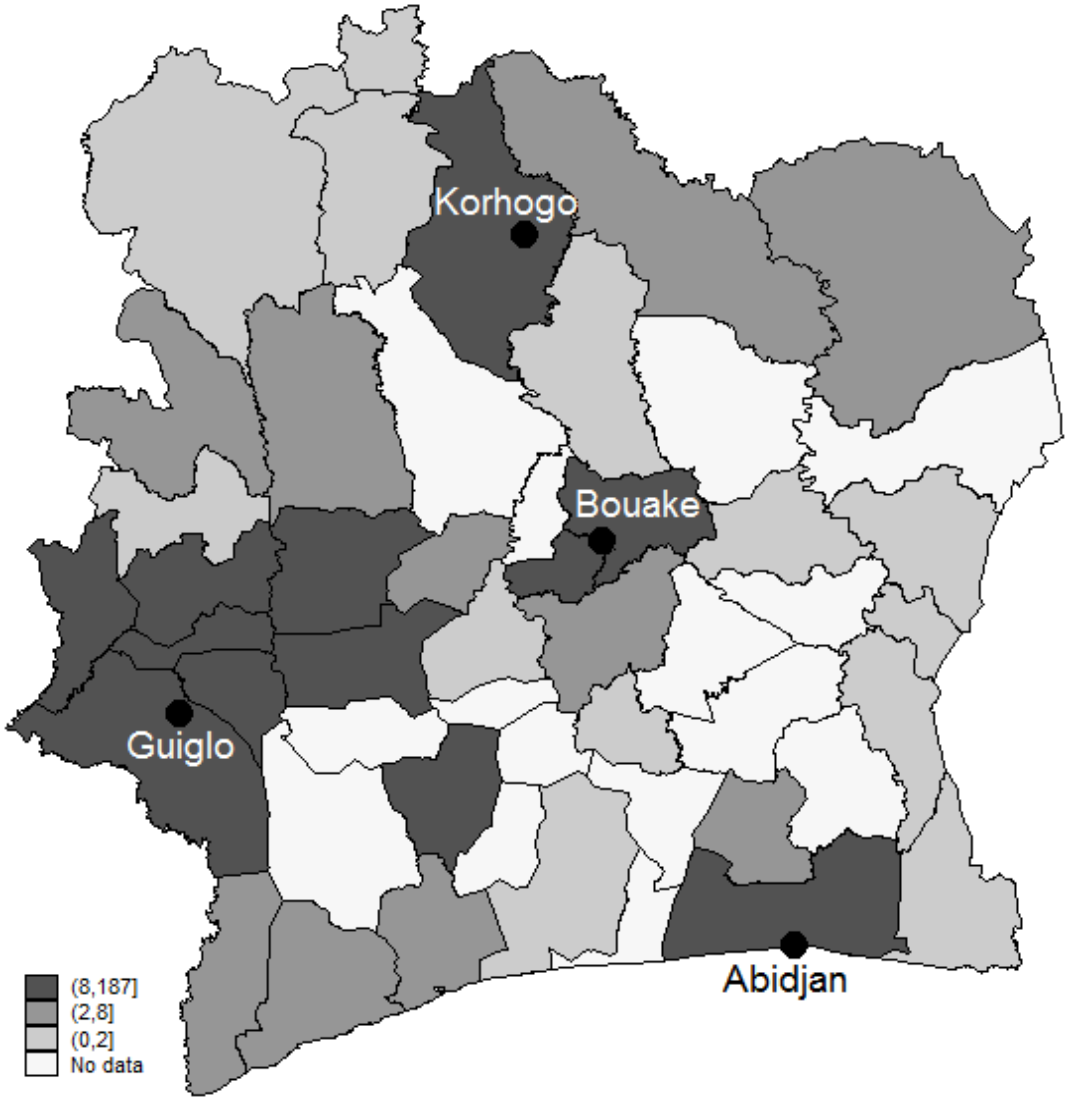
household head's sector of birth as long as the household head has been in the household's current location since the child's birth, and it is a non-migrant household (that is, the child was born in that location). For regressions examining selection into victimization, the household head's sector of birth is imputed as the sector of residence if the household head has been in their current location since birth.

Maps

The conflict event map was created by manually matching conflict event locations from ACLED with children's location in the household surveys. ACLED locations are either provinces, in which case the merging is automatic, or villages and towns, in which case we match them to their respective province (using information from http://www.maplandia.com/search/). The maps (Figures 1, 2) were created using the "spmap" STATA routine (http://www.stata.com/support/faqs/graphics/spmap.html). The Atlas for Côte d'Ivoire with GIS information is from Dynamic Atlas (http://psugeo.org/Africa/Tools.htm).

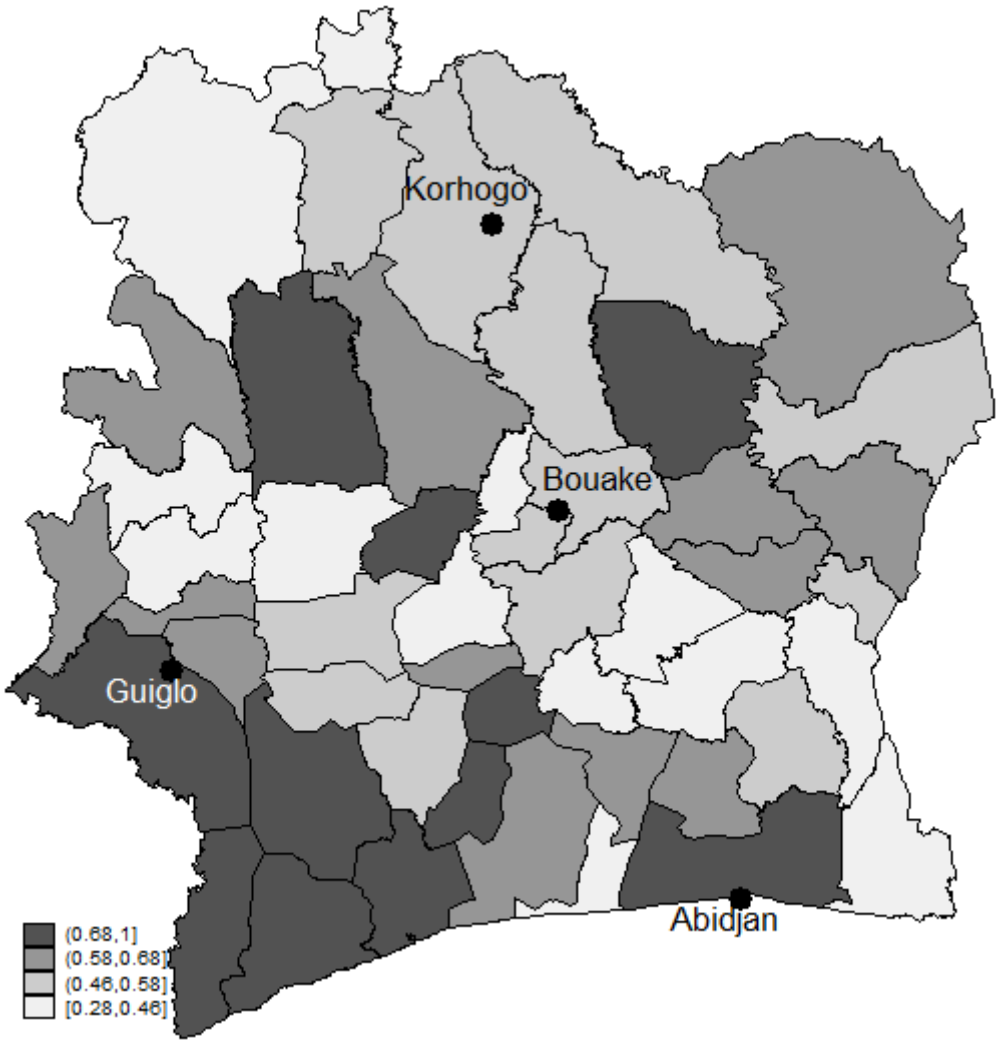
Tables and Figures

Figure 1. Map of Conflict Events in Côte d'Ivoire, September 2002-November 2007



Notes: The map depicts conflict regions. Darker shades indicate a larger number of conflict events reported in the ACLED dataset. In the legend, the "No data" category stands for no reported incidents in the dataset and is treated as zero exposure to conflict in the analysis. The category (8, 187] includes 12 provinces, some of which had relatively low-intensity conflict (between 10 and 30 events) and some with relatively high-intensity conflict, such as Abidjan in the south (187 events), Bouaké in the center (62 events), and the province of Guiglo in the west (48 events). The location of the cities on the map is approximate. Data sources: Based on ACLED dataset, Raleigh et al. (2010).

Figure 2. Map of Conflict-related Household Victimization in Côte d'Ivoire (Post-conflict survey)



Notes: The map depicts areas where households report conflict-induced victimization. Darker shades indicate a larger share of households reporting at least one level of victimization (one affirmative answer to the questions underlying each index). The location of the cities on the map is approximate. Data source: Based on the 2008 Côte d'Ivoire HLSS.

Table 1. Summary Statistics

	[1] Obs.	[2] Full	[3] Non-migrants	[4] Conflict Region	[5] Non-Conflict Region	[6] Difference in Means [4]-[5]
Child Variables						
Height-for-age z-score (2002)	5,885	-1.93	-1.97	-1.88	-2.01	0.13 **
Height-for-age z-score (2006)	7,232	-1.52	-	-1.49	-1.59	0.09 ***
Height-for-age z-score (2008)	2,304	-1.55	-1.61	-1.52	-1.61	0.10
Height-for-age z-score (pooled)	15,421	-1.93	-1.97	-1.88	-2.01	0.13 ***
Age in months (2002)	5,885	34.14	34.58	34.04	34.84	-0.81
Age in months (2006)	7,232	31.31	-	31.25	31.45	-0.19
Age in months (2008)	2,304	37.12	37.43	37.04	37.30	-0.26
Age in months (pooled)	15,421	34.13	34.58	34.03	34.83	-0.80
Child is female (pooled)	15,421	0.50	0.51	0.50	0.51	-0.01
Child resides in rural household (pooled)	15,265	0.56	0.61	0.52	0.65	-0.13 ***
Child resides in pre-conflict poor household (2002)	5,885	0.46	0.51	0.49	0.41	0.08 ***
Child resides in victimized household (2008)	2,304	0.86	0.87	0.87	0.84	0.18
Months of exposure to the conflict (2006)	7,232	39.34	-	39.30	39.44	-0.15
Months of exposure to the conflict (2008)	2,304	30.25	30.54	30.28	30.19	0.09
Months of exposure to the conflict (pooled)	9,536	37.08	30.54	37.05	37.16	-0.11
Exposure 0-24 months (pooled)	9,536	0.24	-	0.24	0.24	-0.01
Exposure at least 25 months (pooled)	9,536	0.76	-	0.76	0.76	0.01
Ethnicity (pooled)						
Akan	14,015	0.29	0.29	0.22	0.44	-0.22 ***
Northern Mande	14,015	0.13	0.14	0.15	0.09	0.06 ***
Southern Mande	14,015	0.13	0.14	0.16	0.05	0.11 ***
Krou	14,015	0.14	0.13	0.14	0.12	0.02 ***
Voltaique/Gur	14,015	0.12	0.12	0.15	0.07	0.08 ***
Naturalized Ivorian	14,015	0.003	0.004	0.004	0.002	0.001
Non-Ivorian	14,015	0.19	0.17	0.18	0.23	-0.05 ***
Religion (pooled)						
Muslim	15,381	0.35	0.36	0.37	0.30	0.07 ***
Christian	15,381	0.37	0.33	0.33	0.46	-0.13 ***
Other	15,381	0.28	0.32	0.30	0.24	0.06 ***
Head of the Household (pooled)						
Head's age	15,388	43.80	46.12	43.98	43.25	0.73
Head's education	15,391	0.44	0.39	0.45	0.42	0.03
Head is male	15,421	0.86	0.86	0.87	0.86	0.00
Child's Mother (pooled)						
Mother's age	13,746	29.76	30.33	29.90	29.58	0.32
Mother's education	14,648	0.32	0.28	0.32	0.31	0.01
Mother is married	13,749	0.83	0.82	0.83	0.84	0.00 ***

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. In the 2002 survey, non-migrant households have lived in their current location (as of interview date) since December 1993; in the 2008 survey they are households in their current location since before the start of the war. Information on households' migration status and household heads' marital status is unavailable in the 2006 dataset. Education of the head of household and child's mother is proxied by an indicator variable for having attended school. The pre-crisis poverty rate is based on the national (consumption) poverty line. Estimates are weighted by inverse sampling probability. Data sources: 2002 and 2008 Côte d'Ivoire HLSS, 2006 Côte d'Ivoire MICS3, and Raleigh et al. (2010).

Table 2. Impact of Conflict on Child Health. Baseline Regressions.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Conflict region*War Cohort	-0.250**	-0.414**					-0.276***	-0.432***				
	(0.094)	(0.149)					(0.077)	(0.134)				
Conflict region*War Cohort*Female							-0.014	-0.031				
							(0.103)	(0.107)				
Conflict region*Exposure 0-24 months			-0.126	-0.369**					-0.296**	-0.560***		
			(0.092)	(0.155)					(0.124)	(0.166)		
Conflict region*Exposure at least 25 months			-0.287**	-0.427**					-0.283**	-0.417**		
			(0.113)	(0.159)					(0.101)	(0.161)		
Conflict region*Exposure 0-24 months*Female									0.283**	0.332**		
									(0.108)	(0.133)		
Conflict region*Exposure at least 25 months*Female									-0.075	-0.087		
									(0.080)	(0.078)		
Conflict region*Exposure (no. of months)					-0.007**	-0.010**					-0.007***	-0.010**
					(0.003)	(0.004)					(0.002)	(0.004)
Conflict region*Exposure (no. of months)*Female											-0.001	-0.001
											(0.002)	(0.002)
Female	0.216***	0.217***	0.216***	0.217***	0.216***	0.217***	0.136	0.137	0.137	0.137	0.137	0.137
	(0.061)	(0.060)	(0.061)	(0.060)	(0.061)	(0.060)	(0.120)	(0.121)	(0.120)	(0.121)	(0.120)	(0.121)
Rural household	-0.485***	-0.484***	-0.485***	-0.484***	-0.485***	-0.484***	-0.475***	-0.473***	-0.475***	-0.473***	-0.475***	-0.473***
	(0.092)	(0.094)	(0.092)	(0.094)	(0.092)	(0.094)	(0.083)	(0.085)	(0.083)	(0.085)	(0.083)	(0.085)
Province-specific trends	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
Observations	15,151	15,151	15,151	15,151	15,151	15,151	15,151	15,151	15,151	15,151	15,151	15,151
R-squared	0.071	0.075	0.071	0.075	0.071	0.075	0.071	0.075	0.071	0.075	0.071	0.075

Notes: Robust standard errors in parentheses, clustered at the province level. * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variable is the height-for-age z-score. All regressions include province fixed effects and month-of-birth fixed effects. In columns 7-12, the coefficient estimates on interactions between 'Conflict region' or 'Exposure' variables and the female dummy were jointly statistically insignificant and are not shown. Estimates are weighted by inverse sampling probability. Data sources: 2002 and 2008 Côte d'Ivoire HLSS, 2006 Côte d'Ivoire MICS3, and Raleigh et al. (2010).

Table 3. Impact of Conflict on Child Health. Baseline Regressions with Additional Controls.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Conflict region*War Cohort	-0.344**	-0.440**					-0.367**	-0.476***				
	(0.144)	(0.156)					(0.135)	(0.145)				
Conflict region*War Cohort*Female							-0.027	-0.046				
							(0.106)	(0.114)				
Conflict region*Exposure 0-24 months			-0.292	-0.378*					-0.481**	-0.570**		
			(0.170)	(0.193)					(0.190)	(0.212)		
Conflict region*Exposure at least 25 months			-0.360**	-0.459**					-0.350**	-0.481**		
			(0.158)	(0.165)					(0.161)	(0.167)		
Conflict region*Exposure 0-24 months*Female									0.312**	0.277*		
									(0.145)	(0.146)		
Conflict region*Exposure at least 25 months*Female									-0.094	-0.072		
									(0.083)	(0.090)		
Conflict region*Exposure (no. of months)					-0.008**	-0.011**					-0.008**	-0.012***
					(0.004)	(0.004)					(0.004)	(0.004)
Conflict region*Exposure (no. of months)*Female											-0.001	-0.001
											(0.002)	(0.002)
Female	0.209***	0.218***	0.209***	0.218***	0.209***	0.218***	0.118	0.082	0.118	0.082	0.118	0.082
	(0.059)	(0.064)	(0.059)	(0.064)	(0.059)	(0.064)	(0.111)	(0.130)	(0.110)	(0.130)	(0.110)	(0.130)
Rural household	-0.415***	-0.427***	-0.415***	-0.427***	-0.415***	-0.427***	-0.404***	-0.412***	-0.404***	-0.412***	-0.404***	-0.412***
	(0.089)	(0.095)	(0.089)	(0.095)	(0.089)	(0.095)	(0.081)	(0.082)	(0.081)	(0.082)	(0.081)	(0.082)
Province-specific trends	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Child controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Household head controls	yes	no	yes	no	yes	no	yes	no	yes	no	yes	no
Mother controls	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
p-value F-test of zero effect of:												
Child ethnicity	0.246	0.643	0.246	0.643	0.246	0.643	0.225	0.626	0.225	0.626	0.225	0.626
Child religion	0.041	0.213	0.041	0.213	0.041	0.213	0.042	0.203	0.042	0.203	0.042	0.203
Household head's characteristics	0.033		0.033		0.033		0.032		0.033		0.032	
Mother's characteristics		0.213		0.000		0.000		0.000		0.000		0.000
Observations	13,664	12,132	13,664	12,132	13,664	12,132	13,664	12,132	13,664	12,132	13,664	12,132
R-squared	0.083	0.102	0.083	0.102	0.083	0.102	0.083	0.103	0.083	0.103	0.083	0.103

Notes: Robust standard errors in parentheses, clustered at the province level. * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variable is the height-for-age z-score. All regressions include province fixed effects, and month-of-birth fixed effects. Child controls include ethnicity (Akan (reference category), Northern Mande, Southern Mande, Krou, Voltaique/Gur, naturalized Ivorian or non-Ivorian) and religion (Muslim, Christian, and other (reference category)). Household head controls include age, gender, and education. Mother controls include age, education, and marital status. In specifications that allow for a differential gender impact (columns 7-12), the coefficient estimates on interactions between 'Conflict region' or 'Exposure' variables and the female dummy are jointly statistically insignificant and not shown. Estimates are weighted by inverse sampling probability. Data sources: 2002 and 2008 Côte d'Ivoire HLSS, 2006 Côte d'Ivoire MICS3, and Raleigh et al. (2010).

Table 4. Impact of Conflict on Child Health. Alternative Baseline Cohort.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Conflict region*War Cohort	-0.892**	-1.047***					-0.976***	-1.126***				
	(0.323)	(0.358)					(0.301)	(0.337)				
Conflict region*War Cohort*Female							0.240*	0.156				
							(0.121)	(0.136)				
Conflict region*Exposure 0-24 months			-1.000***	-1.191***					-1.249***	-1.471***		
			(0.305)	(0.350)					(0.303)	(0.358)		
Conflict region*Exposure at least 25 months			-0.852**	-0.990**					-0.843**	-1.013**		
			(0.338)	(0.373)					(0.342)	(0.383)		
Conflict region*Exposure 0-24 months*Female									0.557***	0.555***		
									(0.119)	(0.125)		
Conflict region*Exposure at least 25 months*Female									0.047	0.039		
									(0.088)	(0.111)		
Conflict region*Exposure (no. of months)					-0.021**	-0.024**					-0.021**	-0.026**
					(0.008)	(0.009)					(0.008)	(0.009)
Conflict region*Exposure (no. of months)*Female											0.003	0.003
											(0.002)	(0.003)
Female	0.113	0.110	0.113	0.110	0.114	0.110	0.175*	0.099	0.175*	0.099	0.176*	0.101
	(0.069)	(0.087)	(0.069)	(0.087)	(0.069)	(0.087)	(0.093)	(0.115)	(0.093)	(0.114)	(0.093)	(0.114)
Rural household	-0.364**	-0.380**	-0.364**	-0.380**	-0.364**	-0.380**	-0.371**	-0.379**	-0.371**	-0.379**	-0.371**	-0.379**
	(0.140)	(0.150)	(0.140)	(0.150)	(0.139)	(0.150)	(0.142)	(0.147)	(0.142)	(0.147)	(0.142)	(0.147)
Province-specific trends	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Child controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Household head controls	yes	no	yes	no	yes	no	yes	no	yes	no	yes	no
Mother controls	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
p-value F-test of zero effect of:												
Child ethnicity	0.491	0.448	0.491	0.448	0.490	0.448	0.499	0.443	0.499	0.443	0.498	0.444
Child religion	0.903	0.927	0.903	0.927	0.903	0.926	0.905	0.926	0.905	0.926	0.905	0.925
Household head's characteristics	0.009		0.007		0.009		0.007		0.009		0.007	
Mother's characteristics		0.927		0.000		0.000		0.000		0.000		0.000
Observations	10,128	8,977	10,128	8,977	10,128	8,977	10,128	8,977	10,128	8,977	10,128	8,977
R-squared	0.094	0.120	0.094	0.120	0.093	0.120	0.094	0.120	0.094	0.120	0.094	0.120

Notes: Robust standard errors in parentheses, clustered at the province level. * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variable is the height-for-age z-score. All regressions include province fixed effects and month-of-birth fixed effects. The control variables are as in Table 3. Estimates are weighted by inverse sampling probability. Data sources: 2002 and 2008 Côte d'Ivoire HLSS, 2006 Côte d'Ivoire MICS3, and Raleigh et al. (2010).

Table 5. Impact of Conflict on Child Health. Baseline Regressions on Different Sub-samples.

	[1] Poor	[2] Non-poor	[3] Girls	[4] Boys	[5] Rural	[6] Urban	[7] Head is educated	[8] Head is not educated
Conflict region*War Cohort	-0.516*	-0.382*	-0.602**	-0.297**	-0.655**	-0.017	-0.285	-0.507**
	(0.268)	(0.217)	(0.269)	(0.141)	(0.238)	(0.213)	(0.274)	(0.216)
Conflict region*War Cohort*Female	0.251	-0.269			-0.047	0.348*	-0.035	-0.020
	(0.215)	(0.178)			(0.139)	(0.179)	(0.158)	(0.224)
Female	0.317**	0.036			0.217	0.152	0.111	0.179
	(0.129)	(0.119)			(0.129)	(0.166)	(0.069)	(0.171)
Rural household	-0.087	-0.464***	-0.465***	-0.511***			-0.589***	-0.378***
	(0.093)	(0.096)	(0.082)	(0.119)			(0.083)	(0.106)
*p-value t-test of equality of coefficients on Conflict Region*War Cohort across sub-samples*								
		0.294		0.774		0.043		0.876
Observations	6,700	8,030	7,340	7,811	8,753	6,398	6,696	8,429
R-squared	0.088	0.091	0.088	0.095	0.098	0.069	0.117	0.077

Notes: Robust standard errors in parentheses, clustered at the province level. * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variable is the height-for-age z-score. All regressions include province fixed effects, month-of-birth fixed effects, and province-specific time trends. Households are classified as poor if an index of asset wealth is below average. The asset index is calculated based on seven types of assets: living in dwelling with cement walls, cement floor, metal or cement roof, electricity, phone, toilet, and access to natural gas, coal or electricity for cooking. The index is the first factor extracted using principal components analysis on the seven components, explains 47 percent of their joint variance, and has been standardized to have zero mean and unit variance. In all columns other than 3 and 4, the coefficient estimates on interactions between 'Conflict region' or 'War Cohort' and the female dummy are jointly statistically insignificant and not shown. Estimates are weighted by inverse sampling probability. Data sources: 2002 and 2008 Côte d'Ivoire HLSS, 2006 Côte d'Ivoire MICS3, and Raleigh et al. (2010).

Table 6. Placebo Test

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Conflict Region*War Cohort	0.127	0.134	0.097	0.095	0.126	0.132	0.443	0.427	0.415*	0.397	0.435	0.419
	(0.131)	(0.159)	(0.127)	(0.158)	(0.133)	(0.158)	(0.258)	(0.263)	(0.239)	(0.245)	(0.255)	(0.260)
Conflict Region*War Cohort*Female							-0.748*	-0.725*	-0.721*	-0.710	-0.737*	-0.721
							(0.416)	(0.418)	(0.406)	(0.413)	(0.416)	(0.418)
Conflict Region*Female							0.192**	0.168**	0.147*	0.126*	0.198**	0.175**
							(0.082)	(0.073)	(0.076)	(0.071)	(0.076)	(0.068)
War Cohort*Female							0.426	0.475	0.430	0.479	0.419	0.468
							(0.275)	(0.285)	(0.273)	(0.284)	(0.268)	(0.278)
Female	0.106*	0.116*	0.119*	0.128**	0.110*	0.121*	-0.017	0.001	0.025	0.041	-0.017	0.001
	(0.059)	(0.058)	(0.058)	(0.057)	(0.060)	(0.059)	(0.065)	(0.061)	(0.063)	(0.059)	(0.064)	(0.061)
Rural	-0.352***	-0.365***	-0.296***	-0.313***	-0.333***	-0.344***	-0.341***	-0.357***	-0.289***	-0.309***	-0.322***	-0.336***
	(0.065)	(0.067)	(0.056)	(0.060)	(0.065)	(0.064)	(0.066)	(0.067)	(0.053)	(0.057)	(0.066)	(0.065)
Province specific trends	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
Mother controls	no	no	yes	yes	no	no	no	no	yes	yes	no	no
Household head controls	no	no	no	no	yes	yes	no	no	no	no	yes	yes
p-value F-test of zero effect of:												
Mother's characteristics			0.000	0.000					0.000	0.000		
Household head's characteristics					0.107	0.140					0.064	0.096
Observations	4,076	4,076	4,066	4,066	4,042	4,042	4,076	4,076	4,066	4,066	4,042	4,042
R-squared	0.187	0.196	0.197	0.205	0.188	0.197	0.189	0.198	0.199	0.207	0.190	0.199

Notes: Robust standard errors in parentheses, clustered at the province level. * significant at 10%%, ** significant at 5%, *** significant at 1%. The dependent variable is the height-for-age z-score for children aged 6–60 months. "War Cohort" is an indicator variable for children born during January 1997-December 1999. Mother controls include age, education (a dummy variable for literacy), ethnicity (Akan (reference category), Northern Mande, Southern Mande, Krou, Voltaique/Gur, and other), and religion (Christian, Muslim, and other (reference category)). Household head controls include age, gender, and education (a dummy variable for literacy). All regressions include province fixed effects and month-of-birth fixed effects. Estimates are weighted by inverse sampling probability. Data sources: 1994 and 1998/99 Côte d'Ivoire DHS, and Raleigh et al. (2010).

Table 7. Correlation Matrix for Number of Conflict Events and Share of Households Reporting At Least One Type of Victimization

	Conflict Region	Victimized	Victimized: Economic losses	Victimized: Health	Victimized: Displacement
Victimized	0.249*				
Victimized: Economic losses	0.249*	0.992*			
Victimized: Health impairment	0.233*	0.661*	0.653*		
Victimized: Displacement	0.228	0.498*	0.526*	0.772*	
Victimized: Victim of violence	0.331*	0.554*	0.581*	0.832*	0.943*

Notes: * significant at 10%. Data sources: 2008 Côte d'Ivoire HLSS and Raleigh et al. (2010).

Table 8. Selection into Victimization (Post-Conflict Survey)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
	Victimized		Victimized: Economic losses		Victimized: Health impairment		Victimized: Displacement		Victimized: Victim of violence	
	Full	Non-migrants	Full	Non-migrants	Full	Non-migrants	Full	Non-migrants	Full	Non-migrants
Rural household	-0.165	-0.070	-0.085	-0.053	-0.011	-0.010	-0.042	0.012	-0.019	0.000
	(0.133)	(0.144)	(0.058)	(0.068)	(0.029)	(0.032)	(0.039)	(0.034)	(0.034)	(0.035)
Ethnicity: Northern Mande	-0.393	-0.503	-0.127	-0.116	-0.128	-0.179	-0.074	-0.111	-0.079	-0.103
	(0.265)	(0.301)	(0.085)	(0.093)	(0.093)	(0.106)	(0.065)	(0.065)	(0.061)	(0.069)
Ethnicity: Southern Mande	1.287***	1.228**	0.327*	0.330	0.332**	0.322**	0.232**	0.207	0.288***	0.260***
	(0.394)	(0.453)	(0.180)	(0.214)	(0.121)	(0.125)	(0.093)	(0.122)	(0.070)	(0.075)
Ethnicity: Krou	0.672	0.569	0.040	0.024	0.283**	0.285*	0.095	0.051	0.219**	0.200
	(0.391)	(0.408)	(0.114)	(0.110)	(0.132)	(0.141)	(0.092)	(0.079)	(0.099)	(0.116)
Ethnicity: Voltaique/Gur	-0.396	-0.365	-0.155	-0.105	-0.027	-0.050	-0.076	-0.063	-0.109	-0.117
	(0.451)	(0.510)	(0.113)	(0.127)	(0.147)	(0.164)	(0.096)	(0.110)	(0.094)	(0.101)
Ethnicity: Naturalized Ivorian	0.298	0.315	0.045	0.093	0.120	0.147	-0.056	-0.019	-0.113	-0.193***
	(0.784)	(0.779)	(0.179)	(0.195)	(0.286)	(0.302)	(0.223)	(0.214)	(0.080)	(0.057)
Ethnicity: Non-Ivorian	-0.094	-0.102	-0.062	-0.050	-0.026	-0.041	0.047	0.043	-0.044	-0.060
	(0.196)	(0.219)	(0.074)	(0.078)	(0.072)	(0.078)	(0.058)	(0.058)	(0.036)	(0.036)
Muslim	-0.171	-0.066	-0.035	-0.002	-0.029	-0.022	-0.086*	-0.048	-0.001	0.020
	(0.157)	(0.195)	(0.082)	(0.085)	(0.085)	(0.095)	(0.042)	(0.046)	(0.018)	(0.024)
Christian	-0.219**	-0.155	-0.102*	-0.064	-0.063	-0.061	-0.011	0.002	-0.056***	-0.039*
	(0.092)	(0.122)	(0.051)	(0.063)	(0.037)	(0.043)	(0.030)	(0.029)	(0.019)	(0.021)
Head's age	0.004	0.005	0.003	0.003	0.002**	0.002*	-0.001*	-0.001	-0.000	-0.000
	(0.003)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Head's education	0.078	0.087	-0.028	-0.003	-0.002	0.004	0.040	0.024	0.069***	0.062***
	(0.095)	(0.090)	(0.043)	(0.045)	(0.041)	(0.040)	(0.034)	(0.030)	(0.018)	(0.021)
Head is male	-0.091	-0.133	0.028	0.024	-0.089	-0.098	-0.040	-0.049	-0.024	-0.037
	(0.130)	(0.143)	(0.048)	(0.056)	(0.063)	(0.073)	(0.030)	(0.031)	(0.025)	(0.026)
Head is married	0.379***	0.336***	0.225***	0.219***	0.049	0.051	0.078**	0.053*	0.032*	0.026
	(0.096)	(0.089)	(0.046)	(0.049)	(0.055)	(0.056)	(0.032)	(0.030)	(0.016)	(0.016)
p-value F-test of zero joint effect of:										
Head's ethnicity	0.024	0.085	0.232	0.334	0.002	0.008	0.049	0.005	0.001	0.000
Head's religion	0.068	0.257	0.118	0.481	0.136	0.172	0.129	0.518	0.014	0.016
Head's other characteristics	0.012	0.017	0.000	0.000	0.052	0.138	0.051	0.167	0.005	0.022
Observations	5,256	4,739	5,610	5,057	5,713	5,143	5,707	5,137	5,796	5,221
R-squared	0.332	0.358	0.226	0.239	0.164	0.178	0.260	0.286	0.253	0.262

Notes: Robust standard errors in parentheses, clustered at the province level. * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variables are the victimization indices. Regressions are at the household level and include province fixed effects. Estimates are weighted by inverse sampling probability. Data source: 2008 Côte d'Ivoire HLSS.

Table 9. Impact of Household Victimization on Child Health (Post-Conflict Survey)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Panel A. Full sample:												
Victimized	-0.709*	-0.699*	-0.761**	-0.743*	-0.721*	-0.666	-0.927*	-0.925*	-1.029**	-0.990*	-0.945**	-0.887*
	(0.345)	(0.343)	(0.357)	(0.361)	(0.393)	(0.394)	(0.443)	(0.450)	(0.482)	(0.495)	(0.443)	(0.453)
Victimized*Female							0.516	0.535	0.632	0.580	0.530	0.521
							(0.761)	(0.785)	(0.934)	(0.945)	(0.866)	(0.885)
Observations	2,026	2,026	1,975	1,975	1,821	1,821	2,026	2,026	1,975	1,975	1,821	1,821
R-squared	0.057	0.078	0.070	0.090	0.084	0.103	0.057	0.078	0.070	0.091	0.085	0.104
Panel B. Non-migrants:												
Victimized	-0.778**	-0.809**	-0.836**	-0.861**	-0.817**	-0.802**	-1.090*	-1.102*	-1.219*	-1.203*	-1.065*	-1.038
	(0.317)	(0.315)	(0.304)	(0.314)	(0.343)	(0.358)	(0.573)	(0.598)	(0.640)	(0.664)	(0.611)	(0.645)
Victimized*Female							0.766	0.720	0.930	0.833	0.616	0.586
							(0.966)	(0.987)	(1.132)	(1.148)	(1.019)	(1.045)
Observations	1,686	1,686	1,642	1,642	1,509	1,509	1,686	1,686	1,642	1,642	1,509	1,509
R-squared	0.063	0.083	0.079	0.097	0.095	0.112	0.064	0.084	0.080	0.098	0.095	0.113
p-value t-test that "Victimized" coefficients for migrant and non-migrant households are equal												
	0.454	0.383	0.472	0.410	0.556	0.468	0.484	0.416	0.511	0.446	0.598	0.510
Province specific trends	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
Child controls	no	no	yes	yes	yes	yes	no	no	yes	yes	yes	yes
Household head controls	no	no	yes	yes	no	no	no	no	yes	yes	no	no
Mother controls	no	no	no	no	yes	yes	no	no	no	no	yes	yes

Notes: Robust standard errors in parentheses, clustered at the province level. * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions include indicators for rural residence and female child (coefficients not shown), province fixed effects, and month-of-birth fixed effects. Non-migrants households have lived in their current location since before the start of the war. Estimates are weighted by inverse sampling probability. Data source: 2008 Côte d'Ivoire HLSS.

Table 10. Impact of Different Types of Household Victimization on Child Health (Post-Conflict Survey)

	[1]	[2]	[3]	[4]	[5]	[6]
Panel A. Full sample:						
Victimized: Economic losses	-1.050***	-1.050***	-1.188***	-1.187***	-0.847*	-0.822*
	(0.345)	(0.356)	(0.355)	(0.376)	(0.408)	(0.417)
Victimized: Health impairment	-0.144	-0.156	-0.185	-0.188	-0.287	-0.274
	(0.305)	(0.312)	(0.308)	(0.320)	(0.290)	(0.295)
Victimized: Displacement	0.418	0.440	0.565*	0.587*	0.465	0.489
	(0.360)	(0.359)	(0.309)	(0.306)	(0.382)	(0.381)
Victimized: Victim of violence	0.015	0.020	-0.012	-0.009	-0.103	-0.108
	(0.371)	(0.377)	(0.387)	(0.399)	(0.390)	(0.402)
Observations	2,026	2,026	1,975	1,975	1,821	1,821
R-squared	0.060	0.081	0.074	0.095	0.087	0.106
Panel B. Non-migrants:						
Victimized: Economic losses	-1.054***	-1.066***	-1.155***	-1.164***	-0.741*	-0.713*
	(0.353)	(0.369)	(0.352)	(0.374)	(0.405)	(0.408)
Victimized: Health impairment	0.006	0.035	-0.003	0.022	-0.132	-0.098
	(0.439)	(0.444)	(0.435)	(0.443)	(0.423)	(0.422)
Victimized: Displacement	0.370	0.338	0.470	0.443	0.251	0.245
	(0.425)	(0.445)	(0.386)	(0.409)	(0.463)	(0.488)
Victimized: Victim of violence	-0.105	-0.118	-0.123	-0.135	-0.168	-0.209
	(0.407)	(0.419)	(0.415)	(0.432)	(0.418)	(0.433)
Observations	1,686	1,686	1,642	1,642	1,509	1,509
R-squared	0.066	0.086	0.083	0.101	0.096	0.113
p-value t-test that "Victimized" coefficients for migrant and non-migrant households are equal						
Victimized: Economic losses	0.625	0.661	0.609	0.618	0.883	0.902
Victimized: Health impairment	0.767	0.764	0.637	0.606	0.890	0.914
Victimized: Displacement	0.934	0.874	0.973	0.938	0.765	0.750
Victimized: Victim of violence	0.964	0.973	0.896	0.976	0.771	0.984
Province specific trends	no	yes	no	yes	no	yes
Child controls	no	no	yes	yes	yes	yes
Household head controls	no	no	yes	yes	no	no
Mother controls	no	no	no	no	yes	yes

Notes: Robust standard errors in parentheses, clustered at the province level. * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions include indicator variables for rural residence and female child (coefficients not shown), province fixed effects, and month-of-birth fixed effects. Non-migrants households have lived in their current location since before the start of the war. Estimates are weighted by inverse sampling probability. Data source: 2008 Côte d'Ivoire HLSS.

Table 11. Joint impact of Conflict and Household Victimization on Child Health (Pre- and Post-Conflict Surveys)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Panel A. Full sample:												
Conflict region*Victimized	-1.134*	-2.187***	-1.138**	-2.035***	-1.446**	-2.475***	-1.783***	-2.859***	-1.860***	-2.747***	-2.028***	-3.112***
	(0.573)	(0.643)	(0.537)	(0.592)	(0.507)	(0.715)	(0.513)	(0.638)	(0.465)	(0.553)	(0.508)	(0.716)
Victimized	0.121	0.405	0.012	0.281	0.056	0.407	0.447	0.608	0.276	0.402	0.342	0.576
	(0.442)	(0.516)	(0.383)	(0.488)	(0.386)	(0.556)	(0.328)	(0.383)	(0.335)	(0.403)	(0.388)	(0.520)
Conflict region*Victimized*Female							1.201	1.288	1.315	1.332	0.891	1.019
							(0.865)	(0.943)	(0.830)	(0.863)	(0.883)	(0.929)
Observations	7,673	7,673	7,594	7,594	6,835	6,835	7,673	7,673	7,594	7,594	6,835	6,835
R-squared	0.071	0.075	0.079	0.083	0.098	0.102	0.071	0.076	0.079	0.083	0.099	0.103
Panel B. Non-migrants:												
Conflict region*Victimized	-0.870	-2.196***	-0.766	-1.948***	-1.068*	-2.430***	-1.589**	-2.819***	-1.516**	-2.546***	-1.579**	-2.946***
	(0.570)	(0.655)	(0.592)	(0.663)	(0.599)	(0.746)	(0.646)	(0.812)	(0.660)	(0.805)	(0.592)	(0.825)
Victimized	0.002	0.413	-0.242	0.179	-0.168	0.505	0.302	0.444	-0.056	0.087	0.053	0.524
	(0.516)	(0.660)	(0.478)	(0.619)	(0.495)	(0.615)	(0.553)	(0.670)	(0.602)	(0.708)	(0.557)	(0.639)
Conflict region*Victimized*Female							1.368	1.215	1.426	1.155	0.809	0.823
							(1.215)	(1.274)	(1.176)	(1.224)	(1.208)	(1.306)
Observations	5,816	5,816	5,757	5,757	5,144	5,144	5,816	5,816	5,757	5,757	5,144	5,144
R-squared	0.061	0.066	0.070	0.075	0.084	0.089	0.061	0.066	0.070	0.075	0.085	0.090
*p-value test of equality of coefficients on "Conflict Region*Victimized" for migrant vs. non-migrant households*												
	0.692	0.635	0.648	0.576	0.993	0.927	0.736	0.673	0.728	0.645	0.891	0.971
Province specific trends	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
Child controls	no	no	yes	yes	yes	yes	no	no	yes	yes	yes	yes
Household head controls	no	no	yes	yes	no	no	no	no	yes	yes	no	no
Mother controls	no	no	no	no	yes	yes	no	no	no	no	yes	yes

Notes: Robust standard errors in parentheses, clustered at the province level. * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variable is the height-for-age z-score. All regressions include indicator variables for rural residence and female child (coefficients not shown), province fixed effects, and month-of-birth fixed effects. In columns 7-12 we control for the following variables, which have jointly statistically insignificant coefficients (not shown): Victimized*Female, Conflict Region*Female, and War Cohort*Female. Controls are the same as in Table 3. Non-migrants households have lived in their current location since before the start of the war. Estimates are weighted by inverse sampling probability. Data sources: 2002 and 2008 Côte d'Ivoire HLSS, and Raleigh et al. (2010).