Terror and Birth Weight: Evidence from Boko Haram Attacks*

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Abstract

The paper examines the effect of terrorism on child health. We exploit geographical variation in terror attacks of Boko Haram in Nigeria to show that prenatal exposure to terror attacks reduces infant birth weight and increases the risk of having a child with low birth weight. These effects are stronger for mother's with less education. In addition, we find evidence that parents compensate for exposure to terror by investing more in post-natal care.

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1 Introduction

The April 2014 kidnapping of 276 female students by Boko Haram in Chibok, Nigeria, has renewed attention on the effects of extreme forms of terror activity. The kidnap adds to a 7 year history of violence. Counting all incidents and years since 2009, the yearly prevalence of terror events related to Boko Haram, according to the Armed Conflict and Location Event Data Project (ACLED), is over 300, with a peak of more than 400 in 2015. The cumulated death toll of these terror events exceeds 7000 people. The intensity of these attacks makes Boko Haram one of the deadliest terrorist groups in the world.[1]

This paper examines how Boko Haram terror attacks has affected child health through prenatal exposure. We study the impact of terror with one motivation in mind. We are interested in the indirect effect of terrorism on child health through birth weight. Low birth weight is widely held to be an indicator for poor infant health.[2] Several studies have highlighted the cost and possible impact of low birth weight on child health and future status. Infants with low birth weight experience severe health and developmental difficulties with societal costs (Almond *et al.*, 2005). Babies with low birth have poorer outcomes in terms of mortality rates, educational attainment and earnings (Black *et al.*, 2007; Oreopoulos *et al.*, 2008; Royer, 2009). Low birth weight is also a predictor of future outcomes amongst mothers born into the same family. Women whose mother had low birth weight have a higher chance of having low birth weight, live in a poorer area and have less education at the time of child birth (Currie and Moretti, 2007).

The focus on the impact of terror attacks on birth weight ensures the avoidance of potential confounding factors associated with other forms of violence across the country.[3] In addition, restricting the analysis to a single terror group presents an ideal experiment to assess the effect of persistent terror attacks on households. To quantify the effect of terror attacks on child health, we combined detailed violent data from ACLED with a health survey data conducted approximately four years after the start of terror attacks by Boko Haram. We exploit the variation in fatalities from terror attacks and locations to examine the effect of terror on birth weight reduction and the probability of low birth weight.

The results show that in targeted areas, terror attack reduces birth weight of exposed cohort by 4.67 grams and leads to increase in risk of low birth weight by 0.4 percentage point. The bulk of the impact is experienced by children exposed in the first trimester of pregnancy. While the analysis captures only part of the picture, it provides new evidence on the effects of terror on birth outcomes using microdata in Nigeria. Our results are consistent with existing literature that show that shocks during pregnancy negatively affect child health.

[1] See Global Terrorism Index (2015)

[2] Low birth weight as defined by the World Health Organization (WHO) is the weight at birth of less than 2,500 grams (5.5 pounds). See World Health Organization (2011).

[3] For instance, religious conflict, violence between ethnic groups or conflict related to oil.

Previous studies have compared cohorts exposed to terror to those not exposed, under the identifying assumption that terror attacks are random.[4] Similarly, we estimate the effect of timing of terror attacks by comparing births over periods where terror attacks overlap with pregnancy to those where terror attacks do not. In other words, our results constitute an "intent-to-treat" effect which rely on the assumption that pregnancies are not timed relative to attacks of terror. However, we control for possible confounding factors such as migration, fatalities from other conflict events such as clashes between ethnic groups, household displacement, rainfall and temperature shocks, mother fixed effects, state-by-year fixed effects and linear trends. The results are also robust when fatalities are scaled by district population or fatalities from neighboring districts are used as controls.

Our findings add to growing body of literature on the economic costs of terror (Becker and Murphy, 2001; Abadie and Gardeazabal, 2003; Krueger, 2007; Berman and Laitin, 2008) and the effect of prenatal exposure to shock on infant health (Almond and Currie, 2011; Currie and Neidell, 2005; Currie, 2011; Paxson and Schady, 2005; Banerjee *et al.*, 2010; Dehejia and Lleras-Muney, 2004; Meng and Qian, 2009). Specifically, it provides additional micro-level evidence of the impact of negative shocks on birth outcomes in a developing country context. The remaining part of the paper proceeds as follows: Section 2 gives a brief background on Boko Haram and reviews the literature on the costs of terror and the impact of shocks to infant health. Section 3 describes the data and the empirical analysis. Section 4 presents the results and Section 5 concludes.

[4]See, for example, Camacho (2008). The identifying assumption behind this is that local terror attacks are unpredictable and are not correlated early-life health of a newborn child.

2 Institutional Context and Literature review

2.1 A brief history of Boko Haram

Boko Haram which translates to western education is forbidden was founded in 2002 with the aim to create a strict Islamic state in the north of Nigeria to address societal ills such as corruption and bad governance. However, it was not until mid-2009 that it turned to large-scale terrorist activity which has steadily increased to an average of 1175 fatalities per year between 2009-2014.[5] The group claimed responsibility for nearly all terrorist acts in Nigeria ranging from armed assaults, bombings and kidnappings. These attacks have led to internal displacement of more than a million people.[6]

Figure 1 shows the number of terror events related to Boko Haram. Since 2009, at least 120 events per year are associated with Boko Haram. The sharp increase in terror incidents in 2012 led to the declaration of martial law in certain northern states in May 2013.[7] This, however, did not reduce the intensity of the terror attacks nor the number of deaths from the attacks. Figure 2 reveals that there has been a steady increase in the number of fatalities from Boko Haram attacks since 2011. The number of deaths related to the group peaked at above 8000 in 2015. The spatial distribution of the intensity of terror attacks (see Figure 3) show a large concentration of fatalities in northeastern part of Nigeria. This is possibly because the base of Boko Haram operations is situated in the northern border separating Nigeria from Niger Republic and Cameroon.[8]

2.2 Prior Literature on shocks to infant health

In recent years, there has been an increasing amount of literature on the effect of maternal trauma on infant health. This trauma could result from several factors such as famine, economic shocks, pollution or conflict.[9]

Famine affects the newborn through the well-documented effect of nutrition on fetal health. Results show that cohorts affected during later stages of pregnancy experienced reductions in birth weight. For instance, Roseboom *et al.* (2011) examined the effect of malnutrition on infants born during the 1944-45 wartime famine in Holland. They found that mid or late gestation exposure to famine resulted in low birth weights, head circumference and length amongst affected cohorts.[10]

[5] The total number of fatalities within this period was 7047 deaths. See Raleigh *et al.* (2010).

[6] See Internal Displacement Monitoring Centre (2015)

[7] See `http://www.reuters.com/article/us-nigeria-emergency-idUSBRE94D0ZH20130514`

[8] Boko Haram attacks in northeastern Nigeria is 55 times as large compared to the rest of the country.

[9] See Almond and Currie (2011) and Currie (2013) for review.

[10] In a recent study, Hult *et al.* (2010) found that cohorts exposed to undernutrition and in infancy in the Biafra famine during the Nigerian civil war (1967-1970) have increased prevalence of hypertension on order of 9.5 to 24 percent and type 2 diabetes from 8 to 13 percent when they reach the age of 40. Early childhood exposure to the famine led to increased prevalence of adult blood pressure within the range of 9.5

Almond and Mazumder (2011) show the effect of maternal fasting on the child in utero. Their study show that pre-natal exposure to maternal fasting during Ramadan is associated with lower birth weight and has a 22-23% likelihood of leading to disability of the infant in adulthood.[11] Intrauterine exposure to famine also has long term effects in terms of schooling and socioeconomic outcomes. Relative to unexposed cohorts, cohorts exposed to the Chinese famine (1959-1961) in utero attain 0.58 fewer years of schooling (Meng and Qian, 2009); are 3-6% less likely to work and 12-13% more likely to be disabled (Almond *et al.*, 2007). Exposure of maternal health to disease environment also have latent effects on children in utero. Using 1989-2009 Vital Statistics natality microdata, Almond *et al.* (2012) found that disease exposure to early childhood increases diabetes incidences and associated with poor socioeconomic outcomes and maternal behavior.

Economic shocks around the time of birth are likely determinants of birth weight since it creates maternal stress which affects the child in utero. However, findings are less consistent than the famine channel. Dehejia and Lleras-Muney (2004) provide evidence that children conceived during periods of recession have reduced incidence of low birth weight.[12] In contrast, Van den Berg *et al.* (2006) show that a child born during a recession lives a few years less than a chid born during a boom period. Their study indicates that maternal stress from economic conditions presupposes the infant to a high mortality rate later in life.

Prenatal exposure to pollution increases the risk of negative health outcomes for the infant in utero. A natural experiment study by Currie *et al.* (2009) shows that infants exposed in utero to high levels of carbon monoxide (CO) had low birth weight and gestation length relative to siblings and with an increase in death risk of 2.5%.[13] In addition, Coneus and Spiess (2012) find that an average increase in CO exposure in the last trimester reduces birth weight by 289g for infants and increases the likelihood of bronchitis and respiratory diseases for toddlers. Achyuta *et al.* (2016) show that a standard deviation increase in utero exposure to PM2.5 leads to a 0.39 percentage point increase in infant mortality.

Exposure to conflict is another potential mechanism that affects infant health. Recent studies show that child in utero is affected through psychological stress experienced by the mother. Using 2000-2005 al-Aqsa Intifada in Palestine, Mansour and Rees (2012) find that additional conflict fatality in the first and last trimester increases the probability of low birth weight by 0.003 and 0.002 percentage points respectively. Torche and Shwed (2015) show that exposure to war in the first and second trimesters of pregnancy lowers infant birth weight by 13 and 16 grams respectively.

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to 16 percent.

[11]A further study by Almond *et al.* (2014) indicate that this affects subsequent academic outcomes of the child at the age of 7. They find that test scores are 0.05-0.08 standard deviations lower for students exposed to Ramadan in first trimester of pregnancy.

[12]Banerjee *et al.* (2010) find that income shocks decrease height in the long-run but do not affect health outcomes or life expectancy.

[13]See Currie (2011, 2013) for recent summaries of this literature.

The present study confirms previous finds and contributes additional evidence that suggests a relationship between infant health and in utero terror exposure. Our study is closely related to Camacho (2008) who shows that prenatal exposure to landmine explosions reduces birth weight by 8.7 grams relative to sibling not exposed to explosions.

3 Data and Estimation

3.1 Data

We use the 2013 Nigeria Demographic and Health Survey (NDHS) data. The NDHS contains data on 38,522 households interviewed between February and June 2013. Information at the household level relates to birth registration, maternal education and age, marital status, paternal demographic characteristics, maternal behavior during pregnancy (e.g. number of prenatal visits) and infant health at birth. Our analysis uses infant early-life health outcomes, in particular, weight at birth.

Data on fatalities caused by Boko Haram attacks are collected from Armed Conflict and Location Events Data project. The data contains daily on attacks and deaths related to Boko Haram. We collate the information on a monthly basis and construct three terror exposure measures. The first measure is defined as terror fatalities that occur in the first trimester of pregnancy. In other words, terror fatalities that occur 9-6 months before birth. The second measure is terror fatalities that occur in the second trimester of pregnancy (5-3 months before birth). The third measure of terror exposure is terror fatalities that occur in the last trimester of pregnancy (2-0 months before birth).

Subsequently, we match our measures of terror exposure with household data from the 2013 NDHS by district of residence.[14] Our analysis is focused on terror attacks in the northern part of Nigeria. As discussed in section 2, the larger part of terror attacks occurred in areas of the northern region especially in states such as Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe. We estimate the effect of terror on infants born to ever married women living in the northern region at the time of the survey .[15]

Table 1 provides the descriptive statistics of the data. The sample comprises of 1169 children born between July 2009 and July 2013 (a period of 48 months). We focus on mothers aged 15-49 at the time of the interview. Each woman is asked a series of fertility and health related questions pertaining to date of child birth, number of prenatal care visits, place of delivery, medical attention during pregnancy, weight of the infant at birth, religion and ethnicity. Information on gestation duration is not recorded in the NDHS. The mean birth weight of infant in the total sample is 3068

[14] This is based on the assumption that district of residence is the same as district of birth.

[15] The upsurge in terror attacks started in July 2009 and July 2013 is the final birth entry in the health survey.

grams. 12 percent of the children in our sample weighed less than 2500 grams with an extra 5 percent weighing exactly 2500 grams.

3.2 Empirical model

We use a difference-in-differences approach to relate variation in terror intensity to trimesters of birth of child i as follows:

$$Y_i = \alpha_0 + \sum_{j=1}^{3} \alpha_j \times Trimester_j \times TerrorExposure_d + \beta X_i + \tau_{yob} + \gamma_{mob} + \lambda_{dist} + \varepsilon_i \quad (1)$$

where Y_i is the dependent variable of interest. $Trimester_j$ is an indicator variable for the three trimesters of pregnancy ; $TerrorExposure_d$ is the number of casualties from terror attack in district d. The interaction between $Trimester_j$ and $TerrorExposure_d$ capture terror exposure during pregnancy trimesters.[16] X_i is a vector of individual characteristics such as gender, twin and first born indicators, mother's education, mother's age at birth, mother's age at marriage, father's education and occupation. We control for year of birth (τ_{yob}), month of birth (γ_{mob}) and birth district (λ_{dist}). ε_i is a random error term. The trimester parameters measure the extent to which cohorts (in utero) exposed to terror fatalities differ from those not exposed to terror attacks. In other words, it captures how pregnancy trimesters are differentially affected by terror attacks in relation to impact of terror fatalities.[17]

Following Mansour and Rees (2012) we control for the unobservable characteristics of families by restricting the sample to siblings using unique family identifiers. Put differently, we estimate equation (1) with family fixed effects to control for family characteristics that might affect fertility decisions with or without exposure to terror attacks.[18] Our estimation therefore compare cohorts exposed to terror attacks to their siblings and takes the following form:

$$Y_i = \alpha_0 + \sum_{j=1}^{3} \alpha_j \times Trimester_j \times TerrorExposure_d + \beta X_i + \pi_{family} + \tau_{yob} + \gamma_{mob} + \lambda_{dist} + \varepsilon_i \quad (2)$$

where π_{family} is family fixed effects. Our sample is restrict to 611 siblings born to 449 mothers.

[16] This is measured by fatalities that occur during the first trimester (9-6 months before birth), second trimester (5-3 months before birth) and the last trimester (2-0 months before birth).

[17] We assume that the cost of terror at district level increases with the number of terror fatalities. See Gould and Klor (2010) for conceptual framework.

[18] This is to remove potentially confounding factors from unobserved characteristics, for instance, family income and selective fertility due to terror attack exposure.

The descriptive statistics for sibling sample are reported in the last two columns in Table 1. With the exception of the timing and number of prenatal visits, the sample means are statistically identical to the full sample.

4 Results

4.1 Baseline Results

Table 2 presents our baseline estimates of equation (1) for three different dependent variables: birth weight (in grams), low birth weight (a dummy variable when birth weight is less 2500 grams) and very low birth weight (a dummy variable when birth weight is less than or equal to 2500 grams). For each dependent variable, we show two separate regressions, each comprising a different set of control variables. We begin with a naïve regression by estimating the impact of terror without family fixed effects. The results in column (1) reveal no significant effect of terror exposure on the birth weight of cohorts exposed during pregnancy. This is not surprising in view of the fact that the specification does not account for variation in household labor market conditions. In contrast, our second estimate considers this possibility by including family fixed effects in column (2). As expected, we observe a reduction in infant birth weight by 4.67 grams for every terror attack during the first trimester of pregnancy. The point estimate indicates a 0.15 percent mean difference in birth weight and is significant at the 10 percent level.

Next, we analyze the effect of terror on the probability of low birth weight. In the full sample (column (3)) we find a positive effect of terror exposure on the infant weighing less than 2500 grams but none of the results are statistically significant. However, our results change when we restrict the sample to siblings (column (4)). We find that additional fatality from terrorism increases the likelihood of being born below 2500 grams by 0.4 percentage point. The estimated effect occurs in the first three months of pregnancy and is statistically significant at the 1 percent level.

Table 2 also assesses the impact of terror on the possibility that infant birth weight is below or equal to 2500 grams. The results are reported in columns (5) and (6). In the full sample, we find that additional fatality in the last trimester before birth is associated with 0.2 percentage point increase in the risk of a newborn child weighing less or equal to 2500 grams. Controlling for family fixed effects, we find that this probability increases by 0.3 percentage point for additional terror fatalities in the first trimester before birth. Nevertheless, we find no significant effect for terror exposure in the second and third trimester.

The above findings are consistent with estimates from literature on the prenatal exposure to negative shocks on child health. For instance, Kelly (2011) found a decrease in birth weight by 0.02 ounces (0.57 grams) in infants exposed to Asian influenza pandemic in 1957. In the study of the effect of conflict in Palestine on birth weight Mansour and Rees (2012) find that additional conflict fatality in the first trimester increases the probability of low birth weight by 0.4 percentage point for exposed infants. Furthermore, Quintana-Domeque and Ródenas-Serrano (2016) show that an additional death from ETA bomb attacks in Spain reduces birth weight by 0.7 grams in the first trimester of pregnancy.

4.2 Heterogenous effect

Table 3 explores whether earlier results are heterogeneous across different population subsamples such as mother's level of education and religion. We differentiate the effect of terror on the educational attainment of the mother by classifying our sample into two groups: mothers with less than 12 years of education and mothers with 12 or more years of education. The results as reported in columns (1)-(4) are generally significant for both groups, with larger effects in the first and second trimesters for mothers with less education. However, the group of mothers with higher education also experience a significant effect if exposed to terror in the first and last trimesters before birth.

The sample is further divided by mother's religious identity in columns (5)-(8). Results are broken down according to whether the child's mother is muslim or non-muslim. Since the terror attacks are concentrated in the northern region, we would expect terror effects to be larger for Muslim mothers.[19] Surprisingly, we find that terror effects are substantial for non-muslim mothers exposed in the first trimester of pregnancy. This suggests a differential effect of terror on children of non-muslim mothers as compared to muslim mothers.

4.3 Use of medical care

Among the plausible explanation for the positive effect of terror exposure on low birth weight is the reduction in maternal access to medical facilities. We consider this hypothesis by estimating the effect of terrorism using three different measures of medical care: number of prenatal visits, the timing of the first antenatal check (measured in months) and whether the infant was delivered in a hospital or clinic. Table 4 presents the results. The within-sibling comparison (column (2)) confirms that additional fatalities from terror attacks reduces prenatal visits by 2.6 percent in the second trimester and by 1.9 percent in the last trimester before birth.[20] In contrast, we find that terror exposure increases the timing of the initial antenatal check by 2.2 percent. There is no significant evidence between terror intensity and delivery in the hospital.

The findings in Table 4 suggest that terror exposure is significantly related to the timing and

[19] At least 80 percent of the population in the northern is muslim.

[20] We also explore the possibility that mothers exposed to terror might suffer from anemia or develop pregnancy complications. Table A8 in the online appendix provides evidence of a negative relationship between terror exposure and the odds of having anemia and reporting complications in the earlier stages of pregnancy.

number of prenatal visits. One might worry that our baseline result is capturing access to medical services. We repeat the basic analysis for the effect of terror on low birth weight and control for the possible mediating effect of assess to medical care. Results from Table 5 are virtually identical to our baseline estimates.

4.4 Infant Mortality

We also examine the effect of terror on infant mortality. Recent evidence suggests that environmental shocks increase the risk of early childhood mortality. For instance, Achyuta *et al.* (2016) found that *in utero* exposure to dust pollution in West Africa increases infant mortality by 0.39 percentage points. Jayachandran (2009) shows that prenatal smoke from the 1997 Indonesia wildfire reduced infant survival by 3.5 percent. Kudamatsu *et al.* (2012) demonstrate that African infants face a higher risk of death when exposed to malaria in the first trimester of pregnancy or drought shocks prior to birth.

We estimate the impact of terror shock on child survival using two measures: the probability of the infant dying within one year of birth and the probability of the infant dying within two years of birth. The results in Table 6 suggests that terror is not significantly related to infant mortality. Although there is a positive relationship between terror exposure in the first trimester and the likelihood of infant survival, the estimates are not statistically significant.

4.5 Parental Investment

Our results thus far show that *in utero* exposure to terror fatalities reduces the birth weight of the infant. Yet, parental response to terror may compensate or reinforce the effect of prenatal shock. Previous studies have related differences in parental investments to differences in birth weight. For example, Datar *et al.* (2010) found that parents reinforce differences between siblings by investing more in children who have normal birth weight. However, Hsin (2012) shows that parents compensate children with low birth weight additional investment.[21] We consider the effect of parental investment in two ways. First, we ascertain whether parental investments are correlated with terror exposure by estimating equation 1 using parental prenatal and postnatal investments as dependent variables. Second, we control for the parental investment measures in the baseline regression to account for the mediating impact of investment during pregnancy and immediately after birth. Table 5 shows that terror exposure has no effect on prenatal investments (columns 1 & 2). In contrast, postnatal investment has a negative relation with terror attacks (columns 3-5). Additional fatalities from terror attacks reduces the probability of postnatal visits and duration of breastfeeding by 0.2 percentage points respectively. In addition, it decreases the months of

[21]See Almond and Mazumder (2013) for a recent review of this literature.

breastfeeding by 3 percentage point. Next, we control for postnatal investments in the baseline model and report the results in Table 6. Estimates show that parental investments immediately after birth compensate the effect of prenatal shock from terror.

4.6 Intensity of Terror Attacks

Our baseline specification assumes that the effect of terror fatalities on birth outcomes is linear. We relax this assumption and explore the effects of terrorism by intensity of attacks. Online Appendix Table A10 decomposes terror intensity by the number of deaths. We replace our terror exposure variable with a dummy variable of 1 if the number of fatalities within trimesters of pregnancy is at least 1 (and 0 otherwise) in panel A, at least 5 in panel B and at least 10 in panel C. The results are quite revealing in several ways. First, the coefficients suggest that terror intensity in the first trimester before birth is associated with a 15-25 percent rise in the risk of low birth weight. The largest terror effects are for terror attacks with at least 5 deaths.

4.7 Robustness

The results are robust to the inclusion of several factors that may be correlated with local terror activity. Table 7 examines whether terror attacks have similar effects if fatalities from terror are scaled by district population. Specifically, we test the sensitivity of our results by using the number of terror fatalities by per capita at the district level as our independent variable.[22] There is a significant increase of the effects of terror in our estimate the likelihood of low birth weight increases by 0.54 percentage point.

We also examine the effect of terror on low birth weight by using an alternative measure of first trimester terror exposure. Our new measure captures fatalities from terror attacks that occur 8-6 months before birth. We contrast this with our previous measure of first trimester exposure and present the results in Table 8. Interestingly, the findings across the different specifications reveal similar effect of terror on the odds of having a child with birth weight less than 2500 grams.

Our analysis thus far imply that terror fatalities only affect infant health through exposure during pregnancy. Nevertheless, a potential concern is that terror attacks that occur prior to conception or after child birth may affect birth outcomes. Such an impact would undermine our estimate on the effect of terror on early-life health outcomes of a child. Online Appendix Table A1 demonstrates that this is not the case: using terror exposure before conception and after birth leads to similar estimates of the average effect of terror exposure on birth weight.

We further test our results by controlling for fatalities from other conflict events such as clash

[22] Our population figures are from the Nigerian Census of 2006. This captures population trends prior to the beginning of terror attacks in 2009.

between ethnic groups and religious conflicts in online Appendix Table A2. We compute measures of conflict exposure using district level fatalities from violent events that coincide with pregnancy trimesters in our sample period. The findings are similar to our main results. In Table A3 in the online appendix, we also show that controlling for fatalities from neighboring districts does not affect our estimate of local terror on birth outcomes. This demonstrates that our main results are not driven by spillovers of terror from adjacent districts.

Another concern is that our results may be driven by household migration or possible displacement due to terror. We address the first concern by splitting our sample using a proxy for migration. We consider households that have been away for more than a month within the last 12 months as migrants. We drop the "migrant" households and estimate equation 1. Table A4 in the online appendix presents the results for the non-migrant sample in columns (3)-(4). The results are identical to the estimates from the full sample. For the second issue, we use data on the number of internally displaced persons (IDPs) from the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA) to ascertain at the district level the number of persons displaced each month. We control for the number of households displaced at the district level and report the results in online appendix Table A5. Our findings are identical to the baseline results.

Finally, we consider the possible effect of climate shocks by controlling for yearly variation in rainfall and temperature at the district level.[23] As presented in online Appendix Table A6, our findings remain unchanged. Results are also robust to controlling for different time trends such as month by year fixed effects and district-specific linear trends (see online Appendix Table A7).

5 Conclusion

The paper studies the effect of terrorism on birth outcomes in a developing country context. Our results show that exposure to terror attacks by Boko Haram reduces infant birth weight and increases the risk of low birth weight. Although previous studies have studied the impact of terror on early life health, the present study provides additional evidence to this literature.

First, the study shows that infants are more vulnerable to violent shocks during the early stages of pregnancy. Terror exposures have a pronounced effect on birth weight reduction, especially for exposure in the first trimester before birth. Second, our results show that terror attacks have a larger impact on infants whose parents are less educated and are not muslim. Third, our findings highlight the importance of examining the role of parental investments after prenatal shock. We find that parents compensate for terror exposure by extending the duration of post-natal care.

A plausible limitation of this study is the paucity of data. With respect to infant health out-

[23]Our rainfall and temperature data is from the Nigerian Living Standard Measurement survey carried out by the World Bank between 2009 and 2013.

comes, the available data only covers earlier Boko Haram terror events. Hence, our analysis does not capture the effects of more intense periods of terror attacks in subsequent years. Notwithstanding these limitations, our results suggest that increase in terror fatalities negatively impact child health.

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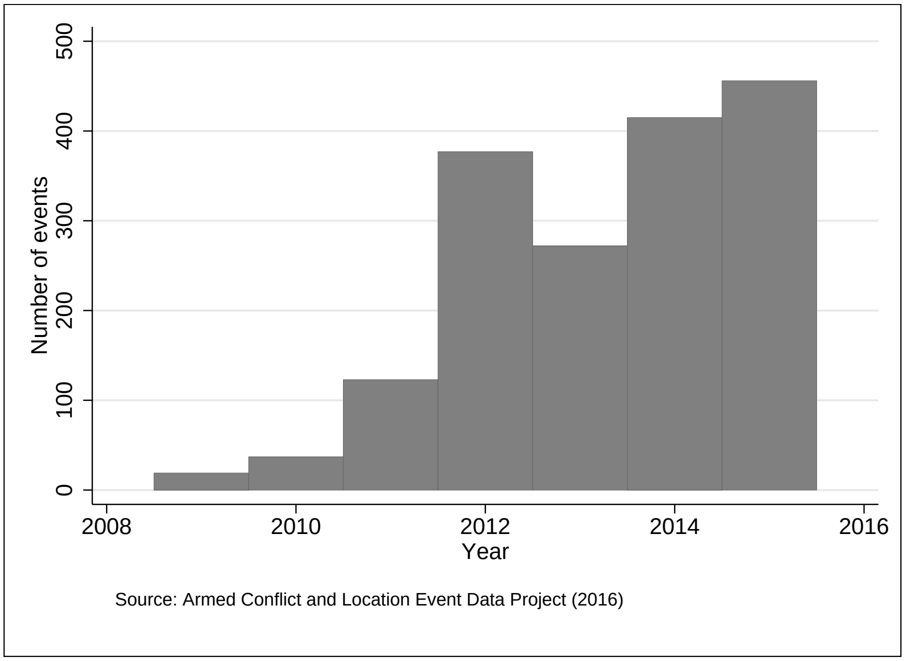

Figure 1: NUMBER OF TERROR EVENTS BY YEAR (2009-2015)

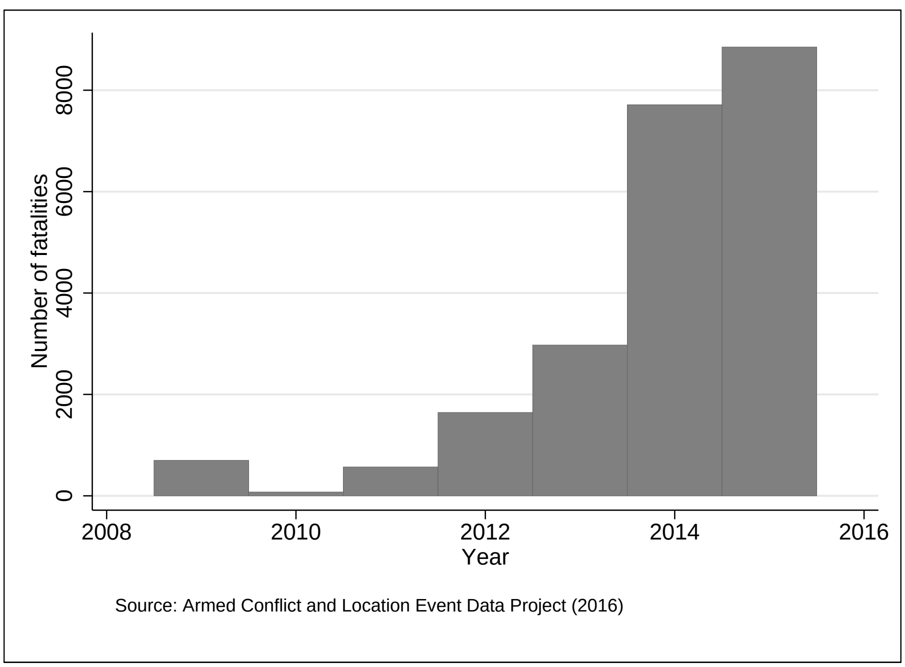

Figure 2: NUMBER OF TERROR FATALITIES BY YEAR (2009-2015)

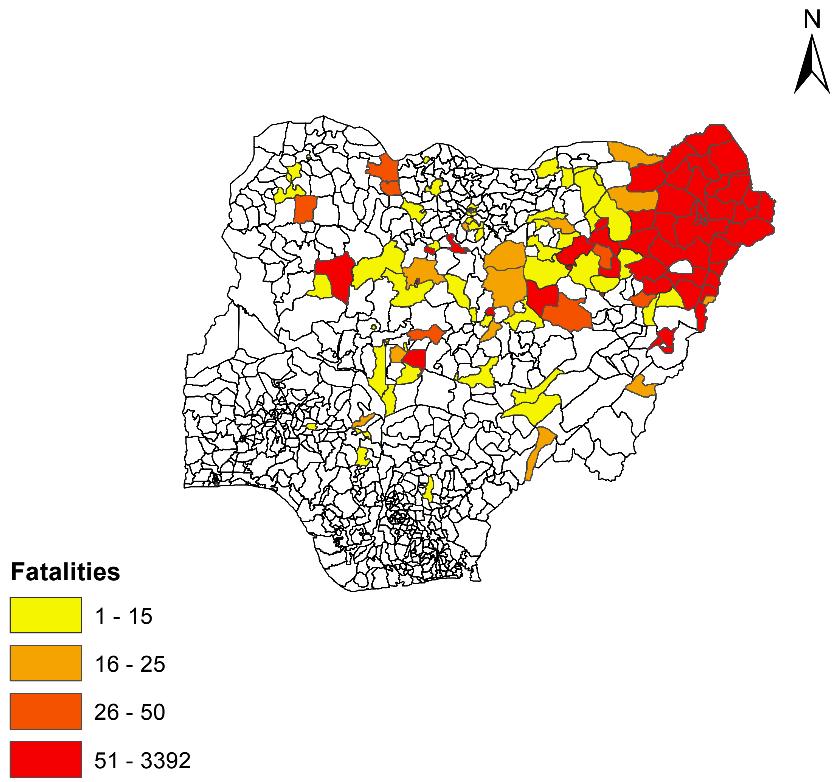

Figure 3: DISTRIBUTION OF TERROR FATALITIES ACROSS DISTRICTS (2009-2015)

Table 1
Descriptive Statistics

	Full sample		Sibling Sample	
	Mean	SD	Mean	SD
A. Infant outcomes				
Birthweight in grams	3068.38	621.66	3096.58	627.14
Birthweight <2500g	0.165	0.372	0.154	0.361
Birthweight ≤2500g	0.214	0.411	0.198	0.399
Died within 1 year	0.025	0.156	0.031	0.174
Died within 2 years	0.027	0.163	0.036	0.186
Female	0.500	0.500	0.519	0.500
Twin	0.013	0.113	0.025	0.155
First born	3.141	2.101	3.433	1.964
B. Mother characteristics				
Age at birth	27.09	5.96	27.30	5.52
Highest level of education	9.59	5.20	9.39	5.17
Age at marriage	18.87	4.48	18.88	4.32
Muslim	0.521	0.500	0.548	0.498
C. Use of medical care				
Number of prenatal visits	5.609	4.201	4.355	4.225
Timing of first antenatal check	3.506	2.053	2.194	2.364
Delivered in hospital or clinic	0.898	0.303	0.890	0.313
Delivered at home	0.101	0.301	0.106	0.310
Doctor assitance in delivery	0.263	0.441	0.211	0.409
D. Pregnancy Complication				
Any complication	0.624	0.485	0.498	0.500
Anaemia	0.802	0.399	0.659	0.474

Notes: This table provides summary statistics of child health outcomes and mother characteristics. The sample is comprised of households in the northern part of the country. The sample size for the full sample is 1169 while the sample size for the sibling sample is 611. The sample period is between July 2009 and July 2013.

Table 2
Terror Exposure and Birth Weight

Dependent variable	Birth weight (grams)		Birth weight <2500g		Birth weight ≤2500g	
	(1)	(2)	(3)	(4)	(5)	(6)
Terror exposure: 1st trimester	0.329	-4.669	0.001	0.004	0.000	0.003
	(1.407)	(2.367)*	(0.001)	(0.001)***	(0.001)	(0.002)*
Terror exposure: 2nd trimester	-0.818	3.456	0.000	-0.003	0.000	-0.004
	(1.252)	(2.852)	(0.001)	(0.002)	(0.001)	(0.004)
Terror exposure: 3rd trimester	-0.398	0.247	0.001	0.000	0.002	0.002
	(1.168)	(1.546)	(0.001)	(0.001)	(0.001)**	(0.001)
Controls						
Family FE	N	Y	N	Y	N	Y
Family characteristics	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y
Observations	1,169	611	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities within trimesters of child birth. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is from July 2009 through July 2013. Family characteristics include for infant gender and birth order, twin indicator, mother´s level of education, mother´s age at birth, mother´s age at marriage, father´s level of education and occupation. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table 3

Terror exposure and low birth weight by mother´s education and religion

	Mother´s education <12 years		Mother´s education ≥12 years		Muslim mothers		Non-Muslim mothers	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Birth weight <2500g								
Terror exposure: 1st trimester	0.001	0.010	0.000	0.003	0.001	0.004	0.005	0.008
	(0.002)	(0.004)**	(0.002)	(0.001)**	(0.002)	(0.002)	(0.003)	(0.003)***
Terror exposure: 2nd trimester	-0.001	0.023	0.003	-0.002	0.000	-0.002	-0.001	-0.007
	(0.002)	(0.009)***	(0.001)**	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)***
Terror exposure: 3rd trimester	0.001	-0.036	0.001	0.001	0.000	-0.002	0.002	-0.004
	(0.003)	(0.010)***	(0.001)	(0.001)	(0.001)	(0.001)**	(0.002)	(0.003)
Controls								
Family FE	N	Y	N	Y	N	Y	N	Y
Family characteristics	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	456	240	713	371	635	340	534	271
Panel B: Birth weight ≤2500g								
Terror exposure: 1st trimester	0.001	0.007	0.001	0.004	0.000	-0.002	0.005	0.006
	(0.002)	(0.003)*	(0.002)	(0.002)**	(0.002)	(0.003)	(0.003)	(0.003)**
Terror exposure: 2nd trimester	-0.001	0.027	0.003	-0.003	-0.000	0.005	-0.000	-0.016
	(0.002)	(0.009)***	(0.002)**	(0.003)	(0.001)	(0.003)*	(0.002)	(0.003)***
Terror exposure: 3rd trimester	0.000	-0.033	0.002	0.003	0.001	-0.001	0.003	-0.002
	(0.004)	(0.007)***	(0.001)**	(0.001)**	(0.001)	(0.001)	(0.002)	(0.002)
Controls								
Family FE	N	Y	N	Y	N	Y	N	Y
Family characteristics	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	456	240	713	371	635	340	534	271

Notes: Each column represents a separate regression. The dependent variable in panel A is a dummy variable equal one if birth weight is less than 2500 grams while the dependent variable in panel B is a dummy variable equal one if birth weight is less than or equal to 2500 grams. The variable of interest (terror exposure) are terror fatalities during pregnancy trimester. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table 4

Terror exposure and use of medical care

Dependent variable	Number of prenatal visits		Timing of prenatal visits		Delivered in hospital	
	(1)	(2)	(3)	(4)	(5)	(6)
Terror exposure: 1st trimester	-0.010	-0.005	-0.006	-0.008	0.000	0.001
	(0.008)	(0.013)	(0.007)	(0.009)	(0.001)	(0.001)
Terror exposure: 2nd trimester	0.008	-0.026	0.003	0.022	0.001	-0.002
	(0.006)	(0.015)*	(0.004)	(0.008)***	(0.000)*	(0.002)
Terror exposure: 3rd trimester	-0.000	-0.019	-0.001	0.002	-0.000	0.001
	(0.007)	(0.009)**	(0.004)	(0.004)	(0.000)	(0.001)
Controls						
Family FE	N	Y	N	Y	N	Y
Family characteristics	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y
Observations	1,169	611	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities during pregnancy trimester. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table 5

Terror exposure and low birth weight: controlling for timing and number of prenatal visits

Dependent variable	Birth weight <2500g		Birth weight ≤2500g	
	(1)	(2)	(3)	(4)
Terror exposure: 1st trimester	0.001	0.004	0.000	0.003
	(0.001)	(0.001)***	(0.001)	(0.002)*
Terror exposure: 2nd trimester	0.000	-0.002	0.000	-0.003
	(0.001)	(0.002)	(0.001)	(0.004)
Terror exposure: 3rd trimester	0.001	0.000	0.002	0.002
	(0.001)	(0.001)	(0.001)**	(0.001)
Controls				
Timing of prenatal visits	Y	Y	Y	Y
Number of prenatal visits	Y	Y	Y	Y
Family FE	N	Y	N	Y
Family characteristics	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Observations	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities during pregnancy trimester. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table 6
Terror exposure and infant mortality

Dependent variable	Infant died within one year of birth		Infant died within two years of birth	
	(1)	(2)	(3)	(4)
Terror exposure: 1st trimester	0.0000	0.0011	-0.0002	0.0006
	(0.0002)	(0.0011)	(0.0004)	(0.0012)
Terror exposure: 2nd trimester	-0.0002	-0.0006	-0.0003	-0.0006
	(0.0002)	(0.0011)	(0.0002)	(0.0013)
Terror exposure: 3rd trimester	0.0000	-0.0006	0.0003	0.0004
	(0.0002)	(0.0004)	(0.0005)	(0.0010)
Controls				
Family FE	N	Y	N	Y
Family characteristics	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Observations	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities during pregnancy trimester. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table 7
Terror exposure and low birth weight: scaling fatalities by district population

Dependent variable	Birth weight <2500g		Birth weight ≤2500g	
	(1)	(2)	(3)	(4)
Terror exposure: 1st trimester	-0.0002	0.0054	-0.0008	0.0036
	(0.0017)	(0.0020)***	(0.0017)	(0.0038)
Terror exposure: 2nd trimester	-0.0005	-0.0082	0.0001	-0.0042
	(0.0015)	(0.0044)*	(0.0017)	(0.0083)
Terror exposure: 3rd trimester	0.0011	0.0010	0.0024	0.0031
	(0.0017)	(0.0037)	(0.0019)	(0.0046)
Controls				
Family FE	N	Y	N	Y
Family characteristics	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Observations	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities per district population. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table 8
Terror exposure and low birth weight: using alternative measure of first-trimester exposure

Dependent variable	Birth weight <2500g		Birth weight ≤2500g		Birth weight <2500g		Birth weight ≤2500g	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Terror exposure: 1st trimester[a]	0.001	0.004	0.000	0.003	-	-	-	-
	(0.001)	(0.001)***	(0.001)	(0.002)*	-	-	-	-
Terror exposure: 1st trimester[b]	-	-	-	-	0.001	0.004	0.001	0.004
	-	-	-	-	(0.001)	(0.001)***	(0.001)	(0.002)*
Terror exposure: 2nd trimester	0.000	-0.003	0.000	-0.004	0.000	-0.003	0.000	-0.004
	(0.001)	(0.002)	(0.001)	(0.004)	(0.001)	(0.002)	(0.001)	(0.004)
Terror exposure: 3rd trimester	0.001	0.000	0.002	0.002	0.001	0.000	0.002	0.002
	(0.001)	(0.001)	(0.001)**	(0.001)	(0.001)	(0.001)	(0.001)**	(0.001)
Controls								
Family FE	N	Y	N	Y	N	Y	N	Y
Family characteristics	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,169	611	1,169	611	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities for each trimester of pregnancy. 1st trimester[a] captures terror fatalities that occured 9-6 months before birth while 1st trimester[b] measures terror fataltles that occured 8-6 months before birth. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table 9
Terror exposure and Parental investments

Dependent variable	Infant postnatal check		Months of breastfeeding		Duration of breastfeeding	
	(1)	(2)	(3)	(4)	(5)	(6)
Terror exposure: 1st trimester	0.000	0.000	-0.023	-0.049	-0.001	-0.005
	(0.001)	(0.002)	(0.014)*	(0.019)**	(0.001)	(0.001)***
Terror exposure: 2nd trimester	0.002	0.003	0.008	0.021	0.000	0.003
	(0.001)*	(0.002)	(0.010)	(0.015)	(0.001)	(0.001)**
Terror exposure: 3rd trimester	0.001	0.001	-0.001	0.005	-0.001	-0.001
	(0.001)	(0.001)	(0.008)	(0.008)	(0.000)*	(0.001)
Controls						
Family FE	N	Y	N	Y	N	Y
Family characteristics	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y
Observations	1,169	611	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities for each trimester of pregnancy. The dependent variable in columns (1)-(2) is a dummy variable equal one if the infant had a postnatal check within 2 months after birth. The dependent variable in columns (3)-(4) capture the number of months of breastfeeding while columns (5)-(6) is a dummy variable equal one if the infant is still breastfeeding. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 10

Terror exposure and low birth weight: controlling for parental investments

Dependent variable	Birth weight <2500g		Birth weight ≤2500g	
	(1)	(2)	(3)	(4)
Terror exposure: 1st trimester	0.001	0.004	0.000	0.003
	(0.001)	(0.001)***	(0.001)	(0.002)*
Terror exposure: 2nd trimester	0.000	-0.003	0.000	-0.003
	(0.001)	(0.002)	(0.001)	(0.004)
Terror exposure: 3rd trimester	0.001	0.000	0.002	0.001
	(0.001)	(0.001)	(0.001)*	(0.001)
Controls				
Parental Investments	Y	Y	Y	Y
Family FE	N	Y	N	Y
Family characteristics	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Observations	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities for each trimester of pregnancy. The controls under parental investments are months and duration of breastfeeding. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Online Appendix to

Terror and Birth Weight: Evidence from Boko Haram Attacks

Appendix Table A1

Terror exposure and low birth weight : adding fatalities prior to month of conception and after birth

Dependent variable	Birth weight <2500g		Birth weight ≤2500g		Birth weight <2500g		Birth weight ≤2500g	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Terror exposure prior to conception	-0.001	-0.000	-0.001	-0.000	-	-	-	-
	(0.000)	(0.001)	(0.001)	(0.001)				
Terror exposure: 1st trimester	0.001	0.004	0.000	0.003	0.001	0.003	0.000	0.004
	(0.001)	(0.001)***	(0.001)	(0.002)*	(0.001)	(0.001)***	(0.001)	(0.002)**
Terror exposure: 2nd trimester	0.000	-0.003	0.000	-0.004	0.000	-0.002	0.000	-0.004
	(0.001)	(0.002)	(0.001)	(0.004)	(0.001)	(0.002)	(0.001)	(0.004)
Terror exposure: 3rd trimester	0.001	0.000	0.002	0.002	0.001	0.001	0.002	0.001
	(0.001)	(0.001)	(0.001)**	(0.001)	(0.001)	(0.001)	(0.001)**	(0.001)
Terror exposure after birth	-	-	-	-	-0.000	-0.001	-0.000	0.001
					(0.001)	(0.001)	(0.001)	(0.002)
Controls								
Family FE	N	Y	N	Y	N	Y	N	Y
Family characteristics	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,169	611	1,169	611	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities for each trimester of pregnancy. Terror exposure prior to conception are fatalities from terror attacks that occured 1 to 3 months before conception while Terror exposure after birth are fatalities from terror attacks that occured 1 to 3 months after birth. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table A2

Terror exposure and birth weight: controlling for fatalities from other conflict events

Dependent variable	Birth weight <2500g		Birth weight ≤2500g	
	(1)	(2)	(3)	(4)
Terror exposure: 1st trimester	0.001	0.003	0.000	0.003
	(0.001)	(0.001)**	(0.001)	(0.001)*
Terror exposure: 2nd trimester	0.000	-0.002	0.000	-0.003
	(0.001)	(0.002)	(0.001)	(0.004)
Terror exposure: 3rd trimester	0.001	0.000	0.002	0.001
	(0.001)	(0.001)	(0.001)*	(0.001)
Other conflict events: 1st trimester	-0.002	-0.020	-0.002	-0.029
	(0.001)***	(0.013)	(0.001)***	(0.017)*
Other conflict events: 2nd trimester	0.003	0.006	0.005	0.003
	(0.002)	(0.004)	(0.002)***	(0.004)
Other conflict events: 3rd trimester	-0.000	0.000	-0.001	-0.001
	(0.001)	(0.001)	(0.002)	(0.002)
Controls				
Family FE	N	Y	N	Y
Family characteristics	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Observations	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities for each trimester of pregnancy. Other conflict events are fatalties that occur from clashes between ethnic groups or religious conflict unrelated to Boko Haram attacks. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table A3

Terror exposure and low birth weight: controlling for fatalities from neighboring districts

Dependent variable	Birth weight <2500g		Birth weight ≤2500g	
	(1)	(2)	(3)	(4)
Terror exposure: 1st trimester	0.001	0.003	0.001	0.003
	(0.001)	(0.002)**	(0.001)	(0.002)
Terror exposure: 2nd trimester	0.001	-0.002	0.001	-0.003
	(0.001)	(0.002)	(0.001)	(0.004)
Terror exposure: 3rd trimester	0.001	0.001	0.002	0.002
	(0.001)	(0.001)	(0.001)**	(0.001)
Neighboring districts: 1st trimester	-0.001	0.002	-0.001	0.002
	(0.003)	(0.003)	(0.003)	(0.004)
Neighboring districts: 2nd trimester	-0.006	-0.002	-0.003	-0.001
	(0.003)**	(0.003)	(0.003)	(0.005)
Neighboring districts: 3rd trimester	-0.000	-0.003	-0.002	-0.006
	(0.002)	(0.003)	(0.002)	(0.004)
Controls				
Family FE	N	Y	N	Y
Family characteristics	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Observations	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities for each trimester of pregnancy. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table A4
Terror exposure and low birth weight: household migration

	Full sample		Non-migrant sample	
	(1)	(2)	(3)	(4)
Panel A: Birth weight <2500g				
Terror exposure: 1st trimester	0.001	0.004	0.001	0.004
	(0.001)	(0.001)***	(0.001)	(0.001)**
Terror exposure: 2nd trimester	0.000	-0.003	0.000	-0.003
	(0.001)	(0.002)	(0.001)	(0.002)
Terror exposure: 3rd trimester	0.001	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Controls				
Family FE	N	Y	N	Y
Family characteristics	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Observations	1,169	611	1,019	551
Panel B: Birth weight ≤2500g				
Terror exposure: 1st trimester	0.000	0.003	0.001	0.003
	(0.001)	(0.002)*	(0.001)	(0.002)*
Terror exposure: 2nd trimester	0.000	-0.004	0.001	-0.004
	(0.001)	(0.004)	(0.001)	(0.004)
Terror exposure: 3rd trimester	0.002	0.002	0.001	0.002
	(0.001)**	(0.001)	(0.001)	(0.001)
Controls				
Family FE	N	Y	N	Y
Family characteristics	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Observations	1,169	611	1,019	551

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities for each trimester of pregnancy. Non-migrant sample are mothers that have been away from home for more than one month. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table A5

Terror exposure and low birth weight: controlling for internal displacement

Dependent variable	Birth weight <2500g		Birth weight ≤2500g	
	(1)	(2)	(3)	(4)
Terror exposure: 1st trimester	0.001	0.003	0.000	0.002
	(0.001)	(0.001)**	(0.001)	(0.002)
Terror exposure: 2nd trimester	0.000	-0.003	0.000	-0.004
	(0.001)	(0.002)	(0.001)	(0.004)
Terror exposure: 3rd trimester	0.001	0.001	0.002	0.002
	(0.001)	(0.001)	(0.001)**	(0.001)
Controls				
Number of people displaced	Y	Y	Y	Y
Family FE	N	Y	N	Y
Family characteristics	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Observations	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities for each trimester of pregnancy. The control for the number of people displaced is at the district level. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table A6

Terror exposure and low birth weight: controlling for rainfall and temperature shocks

Dependent variable	Birth weight <2500g		Birth weight ≤2500g	
	(1)	(2)	(3)	(4)
Terror exposure: 1st trimester	0.001	0.004	0.000	0.003
	(0.001)	(0.001)***	(0.001)	(0.002)*
Terror exposure: 2nd trimester	0.000	-0.002	0.000	-0.004
	(0.001)	(0.002)	(0.001)	(0.004)
Terror exposure: 3rd trimester	0.001	0.000	0.002	0.001
	(0.001)	(0.001)	(0.001)*	(0.001)
Controls				
Rainfall and Temperature shocks	Y	Y	Y	Y
Family FE	N	Y	N	Y
Family characteristics	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Observations	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities for each trimester of pregnancy. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table A7

Terror exposure and low birth weight: controlling different time fixed effects

Dependent variable	Birth weight <2500g		Birth weight ≤2500g	
	(1)	(2)	(3)	(4)
Terror exposure: 1st trimester	0.002	0.003	0.001	0.003
	(0.001)*	(0.002)**	(0.001)	(0.002)*
Terror exposure: 2nd trimester	0.000	0.001	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Terror exposure: 3rd trimester	0.000	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Controls				
District time trends	N	Y	N	Y
Month×Year FE	Y	Y	Y	Y
Family characteristics	Y	Y	Y	Y
Observations	1,169	1,169	1,169	1,169

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities for each trimester of pregnancy. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table A8

Terror exposure, anaemia and pregnancy complications

Dependent variable	Anaemia		Pregnancy complications	
	(1)	(2)	(3)	(4)
Terror exposure: 1st trimester	-0.0003	-0.0021	-0.0009	-0.0032
	(0.0010)	(0.0013)*	(0.0013)	(0.0017)*
Terror exposure: 2nd trimester	-0.0000	-0.0005	0.0003	-0.0022
	(0.0005)	(0.0009)	(0.0008)	(0.0016)
Terror exposure: 3rd trimester	0.0013	0.0003	-0.0016	-0.0004
	(0.0005)**	(0.0005)	(0.0011)	(0.0007)
Controls				
Family FE	N	Y	N	Y
Family characteristics	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Observations	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities for each trimester of pregnancy. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table A9
Terror exposure and different cutoffs of birth weight

Dependent variable	Birth weight <1500g		Birth weight ≤1500g		Birth weight <3000g		Birth weight ≤3000g	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Terror exposure: 1st trimester	-0.0000	0.0014	-0.0001	0.0014	0.0011	0.0038	0.0003	0.0007
	(0.0001)	(0.0008)	(0.0001)	(0.0008)	(0.0012)	(0.0019)*	(0.0011)	(0.0024)
Terror exposure: 2nd trimester	-0.0000	-0.0005	0.0001	-0.0005	0.0001	-0.0029	0.0005	-0.0003
	(0.0001)	(0.0005)	(0.0001)	(0.0005)	(0.0009)	(0.0034)	(0.0014)	(0.0037)
Terror exposure: 3rd trimester	-0.0000	-0.0004	0.0000	-0.0004	0.0018	0.0032	0.0010	-0.0019
	(0.0001)	(0.0003)	(0.0001)	(0.0003)	(0.0008)**	(0.0015)**	(0.0013)	(0.0015)
Controls								
Family FE	N	Y	N	Y	N	Y	N	Y
Family characteristics	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,169	611	1,169	611	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities for each trimester of pregnancy. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for description of family characteristics. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table A10

Terror exposure and low birth weight: intensity of terror attacks

Dependent variable	Birth weight <2500g		Birth weight ≤2500g	
	(1)	(2)	(3)	(4)
Panel A: Terror attacks with at least 1 death				
Terror exposure: 1st trimester	0.029	0.116	0.046	0.162
	(0.055)	(0.072)	(0.062)	(0.092)*
Terror exposure: 2nd trimester	0.050	-0.040	-0.005	-0.119
	(0.061)	(0.105)	(0.069)	(0.124)
Terror exposure: 3rd trimester	0.008	0.033	0.058	0.088
	(0.087)	(0.098)	(0.082)	(0.100)
Family FE	N	Y	N	Y
Observations	1,169	611	1,169	611
Panel B: Terror attacks with at least 5 deaths				
Terror exposure: 1st trimester	0.049	0.247	0.034	0.252
	(0.058)	(0.080)***	(0.063)	(0.107)**
Terror exposure: 2nd trimester	0.052	-0.135	0.031	-0.208
	(0.070)	(0.091)	(0.074)	(0.113)*
Terror exposure: 3rd trimester	0.018	0.029	0.066	0.086
	(0.091)	(0.099)	(0.081)	(0.102)
Family FE	N	Y	N	Y
Observations	1,169	611	1,169	611
Panel C: Terror attacks with at least 10 deaths				
Terror exposure: 1st trimester	0.068	0.137	0.052	0.138
	(0.066)	(0.073)*	(0.069)	(0.099)
Terror exposure: 2nd trimester	0.005	-0.069	0.001	-0.205
	(0.073)	(0.090)	(0.083)	(0.123)*
Terror exposure: 3rd trimester	0.095	0.026	0.143	0.141
	(0.079)	(0.106)	(0.075)*	(0.121)
Family FE	N	Y	N	Y
Observations	1,169	611	1,169	611

Notes: Each column represents a separate regression. The variable of interest (terror exposure) are terror fatalities for each trimester of pregnancy. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is July 2009 through July 2013. See Table 2 for the list of controls. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.