Unpacking the Links between Conflict and Child Health: Evidence from a Foreign Insurgency *

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Abstract

Violent conflict has enduring effects on child health, but the speed at which these effects manifest is not fully understood. This study investigates the immediate effects of deteriorating security environment caused by foreign-borne insurgent terrorism on children's health, using data from a decade before to shortly after the Nigerian Boko Haram insurgency extended across the border to Cameroon. Boko Haram attacks decrease weight-for-height for children under five – an indicator of short-term health and nutrition – within an average of 2.6 months after the attacks. This effect is likely driven by a reduction in healthcare service utilization, which can exacerbate the prevalence and the severity of conditions such as fever and diarrhea. However, the attacks do not affect dietary diversity or child mortality. The results underscore the importance of maintaining accessibility to healthcare service after the start of terrorist violence to prevent irreversible impacts, a concern that is increasingly relevant for countries combating the infiltration of foreign terrorists.

Keywords: Terrorism, Boko Haram, child health and nutrition, anthropometry, Cameroon.

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1 Introduction

Violent conflict can have enduring effects on children's health and well-being that often persist long after the violence ends. However, these longer-term consequences can be mitigated by taking rapid policy action at the onset of violent events. This is particularly relevant for the growing number of West African countries that are combating terrorism along their borders (ECFR, 2022; ISS, 2019).

Conflict has been found to increase stunting (i.e., low Height-for-Age (HAZ) in children under five), which is an important correlate of child mortality (Bundervoet, Verwimp, and Akresh, 2009; Akresh, Verwimp, and Bundervoet, 2011; Akresh, Lucchetti, and Thirumurthy, 2012; Minoiu and Shemyakina, 2012; Minoiu and Shemyakina, 2014).[1] Impacts on stunting are often observed after one or more years of exposure to conflict. However, the immediate pathways that ultimately lead to stunting among children in conflict-affected areas are not fully understood. Low Weight-for-Height (WHZ), a measure of acute malnutrition, is a precursor to stunting (Isanaka et al., 2019; Thurstans et al., 2022). Weight decreases rapidly under adverse conditions, while the effects on height take longer to manifest. During times of conflict, children's weight could decrease, for example, due to higher prevalence of illnesses and the lack of healthcare, or changes in nutritional intake, when food production and markets are disrupted. Given the severe and lasting consequences of stunting into adulthood – including diminished educational attainment, lower earnings, and poorer health outcomes (Dewey and Begum, 2011; Black et al., 2013) – it is important to understand how acute malnutrition progresses to stunting.

We examine the immediate impacts of violent events within the three months prior

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[1] Related studies show that child health outcomes are affected in utero, as children born during conflict have been found to have lower birth weight (Mansour and Rees, 2012; Grossman, Khalil, and Ray, 2019) and poorer health after birth (Oskorouchi, 2019).

to the survey on children's short-term health outcomes – WHZ and its potential precursors: illnesses, health care utilization, and nutrition. We also document the longer-term effects on stunting four years after the beginning of terrorist violence. Our empirical strategy leverages the start of these violent events in northern Cameroon, which experienced a sudden spillover of violence by the rise of the Boko Haram insurgency that spread from North-East Nigeria to Cameroon and which therefore was largely unrelated to the grievances of the Cameroonian population. We use spatial variation in the intensity of conflict, measured by the total number of fatalities, to assess the impact on children's short-term health outcomes. Children living in survey clusters within a 20 km radius of Boko Haram violence are considered affected, while those outside this radius are treated as unaffected. Additionally, we use three nationally representative household surveys – the Multiple Indicator Cluster Survey (MICS) 2014 by UNICEF (UNICEF/INS, 2014) and the 2011 and 2004 Demographic and Health Surveys (DHS) by USAID (Institut National de la Statistique, 2004; Institut National de la Statistique, 2012) – collected during a long period of peace and stability in the country, with the 2014 round conducted within months after the first attacks in northern Cameroon. For data on conflict-related fatalities, we utilize the geo-coded Armed Conflict Location and Event Data Project (ACLED) database (Raleigh et al., 2010) to determine which survey clusters were located near fatal Boko Haram attacks.

We find that exposure in the previous three months to an average number of fatalities due to conflict (22 fatalities) decreased children's WHZ by 0.03 standard deviations (albeit with a wide 95% confidence interval: -0.059 and -0.0075) and increased extreme wasting – a severe form of acute malnutrition – by 0.4 percentage points (95% confidence interval: -0.069 and 0.93), a 14 percent increase among conflict-exposed children under-five. As expected, children's height did not responded to conflict during the 2.6-month period as measured by HAZ and stunting, because stunted growth reflects longer-term responses to weight loss, sustained deterioration of nutrition, and spells of illnesses (Isanaka et al., 2019; Thurstans et al., 2022). However, using data from 2018, we do find longer-term effects on stunting among children who were babies in 2014, a finding in line with the previous literature. Various measures of infant and child mortality remain unaffected. The results are robust to the exclusion of potentially endogenous control variables, as well as to various specification changes.

Reductions in weight can occur immediately as a response to illnesses or inadequate nutritional intake (World Health Organisation, 2021). Indeed, we find a slight increase in the prevalence of diarrhea, which may be an immediate consequence of, for example, drinking contaminated water or consuming low-quality food, but no effect on reported fever or cough. While fever is a common symptom of malaria, cough is more commonly associated with respiratory infections. The severity of the illnesses may have worsened due to decreased access to health services. We find an associated decrease in the propensity to seek treatment from healthcare professionals. Given that over a fifth of children were reported having had diarrhea or fever or cough in the last two weeks, this decrease in care-seeking may have aggravated the health consequences of these highly prevalent disease symptoms. This may be due to the insurgents destroying and damaging healthcare centers, which impaired operational capacity of the centers (International Crisis Group, 2017b). It is also possible that heightened insecurity prevented households from making a safe trip to the nearest health facility.

We find no evidence that exposure to conflict results in lower dietary diversity. Diversity was already low in the study population before the conflict, with children consuming food from only two groups on average – half of the minimum threshold of four considered necessary for adequate dietary diversity (UNICEF, 2016). We observe some changes in the composition of less frequently consumed food groups, possibly reflecting changes in crop and livestock portfolios in response to conflict (Rockmore, 2020). For example, an increase in the consumption of solid foods for 24-36-month-old children may help explain their relatively smaller decrease in WHZ compared to younger infants. These results may be explained, first, by the short time span of the study, during which households may have relied on existing food buffers. Second, even if the conflict resulted in food shortages, households may have prioritized food intake of young children over that of older household members. This is plausible given the already low dietary diversity before the conflict.[2]

Our paper contributes to the existing literature on the effects of violent conflict on children by investigating the immediate pathways through which conflict affects long-term child health. Previous studies have documented sustained effects of conflict on child HAZ and stunting several years after the beginning of violence in the context of the war between Eritrea and Ethiopia (Akresh, Lucchetti, and Thirumurthy, 2012), the civil war in Burundi (Bundervoet, Verwimp, and Akresh, 2009), Rwanda (Akresh, Verwimp, and Bundervoet, 2011), the Ivory Coast (Minoiu and Shemyakina, 2012; Minoiu and Shemyakina, 2014), and on infant mortality (accompanied by a decrease in WHZ) during Boko Haram conflict in Nigeria (Ekhator-Mobayode and Asfaw, 2019).[3] Our evidence adds to the literature by focusing on the immediate impacts on variables for which such changes are detectable, namely, WHZ, as well as disease symptoms, and contributing factors like these outcomes, such as the treatment of illnesses and nutritional intake. Given that height is a stock variable, persistent harmful disruptions to child development need to occur for a child to become stunted. Investigating WHZ and disease symptoms is therefore crucial for understanding the early health impacts of conflict on children. This is important from a policy perspective, as the negative effects on WHZ, illnesses, and health care utilization can be reversed with timely interventions.

[2] Related literature shows that rising insecurity can decrease the efficiency of food markets, and insurgent attacks against farms can disrupt farming activities and farmers' access to their plots. Through such mechanisms, conflict can reduce *household* food security: Adelaja and George (2019) show that the Boko Haram conflict decreased food production in Nigeria, and Justino (2012), Kaila and Azad (2023), Rockmore (2017), and Adong et al. (2021) show a decrease in household consumption due to conflict, Kaila and Azad (2023) in the context of the Boko Haram insurgency. Our research differs from these studies in that it analyzes the near-term effects on small children, while the aforementioned studies look at longer periods.

[3] Ekhator-Mobayode and Asfaw (2019) finds a reduction in WHZ alongside infant mortality but after 5 years of the start of the conflict in Nigeria.

We also expand the literature on the consequences of conflict on health by studying a case where insurgent violence that spilled over into a neighboring country, an increasingly common phenomenon in West Africa (Durmaz, 2022). The economic and social conditions in northern Cameroon did not contribute to the emergence of Boko Haram, an insurgency that targets the Nigerian government and society. In fact, Boko Haram violence in Cameroon disrupted a long period of peace and security. Before the violence spread into Cameroon, northern Cameroon was merely a safe haven and a logistical base for insurgents. In the first year of violence in Cameroon, the attacks occurred predominantly between the Cameroonian security forces and Boko Haram, while in Nigeria terrorist attacks targeting civilians were frequent. Therefore, it is not clear ex-ante how this form of violence would affect the Cameroonian civilians. Our study thus differs from the existing literature on conflict and child health, which examines the effects of conflict in contexts where the government and civilians have been active participants in either domestic or international conflict. Akresh, Verwimp, and Bundervoet (2011), Bundervoet, Verwimp, and Akresh (2009), Minoiu and Shemyakina (2012), Minoiu and Shemyakina (2014), Ekhator-Mobayode and Asfaw (2019), and Grossman, Khalil, and Ray (2019) focus on the consequences of domestic conflict. Other studies examine conflict between countries or regions, such as Akresh et al. (2012), who analyze the health consequences of the Ethiopia-Eritrea war.

This paper proceeds as follows. In Section 2 we discuss the Nigerian Boko Haram insurgency in Cameroon. In Section 3 we present the data used in the analysis, and in Section 4 we present the empirical framework. Section 5 presents the results, and finally, the last section concludes.

2 The Nigerian Boko Haram Insurgency in Cameroon

Boko Haram represents a jihadist ideology that opposes Western influence and education, aiming to establish an Islamic state in Nigeria. Boko Haram was formed in 2002, and the group started attacks against the Nigerian government and civilians in 2009. Boko Haram's operations are centered in Borno State in North-East Nigeria. Its capital, Maiduguri – an urban center at the heart of the conflict and Boko Haram's headquarters– is located only 140 km by road from the Cameroonian border. At the peak of Boko Haram's power in 2013-14, violence spread across the border to northern Cameroon, a region bordering North-East Nigeria, Chad, and Niger in the Lake Chad area. Partly due to this proximity, Cameroon is the most affected country in the Lake Chad region outside Nigeria. Figure 1a displays Cameroon's location within West and Central Africa, highlighting Cameroon's northern border with North-East Nigeria.

The Boko Haram violence in 2013-14 was unprecedented in Cameroon, which had remained relatively peaceful since the 1970s. This long period of peace was sustained throughout the democratic transition in 1990. Cameroon has, therefore, been an exception in the region, given that countries bordering Cameroon – Nigeria, Chad, and the Central African Republic – experienced civil wars and conflict during the recent decades. Figure 2 panel (a) shows that conflict events began in 2013 and peaked in 2014, breaking a long period of peace. The number of fatalities closely followed this pattern. Figure 2 panel (b) further shows that the fatalities in Cameroon since 2013 primarily resulted from clashes involving Boko Haram.

Before violence spread over to Cameroon, northern Cameroon was considered a safe haven for Boko Haram, when Nigerian counterinsurgency operations became more effective (International Crisis Group, 2016; Zenn, 2018). Cameroon was also considered important for logistical reasons (International Crisis Group, 2016). The insurgency gained a foothold in the local informal economy by engaging struggling traders in contraband trafficking. Even though the spread of the conflict was largely unrelated to the grievances of the Cameroonian population, the presence of a foreign terrorist group was of considerable concern.

However, the violent events were quite different in Cameroon than in Nigeria: of the conflict events involving Boko Haram in Nigeria since the start of the insurgency (between 2009 and 2014), 49 percent were classified as "Violence against civilians", while in Cameroon the share of these events was much lower, 21 percent (at the onset of the violence at the end of 2013 and during 2014). Indeed, 70 percent of all events in Cameroon were clashes between the Boko Haram and Cameroonian military or police (those classified as "Battles" in the ACLED database).

Eventually, as the conflict grew stronger in Cameroon, there were similarities in the modes of attacks, namely, car bombings, kidnappings, and armed attacks against schools and health centers, disrupting their activities and leaving considerable infrastructural damage. By 2016, it was estimated that 128 out of 793 schools and 30 out of 217 health clinics had been destroyed or damaged (International Crisis Group, 2017b; Obi and Eboreime, 2017).

Figure 1b displays a map of the Boko Haram attacks as well as the survey clusters of our dataset. We can see that these violent attacks have affected households residing in the Far North region (the northernmost part of northern Cameroon), particularly those close to the Nigerian border. According to the International Crisis Group (2016), conflict events in the Far North region alone claimed the lives of 1,500 people. In 2018-19, it was estimated that more than 50 percent of households in the Far North (1.9 million people) needed humanitarian aid, and 222,000 children under five were suffering from acute malnutrition, including 60,000 with severe acute malnutrition (UN OCHA, 2019).

The capacity of northern Cameroon to overcome this crisis had been weak from the onset. The northern parts of the country are more sparsely inhabited, more rural, and more impoverished than the rest of Cameroon. In particular, the Far North has been the poorest and least educated region in Cameroon even before the Boko Haram crisis (Yenwong-Fai, 2019). Furthermore, the Far North is weakly integrated into the rest of the country, which may have further hindered its capacity to respond to the infiltration of foreign terrorists.

The conflict inside and outside of Cameroon could have potentially led to two types of population movements: Nigerians fleeing to northern Cameroon and Cameroonians in the north escaping to safer areas of the country. First, some Nigerians escaped to the relatively more peaceful Cameroon even before violence broke out on Cameroonian territory, although these movements were likely to be limited before 2012 as Jedwab et al. (2021) find using remotely sensed data. There was no evidence of population movements from Nigeria to Cameroon outside refugee camps. However, by 2017, multiple years after our study period, the conflict between the Nigerian security forces and Boko Haram in North-East Nigeria intensified substantially, leading to over 75,000 Nigerians fleeing to Cameroon. Most of these refugees were being hosted in a camp, while an estimated 14,000 Nigerians lived in villages in Cameroon (UNHCR, 2017). Given the estimated population size of the northern study region in our sample (9.5 million people in 2014), the number of refugees from Nigeria is a meager fraction, just 0.2 percent in 2017. Second, the conflict could have also led to northern Cameroonians fleeing to safer areas of the country. However, data from internally displaced persons (IDPs) from UNHCR (2024) show that there were no IDPs in Cameroon between 2003 and 2014, while IDPs have been recorded only from 2015 onward. Second, the closure of the road between the north and the south in 2014 essentially prevented movements from the north to the south of Cameroon when the violent conflict began (International Crisis Group, 2017b).

3 Data

We use three data sources for the empirical analysis: the 2014 Multiple Indicator Cluster Surveys (MICS), Demographic and Health Surveys (DHS) from 2004 and 2011, and the Armed Conflict Location and Event Data (ACLED) database. DHS and MICS are nationally representative cross-sectional surveys that provide a range of indicators on under-five child welfare: anthropometric measures, the prevalence of illnesses, healthcare service utilization, nutrition, and various household-level characteristics that we use to address the potential omitted variables bias. In additional analysis, we also explore the time-use of older children in these households. Moreover, the datasets provide GPS coordinates of the surveyed clusters, which we match to the geo-locations of Boko Haram conflict events using the ACLED dataset. The DHS surveys include an intentional offset of the true cluster coordinates—up to two kilometers in urban areas and up to five kilometers in rural areas. In addition, one percent of rural clusters are displaced by as much as ten kilometers to protect respondent confidentiality. We restrict our sample to northern Cameroon, which comprises four regions - the Far North, North, Adamaoua, and North West - that share borders with North-East Nigeria, where Boko Haram activities have been concentrated. Our sample includes 11,275 children aged 60 months or younger for the analysis of child health and nutrition. For the additional analysis on older children presented in Appendix B, we use data on 5–17-year-olds for child labor and education, 6,206 individuals. Finally, for long-term analysis on HAZ and stunting, we use the 2018 DHS (in place of the 2014 data).

We measure health and nutritional status in early childhood using anthropometric measures, WHZ and HAZ, following World Health Organization (WHO) guidelines (Borghi et al., 2006). Our primary variables of interest are WHZ, which can fluctuate in the short run due to factors such as illnesses, and HAZ, which captures long-run effects. Additionally, by using WHZ and HAZ, we construct indicator variables for acute and chronic malnutrition, namely, wasting and stunting, respectively. We also construct indicators for extreme wasting and stunting, which capture the most severe forms of malnutrition. A child is defined wasted or stunted when their WHZ or HAZ score is two standard deviations below zero, respectively, while the threshold of three standard deviations below zero is used for extreme wasting and stunting.

To understand the mechanisms behind the immediate effects of conflict on children's nutritional and health status, we examine a broader set of outcome variables, including the prevalence of fever or cough and of diarrhea in the two weeks preceding the survey. While fever is a key symptom of malaria, cough is more commonly associated with respiratory infections. Severe diarrhea can be associated with, for example, drinking contaminated water, and it can affect a child's weight within a short time. These symptoms can be detrimental for under-five children and, in worst cases, lead to death when prolonged and left untreated. Therefore, we also investigate healthcare utilization, which is measured by whether any medical treatment was sought in the case of an ill child. We also examine the diversity of nutritional intake among children aged 0 to 36 months. We measure nutritional diversity using two indicators: i) the number of food groups from which a child consumed items, and ii) whether the child consumed from more than four out of six food groups, which indicates minimal dietary diversity for this age group (UNICEF, 2016). We also construct indicators for individual food groups that include whether the child had starchy staples, legumes and nuts, meat and eggs, dairy, fruits, or vegetables in the 24 hours prior to the interview. [4]

To identify conflict-affected households, we use information from the Armed Conflict Location and Event Data (ACLED) database on the dates and geo-locations of political violence events in Cameroon from 1997 to 2014. The dataset also provides information on

[4] Additionally in Appendix B, we examine the effect of conflict on multiple time-use variables for activities both inside and outside the household for a sample of older children – 5 to 17 year-olds. We investigate children's work, defined as participation in economic activities and household chores. We also investigate schooling outcomes, namely i) whether a child attended school in the current school year, ii) whether a child stopped attending school this year (dropout), and iii) whether or not a child has ever studied in school. We use the last variable as a placebo outcome.

the type of events, whether the events led to any fatalities, and the main actors involved in the event.[5] We use this information to construct our variable of interest: Boko Haram-related fatalities. We include fatalities in events where Boko Haram was recorded as one of the actors. We exclude riots and protests. We use fatalities as our measure, since the deadliness of a conflict proxies well the threat of the conflict to the civilian population, even though conservative estimates of fatalities from newspaper sources, as reported by ACLED, are likely to be underestimates (ACLED, 2024). Furthermore, our measure is consistent with the literature using detailed geocoded information on the impacts of conflict on individuals and households (Mansour and Rees, 2012; Adelaja and George, 2019; Bertoni et al., 2019; George, Adelaja, and Weatherspoon, 2020). However, we recognize that fatalities do not perfectly capture the multifaceted nature of conflict and that even in the absence of fatalities, conflict can also affect livelihoods through fear and perceived risk of conflict (Rockmore, 2017; Rockmore, 2020).

After these restrictions, our data includes 728 Boko Haram-related fatal events that occurred between 2004 and 2014 in Cameroon and and bordering areas of eastern Nigeria, with fatalities ranging from 1 to 370.

We match this conflict information with the geo-location of surveyed clusters and the interview date to identify which households were exposed. We consider a household to be exposed to conflict if it is located within a 20 km radius of a Boko Haram-related fatality. Most violence episodes only occurred in 2014 shortly before the survey was conducted, on average 2.6 months earlier.[6] We use the number of fatalities in the last 3 months preceding the survey date as our main measure of intensity of the Boko Haram conflict.

Table 1 presents the means and standard deviations of the number of fatalities (Panel

[5]Details on how ACLED collects data on political violence from various news sources and how violence incidents were classified is available at ACLED (2019).

[6]This is the average number of months a child was exposed to conflict, conditional on exposure, which is calculated as the number of months between the first fatal event they were exposed to in the 20 km radius, and the survey date.

A), control variables (Panel B), and outcome variables for 0-5 years old (Panel C). Panel A shows that the average number of fatalities within 20 km radius from the households is 21.8. In Panel B, we can see that the under-five children sample is 50 percent female, the average child being 29 months old, and living in a household averaging eight members.

Sample households are from low socioeconomic status. Educational attainment of mothers is low; just 49 percent of the mothers have received primary or higher education, indicating that more than 50 percent of the mothers had at most completed primary school. Seventy-three percent of children in the sample live in rural areas. Half of the sample comes from Christian households, and 38 percent from Muslim households.

Children in our sample also show poor nutritional status. Panel C shows that HAZ is -1.42, and WHZ -0.15 on average; that is, both are below the reference mean of zero in the WHO standardization. As many as 34 percent of the children experienced fever or cough and 24 percent diarrhea in 2 weeks prior to the survey. On average, a child consumed foods from is 1.92 groups, with only 17 percent consuming from more than four food groups in the 24 hours prior to the survey.

4 Empirical strategy

Our empirical strategy makes use of the sudden arrival of the Nigerian insurgency in Cameroon and estimates near-term impacts of the violence on child outcomes. We pool three cross-sectional surveys collected in 2004 and 2011 during a peaceful period and in late 2014, shortly after the beginning of conflict in Cameroon. Thus, we are able to estimate the near-term effects of being exposed to violence in the last three months on child outcomes, while controlling for a long-term pre-trend.

Specifically, we estimate the following linear regression equation:

$$Y_{irw} = \alpha + x'_{irw}\beta + \gamma \text{Fatalities}_{irw} + \delta_{tm} + \tau_w + \rho_r + \xi_{irw} \ , \tag{1}$$

where Y_{irw} denotes an outcome variable of interest for child i in district r measured in survey wave w. Fatalities$_{irw}$ is the main explanatory variable, which denotes the number of fatalities in Boko Haram-related conflict events recorded in the ACLED dataset within a 20 km radius in the last three months preceding the survey date, excluding riots and protests.[7]

A similar specification of a conflict variable is also used in Bertoni et al. (2019), who analyze the effects of Boko Haram on educational outcomes, where the authors use a 20 km conflict exposure radius. We follow this approach and note that this is a somewhat conservative specification, as Bertoni et al. (2019) find their effects to be stronger with a smaller radius. We also run sensitivity checks with a wider 40 km radius.

The vector x'_{irw} captures child and household control variables: the gender of the child, household size, whether the head of the household is female, a dummy for a rural location, household wealth score, household's religion and ethnicity, mother's age, education level, and marital status.[8] We also present the results without controls throughout the paper to account for the fact that some of the control variables may also be affected by conflict.

Measurement error may still pose a concern in our setting. It may be present in the indicators of both height as well as conflict fatalities. Fatality counts from ACLED may be underreported due to reliance on media and public sources, which may attenuate our results. Anthropometric indicators, particularly HAZ, may also be mismeasured if children's age is misreported—an issue in contexts without reliable birth records. Such non-classical measurement error may bias HAZ results (Agarwal et al., 2017; Larsen, Headey,

[7]The 3-month threshold is not a limiting factor to the conflict variable, as the Boko Haram conflict in Cameroon really began only in 2014, prior to which Cameroon had a very long period of security, as illustrated in Figure 2. Increasing the recall period indeed has little effect on the conflict variable (see Section 5.6).

[8]Wealth index is readily constructed in the DHS and MICS datasets using principal component analysis (PCA) with information on ownership of selected assets (such as television, bicycle etc.), materials used for housing construction, and types of water access and sanitation facilities. A detailed description of the DHS methodology can be found at https://dhsprogram.com/topics/wealth-index/Wealth-Index-Construction.cfm

and Masters, 2019), but is less likely to affect our main variable of interest, WHZ. Furthermore, measurement errors in conflict and health data are likely uncorrelated, since they come from separate sources (ACLED vs. DHS/MICS). However, measurement error in controls and outcomes from the same survey instrument may be correlated, as noted in Abay et al. (2019), which further justifies showing results both with and without controls.[9]

Children born in different time periods may have been exposed to different conditions in terms of health infrastructure and the state of the economy throughout their lives. To control for such covariate changes that affect birth cohorts differently, we include birth-year by birth-month fixed effects, denoted by δ_{tm}. Additionally, we control for survey wave fixed effects τ_w and district fixed effects ρ_r, representing fixed effects at the level of the sub-regional administrative level. Standard errors are clustered at the district level across all specifications. We also report sharpened False Discovery Rate (FDR)-adjusted q-values, correcting for multiple hypothesis testing across dependent variables within each family of outcomes (Anderson, 2008).

The terrorist violence resulted from a foreign-borne insurgency, and thus the root causes and timing of the violence inside Cameroon were not related to the grievances of the domestic population. Nevertheless, multiple threats to identifying the effect of these violent events remain, which we investigate in Section 5.5. The effects on child outcomes may be biased if the population in locations that were attacked changed over the study period, for example due to migration or due to mortality. We do not believe that selective migration threatens our identification, as population movements were limited during our study period (see Section 2). Nevertheless, we investigate whether the sample changed over time. We also investigate whether pre-conflict differences in sample characteristics could indicate selective targeting of attack locations. Furthermore, if mortality increased as a consequence of violence, the characteristics of the children remaining in

[9] In studies that investigate the effect of a specific shock on HAZ, the direction of the bias depends on the calendar month of the shock. Given that the conflict fatalities occurred across many months, such bias is unlikely to be systematic. If anything, the combined effect may bias our null results on HAZ upward.

our sample within the 20 km radius from conflict locations – including their health and nutrition status – may differ from those of the children outside conflict areas. In this case, our estimates would not capture the true extent of the conflict's impact on child health. However, we find no increase in mortality indicators of under-five children.

We also conduct multiple robustness and sensitivity checks, varying the distance for conflict exposure, the time period of conflict relative to outcomes, and replacing birth cohort fixed effects with birth-month fixed effects to control for seasonality of birth timing. The results are reported in Section 5.6.

5 Results

This section presents the results on the effects of fatalities in Boko Haram attacks on child outcomes. Tables 2 - 4 display the results with control variables (Panel A) and without them (Panel B).

5.1 Effects on nutritional status

We find that Boko Haram attacks harm the short-term nutritional status of under-five children. Table 2 reports that conflict-related fatalities decrease WHZ and increase the probability of being extremely wasted. Column (1) of Panel A shows that an additional conflict-related fatality decreases WHZ by 0.001 standard deviations (95% CI: -0.0027, -0.0003), and this result is statistically significant at the five percent level. However, the propensity to be wasted is not affected substantially, as indicated by statistically insignificant coefficients (Column (2) in Panel A and Panel B) and a 95% confidence interval that includes zero (-0.0003, 0.0002). The effect could be concentrated at the lower end of the WHZ distribution, so we also examine the effects on the prevalence of extreme wasting (Column (3)). We find that an additional fatality leads to a 0.02 percentage point increase in the propensity to be extremely wasted (95% CI: -0.003, 0.043), although this effect is statistically significant at the 10 percent level. All of these estimates are robust to the exclusion of control variables (Panel B). To account for multiple hypothesis testing, we report Anderson (2008) sharpened q-values in square brackets in Table 2. For WHZ, the q-value is 0.093, supporting the robustness of the finding after adjustment. For extreme wasting, the q-value is 0.281, indicating weaker evidence once correcting for multiplicity.

To contextualize the effects, we calculate the average effect by multiplying the number of average fatalities (21.85) by the estimated coefficients, and present the coefficient and the p-value at the bottom of each panel. On average, the WHZ score decreases by 0.05 standard deviations, and the propensity to be extremely wasted increases by 0.4 percentage points, a 14 percent increase. Given that the average child has a WHZ score of -0.16, lower than the WHO reference mean of zero, the negative effect on WHZ we find is concerning for the children in our sample, whose weight is already low. While these average effects are substantial relative to baseline values, it is important to note that the corresponding 95% confidence intervals indicate a degree of statistical uncertainty, especially for extreme wasting where the interval ranges from a small negative to a moderate positive effect.

As expected, HAZ, a measure of long-term nutritional status, does not change in response to fatalities during such a short time span. Estimated effects for HAZ (Column (4)), the propensity to be stunted (Column (5)), and extremely stunted (Column (6)) are not statistically significant, and their 95% confidence intervals include zero, indicating no clear evidence of an effect.

Taken together, the results provide evidence of short-term adverse effects of Boko Haram attacks on children's weight, with WHZ declining and extreme wasting increasing. However, the 95% confidence intervals are generally wide and in some cases include zero, reflecting limited precision. Therefore, the estimates should be interpreted with appropriate caution, consistent with their statistical significance levels.

We also examine the longer-term effects of conflict-related fatalities to assess whether the immediate effects persisted, using data from 2018 Cameroon DHS. To separately examine the effects on 2018 outcomes, we replace the 2014 sample with the 2018 sample, and follow the same empirical specifications. Given that the DHS module on nutritional status includes children under 60 months of age, we construct a 2018 sample of children who could have been affected by conflict in 2014: those who were in utero or under 12 months old during the 2014 survey and aged 36 to 60 months during the 2018 round.

One caveat with this approach is that the Anglophone crisis between the Cameroonian government and separatist rebel groups, that started in September 2017, could have also affected these outcomes. Although the crisis started and has been concentrated in the Northwest and Southwest regions, outside of our study area, we cannot rule out this possibility, and results should be interpreted with caution. Nevertheless, we would expect the longer-run results to show a decrease in HAZ and an increase in stunting as a consequence of the 2014 violence.

Our findings, which are reported in Table A1, indeed show a decrease in HAZ for children exposed to Boko Haram-related conflict in 2014, and an increase in the likelihood of stunting and extreme stunting in 2018 (Columns (4)-(6)). While these effects are statistically significant, the magnitudes are relatively small: HAZ decreases by 0.012 SD on average (CI on the number of fatalities being between -0.021 and -0.0031), the likelihood of stunting increases by 0.6 percentage points (CI on the number of fatalities being between 0.2 and 1.07), and extreme stunting by 0.3 percentage points (CI on the number of fatalities being between 0.14 and 0.52).

5.2 Disease symptoms and access to medical treatment

We also find evidence of an increased prevalence of disease symptoms and a decrease in the use of health care services when children become ill. The results reported in Table 3 suggest that the conflict-related fatalities slightly increased the probability of a child having diarrhea and had no effect on fever or cough. The coefficient estimates on fever or cough are positive, but the effects are not statistically significant. An additional fatality from conflict within three months prior to the interview increases the likelihood of having had diarrhea by 0.8 percentage points. However, this effect is significant only at the 10 percent level (95% CI: -.0000269 .000816). Considering that 24 percent of children had diarrhea in the two weeks preceding the survey, this represents a 3 percent increase from the average. Taken together, the increase in the prevalence of diarrhea may be one channel through which conflict negatively impacts child health.

The effect of diseases on longer-term health outcomes can be mitigated if children receive adequate and timely treatment from formal healthcare providers. Untreated and prolonged diarrhea and fever, especially when fever is a symptom of malaria, can be dangerous in the short term and ultimately lead to long-term adverse outcomes. Therefore, we also examine whether respondents sought medical care when the their children became ill. Columns (2) and (4) of Table 3 Panel A show that an additional fatality decreases the likelihood of taking a child with fever or cough to any health care provider by 0.06 percentage points (95% CI on number of fatalities: -.00127, -.000203), and a child with diarrhea by 0.01 percentage points (95% CI on number of fatalities: -.00105, -.0000282). On average, these effects translate to a decrease of over 1 percentage point for both. Both coefficients are statistically significant at the 1 percent level. On average, over half of cases of either illness result in caretakers not seeking medical assistance. Thus, our results translate into a two percent reduction relative to the mean in seeking assistance for fever or cough and diarrhea, respectively.

One reason for the decrease in treatment-seeking may be a reduction in the supply of healthcare services, as a result of Boko Haram's attacks against health facilities in Cameroon (International Crisis Group, 2017b). Another potential reason could be the widespread insecurity, which constraints people's movement to health care facilities, regardless of the operational status of the nearby facilities.

We further investigate whether there was a change in the composition of health care providers used, to assess whether the results are driven disproportionately by formal facilities. Table A2 shows the estimated effects of conflict on the use of formal, informal, and traditional care providers, *conditional* on seeking help. None of the results are statistically significant; that is, we do not find changes in the composition of the type of care used. We do find a reduction in traditional care, which is significant at the 10 percent level. Still, this decrease is not accompanied by an increase in any of the other categories, implying little evidence on compositional changes in the type of health care providers used.

5.3 Nutritional intake

Next, we analyze whether conflict-related fatalities affect the food intake of children aged 7-36 months. We focus on this group as the module is available for children of 36 months of age or younger, while 6-month-olds and younger are recommended to be exclusively breastfed. We do not find changes in dietary diversity as a consequence of conflict. Results reported in Table 4 show no detectable change in the number of food groups consumed or in the prevalence of consuming more than four out of six food groups – an indicator of minimal dietary diversity for children under three years old (Columns (1) and (2)). On average, children consumed from only two food groups in the seven days preceding the survey.

Columns (3) to (8) present results per food group. Each dependent variable is a dummy denoting whether the child had consumed anything from this food group. Starchy staples are the most commonly consumed food group (69 percent of children), followed by vegetables (40 percent of children). We do not find statistically significant changes in the consumption of these two most prevalent food groups. We find an increase in the prevalence of dairy consumption, which on average consumed is consumed by 14 percent of children.[10] For less commonly consumed food groups, we find some composi-

[10]While many children in this age range are still being breastfed, this increase does not affect those in the age recommended for exclusive breastfeeding, as shown in the heterogeneity check in Table A3. For older children, this could be due to mothers shifting to other activities, or stress related to conflict. However, we

tional changes indicating a slight decrease in the consumption of legumes and nuts, and a slight increase in the consumption of fruit.[11]

Taken together, we do not find substantive changes in children's dietary diversity as a consequence of conflict, although we find some compositional changes in consumption of food groups. It is important to point out that dietary diversity is already very low, with the average child only consuming from two food groups. These compositional changes may reflect adjustments in both livestock and crop portfolios by agricultural households facing conflict risk (Rockmore, 2020). Therefore, in conflict situations where agricultural activity is not entirely disrupted, the dietary diversity of small children may not change as households move from profit-maximizing to risk-mitigating farming strategies and maintain a certain level of food production. Furthermore, these extensive margin effects may mask any effects in the *quantities* consumed.

Finally, increases in food prices in markets close to conflict locations could indicate increased demand resulting from food shortages. Therefore, we conduct additional analysis on geocoded market-level data on food prices by linking the monthly food price index from the World Bank (Andrée, 2021) with the ACLED dataset on conflict. Figure A1 shows that while food prices increased in markets within a 20 km radius of conflict events during 2014, similar increases occurred in markets outside of this radius. Therefore, we conclude that shortages of food sold on the market are unlikely to explain our results on food consumption.

are unable to directly investigate the effects on breastfeeding, as our data do not include repeated cross-sectional information on breastfeeding or mothers' time use.

[11] The share of children who consumed legumes and nuts decreased by 0.04 percentage point, with an average effect of 0.9 percentage points, and the coefficient is statistically significant at the 10 percent level (95% CI: -.000858, 5.51e-06). As 23 percent of children consumed this food group, this corresponds to a 3 percent decrease among children who ate legumes and nuts. The change in the share of children who consumed fruit is statistically significant at the 5 percent level.

5.4 Heterogeneity by age

Next, we investigate whether the observed impacts on anthropometry, disease symptoms and health care utilization vary across age groups among the under-five children. Children grow faster when they are younger and at a relatively steady pace after turning two years old. Therefore, changes in anthropometric measures of younger children may be easier to detect statistically. On the other hand, younger children – children below two years of age – may be less susceptible to changes in their living environment, as they are often breastfed. Babies under six months are typically exclusively breastfed, which may protect this age group against changes in household food availability. To investigate potential heterogeneity by age, we divide our sample into younger children aged between 0 and 24 months and older children aged from 25 to 60 months.

We find that WHZ declines in both age groups, although patterns differ. The reduction is larger in magnitude for children under 24 months, while the effects are more precisely estimated (i.e., statistically stronger) for children between 25 and 60 months old (Table A4).[12] On average, younger children have lower WHZ to begin with – 0.39 standard deviations below zero compared to 0.01 standard deviations above zero for older children (Table A6). While WHZ typically improves with age in low-income settings – as weight-for-age tends to stabilize while HAZ worsens – the greater decline of WHZ among younger children is concerning given the critical importance of early growth for long-term development. This pattern is reinforced by related findings: the probability of being extremely wasted increases significantly (at the 10 percent level) among children under 24 months.

Table A5, also shows that while the children under 24 months became more likely to have diarrhea, while children over 24 months were less likely to seek medical care when

[12] Table A4 reports that the WHZ decreased for children 24 months and below by 0.037 SD (significant at the ten percent level), and for children between 25 and 60 months by 0.025 SD (significant at the one percent level). The difference between the two effects is not statistically significant.

ill.[13] On average, the prevalence rate of diarrhea was 30 percent among the younger children, while it was 19 percent among the older children. In both age groups, 60 percent or fewer children experiencing diarrhea or fever/cough sought any medical treatment (Table A6). The increases in already prevalent diarrhea in children under 24 months and the decrease in medical care sought for children over 24 months support the result we find on the decrease in WHZ for both age groups.

We find some heterogeneous effects on nutritional diversity across age groups (Table A3). The consumption of dairy increased in both groups, but more among the 7-24 month-olds, which suggests a substitution of breast milk. We find no increase in the number of food groups consumed by younger children, but an increase among children over 24 months.[14] We also observe compositional changes among food groups for older children, such that there are increases among older children in several food groups, consistent with the increase in the number of food groups.[15] The results support a larger decrease in weight among children under 24 months: the plausibly illness-related decreases in WHZ among older children is perhaps mitigated by increased consumption of these solid food

[13]Table A5 reports that on average, the prevalence of fever or cough was not affected by the conflict in both age groups (Column 1), and diarrhea increased only in the younger age group by 1.2 percentage points on average (Column 3). On the other hand, the conflict-related decrease in healthcare seeking for both fever/cough and diarrhea is statistically significant only among the older children (Columns 2 and 4). The heterogeneity of the effects on healthcare seeking behavior where caregivers are more likely to seek healthcare services for younger than older children within under five age range is consistent with the documented behaviors (Taffa and Chepngeno, 2005; Bennett et al., 2015; Kanté et al., 2015; Abdulkadir and Abdulkadir, 2017; Lungu, Darker, and Biesma, 2020; Khasanah et al., 2023). Previous studies refer to the vulnerability of younger children as a potential reason behind these findings.

[14]Table A3 reports that the number of food groups consumed by children over 24 months increased statistically significantly at 5 percent level, by 2.3 percentage point on average. The effects on children under 24 months were not statistically significant, and the size of the coefficient estimates are smaller than those for children over 24 months. The difference in effects between the groups was statistically insignificant (Column 2).

[15]Specifically, we find an increase in starchy staples (Column 3) and meat and eggs (Column 5) among children over 24 months, by 0.4 percentage points and 0.8 percentage points both at five percent significance level, with the effects on children under 24 months being negative and statistically insignificant. The difference was also statistically significant at five percent level for meat and eggs. Consumption of fruits (Column 8) increased in both age groups at five percent significance level. The younger children, on the other hand, were less likely to consume legumes and nuts, which was statistically significant at 10 percent level (Column 4). Other food groups such as starchy staples, meat and eggs, and vegetables – were also estimated to decrease among children under 24 months but the effects were not statistically significant.

groups.[16]

5.5 Alternative mechanisms

Other potential mechanisms could explain the worsened child health and nutritional outcomes. First, our results may have been driven by selective mortality rates among children. Violent conflicts can increase mortality directly through conflict-related fatalities, as well as indirectly through the deterioration of health. If mortality increased substantially within a 20 km radius of the conflict locations, then the characteristics of the surviving children in these areas – including their health and nutrition status – may differ from those of children outside these locations. In this case, our child health estimates would not capture the true impact of conflict on children's health. Indeed, five years into the Boko Haram conflict in Nigeria, child mortality in states with Boko Haram activity was higher than in states not affected by the insurgency (Ekhator-Mobayode and Asfaw, 2019). To address this concern, we estimate the effects of conflict on mortality outcomes of children under five using the MICS 2014 dataset, which collects the birth histories of women of childbearing age, whether the children born survived or died, and at what age did the death occur. Thus, we have information on children's births and deaths that occurred even decades prior to the survey, given that this module is administered to all women 15-50 years of age. Specifically, we estimate the following linear model

$$
\begin{aligned}
D_{irtm} = \alpha + x'_{irtm}\beta + \gamma \text{Fatalities}_{ir} + \psi \text{Born after first attack}_{irtm} \\
+ \pi \text{Fatalities}_{ir} \times \text{Born after first attack}_{irtm} \\
+ \delta_{tm} + \rho_r + \xi_{irtm}
\end{aligned} \tag{2}
$$

[16]First, we added heterogeneity by age using another age cutoff: 36 months. Tables A7 and A8 report the results. Second, we also add a heterogeneity of the effects with age ranges of 12 months to supplement these results, presented in Tables A9 and A10. All results presented in these tables are qualitatively similar.

where D_{irtm} denotes the mortality outcome of child i in district r, born in year t and month m, as recorded in the MICS 2014 survey. The variable Fatalities_{ir} denotes the number of fatalities in Boko Haram-related conflict events recorded in the ACLED dataset within the 20 km radius in the last 12 months prior to the survey date, excluding riots and protests. For neonatal mortality, we consider children exposed to conflict after their birth to be potentially affected by the conflict. The variable $\text{Born after first attack}_{irtm}$ is an indicator variable denoting whether a child was born after the first attack within the 20 km survey radius, and zero otherwise. The interaction term $\text{Fatalities}_{ir} \times \text{Born after first attack}_{irtm}$ is our variable of interest for neonatal mortality, with the coefficient π measuring the effect of conflict within a 20 km radius on the probability of death within the first month of life.

For infant mortality as an outcome, we consider children to be potentially exposed to conflict if they were affected by conflict at under one year of age, and for under-five mortality, if they were affected by conflict before turning five. Therefore, for infant mortality we replace the $\text{Born after first attack}_{irtm}$ variable with a variable denoting that they were born up to 12 months before the first attack, and for child mortality, with a variable denoting that they were born up to 60 months before the first attack in the 20 km radius. In each model, we control for the birth cohort by adding the birth year and birth month fixed effects, denoted by δ_{tm}, and district fixed effects, denoted by ρ_r. Finally, ξ_{irtm} is the error term.

While conflict can affect mortality directly, it can also affect neonatal mortality if women are less likely to give birth safely in a health care facility. Infant mortality and under-five mortality can also be affected by illnesses, among other things. Table A11 shows that conflict does not substantially affect any of the mortality outcomes. Our results are similar to those presented by Akresh, Lucchetti, and Thirumurthy (2012) for child mortality in the context of the Eritrean–Ethiopian civil war.

Next, we examine if the out-migration could explain the results. In Table A12, we run models with demographic characteristics of the household as the dependent variable, and the independent variable in each regression is the fatalities in 20 km radius. We find that the demographic characteristics are not substantively correlated with the fatalities. Out of 12 demographic characteristics examined, three are statistically significant at least at the 10 percent level. There is a slight increase in the Muslim survey population, which is small and statistically significant at the 10 percent level. Taken together, the changes in the religious composition are so small, they are economically insignificant. Furthermore, the share of female children is statistically significant from zero, but the coefficient is arguably very small, while the rural area is statistically significant but very close to zero. Therefore, the results suggest that the endogenous out-migration does not drive the results. Indeed, as discussed in Section 2, the migration movements within Cameroon were extremely restricted, and in-migration to Cameroon from Nigeria likely constituted a negligibly small share of the total population in 2014.[17]

The attacks in Cameroon occurred close to the border to Nigeria (Figure 2), which raises the question of whether the households in the vicinity of the attacks differed at baseline from those further away. This would be the case, if for instance, there was a strong influx of Nigerians escaping conflict in 2009 onwards. However, the share of foreigners in the data is 3 percent or less in each wave, indicating that even the upper bound for Nigerians residing outside refugee camps consitutes a small share of the total population. Furthermore, using remote-sensing data, Jedwab et al. (2021) find little evidence of significant population movements from Nigeria to Cameroon by 2012, that is, after the Boko Haram conflict started in 2009 in the country.

In addition, we investigate the characteristics of the population within the 20 km radius of the attacks and households outside of these locations before the attacks took place. Table A13 shows that in the 2004 pre-conflict wave (Panel A), the households within conflict areas were statistically significantly wealthier than those outside, and were more

[17] We use our study samples for investigating this, given that no systematic data has been collected on migration during our study period. The only and most recent census of Cameroon during the period of our study was collected in 2005 (IPUMS, 2023).

likely to be of the Muslim and less likely to be Christian. They are similar in rural residence and the mothers' education levels compared households outside these areas.

We also investigate the trends in the demographic composition of the sample before the conflict in 2014. The results are reported in Panel C of Table A13. We do not find changes in household wealth, household size, nor the education level or age of the mothers in the sample. We find a slight increase in the Christian population relative to Muslims, a slight decrease in female-headed households, and an associated increase in married mothers.

Lastly, we implement a placebo test, where we estimate the effect of conflict exposure on children's anthropometric outcomes measured before the conflict. Table A14 shows that the total number of fatalities from 2014 conflicts did not have substantial impacts on WHZ or HAZ in either 2004 or 2011, suggesting that conflict-exposed areas in 2014 were not systematically inhabited by children with better or worse nutritional status prior to the conflict. However, we note that the coefficient on extreme stunting in the 2011 sample is positive and marginally significant at the 10 percent level, although this estimate does not survive corrections for multiple hypothesis testing, and we thus acknowledge it as a minor exception to the otherwise null placebo results.

Taken together, the results suggest that there were not large changes within the population during the pre-period, although the areas where attacks occurred were inhabited by slightly different types of households, and some of these changes became more pronounced over time. The results are robust to the exclusion of control variables for these characteristics.

5.6 Robustness checks

We run several robustness checks to our main results. First, as an alternative to the birth cohort-specific trends, we control for intra-annual seasonality in birth outcomes, which may impact children differently in utero or during the first months of life – for instance, due to the agricultural cycle. To do so, we include birth-month and birth-year dummies separately, replacing birth-year by birth-month fixed effects. Table A16 presents the results of this robustness check for the models with controls from Tables 2 and 3. We find that our results are robust to this specification.

Next, we assess the sensitivity of our findings to an alternative distance threshold to define conflict exposure by increasing the threshold to 40km. The results are presented in Table A15. We find that the results are robust to this sensitivity check – the estimates retain their statistical significance. However, we do find that the effect sizes are smaller as the threshold distance increases. An additional fatality further away is less detrimental to a child than one closer to the household.

We also investigate the sensitivity of our results regarding the timing of the attacks. We investigate fatalities in attacks in the 20 km radius that occurred in the last 1, 2, 3, 4, 6, 9, 10, and 24 months, in addition to the 3-month period used in the main analysis. The results are presented in Figure A2. We find that the results are not sensitive to the timing of the events. The size of the coefficients varies little across the different specifications. At the 1-month exposure, the coefficients are slightly larger, but due to the smaller sample size, the estimates are less precise than those for the 2-24 month periods. Overall, the results of our main specification using the 3-month exposure are robust across exposure windows between 2-24 months. This is also due to the fact that 89 percent of all fatalities that children were exposed to happened during the 3-month exposure period, and 94 percent during the 6-month period. This may also explain why we do not see different results on HAZ at these longer exposure times.

6 Conclusions and Policy Implications

In this paper, we examine the impact of violent conflict on child health using datasets collected up to a decade before and immediately after the start of violent attacks by the

Nigerian Boko Haram insurgency in northern Cameroon. We find that under-five children experienced immediate health setbacks in their WHZ in the course of 2.6 months.

Low WHZ can result from both illnesses and inadequate nutritional intake. We find an increase in the prevalence of diarrhea, but not in fever or cough, and a decline in the use of health services for treating these illnesses. This suggests that common illnesses may have been left untreated. We also find compositional changes in food groups, including a slight increase in the consumption of some solid foods among children over 24 months, which is consistent with the smaller reductions in WHZ observed for this age group.

Given that disrupted healthcare use is a potential channel through which children's nutritional status is immediately affected, policies for rapid recovery can focus on ensuring the healthcare services accessibility for populations in conflict-affected areas. Indeed, programs targeted for health care center reconstruction and efforts to bring back health care workers and supplies have been set up in Nigeria (World Bank, 2016), and responses by NGOs have taken place in both countries. In the long term, as violent conflicts persist in the region, designing healthcare infrastructure to be more resilient in insecure settings, such as by increasing service mobility to respond to shifting conflict risk, can help prevent long-term negative consequences on child health.[18]

Our results carry important policy relevance, as extreme poverty and malnourishment are increasingly concentrated in fragile and conflict-affected countries (Corral et al., 2020). Given the rise in terrorist movements in Western Africa, historically peaceful Cameroon was the first country to struggle with foreign-borne conflict inside its own borders in 2014, before the insurgency spread across the borders of Chad and Niger (Africa Center for Strategic Studies, 2020). Since then, coastal West African countries have started experiencing terrorist violence in areas close to their northern neighbors. Benin, Togo

[18] Additional results also show that conflict also had effects on older children's time use towards household chores and away from schooling. Children between 5-17 years of age are more likely to participate in household tasks, and to drop out of school due to conflict. It implies that households consider activities inside the household relatively safer than activities outside the household, but this may come at the expense of a decrease in education.

and Ghana — countries that have been internally peaceful for decades — have experiences terrorist violence in their northern regions as insecurity has increased in neighboring Burkina Faso, Mali and Niger (Durmaz, 2022; ECFR, 2022). Meanwhile, the security situation in Cameroon has decreased significantly with the Anglophone crisis, a secessionist insurgency, that began in the western parts of Cameroon in late 2016 (Craig, 2021; International Crisis Group, 2017a), and a more recent intensified Boko Haram activity in the north (Africa Center for Strategic Studies, 2020). Our findings shed light on the immediate human capital consequences of such foreign-borne violence, right at its onset. Indeed, given how rapidly these negative consequences to children's human capital manifest, within Cameroon in a scope of 2.6 months, this calls to question not only appropriate investments in the health care sector, but also strong security at the borders to prevent spill-overs of violence.

Data Availability

Code replicating the tables and figures in this article can be found in Kaila, Larissa, and Son (2025) in the Harvard Dataverse.

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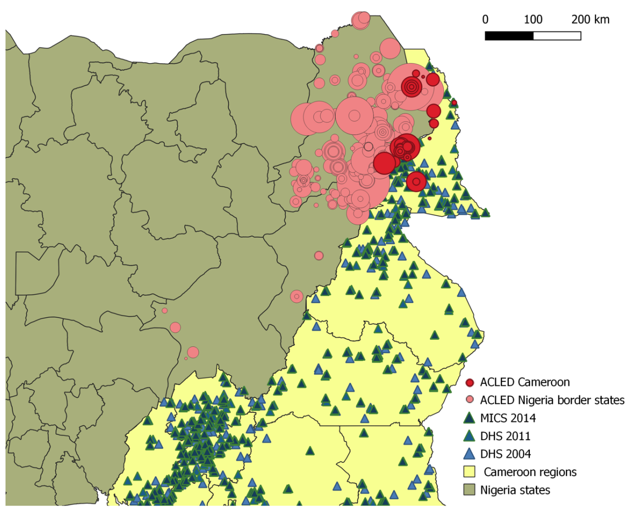
Figures

Figure 1: Map of Conflict Region and Boko Haram Attacks

(a) Conflict Region

(b) Boko Haram attacks in Cameroon and Bordering States in Nigeria



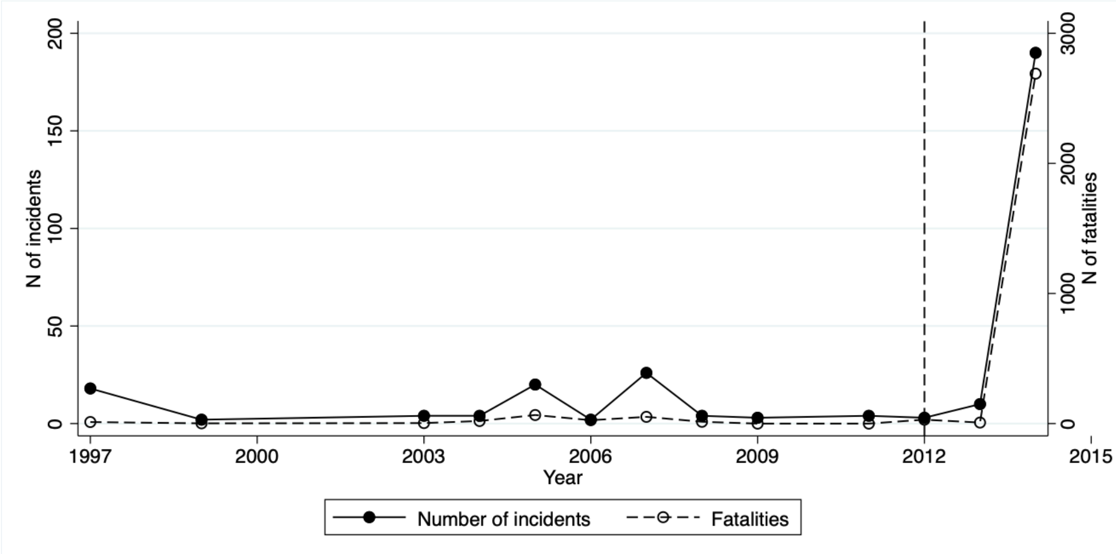
Notes: In Figure (a) the square displays the location of northern Cameroon. In Figure (b) the triangles labeled MICS 2014, DHS 2011 and DHS 2004 denote the survey clusters. The light and dark circles denote incidents from ACLED dataset involving Boko Haram. The size of the circle is inflated reflecting the number of fatalities.

Source: Figure (a) compiled using ARCGIS online mapping tool. Figure (b) uses shapefiles Cameroon and Nigeria (for regions and states, respectively) downloaded from `https://data.humdata.org/`.

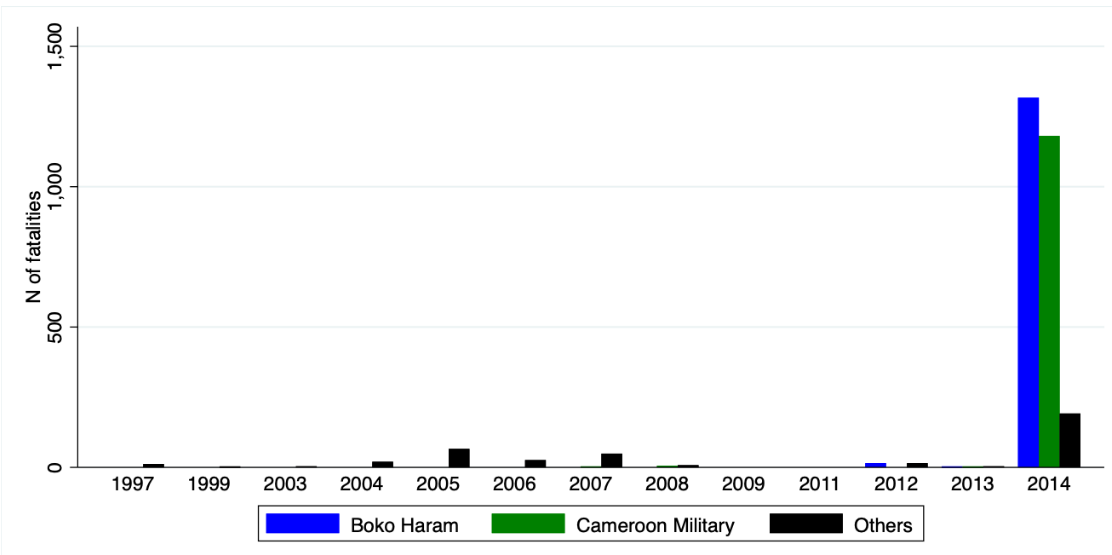
Alt text: Map showing northern Cameroon and adjoining regions of Nigeria. The top panel highlights the study area. The lower panel displays Boko Haram incidents as circles of varying size and survey cluster locations marked with triangles across Cameroon and border states in Nigeria.

Figure 2: Evolution of Conflict in northern Cameroon

(a) Fatalities and Incidents by year



(b) Fatalities by group-year



a

Notes: In panel (a) Incidents denotes the number of fatal events in northern Cameroon by year as reported in the ACLED database. We include all events except riots and protest in our measure of incidents. Fatalities denotes the number of fatalities in these events. In panel (b) the number of fatalities are reported by actor involved in the incident. Most fatalities occur in clashes between the Boko Haram and the Cameroonian military.

Source: ACLED dataset (Raleigh et al., 2010).

Alt text: Two-panel graph depicting trends in conflict in northern Cameroon. The top panel shows yearly counts of incidents and fatalities from 1997 to 2014. The lower panel shows fatalities in 2014 by actor group, with bars representing Boko Haram, the Cameroonian military, and other actors.

Tables

Table 1: Summary Statistics

	Mean	SD	N
Panel A: Conflict Events			
N of fatalities	21.85	35.26	61
Panel B: Control variables			
Female child	0.50	0.50	11275
Age in months	29.15	17.28	11224
Household size	8.08	4.41	11275
Female-headed household	0.12	0.33	11275
wealth index factor score (5 decimals)	-0.64	0.70	11275
Mother: Age	28.04	6.99	11077
Mother: Currently married	0.91	0.29	11077
Christian	0.50	0.50	11275
Muslim	0.38	0.48	11275
Rural area	0.73	0.44	11275
Mother: Primary school	0.37	0.48	11275
Mother: Secondary school	0.11	0.32	11275
Mother: More than secondary school	0.01	0.08	11275
Panel C: Outcome variables, 0-5 years old			
Height-for-Age Z-score	-1.42	1.64	6068
Weight-for-Height Z-score	-0.15	1.37	5750
Had fever in last 2 wks	0.34	0.47	10292
Had diarrhea in last 2 wks	0.24	0.43	10037
Diarrhea: Seek medical treatment	0.55	0.50	2189
Fever: Seek medical treatment	0.58	0.49	3281
No. of food groups	1.94	1.52	6593
Food groups > 4	0.17	0.38	6593

Notes: The variable No. of food groups takes values between 0 and 6. The omitted category in Mother's education is no education. Column (1) reports the mean, column (2) the standard deviation, and column (3) the number of observations for each variable.
Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table 2: Effect on Anthropometric Measures of Children (0-60 months old)

	Weight			Height		
	WHZ	Wasted	Extremely Wasted	HAZ	Stunted	Extremely Stunted
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Fatalities	-.00154**	-.0000278	.000197*	-.000361	.0000393	-.000234
	(.000577)	(.00012)	(.00011)	(.000695)	(.000257)	(.000389)
	[.093]	[1]	[.281]	[1]	[1]	[1]
	{-.00274 -.000344}	{-.000277 .000221}	{-.0000316 .000425}	{-.00181 .00109}	{-.000496 .000574}	{-.00104 .000576}
Control	Yes	Yes	Yes	Yes	Yes	Yes
Coef: Average effect	-0.034	-0.001	0.004	-0.008	0.001	-0.005
P-val: Average effect	0.014	0.819	0.088	0.609	0.880	0.555
R-Squared	0.209	0.107	0.085	0.163	0.123	0.095
Panel B: Without control variables						
Fatalities	-.00253**	.0000186	.000184*	-.00107*	.000159	-.00019
	(.000954)	(.000132)	(.000102)	(.000579)	(.00025)	(.000355)
	[.099]	[.801]	[.169]	[.169]	[.559]	[.559]
	{-.00451 -.000545}	{-.000257 .000294}	{-.0000288 .000397}	{-.00228 .00013}	{-.000362 .00068}	{-.000929 .000548}
Coef: Average effect	-0.055	0.000	0.004	-0.023	0.003	-0.004
P-val: Average effect	0.015	0.889	0.086	0.078	0.532	0.597
N	5750	5750	5750	6068	6068	6068
R-Squared	0.175	0.098	0.077	0.139	0.101	0.081
Mean of Dep. Var.	-0.155	0.089	0.028	-1.421	0.375	0.163

Notes: Sample includes children under 5 years of age. Panel A includes control variables, Panel B does not. Controls include all variables listed in Table 1. All regressions include Birthyear × Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. Standard errors clustered at the district level are in paranthesis, sharpened q-value in square brackets, and 95% confidence interval in curly braces. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.
Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table 3: Effect on Children's Illnesses and Use of Medical Care (0-60 months old)

	Fever or cough		Diarrhea	
	Illness in 2 weeks	Seek medical care	Illness in 2 weeks	Seek medical care
	(1)	(2)	(3)	(4)
Panel A				
Fatalities	.000309	-.000736***	.000394*	-.000538**
	(.000286)	(.000256)	(.000203)	(.000245)
	[.096]	[.038]	[.07]	[.064]
	{-.000286 .000903}	{-.00127 -.000203}	{-.0000269 .000816}	{-.00105 -.0000282}
Control	Yes	Yes	Yes	Yes
Coef: Average effect	0.007	-0.016	0.009	-0.012
P-val: Average effect	0.292	0.009	0.065	0.040
R-Squared	0.086	0.115	0.103	0.176
Panel B: Without control variables				
Fatalities	.000403	-.00086**	.000447	-.000503***
	(.000323)	(.000308)	(.000274)	(.000175)
	[.128]	[.023]	[.086]	[.023]
	{-.000269 .00108}	{-.0015 -.000219}	{-.000123 .00102}	{-.000867 -.00014}
Coef: Average effect	0.009	-0.019	0.010	-0.011
P-val: Average effect	0.226	0.011	0.118	0.009
N	10292	3281	10037	2189
R-Squared	0.084	0.095	0.097	0.144
Mean of Dep. Var.	0.336	0.581	0.242	0.549

Notes: Sample includes children under 5 years of age. Panel A includes control variables, Panel B does not. Controls include all variables listed in Table 1. All regressions include Birthyear × Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. In columns (2) and (4) the sample is restricted to children who had been ill with fever or cough, or diarrhea, respectively. Standard errors clustered at the district level are in paranthesis, and sharpened q-value in square brackets. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.

Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table 4: Effect on Food Intake (7-36 months old)

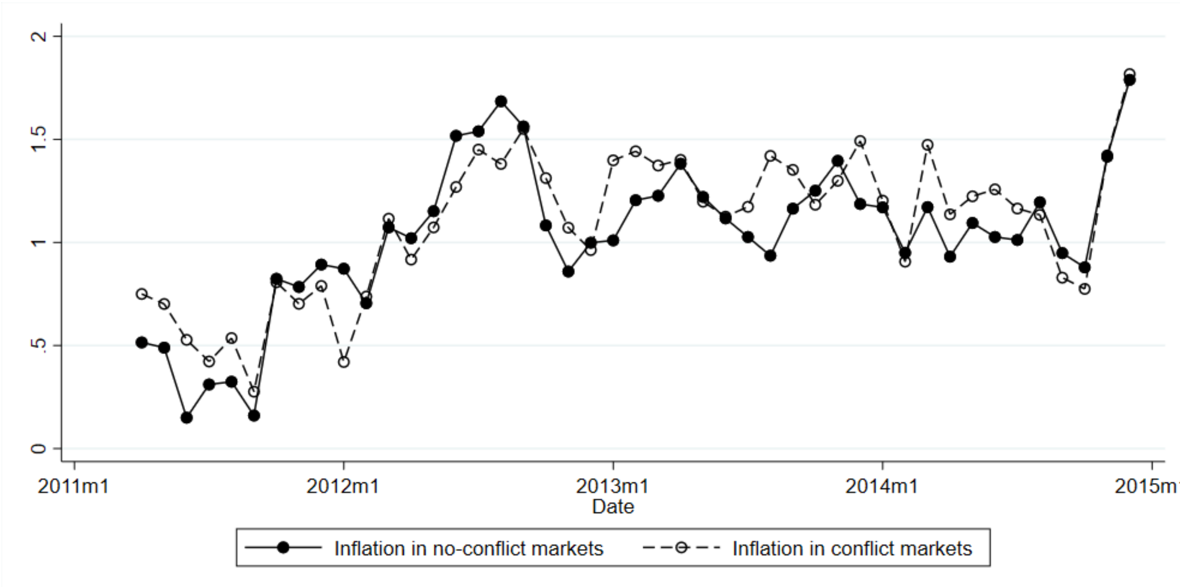
	Food groups > 4	No. of food groups	Starchy Staples	Legumes/ Nuts	Meat and eggs	Dairy	Vegetables	Fruits
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A								
Fatalities	.000248	.0011	.0000528	-.000426*	.0000306	.00121***	-.000225	.000465**
	(.000235)	(.000754)	(.000111)	(.000208)	(.000236)	(.000414)	(.00039)	(.000182)
	[.436]	[.252]	[.578]	[.118]	[.816]	[.072]	[.578]	[.072]
	{-.000241 .000737}	{-.000471 .00266}	{-.000179 .000285}	{-.000858 5.51e-06}	{-.000461 .000522}	{.000345 .00207}	{-.00104 .000585}	{.0000859 .000844}
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Coef: Average effect	0.005	0.024	0.001	-0.009	0.001	0.026	-0.005	0.010
P-val: Average effect	0.303	0.161	0.640	0.053	0.898	0.008	0.570	0.019
R-Squared	0.139	0.328	0.333	0.098	0.283	0.135	0.172	0.149
Panel B: Without control variables								
Fatalities	.000361*	.00134**	.0000252	-.000352	.000103	.0012**	-.000069	.000443**
	(.000196)	(.000546)	(.000104)	(.000209)	(.000154)	(.000514)	(.000375)	(.000193)
	[.112]	[.094]	[.473]	[.121]	[.343]	[.094]	[.473]	[.094]
	{-.0000476 .000769}	{.000205 .00248}	{-.00019 .000241}	{-.000787 .0000839}	{-.000217 .000424}	{.000127 .00227}	{-.000848 .00071}	{.0000417 .000844}
Coef: Average effect	0.008	0.029	0.001	-0.008	0.002	0.026	-0.002	0.010
P-val: Average effect	0.080	0.023	0.810	0.108	0.510	0.030	0.856	0.032
N	8438	8438	8438	8422	8435	8435	8437	8422
R-Squared	0.117	0.319	0.344	0.095	0.263	0.088	0.170	0.127
Mean of Dep. Var.	0.173	1.948	0.690	0.229	0.321	0.135	0.398	0.177

Notes: Sample includes children under 36 months of age. All dependent variables denote food intake in the last 24 hours preceding the survey. Outcome variables in Columns (3)-(8) are dummy variables denoting whether the child consumed anything from this food group in the last 24 hours. Food groups > 4 is a dummy for whether the child ate from more than 4 out of 6 food groups in the last 24 hours. The variable number of food groups denotes the number of food groups a child consumed from (taking values from 0 to 6). Panel A includes control variables, Panel B does not. Controls include all variables listed in Table 1. All regressions include Birthyear × Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. Standard errors clustered at the district level are in paranthesis, and sharpened q-value in square brackets. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.

Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Appendix

Figure A1: Food inflation in conflict and non-conflict markets

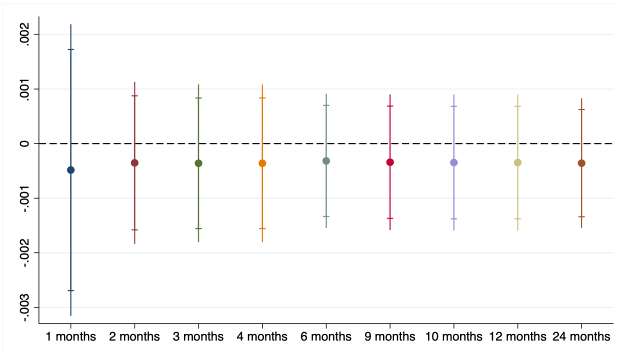


Notes: The figure displays monthly food inflation rate (%). Conflict markets are markets in the dataset in the 20 km radius from the fatalities during the period for which the datasets overlap (April 2011 to December 2014). Non-conflict markets are markets that did not have any fatal conflict events during that time.

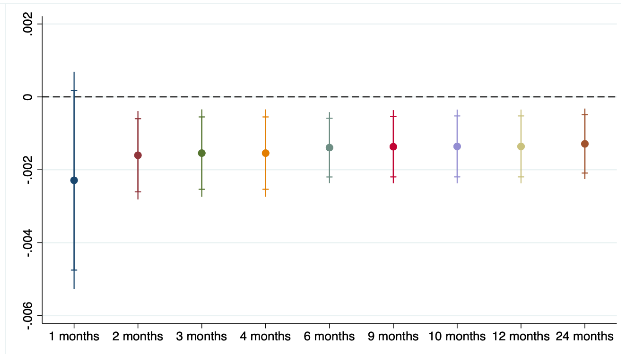
Source: Food price data is from Andrée (2021). Conflict data is from ACLED.

Figure A2: Effect on anthropometric measures by months of exposure

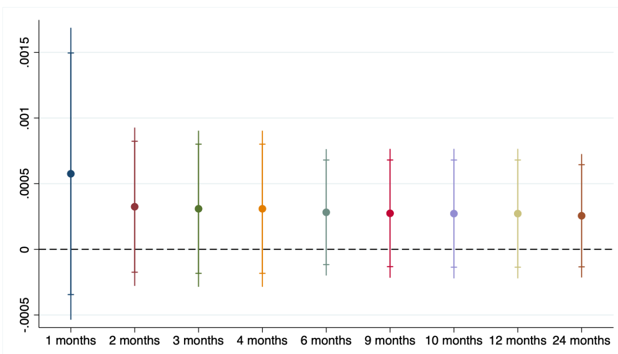
(a) HAZ



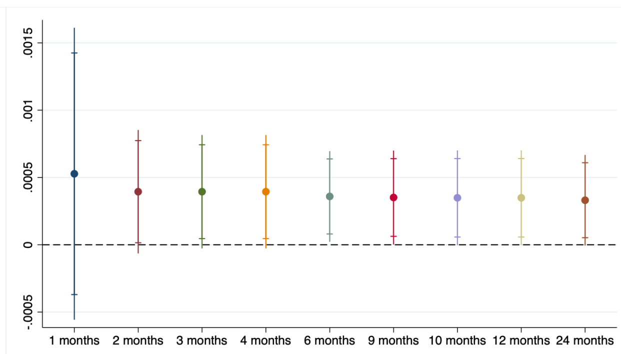
(b) WHZ



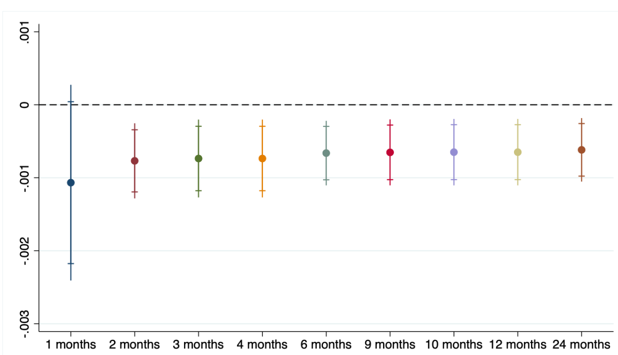
(c) Fever or Cough



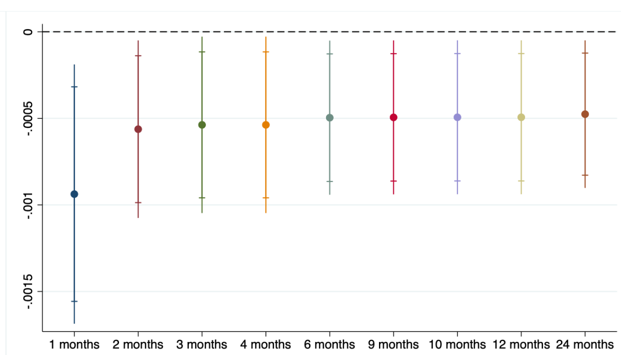
(d) Diarrhea



(e) Fever or Cough: Medical care



(f) Diarrhea: Medical care



Notes: The bars denote the coefficient estimate of a regression that estimates the effect of the number of fatalities in the 20 km radius to the outcome variable in each panel. The vertical axis denotes the magnitude of the coefficient with 95 per cent confidence intervals. The horizontal axis denotes the recall period which is different for each regression. This ranges from 3 to 24 months. The 12 month coefficient estimate thus corresponds to results presented in Tables 2 and 3.

Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011, and the ACLED dataset.

Table A1: Effect on Anthropometric Measures of Children (In utero to 12 months old in 2014)

	Weight			Height		
	WHZ	Wasted	Extremely Wasted	HAZ	Stunted	Extremely Stunted
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Total N of fatalities in 20km	.000509*	-.000108***	-.0000317***	-.000559**	.000292***	.00015***
	(.000268)	(.0000335)	(9.59e-06)	(.000201)	(.000096)	(.0000423)
	[.014]	[.009]	[.009]	[.009]	[.009]	[.009]
	{-.0000483 .00107}	{-.000178 -.0000385}	{-.0000516 -.0000117}	{-.000976 -.000142}	{.0000921 .000491}	{.000062 .000238}
Control	Yes	Yes	Yes	Yes	Yes	Yes
Coef: Average effect	0.011	-0.002	-0.001	-0.012	0.006	0.003
P-val: Average effect	0.071	0.004	0.003	0.011	0.006	0.002
R-Squared	0.201	0.089	0.046	0.164	0.159	0.119
Panel B: Without control variables						
Total N of fatalities in 20km	.00047	-.000105**	-.0000325***	-.000639***	.000323***	.000163***
	(.000322)	(.0000382)	(.0000109)	(.000142)	(.0000808)	(.0000448)
	[.028]	[.008]	[.006]	[.002]	[.002]	[.003]
	{-.0002 .00114}	{-.000184 -.0000255}	{-.0000551 -9.85e-06}	{-.000934 -.000344}	{.000155 .000491}	{.0000699 .000256}
Coef: Average effect	0.010	-0.002	-0.001	-0.014	0.007	0.004
P-val: Average effect	0.159	0.012	0.007	0.000	0.001	0.002
N	2037	2037	2037	1982	1982	1982
R-Squared	0.184	0.082	0.042	0.124	0.107	0.097
Mean of Dep. Var.	0.057	0.050	0.010	-1.692	0.421	0.199

Notes: Sample includes children under 5 years of age. Panel A includes control variables, Panel B does not. Controls include all variables listed in Table 1. All regressions include Birthyear $\times$ Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. Standard errors clustered at the district level are in paranthesis, and sharpened q-value in square brackets. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.

Source: Pooled dataset using Demographic and Health Survey (DHS) from 2004, 2011, and 2018.

Table A2: Effect on Types of Medical Care Sought

	Upon fever and cough			Upon diarrhea		
	Formal	Informal	Traditional	Formal	Informal	Traditional
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Fatalities	-.000258	.000367	-.000213*	-.000176	-.00012	-.000672
	(.000682)	(.000742)	(.000109)	(.000677)	(.000566)	(.000392)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Coef: Average effect	-0.006	0.008	-0.005	-0.004	-0.003	-0.015
∗1 P-val: Average effect	0.709	0.626	0.064	0.798	0.834	0.101
R-Squared	0.242	0.239	0.162	0.215	0.207	0.179
Panel B: Without control variables						
Fatalities	-.000825	.000875	-.000139*	-.000244	-.0000946	-.000569
	(.000592)	(.00065)	(.0000719)	(.00071)	(.000582)	(.000366)
Coef: Average effect	-0.018	0.019	-0.003	-0.005	-0.002	-0.012
P-val: Average effect	0.178	0.193	0.067	0.734	0.872	0.135
N	1271	1271	1271	908	908	908
R-Squared	0.208	0.210	0.144	0.193	0.184	0.162
Mean of Dep. Var.	0.405	0.555	0.057	0.368	0.551	0.112

Notes: Sample includes children under 5 years of age who had been sick with fever (Columns 1-3) or diarrhea (Columns 4-6), and for whom medical care was sought for due to illness. Formal care includes both private and public hospitals and clinics, informal care includes ?? and traditional care comprises of traditional practicioners. Panel B: Without control variables A includes controls, Panel B: Without control variables B does not. Controls include all variables listed in Table 1 Panel B: Without control variables A. All regressions include Birthyear $\times$ Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. Standard errors clustered at the district level are in paranthesis. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.

Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table A3: Effect on Children's Food Intake by Age Groups

	Food groups > 4	No. of food groups	Starchy Staples	Legumes/ Nuts	Meat and eggs	Dairy	Vegetables	Fruits
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fatalities	-.0000549	.00105	-.000651***	-.0000872	-.000116	.00192	-.000105	.0000845
	(.0000432)	(.000866)	(.000227)	(.000072)	(.000093)	(.00119)	(.0000617)	(.0000736)
7-24 Month × Fatalities	.0004	.0000376	.00049**	-.000728	-.000376	.000572*	-.000477	.000564**
	(.000337)	(.00208)	(.000193)	(.000442)	(.000459)	(.000313)	(.000694)	(.000221)
25-36 Month × Fatalities	.000286*	.000187	.000837***	-.0000817	.00053***	-.00154	.000181	.00027**
	(.00015)	(.00124)	(.000202)	(.000107)	(.000176)	(.00112)	(.000161)	(.000113)
Coef (0-6 Months): Average effect	-0.001	0.023	-0.014	-0.002	-0.003	0.042	-0.002	0.002
P-val (0-6 Months): Average effect	0.217	0.239	0.009	0.239	0.227	0.122	0.102	0.264
Coef (7-24 Months): Average effect	0.008	0.024	-0.004	-0.018	-0.011	0.055	-0.013	0.014
P-val (7-24 Months): Average effect	0.351	0.415	0.520	0.118	0.364	0.020	0.438	0.029
Coef (25-36 Months): Average effect	0.005	0.027	0.004	-0.004	0.009	0.008	0.002	0.008
P-val (25-36 Months): Average effect	0.191	0.041	0.016	0.161	0.014	0.037	0.711	0.019
N	9582	9582	9582	9566	9579	9579	9581	9566
R-Squared	0.165	0.409	0.400	0.130	0.323	0.148	0.236	0.179
Mean of Dep. Var.	0.153	1.757	0.635	0.204	0.282	0.128	0.351	0.157

Notes: Sample includes children 7-36 months of age. Controls include all variables listed in Table 1 Panel B. All regressions include control variables, Birthyear × Birthmonth fixed effects, and survey wave fixed effects. Standard errors clustered at the commune level are in paranthesis. * denotes significance at 0.10; ** at 0.05; and *** at 0.01.

Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table A4: Effect on Anthropometric Measures of Children by Age

	Weight			Height		
	WHZ	Wasted	Extremely Wasted	HAZ	Stunted	Extremely Stunted
	(1)	(2)	(3)	(4)	(5)	(6)
Fatalities	-.00134***	-.000115	.0000305	.000211	-.0000129	-.000315
	(.000337)	(.0000741)	(.0000307)	(.00113)	(.000448)	(.000496)
0-24 Month × Fatalities	-.000536	.000133	.000427*	-.000862	-.000017	.000273
	(.000952)	(.000241)	(.000239)	(.000825)	(.000285)	(.000336)
Coef (25-60 Months): Average effect	-0.029	-0.003	0.001	0.005	-0.000	-0.007
P-val (25-60 Months): Average effect	0.001	0.137	0.331	0.853	0.977	0.532
Coef (0-24 Months): Average effect	-0.041	0.000	0.010	-0.014	-0.001	-0.001
P-val (0-24 Months): Average effect	0.071	0.934	0.081	0.362	0.909	0.842
N	5596	5596	5596	5924	5924	5924
R-Squared	0.228	0.131	0.099	0.192	0.148	0.118
Mean of Dep. Var.	-0.159	0.089	0.028	-1.425	0.376	0.162

Notes: Sample includes children under 5 years of age. All regressions include controls as in Table 2, Birthyear × Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. Standard errors clustered at the district level are in paranthesis. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.

Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table A5: Effect on Children's Illnesses and Use of Medical Care by Age

	Fever or cough		Diarrhea	
	Illness in 2 weeks	Seek medical care	Illness in 2 weeks	Seek medical care
	(1)	(2)	(3)	(4)
Fatalities	.000217	-.00149***	.000245	-.00232***
	(.000248)	(.000224)	(.00023)	(.000526)
0-24 Month × Fatalities	.000119	.00127**	.000322*	.00277***
	(.000166)	(.000487)	(.000164)	(.000713)
Coef (25-60 Months): Average effect	0.005	-0.033	0.005	-0.051
P-val (25-60 Months): Average effect	0.391	0.000	0.299	0.000
Coef (0-24 Months): Average effect	0.007	-0.005	0.012	0.010
P-val (0-24 Months): Average effect	0.323	0.621	0.036	0.195
N	10123	3204	9868	2149
R-Squared	0.097	0.143	0.123	0.220
Mean of Dep. Var.	0.335	0.582	0.243	0.547

Notes: Sample includes children under 5 years of age. In columns (2) and (4) the sample is restricted to children who had been ill with fever or cough, or diarrhea, respectively. All regressions include controls as in Table 2, Birthyear × Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. Standard errors clustered at the district level are in paranthesis. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.

Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table A6: Summary Statistics by Demographic Groups

	0-24 months old			25-60 months old		
	Mean	SD	N	Mean	SD	N
Panel A: Control variables						
Female child	0.50	0.50	4797	0.51	0.50	6427
Age in months	11.87	7.00	4797	41.93	9.97	6427
Household size	8.00	4.44	4797	8.14	4.39	6427
Female-headed household	0.12	0.32	4797	0.13	0.34	6427
wealth index factor score (5 decimals)	-0.64	0.69	4797	-0.64	0.71	6427
Mother: Age	26.73	6.81	4766	29.02	6.97	6293
Mother: Currently married	0.90	0.30	4766	0.92	0.28	6293
Christian	0.51	0.50	4797	0.49	0.50	6427
Muslim	0.37	0.48	4797	0.38	0.49	6427
Rural area	0.74	0.44	4797	0.73	0.44	6427
Mother: Primary school	0.38	0.49	4797	0.36	0.48	6427
Mother: Secondary school	0.13	0.33	4797	0.11	0.31	6427
Mother: More than secondary school	0.01	0.10	4797	0.00	0.06	6427
Panel B: Outcome variables, 0-5 years old						
Height-for-Age Z-score	-1.06	1.74	2766	-1.73	1.48	3302
Weight-for-Height Z-score	-0.39	1.50	2369	0.01	1.25	3381
Had fever in last 2 wks	0.37	0.48	4551	0.31	0.46	5741
Had diarrhea in last 2 wks	0.30	0.46	4526	0.19	0.40	5511
Diarrhea: Seek medical treatment	0.56	0.50	1220	0.53	0.50	969
Fever: Seek medical treatment	0.60	0.49	1568	0.57	0.50	1713
No. of food groups	1.81	1.51	4583	2.25	1.49	1959
Food groups > 4	0.15	0.36	4583	0.21	0.41	1959
	5-12 years old			13-17 years old		
Panel C: Outcome variables, 5-17 years old						
Economic Activities	0.52	0.50	4965	0.69	0.46	1241
Household Tasks	0.75	0.43	4965	0.86	0.34	1241
Attended School	0.61	0.49	4729	0.70	0.46	1195
Dropped Out	0.01	0.08	4729	0.01	0.10	1195
Never Went to School	0.37	0.48	4925	0.19	0.39	1233

Notes: Panel C: Outcome variables, 5-17 years olds A and B report control and outcome variables, respectively, for children under 5 years of age, separately for 0-24-month-olds, and 25-60-month-olds. The variable “Number of food groups” takes values between 0 and 6. Panel C: Outcome variables, 5-17 years old C reports the outcome variables for 5-17-year-olds, separated between 5-12-year-olds and 13-17-year-olds.

Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table A7: Effect on Anthropometric Measures of Children by Age

	Weight			Height		
	WHZ	Wasted	Extremely Wasted	HAZ	Stunted	Extremely Stunted
	(1)	(2)	(3)	(4)	(5)	(6)
Fatalities	-.00116***	-.000127	4.20e-06	-.0000121	-.000134	-.00022
	(.000372)	(.0000992)	(.0000149)	(.00117)	(.000415)	(.00029)
0-36 Month × Fatalities	-.000687	.000142	.000386*	-.000354	.000158	.0000286
	(.00086)	(.000207)	(.000222)	(.000632)	(.00017)	(.000239)
Coef (37-60 Months): Average effect	-0.025	-0.003	0.000	-0.000	-0.003	-0.005
P-val (37-60 Months): Average effect	0.005	0.213	0.782	0.992	0.750	0.456
Coef (0-36 Months): Average effect	-0.040	0.000	0.009	-0.008	0.001	-0.004
P-val (0-36 Months): Average effect	0.035	0.931	0.101	0.611	0.939	0.674
N	5596	5596	5596	5923	5923	5923
R-Squared	0.224	0.125	0.092	0.190	0.148	0.113
Mean of Dep. Var.	-0.160	0.089	0.028	-1.424	0.376	0.162

Notes: Sample includes children under 5 years of age. All regressions include controls as in Table 2, Birthyear × Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. Standard errors clustered at the district level are in paranthesis. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.

Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table A8: Effect on Children's Illnesses and Use of Medical Care by Age

	Fever or cough		Diarrhea	
	Illness in 2 weeks	Seek medical care	Illness in 2 weeks	Seek medical care
	(1)	(2)	(3)	(4)
Fatalities	.000269	-.00126***	.000604***	-.00226***
	(.000167)	(.000287)	(.000133)	(.000782)
0-36 Month × Fatalities	5.22e-08	.000758	-.000354	.00191**
	(.000343)	(.000536)	(.000228)	(.000815)
Coef (37-60 Months): Average effect	0.006	-0.028	0.013	-0.049
P-val (37-60 Months): Average effect	0.123	0.000	0.000	0.009
Coef (0-36 Months): Average effect	0.006	-0.011	0.005	-0.008
P-val (0-36 Months): Average effect	0.512	0.254	0.384	0.271
N	10123	3205	9868	2150
R-Squared	0.098	0.145	0.124	0.215
Mean of Dep. Var.	0.335	0.583	0.243	0.547

Notes: Sample includes children under 5 years of age. In columns (2) and (4) the sample is restricted to children who had been ill with fever or cough, or diarrhea, respectively. All regressions include controls as in Table 2, Birthyear × Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. Standard errors clustered at the district level are in paranthesis. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.

Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table A9: Effect on Anthropometric Measures of Children by Age

	Weight			Height		
	WHZ	Wasted	Extremely Wasted	HAZ	Stunted	Extremely Stunted
	(1)	(2)	(3)	(4)	(5)	(6)
Fatalities	-.00138**	.0000236	.0000137	-.00108	.000961*	.000379
	(.000605)	(.00021)	(.0000234)	(.00196)	(.000501)	(.000328)
0-12 Month × Fatalities	-.00207	.000592	.000835	-.000522	-.000729	.000147
	(.00292)	(.000654)	(.00058)	(.00281)	(.000763)	(.000722)
13-24 Month × Fatalities	.000277	-.00038	.000257*	.000802	-.00121***	-.000836*
	(.000747)	(.000267)	(.00013)	(.0013)	(.00032)	(.000421)
25-36 Month × Fatalities	-.000984	-.0000977	.000179	.00158	-.000819**	-.000862
	(.000751)	(.000261)	(.000115)	(.00126)	(.000391)	(.00114)
37-48 Month × Fatalities	.000344	-.000335	-.0000102	.00197	-.00181***	-.00107***
	(.000653)	(.000199)	(.000029)	(.0016)	(.000389)	(.000246)
Coef (49-60 Months): Average effect	-0.0302	0.000516	0.000300	-0.0236	0.0210	0.00827
P-val (49-60 Months): Average effect	0.0329	0.912	0.564	0.588	0.0687	0.261
Coef (37-48 Months): Average effect	-0.0227	-0.00681	0.0000779	0.0194	-0.0186	-0.0150
P-val (37-48 Months): Average effect	0.0178	0.00000924	0.800	0.214	0.000216	0.00503
Coef (25-36 Months): Average effect	-0.0517	-0.00162	0.00421	0.0110	0.00310	-0.0106
P-val (25-36 Months): Average effect	0.000447	0.588	0.0800	0.661	0.830	0.702
Coef (13-24 Months): Average effect	-0.0241	-0.00779	0.00592	-0.00605	-0.00551	-0.00999
P-val (13-24 Months): Average effect	0.0232	0.00967	0.0291	0.819	0.653	0.434
Coef (0-12 Months): Average effect	-0.0754	0.0135	0.0185	-0.0350	0.00507	0.0115
P-val (0-12 Months): Average effect	0.262	0.318	0.147	0.223	0.543	0.305
N	5590	5590	5590	5917	5917	5917
R-Squared	0.251	0.151	0.124	0.213	0.172	0.143
Mean of Dep. Var.	-0.159	0.089	0.028	-1.426	0.376	0.162

Notes: Sample includes children under 5 years of age. All regressions include controls as in Table 2, Birthyear × Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. Standard errors clustered at the district level are in paranthesis. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.

Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table A10: Effect on Illnesses and Use of Medical Care of Children by Age

	Fever or cough		Diarrhea	
	Illness in 2 weeks	Seek medical care	Illness in 2 weeks	Seek medical care
	(1)	(2)	(3)	(4)
Fatalities	.000724***	-.00212***	.00118***	-.00255***
	(.000226)	(.00036)	(.000205)	(.000809)
0-12 Month × Fatalities	-.000887***	.00114	-.000982***	.000763
	(.000289)	(.001)	(.000319)	(.000969)
13-24 Month × Fatalities	-.000131	.00204***	-.000403**	.00385***
	(.00035)	(.000414)	(.000179)	(.00084)
25-36 Month × Fatalities	-.000668	.0000927	-.00201***	-.000989
	(.000704)	(.000708)	(.000334)	(.000753)
37-48 Month × Fatalities	-.000665*	.00172***	-.000934***	.00147
	(.000326)	(.000512)	(.000137)	(.000867)
Coef (49-60 Months): Average effect	0.0158	-0.0462	0.0257	-0.0556
P-val (49-60 Months): Average effect	0.00420	0.00000775	0.0000106	0.00488
Coef (37-48 Months): Average effect	0.00129	-0.00861	0.00529	-0.0235
P-val (37-48 Months): Average effect	0.812	0.312	0.139	0.136
Coef (25-36 Months): Average effect	0.00122	-0.0442	-0.0181	-0.0772
P-val (25-36 Months): Average effect	0.937	0.00259	0.0832	2.34e-11
Coef (13-24 Months): Average effect	0.0130	-0.00164	0.0169	0.0285
P-val (13-24 Months): Average effect	0.106	0.858	0.00991	0.00685
Coef (0-12 Months): Average effect	-0.00355	-0.0213	0.00424	-0.0389
P-val (0-12 Months): Average effect	0.562	0.359	0.522	0.00552
N	10121	3199	9866	2131
R-Squared	0.112	0.193	0.138	0.274
Mean of Dep. Var.	0.335	0.582	0.243	0.547

Notes: Sample includes children under 5 years of age. All regressions include controls as in Table 2, Birthyear × Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. Standard errors clustered at the district level are in paranthesis. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.
Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table A11: Effect on Mortality Measures

	Neonatal	Infant	U5
	(1)	(2)	(3)
Panel A			
Fatalities	-.000037	4.32e-06	.0000278
	(.0000414)	(.0000219)	(.000118)
Born after first attack	-.0227*		
	(.0116)		
Fatalities*Born after first attack	.0000994		
	(.00013)		
Under 1 after first attack		-.0419	
		(.0275)	
Fatalities*Under 1 after first attack		-.0000617	
		(.000114)	
Under 5 after first attack			-.024
			(.0251)
Fatalities*Under 5 after first attack			-.000116
			(.000142)
Control	Yes	Yes	Yes
Coef: Average effect	-0.001	0.000	0.001
P-val: Average effect	0.381	0.846	0.816
R-Squared	0.068	0.075	0.087
Panel B: Without control variables			
Fatalities	-1.50e-06	.0000359	.0000919
	(.0000564)	(.0000219)	(.000137)
Born after first attack	-.0375***		
	(.0111)		
Fatalities*Born after first attack	.000147		
	(.000133)		
Under 1 after first attack		-.0546**	
		(.0222)	
Fatalities*Under 1 after first attack		-9.23e-06	
		(.0000965)	
Under 5 after first attack			-.0487**
			(.021)
Fatalities*Under 5 after first attack			-.000024
			(.000151)
Coef: Average effect	-0.000	0.001	0.002
P-val: Average effect	0.979	0.117	0.510
N	9347	9347	9347
R-Squared	0.061	0.065	0.071
Mean of Dep. Var.	0.035	0.077	0.122

Notes: Sample includes all births to women aged 15–49 in the 2014 MICS. The dependent variables are: (1) Neonatal mortality (death within first month), (2) Infant mortality (death before first birthday), and (3) Under-five mortality (death before age five). The key independent variable is an interaction between the number of conflict-related fatalities within 20 km and indicators for whether the child was (1) born, (2) under age 1, or (3) under age 5 after the first nearby attack. Panel A includes controls, Panel B does not. Controls include all variables listed in Table 1 Panel B. All regressions include Birthyear $\times$ Birthmonth fixed effects and district fixed effects. Standard errors clustered at the district level are in paranthesis. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.
Source: Multiple Indicator Cluster Surveys (MICS) 2014.

Table A12: Effect on Stock variables

	Demographic characterstics
	(1)
Female child	.000169***
	(.0000547)
Household size	.00157
	(.00247)
Female-headed household	-.0000507
	(.0000773)
Wealth Index	4.02e-19
	(6.82e-19)
Mother: Age	-1.86e-20
	(1.11e-18)
Mother: Currently married	-8.90e-20
	(6.32e-20)
Christian	5.24e-19
	(4.11e-19)
Muslim	.00163*
	(.000857)
Rural area	-2.04e-19*
	(1.06e-19)
Mother: Primary school	1.21e-18
	(1.10e-18)
Mother: Secondary school	-.000116
	(.000134)
Mother: More than secondary school	.000028
	(.000024)
Observations	11059

Notes: Sample includes children under 5 years of age. All regressions include control variables. Controls include all variables listed in Table 1 Panel A. All regressions include Birthyear × Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. Standard errors clustered at the district level are in paranthesis. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.
Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table A13: Pre-2014 difference on control variables

	Household characteristics						Individual characteristics					
	Household size	Female household head	Welath index	Christian	Muslim	Living in rural area	Female child	Age in months	Mother's age	Mother: married	Mother: Completed primary school	Mother : Completed secondary school
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: 2004												
Living within 20km from 2014 conflict area in 2004	.132	-.00249	.482**	-.138***	.258**	-.176	-.0602***	.00129	.526	-.0307	-.0108	.0319
	(.329)	(.00623)	(.195)	(.037)	(.101)	(.11)	(.0207)	(.267)	(.906)	(.0242)	(.0382)	(.0264)
N	3261	3261	3261	3261	3261	3261	3261	3261	3261	3261	3261	3261
R-Squared	0.067	0.106	0.249	0.306	0.342	0.129	0.024	0.997	0.070	0.078	0.208	0.109
Mean of Dep. Var.	8.160	0.109	-0.624	0.481	0.377	0.734	0.498	29.481	27.638	0.926	0.346	0.075
Panel B: 2011												
Living within 20km from 2014 conflict area in 2011	.354	-.0242	.361	.0571	-.0557	-.225	-.0199	-.444	.123	-.00336	.0275	-.0201
	(.49)	(.0343)	(.219)	(.0742)	(.127)	(.149)	(.0275)	(.29)	(.477)	(.0146)	(.0552)	(.0176)
N	5382	5382	5382	5382	5382	5382	5382	5382	5382	5382	5382	5382
R-Squared	0.065	0.096	0.223	0.246	0.262	0.101	0.016	0.996	0.050	0.122	0.120	0.100
Mean of Dep. Var.	8.250	0.132	-0.615	0.519	0.401	0.743	0.515	28.931	28.018	0.906	0.401	0.099
Panel C: 2004 and 2011 joint test for trend												
Living within 20km from 2014 conflict area in 2004	.0131	.0228	.417**	-.171***	.276**	-.182	-.0424**	-.253	-.0327	-.0367*	-.0231	.0136
	(.394)	(.0177)	(.181)	(.058)	(.125)	(.109)	(.0189)	(.487)	(.879)	(.0182)	(.0352)	(.02)
Living within 20km from 2014 conflict area in 2011	.00259	-.0505***	.349**	-.0125	.00459	-.181*	-.0106	-.00901	.298	.0233*	-.0528	-.00724
	(.461)	(.0169)	(.136)	(.103)	(.161)	(.0939)	(.0166)	(.348)	(.264)	(.0134)	(.0574)	(.0255)
P-val: 2004 = 2011	0.961	0.014	0.306	0.022	0.003	0.987	0.117	0.580	0.680	0.005	0.515	0.447
R-Squared	0.052	0.080	0.215	0.145	0.151	0.107	0.019	0.995	0.059	0.084	0.109	0.131
Mean of Dep. Var.	8.080	0.135	-0.593	0.528	0.365	0.735	0.503	29.043	28.028	0.896	0.391	0.133

Notes: All regressions include Birthyear $\times$ Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. Standard errors clustered at the district level are in paranthesis. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.
Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table A14: Effect on Anthropometric Measures of Children

	Weight			Height		
	WHZ	Wasted	Extremely Wasted	HAZ	Stunted	Extremely Stunted
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: 2004						
Total N of 2014 fatalities in 20km in 2004	-.000156	.0000385	-1.59e-06	.000877	-.000226*	-.0000676
	(.000275)	(.0000795)	(.0000524)	(.000543)	(.000114)	(.00012)
	[1]	[1]	[1]	[.573]	[.573]	[1]
Control	Yes	Yes	Yes	Yes	Yes	Yes
Coef: Average effect	-0.003	0.001	-0.000	0.019	-0.005	-0.001
P-val: Average effect	0.577	0.634	0.976	0.121	0.061	0.578
R-Squared	0.231	0.132	0.108	0.200	0.154	0.116
Panel B: 2011						
Total N of 2014 fatalities in 20km in 2011	.0000263	-.0000543	-.0000543***	-.000359	.000151	.0000832*
	(.0000827)	(.000036)	(.0000191)	(.000368)	(.000111)	(.0000475)
	[.391]	[.306]	[.062]	[.391]	[.306]	[.306]
Coef: Average effect	0.001	-0.001	-0.001	-0.008	0.003	0.002
P-val: Average effect	0.754	0.146	0.010	0.340	0.187	0.095
N	3295	3295	3295	3636	3636	3636
R-Squared	0.231	0.132	0.109	0.200	0.154	0.116
Mean of Dep. Var.	-0.275	0.103	0.037	-1.502	0.406	0.187

Notes: Sample includes children under 5 years of age. Panel A uses outcomes from 2004, while Panel B uses outcomes from 2011. Controls include all variables listed in Table 1. All regressions include Birthyear × Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. Standard errors clustered at the district level are in paranthesis, and sharpened q-value in square brackets. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.
Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table A15: Effect on Anthropometric Measures and Illness of Children (Sensitivity on Distance to Conflict)

	HAZ	WHZ	Stunted	Wasted
	(1)	(2)	(3)	(4)
Panel A: Anthropometric measures				
Fatalities in 40km 12-month recall	.000274	-.000394*	-.0000355	.0000317
	(.000227)	(.000199)	(.0000819)	(.0000477)
Coef: Average effect	0.006	-0.009	-0.001	0.001
P-val: Average effect	0.240	0.061	0.669	0.513
N	5929	5606	5929	5606
R-Squared	0.163	0.209	0.123	0.108
Mean of Dep. Var.	-1.424	-0.162	0.376	0.089

	Fever in 2 weeks	Fever: Seek medical care	Diarrhea in 2 weeks	Diarrhea: Seek medical care
	(1)	(2)	(3)	(4)
Panel B: Illness and medical service use				
Fatalities in 40km 12-month recall	.000181*	-.000125	.0000597	-.0000316
	(.0000959)	(.000117)	(.0000938)	(.0000692)
Coef: Average effect	0.004	-0.003	0.001	-0.001
P-val: Average effect	0.073	0.295	0.531	0.653
N	10127	3207	9872	2159
R-Squared	0.087	0.115	0.103	0.176
Mean of Dep. Var.	0.335	0.582	0.243	0.548

Notes: Sample includes children under 5 years of age. All models include control variables listed in Table 1 Panel B: Illness and medical service use A. All regressions include Birthyear × Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. Variable 'Fatalities in 40km' denotes the number of fatalities within a 40km radius in the last 12 months. All models include sample weights. Standard errors clustered at the district level are in paranthesis. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.
Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table A16: Effect on Anthropometric Measures and Illness of Children (Seasonality in Birth Month)

	HAZ	WHZ	Stunted	Wasted
	(1)	(2)	(3)	(4)
Panel A: Anthropometric measures				
Fatalities in 20km	-.000361	-.00154**	.0000393	-.0000278
	(.000695)	(.000577)	(.000257)	(.00012)
Coef: Average effect	-0.008	-0.034	0.001	-0.001
P-val: Average effect	0.609	0.014	0.880	0.819
N	5929	5606	5929	5606
R-Squared	0.163	0.209	0.123	0.107
Mean of Dep. Var.	-1.424	-0.162	0.376	0.089

	Fever in 2 weeks	Fever: Seek medical care	Diarrhea in 2 weeks	Diarrhea: Seek medical care
	(1)	(2)	(3)	(4)
Panel B: Illness and medical service use				
Fatalities in 20km	.000309	-.000736***	.000394*	-.000538**
	(.000286)	(.000256)	(.000203)	(.000245)
Coef: Average effect	0.007	-0.016	0.009	-0.012
P-val: Average effect	0.292	0.009	0.065	0.040
N	10127	3207	9872	2159
R-Squared	0.086	0.115	0.103	0.176
Mean of Dep. Var.	0.335	0.582	0.243	0.548

Notes: Sample includes children under 5 years of age. All models include control variables listed in Table 1 Panel B: Illness and medical service use A. All regressions include Birthyear fixed effects, and Birthmonth fixed effects, survey wave fixed effects, and commune fixed effects. Standard errors clustered at the district level are in paranthesis. All models include sample weights. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.
Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.

Table A17: Summary Statistics by Survey Year

	2004			2011			2014		
	Mean	SD	N	Mean	SD	N	Mean	SD	N
Panel A: Control variables									
Female child	0.50	0.50	3261	0.52	0.50	5382	0.47	0.50	2632
Age in months	29.64	17.22	3261	28.98	17.42	5382	28.83	17.06	2581
Household size	8.15	4.79	3261	8.22	4.31	5382	7.69	4.04	2632
Female-headed household	0.12	0.32	3261	0.11	0.32	5382	0.16	0.37	2632
wealth index factor score (5 decimals)	-0.65	0.68	3261	-0.65	0.69	5382	-0.60	0.77	2632
Mother: Age	27.64	6.90	3261	28.06	6.91	5382	28.58	7.30	2434
Mother: Currently married	0.92	0.27	3261	0.92	0.27	5382	0.86	0.35	2434
Christian	0.47	0.50	3261	0.50	0.50	5382	0.53	0.50	2632
Muslim	0.37	0.48	3261	0.40	0.49	5382	0.35	0.48	2632
Rural area	0.71	0.45	3261	0.74	0.44	5382	0.77	0.42	2632
Mother: Primary school	0.35	0.48	3261	0.37	0.48	5382	0.41	0.49	2632
Mother: Secondary school	0.07	0.26	3261	0.09	0.28	5382	0.23	0.42	2632
Mother: More than secondary school	0.00	0.05	3261	0.01	0.08	5382	0.01	0.12	2632
Panel B: Outcome variables, 0-5 years old									
Height-for-Age Z-score	-1.50	1.73	1337	-1.51	1.68	2299	-1.29	1.54	2432
Weight-for-Height Z-score	-0.24	1.40	1204	-0.30	1.38	2091	0.01	1.33	2455
Had fever in last 2 wks	0.23	0.42	2903	0.35	0.48	4808	0.44	0.50	2581
Had diarrhea in last 2 wks	0.21	0.41	2800	0.28	0.45	4656	0.22	0.41	2581
Diarrhea: Seek medical treatment	0.44	0.50	529	0.56	0.50	1160	0.64	0.48	500
Fever: Seek medical treatment	0.66	0.47	604	0.55	0.50	1541	0.58	0.49	1136
No. of food groups	2.02	1.57	1851	1.68	1.43	3079	2.35	1.52	1663
Food groups > 4	0.21	0.41	1851	0.11	0.32	3079	0.23	0.42	1663
Panel C: Outcome variables, 5-17 years old									
Economic Activities				0.55	0.50	4516	0.54	0.50	1690
Household Tasks				0.77	0.42	4516	0.81	0.39	1690
Attended School				0.62	0.48	4468	0.92	0.27	1456
Dropped Out				0.01	0.08	4468	0.01	0.09	1456
Never Went to School				0.34	0.47	4468	0.18	0.38	1690

Notes: Number of food groups takes values between 0 and 6. Columns (1) to (3) reports mean and standard deviations (in parenthesis) of the variables while Column (4) reports the mean difference and its p-values in parenthesis between the conflict exposed area prior to conflict events and never-exposed areas.
Source: Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011, and the ACLED datase.

Table A18: Mean comparison of variables by conflict exposure in 2014

	Conflict in 20km		No conflict in 20km		Conflict vs. No-conflict		N
	Mean	SD	Mean	SD	Coef.	SE	
Panel A: Control variables							
Female child	0.464	[0.500]	0.473	[0.499]	-0.009	(0.014)	2581
Age in months	30.4	[17.4]	28.7	[17.0]	1.68	(1.07)	2581
Household size	8.65	[5.70]	7.59	[3.81]	1.06	(0.880)	2581
Female-headed household	0.097	[0.297]	0.170	[0.376]	-0.073**	(0.034)	2581
wealth index factor score (5 decimals)	-0.920	[0.808]	-0.563	[0.757]	-0.357	(0.211)	2581
Mother: Age	29.5	[6.98]	28.5	[7.32]	1.01*	(0.518)	2416
Mother: Currently married	0.931	[0.254]	0.853	[0.354]	0.078***	(0.028)	2416
Christian	0.219	[0.414]	0.560	[0.496]	-0.342***	(0.110)	2581
Muslim	0.568	[0.496]	0.326	[0.469]	0.242	(0.219)	2581
Rural area	0.845	[0.362]	0.757	[0.429]	0.089	(0.120)	2581
Mother: Primary school	0.158	[0.365]	0.432	[0.495]	-0.274***	(0.081)	2581
Mother: Secondary school	0.131	[0.338]	0.244	[0.429]	-0.113	(0.081)	2581
Mother: More than secondary school	0	[0]	0.015	[0.121]	-0.015***	(0.005)	2581
Panel B: Outcome variables, 0-5 years old							
Height-for-Age Z-score	-1.30	[1.55]	-1.29	[1.54]	-0.010	(0.201)	2432
Weight-for-Height Z-score	-0.603	[1.29]	0.080	[1.32]	-0.683**	(0.261)	2455
Had fever in last 2 wks	0.488	[0.501]	0.433	[0.496]	0.055	(0.072)	2581
Had diarrhea in last 2 wks	0.313	[0.465]	0.207	[0.406]	0.106	(0.070)	2581
Diarrhea: Seek medical treatment	0.643	[0.482]	0.638	[0.481]	0.005	(0.042)	500
Fever: Seek medical treatment	0.460	[0.500]	0.590	[0.492]	-0.130	(0.093)	1136
No. of food groups	2.67	[1.66]	2.31	[1.50]	0.352**	(0.130)	1612
Food groups > 4	0.355	[0.480]	0.219	[0.414]	0.136*	(0.078)	1612
Panel C: Outcome variables, 5-17 years old							
Economic Activities	0.513	[0.502]	0.547	[0.498]	-0.034	(0.035)	1690
Household Tasks	0.856	[0.352]	0.811	[0.391]	0.045**	(0.019)	1690
Attended School	0.840	[0.370]	0.927	[0.260]	-0.087	(0.062)	1456
Dropped Out	0.046	[0.211]	0.007	[0.085]	0.039*	(0.022)	1456
Never Went to School	0.522	[0.501]	0.147	[0.354]	0.376*	(0.218)	1690

Notes: Panel A reports control variables, Panel B the outcome variables for 0-5-year-olds, where the variable "Number of food groups" takes values between 0 and 6, and Panel C reports the outcome variables for 5-17 year-olds for 2014 data only.The statistics under "Conflict in 20km" and "No Conflict in 20km" report the mean and standard deviation (in square brackets) of these samples.The statistics under "Conflict vs. No-conflict" report the mean difference conducted using a t-test on the sample that was exposed to conflict in the 20km radius in the 12 months prior to the survey, and the sample that was not exposed.The standard errors of the t-tests are in parenthesis. * denotes significance at 0.10; ** at 0.05; and *** at 0.01.

Source: Multiple Indicator Cluster Surveys (MICS) 2014

Appendix B: Effects on older children (5-17 years old)

Conflict might also affect which activities children engage in. We investigate this by using data from an older group of children, aged between 5 to 17 years, who are most often engaged in either work or schooling. Children's time use may be affected through an intra-household substitution effect if children need to take up adults' activities due to changes in adults' time use as a consequence of conflict, or as a response to household income losses due to conflict, which may move children's time use towards economic activities. For instance, foregone income could be substituted by engaging children in subsistence farming. However, security threats from conflict and constraints in mobility may decrease children's participation in any activity outside the household. Indeed, evidence from North-East Nigeria shows that Boko Haram activity reduced school attendance (Bertoni et al., 2019). While the authors do not investigate effects on child labor, a reduction in time spent in school could result in increased child labor or time spent on household chores.

Table B1 reports the estimated effects on child labor, household chores, and schooling. Columns (1) and (2) are for the extensive margin of children's work; the dependent variables are dummies denoting whether a child of age 5-17 worked at any economic activity (outside of the household), and participated in household tasks, respectively. Indeed, child labor is highly prevalent; over 50 percent of children involved in economic activities, while as many as 77 percent of children in this age group participate in household chores. While we do not find a decrease in the participation in economic activities outside the household, we find an increase in the share of children participating in household chores, statistically significant at the five percent level. This 0.9 percentage points increase in household chores translates to 1.2 percent increase from the mean.

Columns (3)-(5) of Table B1 show results for children's educational outcomes. If there was a reduction in school attendance, measured by whether a child attended school during any time of the school year 2013-14, we could hypothesize that the very first attacks in 2013 led to pulling children entirely out of school during the school year 2013-14. However, we find that attendance did not change substantially. On the other hand, the propensity to drop out of school between the 2012-13 and 2013-14 school years increased. It implies that we do find an increase in the *change* of attendance from one school year to another. Given that on average only 0.7 percent of children drop out at all, our mean effect of 0.2 percentage points indicates a 28 percent increase in dropout as a consequence of conflict. Column (5) shows results for a variable "Never went to school", which is a stock variable and less likely to have been affected by the conflict, as most of the children in the sample would have started school before the conflict began. Therefore, this dependent variable can be considered a placebo-check, resulting in null results as expected. Taken together, children 5-17 years of age seem to have increased their participation in household tasks, some at the expense of schooling.

Table B2 explores heterogeneity in these effects by school age group. While changes in work activities are qualitatively similar across primary (6-12 years) and secondary (13-17 years) school-age children, educational outcomes differ: secondary school-age children show increased dropout rates, whereas primary school-age children exhibit higher school attendance. This suggests that the trade-off between household tasks and schooling was driven primarily by secondary school-age children.

Table B1: Effect on Child Schooling and Labor (5-17 years old)

	Work		Schooling		
	Economic activities	Household tasks	Attended school	Dropped out	Never went to school
	(1)	(2)	(3)	(4)	(5)
Panel A					
Fatalities	-.000715	.000463**	.00119	.00011***	.00138
	(.000552)	(.000219)	(.000843)	(.0000356)	(.00116)
Control	Yes	Yes	Yes	Yes	Yes
Coef: Average effect	-0.016	0.010	0.026	0.002	0.030
P-val: Average effect	0.209	0.047	0.173	0.006	0.248
R-Squared	0.199	0.215	0.325	0.013	0.354
Panel B: Without control variables					
Fatalities	-.000588	.000461*	.00114	.000107**	.00156
	(.000536)	(.000239)	(.000819)	(.0000381)	(.0012)
Coef: Average effect	-0.013	0.010	0.025	0.002	0.034
P-val: Average effect	0.285	0.067	0.177	0.011	0.208
N	6206	6206	5924	5924	6158
R-Squared	0.176	0.195	0.288	0.008	0.317
Mean of Dep. Var.	0.546	0.770	0.623	0.007	0.340

Notes: Sample includes children 5-17 years of age. Dependent variables in columns (1) and (2) are dummy variables denoting whether the child participated in any economic activities outside of the household, and in household tasks, respectively, in the 7 days preceding the survey. Dependent variables in columns (3)-(5) are dummy variables denoting school attendance in the 2013-14 school year, whether the child dropped out between the 2012-13 and 2013-14 school years, and whether the child ever attended school. Panel A includes control variables, Panel B does not. Controls include all variables listed in Table 1. All regressions include Birthyear × Birthmonth fixed effects, survey wave fixed effects, and district fixed effects. All models include sample weights. Standard errors clustered at the district level are in paranthesis, and sharpened q-value in square brackets. * denotes significance at 0.10; ** at 0.05; and *** at 0.01 level.

Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2011.

Table B2: Effect on Child Schooling and Work by school age group

	Work		Schooling		
	Economic activities	Household tasks	Attended school	Dropped out	Never went to school
	(1)	(2)	(3)	(4)	(5)
Panel A: Primary school age (6-12 years old)					
Fatalities	-.000906	.000502*	.00187***	6.75e-06	.00173
	(.000641)	(.000251)	(.000276)	(.000032)	(.00104)
Control	Yes	Yes	Yes	Yes	Yes
Coef: Average effect	-0.020	0.011	0.041	0.000	0.038
P-val: Average effect	0.172	0.058	0.000	0.835	0.110
R-Squared	0.177	0.138	0.269	0.018	0.277
Panel B: Secondary school age (13-17 years old)					
Fatalities	-.000791	.000448*	-.000311	.000342*	.00115
	(.000583)	(.00024)	(.00143)	(.000186)	(.000788)
Coef: Average effect	-0.017	0.010	-0.007	0.007	0.025
P-val: Average effect	0.189	0.076	0.830	0.080	0.158
N	1239	1239	1193	1193	1231
R-Squared	0.160	0.112	0.221	0.030	0.225
Mean of Dep. Var.	0.690	0.864	0.695	0.010	0.189

Notes: All regressions include control variables. Controls include all variables listed in Table 1. All regressions include Year × Month fixed effects, and survey wave fixed effects. Standard errors clustered at the commune level are in paranthesis. * denotes significance at 0.10; ** at 0.05; and *** at 0.01.

Source: Pooled dataset using Multiple Indicator Cluster Surveys (MICS) 2014 and Demographic and Health Survey (DHS) from 2004 and 2011.