The Impact of Conflict on Child Health Outcomes: Micro-Level Evidence from Nigeria

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Abstract

Globally, the prevalence of conflicts has taken different dimensions due to exposure to different forms of conflict. Also, extant studies have linked conflict with health outcomes. However, existing studies face the challenge of comprehensive information on different conflict types. Thus, this study provides a comprehensive analysis of the impact of conflicts on child well-being in Nigeria. To achieve the goal, it classified the conflicts into three categories: aggregate, insurgency/terrorism, and herdsmen/farmers' conflict. Furthermore, robust data are used by exploring four DHS waves (2003, 2008, 2013, and 2018) and integrating three conflict datasets using the MELTT technique. We present three steps of analysis for conflicts and child well-being based on this robust information. The impact of aggregate conflicts on child health outcomes, mechanisms, and across different groups was first investigated. Second, the impact of insurgency/terrorism on child health outcomes, mechanisms, and across different groups was examined. Third, the impact of herdsmen/farmers' conflict on child health outcomes, mechanisms, and across various groups was investigated. The results of a difference-in-difference approach suggest that proximity and exposure to different types of conflict worsened child health outcomes (infant mortality, height-for-age z-score, weight-for-age z-score and weight-for-height z-score). Also, vaccination, hospital visitation, and mother's education are significantly affected by conflict types. Proximity and exposure to different conflict types forced people to migrate to less conflict-affected areas.

Key words: Conflict, Boko Haram, Herdsmen/Farmer, Child health, Nigeria

1. Introduction

The significance of child well-being in the world is well recognized in the various targets and indicators of the United Nations' Sustainable Development Goals. Both developed and developing countries place a premium on their children's well-being because of the importance of human and social capital production in the future. As a result, child well-being is an important indicator of progress in any country or region. According to UNICEF (2007), child well-being encompasses children's health, safety, material security, education, and socializing, and the love and values instilled in those children by their families and the societal environment. It also includes the fundamental characteristics that ensure a good quality of life for children, such as their growth, development, happiness, and satisfaction (Helseth and Haralstad, 2014). Given the concept's complexities, this study focuses solely on the child health components of well-being.

Several regions, including Europe, Northern America, Latin America, and the Caribbean, have made substantial progress in child health outcomes when compared to regions such as Sub-Saharan Africa (UN IGME, 2018). Nigeria has one of the worst child health outcomes in Sub-Saharan Africa. For example, in 2018, the country's under-five mortality rate was 100 deaths per 1000 live births, compared to the Sub-Saharan African average of 76 deaths per 1000 births. Indeed, Nigeria was among the conflict-prone African nations that had under-five mortality rates of more than 100 deaths per 1000 births between 2008 and 2018. These countries included the Central African Republic, Guinea, Sierra Leone, Somalia, and Chad. As a result of limited access to adequate health care services, improving child well-being in the country is a significant challenge. Access to health care services is dependent on availability, accessibility, accommodation, affordability, and acceptability (Penchansky and Thomas, 1981; Campbell, Roland and Beutow, 2000), all of which are often undermined by presence of conflicts[1]. As a result, there is a growing concern in Nigeria about the stifling influence of conflicts on development outcomes such as child well-being.

1 According to ICRC (2008), armed conflicts can be classified as international armed conflicts (conflicts between two states that involves the intervention of armed forces) and non-international conflicts (the occurrence of conflicts in the territory of a 'high contracting party' between its armed forces and rebellious armed forces or organized armed groups with vibrant command exercising a form of control over a part of its territory to perform and execute military operations effectively and implement this Protocol). Another definition of armed conflicts is given by the Armed Conflict Location and Event Data (ACLED) report, which comprehensively measured armed conflicts as the death resulting from political violence, civil and communal conflicts, violence against civilians, rioting and protesting and militia interactions (Clionadh et al, 2010). According to Uppsala Conflict Data Programme (UCDP), armed conflict is a contested incompatibility that requires government action using armed force by

Furthermore, the impact of conflict has terrible health consequences for the vulnerable, particularly children. For example, between 2000 and 2008, about one-third of developing countries experienced civil war or other forms of violence (Minoiu and Shemyakina, 2014). Hostilities have no direct impact on child well-being because children are non-combatants in conflicts. Exposure to conflicts may have an indirect and detrimental impact on their well-being. More specifically, early-life experiences are known to have long-term and long-lasting consequences on health, education, and socioeconomic outcomes (Maccini and Yang, 2008). In essence, many essential drivers of child well-being (such as household income, access to health care, supply chain, and a tranquil environment, among others) may be impacted (Chi, Patience, Urdal and Sundby, 2015; David et al, 2017).

According to Wagner et al (2019), the extent to which armed conflicts affect child mortality is largely unknown beyond specific conflicts. Furthermore, Kinney et al (2010) emphasized that high child mortality in conflict-prone countries is mainly due to under-development caused by conflicts, rather than the direct influence of conflicts on child mortality. According to recent statistics, Nigeria is one of the world's deadliest countries in terms of terrorism and armed conflicts. Specifically, using the UCPD dataset, Hoeffler (2021) classified armed conflicts into three types and rated Nigeria first, third, and fifth in one-sided violence, state-based armed conflict, and non-State conflict, among high-fatality countries around the world. The study also ranked Nigeria third in terms of terrorist events, trailing only Iraq and Afghanistan. Moreover, the number of fatalities in armed conflicts increased from 497 in 1997 to 5,147 in 2019 (ACLED, 2019).

Furthermore, conflicts generate security issues in the country because most household members experience one form of conflict on a regular basis. Between 2010 and 2017, 49% of households in the North-East had at least one conflict episode. During the same period, 25% of households in the North-Central experienced conflict, while 22% of households in the South-South have been directly affected by conflicts (NBS and World Bank, 2018). This demonstrates the spread of armed conflicts in Nigeria, which may raise the likelihood of wasting either at birth before one year or five years. Furthermore, Nigeria has a youthful population of about 31 million children under the age of five, who are the most affected age group in conflict areas, becoming

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the military forces of two parties where one party is the government of the state, which resulted in at least 25 battle-related deaths each year. The Global Terrorism Database (GTD) defines terrorist attacks as: the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation. These are three main conceptual definitions for armed conflict. In this study, we preferentially adopt an armed conflict definition in the context of ACLED and UCDP essentially because they cover different aspects of armed conflicts experienced in African countries. ACLED and UCDP definitions are merged with GTD to provide a more detailed analysis of conflicts in Nigeria. Therefore, we specifically conceptualized conflict as any forms of political violence, civil and communal clashes, violence against civilians, militia interactions, and rioting and protest and use of violence means by non-state actors to achieve self-fulfilling goals through force or deterrence.

affected age group in conflict areas, becoming homeless and forced to live in Internally Displaced Persons (IDP) camps (UNICEF, 2017). This group also had the highest mortality rate in IDP camps due to common causes such as cholera, severe malnutrition, and malaria. Nigeria has the highest rate of child mortality due to pneumonia (162,000 deaths in 2018; 443 deaths per day or 18 deaths every hour). The cause of mortality can be ascribed to hunger and indoor pollution caused by use of solid fuels (UNICEF, 2019). The risk factors for infectious disease fatality are enhanced during complex emergencies, which are often caused by conflicts (Connolly et al, 2004).

Conflicts have an impact on people's livelihoods, particularly in conflict areas, and the entire country. Nigeria, for example, was among the countries with the highest overall expected conflict risk index in 2019, and increased risk in socio-economic vulnerability, inequality, and food security (World Risk Report, 2020). Nigeria's conflicts have remained unabated. As the Boko Haram menace grows in the North-East, the North-West and North-Central continue to experience growing threats in the form of banditry and herdsmen-farmer conflicts, respectively, raising serious concerns for national security and having far-reaching consequences for the people. After prolonged conflicts in Nigeria, the crisis in the affected areas is one of the most severe, with 7.9 million people (more than one in every two people) in crisis-hit states in need of humanitarian assistance in 2020 (United Nations Office for the Coordination of Humanitarian Affairs-OCHA, 2020). Consequently, one-fourth of the affected population is under the age of five, and one-fourth of conflict-affected households lack access to economic opportunities due to destruction of social and economic infrastructure, and private enterprises. Due to conflict, there are certain restrictions on movement in conflict areas, markets, and economic activities. Furthermore, of the 4.7 million people suffering from severe problems related to physical and mental well-being, 58% are children while 53% of the whole population lacks access to basic living conditions due to conflicts (United Nations Office for the Coordination of Humanitarian Affairs-OCHA, 2020).

Therefore, existing studies on Africa have examined the relationships between shocks and a myriad of outcomes. Some studies have examined the micro-effects of aid on health outcomes (Wayoro and Ndikumana, 2020; Kotsadam et al, 2018; Odokonyero et al, 2018; and others), while others have investigated the micro-effects of armed conflict on health outcomes (Wayoro and Ndikumana, 2020; Kotsadam et al, 2018; Odokonyero et al, 2018; Kotsadam and Ostby, 2019; Ostby et al, 2018; Ekhator and Asfaw, 2018; Chukwuma and Ekhator-Mobayode, 2019; Wayoro, 2017; Nwokolo, 2015; Plumper and Neumayer, 2006; among others). Some studies on Nigeria have sought to provide explanations for the impact of armed conflicts on health outcomes at the micro-level (Howell et al, 2020; Dunn, 2018; Ekhator-Mobayode and Asfaw, 2018; Chukwuma and Ekhator-Mobayode, 2019; Nwokolo, 2015). These studies are focused on the negative impact of the Boko Haram insurgency. The growth and spread of various types of armed conflict in the country, however, suggests that these studies are insufficient for policy prescription for all the country's federating units (States). While

the Boko Haram insurgency is critical to child well-being in the country's North-East, other pockets of rising violent conflicts such as farmer-herdsmen conflict, political, religious crises, and communal conflicts are also critical to child well-being in other parts of the country.

Thus, by focusing on the local effects of armed conflicts on child well-being, this study adds to the rapidly developing literature. Evidence suggests that the country's conflict dimensions extend beyond the Boko Haram insurgency. Armed conflict actors, as opposed to terrorism, constitute a more serious challenge to the government (Blattman and Miguel, 2010; Hoeffler, 2012). Thus, to present a more complete picture of conflicts in Nigeria, this study attempts to integrate conflict datasets (ACLED, UCDP-GED, and GTD) using the Matching Event Data by Location, Time, and Type (MELTT) approach recently developed by Donnay et al (2019). This approach distinguishes this study from previous studies on Nigeria, which only focused on a single dataset. To analyse conflict events more broadly, integrating datasets could lead to a more comprehensive measurement of a subnational pattern of violence than relying on a single dataset (Donnay et al, 2019). Data integration is an important approach to resolving all issues in empirical conflict measurement. Furthermore, in comparison to armed conflicts, the number of terrorist/insurgency events is very low (Hoeffler, 2021). Dunn (2018) observes that Boko Haram is not the only source of violence in Nigeria's Northeast, and that there may be other unobserved dynamics influencing the findings of his analysis. Thus, focusing just on terrorism/insurgency as a conflict is a potentially significant omission. The MELTT approach enables us to give thorough and robust evidence of the impact of various conflict dimensions on child well-being in Nigeria. Following the integration of conflict data, the study explores the geo-matching of household data surveys with the new conflict data for a 15km buffer zone to assess the well-being of a child born near conflict areas.

It is evident from the narrative that Nigeria continues to struggle with subpar child health outcomes. Furthermore, exposure to conflicts worsens the issue, putting the realization of Sustainable Development Goal 3 by 2030 in jeopardy. While recent studies have focused on only two Demographic and Health Surveys (DHS 2008 and 2013) to explore this relationship, the availability of four waves and our focus on these—including the most recent survey, 2018—allows for a more thorough assessment of the patterns in the influence of conflicts on child health outcomes. The most recent surveys accurately reflect the country's growing intensity of conflicts. Furthermore, over-reliance on inadequate conflict information necessitates revisiting this link to improve understanding of how conflicts affect child health outcomes and thus contribute to the literature. The mechanisms by which armed conflicts harm child health outcomes are investigated. Maternal education, employment, earnings, hospital visitation, vaccination, and migration are all important factors in child health

outcomes. The comprehensive analysis provides solid evidence for policy making involving all federating units in the country. Therefore, the study answers the following pertinent questions:

i. What effect do conflicts have on child health outcomes?

ii. What are the mechanisms by which conflicts impair the child health outcomes?

2. Literature review

Several studies in the literature have found a link between armed conflicts and child health. Wars exacerbate poverty, damage crops, disrupt transportation, damage health care facilities, and cause widespread famine. As a result of the armed conflict, children suffer from malnutrition and diseases such as diarrhoea, cholera, tuberculosis, measles, and malaria (Wessells, 1998). According to Moss et al (2006), children under the age of five had the highest mortality rate among refugee groups, and the most common causes of death include diarrheal diseases, acute respiratory infections, measles, malaria, and severe malnutrition. Children have limited access to quality health care during conflicts. In this light, Akresh et al (2012) argue that war may have an impact on children by preventing food aid from reaching war-affected areas or by causing households in those areas to lose their source of income due to burgling. Children may also be affected because of displacement, which makes access to appropriate health care services or clean water difficult.

Alderman et al (2006) observe that experiencing civil war leads to a lower height-for-age z-score, a late start of school, and fewer years of schooling among children in Zimbabwe when they studied the effect of drought (1982-1984) and the civil war on children. Neugebauer (2009) reveals that after a year of conflict and killings, the levels of likely post-traumatic stress disorder increased from 54% to 62% in a sample of over 1,500 Rwandan children and adolescents. Similarly, the Maoist insurgency in Nepal exposed children to HIV/AIDS and other infectious diseases, trafficking, and psychosocial stressors (Singh, 2005). Existing empirical studies indicate that conflict has an impact on survival. According to Dagnelie et al (2018), the Congolese conflict has a negative impact on infant mortality. According to Gates et al (2012), the average infant mortality rate in war-torn countries is 10% higher than in non-war affected countries. Children in Burundi who were exposed to civil war in their area of residence had a 10% increased risk of dying (Verwimp, 2012).

Further, studies on Cote d'Ivoire indicate a link between conflict and children's health. Wayoro (2017), for example, concludes that conflict reduces the height-for-age z-score of exposed children compared to their non-exposed counterparts. Children born during the war are both affected. Those from high-conflict regions faced considerable health setbacks compared to children from less-affected regions (Minoiu and Shemyakina, 2014). Dabalen and Saumik (2014) discover that conflict-affected

households had lower dietary diversity. Besides that, the study demonstrates that household victimization or economic losses are mechanisms by which armed conflicts negatively impact child health. However, a study in Ethiopia found that, while there was a link between conflict and child health, after controlling for drought, the conflict had no influence on child health (Delbiso et al, 2017).

Recent multi-country analysis studies by Nguyen and Le (2022) and Goli et al (2022) confirm the negative impact of conflict on various health outcomes. Conflict worsens children's nutrition by increasing wasting, stunting, underweight, and poor immunization. Similarly, conflict exposure is detrimental to child development in Colombia, as children have low height-to-age Z-scores and weight-to-age Z-scores (Kreif et al, 2022). Similarly, conflict exposure is linked to a decrease in birth weight in developing countries. Mothers' low levels of education and high poverty exacerbated the conflict's impact on infants (Le and Nguyen, 2020). Relatedly, pregnant women exposed to armed conflict are more likely to receive inadequate prenatal and delivery care, indicating a significant decline in the composite prenatal and delivery care indices (Nguyen and Le, 2022).

Additionally, studies have been conducted to investigate the impact of conflict shocks on child health in Nigeria. Nwokolo (2015) investigates the effect of the Boko Haram Insurgency (BHI) on child health by geo-matching Nigerian Demographic Health Survey (NDHS) and ACLED data. According to the findings, a rise in conflict reduces birth weight and increases the likelihood of low birth weight for women exposed within six months of pregnancy. Further, the findings imply that both genders in utero have an increased risk of having a low birth weight due to conflict exposure. In a similar line, Akresh et al (2012) assess the influence of the Nigerian civil war of 1967-1970 on stature using NDHS data and variation across ethnicity and cohort. Their findings suggest that people exposed to conflict at all ages between birth and adolescence exhibit lower adult stature, with the largest impact occurring in adolescence.

Similarly, Ekhator-Mobayode and Asfaw (2018) confirm that the Boko Haram insurgency lowers weight-for-height z-score, weight-for-age, and increases the probability of wasting. Similarly, Dunn (2018) finds that if children who had been exposed to the conflict had not been exposed, their mean weight-for-height z-score would be 0.49 standard deviations higher, increasing from -0.74 to -0.25. Furthermore, the likelihood of wasting would be reduced by 13 percentage points, reducing the proportion from 23% to 10%. In addition, the Boko Haram insurgency limits the probability of any antenatal care visits and delivery by a skilled health professional (Chukwuma and Ekhator-Mobayode, 2019).

3. Data

Conflict data

Three datasets on conflicts are integrated to provide a more comprehensive understanding of the dynamic effect of conflicts on child well-being. Existing studies, such as Ekhator-Mobayode and Asfaw (2018), Chukwuma and Ekhator-Mobayode (2019), Kotsadam and Ostby (2019), and Dunn (2018), have only investigated one dataset (either ACLED or UCDP-GED or GTD). Many studies, however (for example, Findley and Young, 2012; Fortna, 2013; Polo and Gleditsch, 2016), have investigated data integration to provide a comprehensive analysis of conflicts. Because the datasets reinforced each other, this approach provides useful information regarding the interrelationships among conflicts. Despite the progress, the approach is hampered by incompatible data formats, a restrictive process, and a tedious and manual approach (Donnay et al, 2019). As a result, Donnay et al (2019) developed an automated protocol called Matching Event Data by Location, Time, and Type (MELTT) to improve data quality and yield reliable results. The approach enables information on the same event across different datasets to be harmonized. As a result, this study used this approach to address the problem of missing data in a single conflict dataset. Understanding the various dimensions of Nigeria's ongoing conflicts is essential to this study, which a single dataset cannot provide.

Three datasets on conflict events were used. First, the Armed Conflict Location and Event Data (ACLED) project focuses on collecting, analysing, and mapping disaggregated conflict data. ACLED categorizes all documented conflicts in over 150 countries by the dates and locations of the conflicts. It gathers real-time information on the locations, dates, actors, fatalities, and reported political violence, and events that occur during civil wars and periods of instability, and regime breakdown and protest events. Second, from 1970 to the present, the Global Terrorism Database (GTD) provides detailed information on terrorist attacks worldwide. The database gathers information on the attacks' timing, location, and perpetrators. Third, the Georeferenced Event Dataset (GED) from the Uppsala Conflict Data Programme (UCDP) shows a contested incompatibility that requires government action using armed force by the military forces of two parties where one of the parties is the government of the state that resulted in at least 25 battle-related deaths each year. These datasets contain information about Nigerian conflicts, although they are coded differently and have time lags. We determined the spatiotemporal blocking (spatial fuzziness-radius in kilometres and temporal fuzziness-time unit in a day) and conflict event attributes are captured taxonomy, thus allowing us to apply MELTT to the three datasets for the periods 2003, 2008, 2013, and 2018.

To account for potential coding ambiguity and false identification of matched entries across the datasets, the study employed a radius of 5km for spatial fuzziness and one day for temporal fuzziness. In addition, we developed two taxonomies that consolidate variables from the three datasets. The first taxonomy focuses on mapping a certain conflict event type to any other conflict event across datasets. The second taxonomy captures geo-precision in the three datasets in terms of exact state, local government, and town. Table 1 shows the results of the matching approach. The table shows that just 2.2% and 1.4% of the entries match across the datasets in 2003 and 2008, respectively. In addition, the percentage of entries matching across datasets increased to 12.4% and 3.8% in 2013 and 2018, respectively. In comparison to a single dataset, the new dataset contains more information on conflict events in Nigeria.

Table 1: MELTT summary output

Data Object Names: GTD, UCDP, and ACLED

Spatial Window: 5km

Temporal Window: 1 Day(s)

No. of Taxonomies: 1

Taxonomy Names: Event Type

	2003	2008	2013	2018
Total No. of Input Observations	272	290	1722	3219
No. of Unique Obs. (After Deduplication)	266	286	1508	3098
No. of Unique Matches	5	4	180	118
No. of Duplicates Removed	6	4	214	121

In addition, the new dataset is being used to assess the localized consequences of conflict on child well-being. It now has adequate information on several types of conflict, such as political violence, religious violence, insurgency, and farmer/herdsmen violence. Furthermore, we classified the conflict dataset into three categories. The first dataset captures information on conflict areas (whether it is political violence or insurgency, farmer/herder clashes, or religious/communal violence). The second set of data focuses solely on the insurgency caused by Boko Haram/Islamic State in West Africa Province-ISWAP attacks. The third dataset only includes farmer/herdsmen conflict. As a result, Appendix Figures 1-3 depict the relationship between the three types of data and DHS distribution.

We match the DHS data with the new conflict dataset (in various forms) and the location of live-born children under 12 months in households within 5km, 15km, 25km, and 45km radius. Figure 1 (see Appendix) depicts the distribution of DHS clusters and conflict events across the period under consideration at different buffer zones. The red, black, blue, and yellow dots on the maps indicate the presence of conflicts (in any form) in the DHS clustering area (plus dots) and the absence of conflicts. A brief look at the map reveals that pockets of conflict began to spread from the southern part of the country in 2003 and 2008. More so, the post-2009 insurgency, farmer/herdsmen violence, and other conflicts paint a devastating image of conflict intensity across the country.

In Figure 2 (see Appendix), we isolated insurgency from the broader conflict. In 2003, two dots were located around the Yobe and Borno areas, demonstrating the origin of Boko Haram before they became prominent after 2009. Furthermore, there is no map for 2008 that suggests that there are no insurgency activities throughout that period. Figures from 2013 and 2018 reveal a significant concentration of the insurgency in the northern part of the country. In addition, when separated from the total conflict data, Figure 3 (see Appendix) provides more detailed information about the farmer/herdsmen conflict. In 2003 and 2008, we can clearly see that there are only a few pockets of this conflict. From 2013 to 2018, the conflict became more complex as it spreads across the country. The figure depicts the evolution and spread of conflicts across the country, and the distribution of DHS clusters among conflict and non-conflict areas, based on the foregoing. This demonstrates the complexities of the conflicts and why their influence on child well-being in Nigeria cannot be disregarded.

Data from DHS

The study used four waves of Demographic Health Surveys (DHS) conducted in Nigeria over four years to achieve our objectives. The variables relating to child health outcomes and its characteristics, and the demographic information of mothers are obtained from the DHS. The NDHS is a nationally representative cross-sectional household survey that provides information on the population and health of Nigerian households. Individual interviews are conducted with men and women aged 15 to 49. The datasets considered in this study are from 2003, 2008, 2013, and 2018 Children Recode (KR). The KR code file has a record for every child from 0-59 months old for each woman interviewed. The data contains information on the time of death for each child, child weight, height, vaccinations, and age of each child if the child is of multiple births. In addition, the survey instrument gathers data on sexual and reproductive health, nutrition, family, ethnicity, education, household assets, and other demographic factors. Traditionally, the surveys cover several thousand respondents across the country, representing urban and rural areas and provinces/States. The KR code files for the years used (2003, 2008, 2013, and 2018 NDHS), respectively, comprise 6,029, 28,647, 31,482, and 33,924 observations. The observations of children from the 2003 and 2008 KR provide data for 'pre-2009,' i.e before the commencement of the insurgency/terrorism. While observations of children from the 2013 and 2018 KR provide information for the 'post-2009' period, which is regarded to be during the insurgency/terrorism, the geographic DHS data, which is separate from the main dataset, contains detailed information on the locations of each sample cluster, and geographical coordinates for each surveyed location, allowing us to match with conflict datasets. Table 2 shows that the outcome variables differ significantly between conflict and non-conflict areas. It also demonstrates differences in the characteristics of the children and mothers, religion, and region between the two areas. Tables 3 and 4 show similar results because there is a significant difference in the outcome variables between insurgency/herdsmen/farmers conflict areas and non-insurgency/herdsmen/farmers conflict areas.

Table 2: Descriptive statistics for all conflicts (standardized statistics) (15km buffer zone)

Variable	Obs.	Non-Conflict Area	Conflict Area	SD
Outcome variables				
Infant mortality (=1 if Yes, 0 if No)	9,395	0.4421	0.4193	-0.0904
Height-for-age (HAZ)	39,313	2.557	3.2168	-0.0119
Weight-for-age (WAZ)	47,833	2.160	2.709	0.1515
Weight-for-height (WHZ)	45,630	1.7106	1.4378	0.1491
Child characteristics				
Hospital Visitation (=1 if Yes, 0 if No)	93,673	0.4846	0.4994	-0.2010
Child vaccinated (=1 if Yes, 0 if No)	51,813	0.4725	0.4636	-0.0508
Child is from multiple births (=1 if Yes, 0 if No)	93,988	0.1845	0.1913	-0.0147
Child gender is male (=1 if Yes, 0 if No)	93,988	0.4999	0.4999	0.0065
Child Age in month	68,614	17.262	17.288	-0.0124
Number of children under-five	93,988	1.2621	1.1447	0.1528
Residence is urban (=1 if Yes, 0 if No)	93,988	0.4642	0.4716	0.0423
Migration (=1 if Yes, 0 if No)	40,177	0.4139	0.4311	-0.0643
Mother characteristics				
Education (=1 if Yes, 0 if No)	93,988	0.4999	0.4608	-0.4100
Mother's Age (in year)	93,988	7.0027	6.6847	-0.0124
Earnings (=1 if Yes, 0 if No)	65,732	0.3526	0.3632	0.0303
Employment (=1 if Yes, 0 if No)	93,665	0.4747	0.4494	-0.1343
Father characteristics				
Education (=1 if Yes, 0 if No)	95,920	0.4903	0.4936	0.0363
Wealth Index				
Second Quintile (=1 if Yes, 0 if No)	93,988	0.4233	0.4180	0.0197
Middle Quintile (=1 if Yes, 0 if No)	93,988	0.3972	0.4249	-0.0974
Fourth Quintile (=1 if Yes, 0 if No)	93,988	0.3788	0.4059	-0.0874
Highest Quintile (=1 if Yes, 0 if No)	93,988	0.3500	0.3629	-0.0367
Religion				
Christianity (=1 if Yes, 0 if No)	93,812	0.4813	0.4847	-0.5343
Islam (=1 if Yes, 0 if No)	93,812	0.4849	0.4815	0.5320
Others (=1 if Yes, 0 if No)	93,812	0.1142	0.1097	0.0093

Notes: Non-conflict area captures the proximity of children away from conflict within the radius of 15km while conflict area captures the proximity of children to conflict within the radius of 15km. The standardized difference (SD) is compared with the rule of thumb of 1.5.

Table 3: Descriptive statistics for insurgency

Variable	Obs.	Non-insurgency area	Insurgency area	SD
Outcome variables				
Infant mortality (=1 if Yes, 0 if No)	9,395	0.4367	0.4530	0.0711
Height-for-age (HAZ)	39,313	2.5541	3.2011	0.0682
Weight-for-age (WAZ)	47,833	2.1405	2.6995	0.3408
Weight-for-height (WHZ)	45,630	1.6747	1.7655	0.2275
Child characteristics				
Hospital Visitation (=1 if Yes, 0 if No)	93,673	0.4885	0.4860	0.0220
Child vaccinated (=1 if Yes, 0 if No)	51,813	0.4705	0.4773	0.0428
Child is from multiple births (=1 if Yes, 0 if No)	93,988	0.1862	0.1820	0.0090
Child gender is male (=1 if Yes, 0 if No)	93,988	0.4999	0.5000	0.0150
Child Age in month	68,614	17.238	17.419	-0.0688
Number of children under-five	93,988	1.2246	1.3371	-0.2005
Residence is urban (=1 if Yes, 0 if No)	93,988	0.4703	0.4328	-0.1784
Migration (=1 if Yes, 0 if No)	40,177	0.4319	0.3263	0.3320
Mother characteristics				
Education (=1 if Yes, 0 if No)	93,988	0.4954	0.4629	0.5355
Mother's Age (in year)	93,988	6.9202	7.1169	0.0962
Earnings (=1 if Yes, 0 if No)	65,732	0.3616	0.3048	-0.1526
Employment (=1 if Yes, 0 if No)	93,665	0.4665	0.4907	0.1747
Father characteristics				
Education (=1 if Yes, 0 if No)	95,920	0.4854	0..4990	0.3092
Wealth Index				
Second Quintile (=1 if Yes, 0 if No)	93,988	0.4181	0.4430	-0.0984
Middle Quintile (=1 if Yes, 0 if No)	93,988	0.4059	0.3775	0.0919
Fourth Quintile (=1 if Yes, 0 if No)	93,988	0.3924	0.3247	0.1954
Highest Quintile (=1 if Yes, 0 if No)	93,988	0.3637	0.2752	0.2305
Religion				
Christianity (=1 if Yes, 0 if No)	93,812	0.4981	0.3349	0.7712
Islam (=1 if Yes, 0 if No)	93,812	0.4991	0.3443	-0.7753
Others (=1 if Yes, 0 if No)	93,812	0.1171	0.0932	0.0485

Notes: Non-conflict area captures the children not in Insurgency conflict States while conflict area captures the children in Insurgency conflict States. The standardized difference (SD) is compared with the rule of thumb of 1.5.

Table 4: Descriptive statistics for herdsmen/farmer

Variable	Obs.	Non-herdsmen/ farmers conflict area	Herdsmen/ farmers conflict area	SD
Outcome variables				
Infant mortality (=1 if Yes, 0 if No)	9,395	0.4423	0.4238	-0.0746
Height-for-age (HAZ)	39,313	2.5392	3.1913	0.0293
Weight-for-age (WAZ)	47,833	2.1314	2.7195	0.2113
Weight-for-height (WHZ)	45,630	1.7127	1.4835	0.1829
Child characteristics				
Hospital Visitation (=1 if Yes, 0 if No)	93,673	0.4860	0.4952	-0.0983
Child vaccinated (=1 if Yes, 0 if No)	51,813	0.4726	0.4659	-0.0389
Child is from multiple births (=1 if Yes, 0 if No)	93,988	0.1881	0.1734	0.0316
Child gender is male (=1 if Yes, 0 if No)	93,988	0.4999	0.4999	0.0041
Child Age in month	68,614	17.242	17.392	-0.0148
Number of children under-five	93,988	1.2399	1.2763	-0.0688
Residence is urban (=1 if Yes, 0 if No)	93,988	0.4729	0.4211	-0.2382
Migration (=1 if Yes, 0 if No)	40,177	0.4148	0.4234	-0.0312
Mother characteristics				
Education (=1 if Yes, 0 if No)	93,988	0.4991	0.4999	0.0502
Mother's Age (in year)	93,988	6.9568	6.9388	0.0823
Earnings (=1 if Yes, 0 if No)	65,732	0.3521	0.3640	0.0341
Employment (=1 if Yes, 0 if No)	93,665	0.4712	0.4732	0.0123
Father characteristics				
Education (=1 if Yes, 0 if No)	95,920	0.4915	0.4877	-0.0375
Wealth Index				
Second Quintile (=1 if Yes, 0 if No)	93,988	0.4204	0.4314	-0.0421
Middle Quintile (=1 if Yes, 0 if No)	93,988	0.3884	0.4152	-0.0581
Fourth Quintile (=1 if Yes, 0 if No)	93,988	0.3850	0.3745	0.0323
Highest Quintile (=1 if Yes, 0 if No)	93,988	0.3602	0.3103	0.1349
Religion				
Christianity (=1 if Yes, 0 if No)	93,812	0.4907	0.4893	0.0137
Islam (=1 if Yes, 0 if No)	93,812	0.4930	0.4923	-0.0086
Others (=1 if Yes, 0 if No)	93,812	0.1116	0.1218	-0.0210

Notes: Non-conflict area captures the children not in herdsmen/farmers conflict States while conflict area captures the children in Herdsmen/Farmers conflict States. The standardized difference (SD) is compared with the rule of thumb of 1.5.

In Figures 1-3, we present the trends of the health outcomes (height-for-age z-scores, weight-for-age z-scores, and weight-for-height z-scores) for conflict-affected and non-conflict-affected children. Before 2009 (pre-conflict period), the children born in conflict-affected areas have high height-for-age z-scores, weight-for-age z-scores

and weight-for-height z-scores compared to children born in non-conflict-affected areas. However, the height-for-age z-scores, weight-for-age z-scores, and weight-for-height z-scores of the children born in conflict-affected areas decline over time after 2009. This may suggest that the effect of conflicts results in stunting, underweight, and wasting as conflicts persist due to food deprivation. Therefore, the trends of indicators are similar in pre-2009 but diverge in post-2009, which fulfils the assumption of a common trend.

Figure 1: Height-for-age Z-scores and exposure to conflict

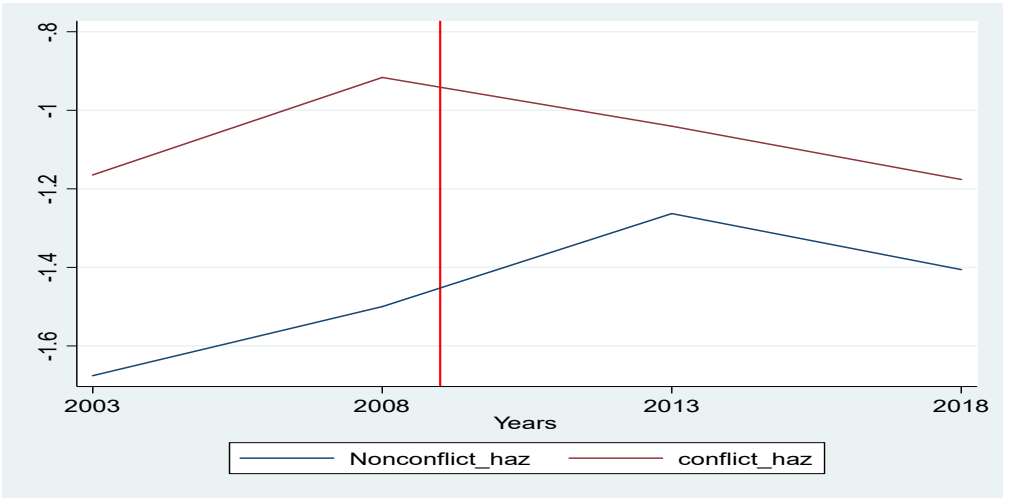


Figure 2: Weight-for-age Z-scores and exposure to conflict

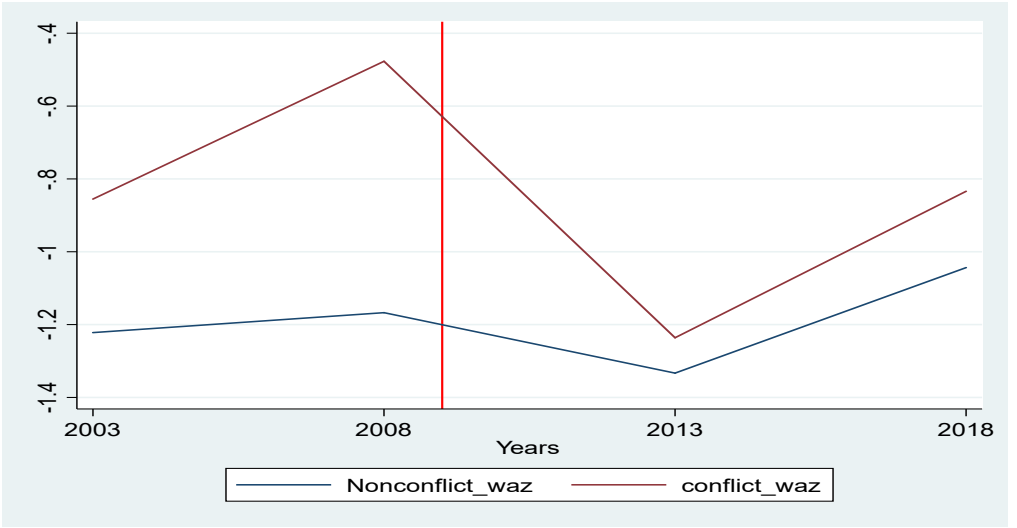
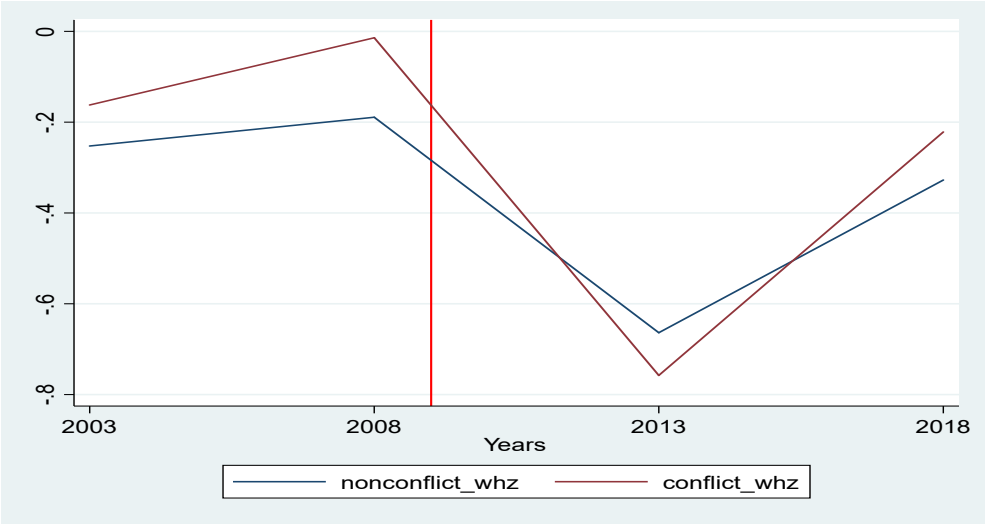


Figure 3: Weight-for-height Z-scores and exposure to conflict



4. Methodology

The study used two identification strategies to investigate the effect of conflict on child well-being in Nigeria. First, we take advantage of the spatiotemporal nature of the dataset to evaluate whether a child's health outcome is determined by the proximity of a child or mother to conflict areas between 2003 and 2018. The conflict events included in this study are available from 2010 to 2018. However, the child's year of birth in the survey ranges from 1991 to 2018. The treatment group for this identification strategy consists of children born between 2010 and 2018, who have been exposed to armed conflicts within a 15km buffer zone. Children born between 2010 and 2018 but not in conflict zones constitute the control group. The choice of 15km is informed by improvement in the health outcomes as the buffer zone increases. We also consider 45km buffer zone and compare the results. We match the NDHS with the integrated conflict dataset, thus we exclude observations of children born in 2009 from the 2013 NDHS to avoid misidentification or misclassification. This study takes advantage of the spatiotemporal nature of the dataset to investigate the impact of conflicts on child health outcomes in Nigeria, using the difference-in-differences (DID) estimation technique. The DID estimation strategy is a quasi-experimental method that uses before and after groups but does not use random assignment (Khandker et al, 2010). It enables us to compare the child health status of children living in conflict areas and children living close to conflict areas to the rest of the country.

Second, we classified major events in Nigeria as insurgency/terrorism or herdsmen/farmers conflicts. We collect matched information on conflict attacks categorized as insurgency/terrorism and herdsmen/farmers conflicts from 2003 to 2018, to correspond with the NDHS data timeframe used in the study. By identification, this study explained if a child's observation is from high-active conflict areas or low-active areas for both conflict event categories. Using Ekhator-Mobayode and Asfaw (2018)'s identification technique, we defined conflict type high-active areas as states with more than 12 attacks in any year, implying that the state must experience an attack every month, on average. Adamawa, Borno, Gombe, Kaduna, Kano, Yobe, and FCT Abuja are the most active insurgency/terrorism conflict areas. Benue, Plateau, Zamfara, Adamawa, Delta, Edo, Kaduna, Kogi, Nasarawa, Sokoto, and Taraba are the most active States in terms of herds/farmers' clashes. The states are coded as insurgency high-active areas or insurgency low-active areas, and herds/farmers high-active areas or herds/farmers low-active areas. These definitions allow for conflict type differentiation and clarify the effect of each conflict type on child health in Nigeria.

Because attacks before 2009 were relatively low and not significantly related to the insurgency or herdsmen/farmers conflicts, the 2003 and 2008 NDHS is reflective of the period before the insurgency and herdsmen/farmers conflicts.

To examine the effect of conflicts on child health outcome, we specified two regression models using two identification strategies, drawing on Chukwuma and Ekhator-Mobayode (2019) and Dunn (2018):

$$Y_{ivjt} = \beta_0 + \beta_1 ConflictAreas15km_{ijv} + \beta_2 Post2009_{ivt} + \beta_3 (ConflictAreas15km_{ijv} * Post2009_{ivt}) + X'_{itY} + \alpha_j + \lambda_t + \theta_m + \varepsilon_{ivjt} \quad (1)$$

$$Y_{ivjt} = \beta_0 + \beta_1 ConflictHighActive_{ij} + \beta_2 Post2009_{ijt} + \beta_3 (ConflictHighActive_{ij} * Post2009_{ijt}) + X'_{itY} + \alpha_j + \lambda_t + \gamma_i + +\theta_m + \varepsilon_{ivjt} \quad (2)$$

Where: Y_{ivjt} = Child health outcomes

X'_{itY} = Vector for control variables

γ_i = Region fixed effects

θ_m = Mother fixed effects

α_j = State fixed effects

λ_t = Year of birth fixed effects

ε_{ivjt} = Error term

From the equation specified, the variable Y_{ivjt} is the health outcome of a child i born in cluster v and state j at time t. The child health outcome is proxied by the continuous variable of stunting, underweight, and wasting using the z-scores for height-for-age (HAZ), weight-for-age (WAZ), weight-for-height (WHZ), and infant mortalities. For the continuous variable, the raw height and weight data were explored to calculate the z-scores adhering to the World Health Organization standard. Accounting for the possible differences in weight of children, Habicht et al (1974) affirm that irrespective of the location differences, under-five children in normal conditions should have similar weights. Infant mortality is measured by probability (or likelihood) of dying either at birth or up to 12 months. The variables describing infant mortality are taken from a question answered by the mother. The mother is asked if her children are alive or dead. If children are dead, the mother is asked the age the child died. The responses are coded as a binary variable, where 1 implies the child died before his/her first birthday (12 months) and 0 otherwise.

The first independent variable in Equation 1 is $ConflictAreas15km_{ijv}$, which indicates the location of conflict events to DHS clusters, looking at 15km buffer zones. It is a dummy variable assuming the value of 1 if the child lives in a cluster located within the stated ambit from the conflict location and 0 otherwise. Another variable under consideration is $Post2009_{ivt}$. It is a binary variable for children who are born during conflict events. The third independent variable is the interaction between the conflict areas and the children born during conflicts. While for equation 2, the first independent variable $ConflictHighActive_{ij}$ is a binary variable that indicates whether a State of residence jj is in conflict high-active or low-active areas. It is equal to 1 if the state of residence is in conflict high-active areas and 0 otherwise. X'_{itY} represents the vector of control variables such as child gender, residence, household size, mother age, wealth index, religion, and birth order. The term λ_t represents the fixed effects of year of birth of the children and the study controls for State-fixed effects (α_j) and mother effects (θ_m).

Specifically, the regressions allow us to account for potential time-varying variables (birth order and multiple birth). When considering child health outcomes, these are critical time-varying factors (Kotsadam, 2018). These variables are associated with child health outcomes, and are considered in the regressions. Because these conflicts are largely located in regions, the study controls for region effects in Equation 2. We also account for mother-fixed effects to control for selection bias. This allows us to consider a number of factors that may be related to conflicts and child health outcomes. Controlling for observed and unobserved effects (such as mother's education, ethnicity, religion, father's education, and residency) is particularly important. This also eliminates the impact of population changes, which could affect the estimated effect.

More so, the study examines the mechanisms through which armed conflicts may affect child health. Empirical studies have shown that vaccination is a major determinant of child growth (Anekwe and Kumar, 2012). Thus, we examine the effects of conflicts on the probability of child vaccination. This is essential to the survival of a child. In a conflict-prone area, access to vaccination will be adversely affected, which will increase preventable child mortality. The variables to measure the mechanisms are derived from questions answered by the mother in the survey data. The mother was asked if the child received any form of vaccination. We create a dummy variable from the responses, which is a binary variable equal to 1 if the child has received any vaccination and 0 otherwise. For maternal healthcare, the mother was asked if she visited the hospital in the past 12 months. A dummy was created from the responses, equal to 1 if the mother has visited the hospital in the past 12 months and 0 otherwise. Finally, other mechanisms such as mother's education (1 if she has any form of education), mother's employment (1 if she has any form of employment), and mother's economic strength (1 if she has any form of earning).

5. Results and discussion

a.) Full sample result

Table 5a shows the effect of conflicts on child outcomes (infant mortality, height-for-age, weight-for-age, and weight-for-height z-scores) in Nigeria after 2009, which is regarded as the start date for significant conflicts in the country. A difference-in-differences approach was used to obtain the results. The results show that proximity to conflict impact child health outcomes. The variable of interest shows the interactions between proximity to conflict areas within 15km buffer zones and children born during conflicts in the country. The table illustrates that living within 15km close to a conflict zone is associated with an increase in infant mortality rate and low height-for-age (HAZ), weight-for-age (WAZ), and weight-for-height (WHZ) z-scores for children under the age of five. Furthermore, the result shows that children born during conflict and close to conflict areas have a 12.3 percentage point higher risk of dying before the age of 12 months. More so, the result indicates that *ceteris paribus*, children who are born during conflict period and 15km close to conflict areas have a mean HAZ, WAZ, and WHZ of 0.18, 0.37, and 14.7, respectively, lower than children who are not close to conflict areas. This implies that if children are not close to conflict areas nor born during conflict periods, their mean HAZ, WAZ, and WHZ would be higher than it is. Further analysis examines the effect between North and South divides as presented in Tables 5b and c. The results show that the probability of dying before first birthday of children born during conflicts and close to conflict within 15km radius is higher in the South relative to the North. However, the means of HAZ, WAZ, and WHZ in the North are relatively lower than in the South for children born during conflicts and close to conflict areas. This result shows the nature of conflict in these regions. In the North, conflicts experienced are more terrorism- and insurgency-related where infants are non-combatants, hence mortality rate associated with conflict may be low. In the case of the South, the conflicts are more of riots where children are direct victims. This may be a plausible reason for the significant impact of conflict on mortality. Expectedly, the adverse effect of conflict on children is largely indirect where hunger persists for a long period.

Table 5a: Impact of aggregate conflict on child health outcomes in Nigeria (aggregate)

Variables	Infant Mortality	Height-to-Age Z-score	Weight-to-Age Z-score	Weight-to-Height Z-score
inter15km	-0.132**	0.203***	0.273***	0.0364
	(0.0561)	(0.0438)	(0.0309)	(0.0301)
post2009	0.309***	-4.467***	-4.644***	-0.355***
	(0.0745)	(0.199)	(0.121)	(0.118)
inter15km_ post2009	0.123**	-0.188***	-0.370***	-0.147***
	(0.0607)	(0.0654)	(0.0433)	(0.0413)
Observations	1,659	38,917	47,367	45,209
R-squared	0.142	0.222	0.401	0.068
F-test	4.113	156	446.5	46.34
Prob > F	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include state-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. Also, we control for additional variables (education, mother's employment, earnings, hospital visitation) in the case of infant mortality. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table 5b: Impact of aggregate conflict on child health outcomes in Nigeria (in North)

Variables	Infant Mortality	Height-to-Age Z-score	Weight-to-Age Z-score	Weight-to-Height Z-score
inter15km	-0.0898	0.433***	0.468***	0.0737
	(0.0739)	(0.0743)	(0.0527)	(0.0523)
post2009	0.324***	-4.256***	-4.511***	-0.455***
	(0.0897)	(0.245)	(0.149)	(0.150)
inter15km_ post2009	0.0423	-0.288***	-0.558***	-0.241***
	(0.0806)	(0.100)	(0.0673)	(0.0663)
Observations	1,157	25,784	31,685	29,928
R-squared	0.135	0.215	0.383	0.070
F-test	3.671	130.8	364	41.36
Prob > F	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include state-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. Also, we control for additional variables (education, mother's employment, earnings, hospital visitation) in the case of infant mortality. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table 5c: Impact of aggregate conflict on child health outcomes in Nigeria (in South)

Variables	Infant Mortality	Height-to-Age Z-score	Weight-to-Age Z-score	Weight-to-Height Z-score
inter15km	-0.205**	0.0197	0.104***	0.0229
	(0.0849)	(0.0549)	(0.0386)	(0.0348)
post2009	0.238*	-4.953***	-4.926***	-0.128
	(0.140)	(0.341)	(0.206)	(0.184)
inter15km_ post2009	0.260***	-0.0838	-0.145**	-0.0677
	(0.0922)	(0.0914)	(0.0600)	(0.0523)
Observations	502	13,133	15,682	15,281
R-squared	0.188	0.224	0.415	0.062
F-test	2.402	73.95	217.5	19.62
Prob > F	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. Also, we control for additional variables (education, mother's employment, earnings, hospital visitation) in the case of infant mortality. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Thus, we may conclude that proximity to conflict areas considerably increases the chances of having worse health outcomes for children closer to conflict areas than children who are not near conflict areas. This evidence suggests that different forms of conflict have an adverse effect on child health outcomes. Children are not combatants in the battle, but they suffer because of lack of social services, food, and an unstable environment. The findings are supported by pockets of conflict around the country, in contrast to previous studies (such as Dunn, 2018; Ekhator-Mobayode and Asfaw, 2018) that focused solely on insurgency. Furthermore, children are subjected to negative consequences of conflict in many parts of the country, thus limiting their prospects. Also, the results supported the findings by Howell et al (2020); nevertheless, the study primarily focused on wasting and provided limited information on conflict (use of Social Conflict Analysis Data 2013).

In Table 6a, we considered different mechanisms through which conflicts within 15km buffer zones can undermine child health outcomes. Therefore, we explore vaccination, hospital visitation, earnings, employment, education status, and migration of the mother. The findings show that living within 15km to conflict areas reduces the likelihood of children being vaccinated and hospital visitation by 0.7 and 0.3 percentage points, respectively, at a 1% significant level. Conflict explicitly limited access to vaccination and hospital visitation due to lack of safety assurance. The results also show that proximity to conflict areas within a 15km radius has a negative effect on the education of a mother. Therefore, the closer a household is to conflict areas, the lower the probability of a child to live with a mother with any educational qualification by 0.5 percentage points, respectively. In addition, because

of proximity to conflict areas, a family is more likely to migrate from their place of living. A mother who lives within 15km of a conflict location has a 0.3 percentage point higher likelihood to migrate than a mother who does not live near a conflict location. The associated coefficient is statistically significant at 5% level. These findings show that a mother's proximity to conflict location worsens both the mother's and child's livelihoods. From Tables 6b and 6c, the proximity to conflict significantly weakens vaccination, hospital visit, employment, and education in the North while earnings are substantially affected. Conflicts in the North affect several dimensions of mothers' lives in providing quality health for their children compared to the South. Therefore, during a conflict, socio-economic activities are disrupted, resulting in lower chances of getting vaccination, visiting the hospital, obtaining education, and greater chances of internal migration. For robustness checks (see Tables A1-F2 in the Appendix), the analysis was considered across the six regions of the country. At this specific level, most results align with previous findings at aggregate level. In sum, the exposure of children to conflict in any part of the country adversely worsens their health outcomes.

Table 6a: Impact of aggregate conflict on child health mechanisms in Nigeria (aggregate)

Variables	Vaccinated	Hospital Visit	Earnings	Employment	Education	Migration
inter15km	0.0446***	0.0373***	0.0141**	0.00680	0.0622***	-0.0304***
	(0.0091)	(0.0074)	(0.0063)	(0.0076)	(0.0060)	(0.0113)
post2009	-0.251***	0.193***	-0.0533**	-0.110***	0.0812***	-0.0162
	(0.0334)	(0.0275)	(0.0235)	(0.0281)	(0.0225)	(0.0284)
inter15km_ post2009	-0.0718***	-0.0291***	0.0100	-0.0153	-0.0525***	0.0324**
	(0.0130)	(0.0099)	(0.0085)	(0.0101)	(0.0080)	(0.0145)
Observations	38,452	55,936	39,370	55,935	56,191	21,996
R-squared	0.143	0.166	0.164	0.122	0.499	0.115
F-test	91.65	156.3	108.6	109.4	787.2	43.04
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table 6b: Impact of aggregate conflict on child health mechanisms in Nigeria (in North)

Variables	Vaccinated	Hospital Visit	Earnings	Employment	Education	Migration
inter15km	0.101***	0.0558***	0.0301***	0.0319**	0.0919***	0.0311*
	(0.0144)	(0.0116)	(0.0107)	(0.0132)	(0.0108)	(0.0174)
post2009	-0.260***	0.262***	-0.110***	-0.122***	0.0889***	-0.0608*
	(0.0401)	(0.0312)	(0.0288)	(0.0355)	(0.0292)	(0.0323)
inter15km_post2009	-0.147***	-0.0534***	0.00982	-0.0495***	-0.0743***	-0.0334
	(0.0187)	(0.0143)	(0.0132)	(0.0162)	(0.0133)	(0.0205)
Observations	28,646	37,666	24,480	37,740	37,898	14,696
R-squared	0.127	0.178	0.181	0.092	0.361	0.080
F-test	78.24	150.5	100.2	70.46	395.4	26.10
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. Also, we control for additional variables (education, mother's employment, earnings, hospital visitation) in the case of infant mortality. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table 6c: Impact of aggregate conflict on child health mechanisms in Nigeria (in South)

VARIABLES	Vaccinated	Hospital Visit	Earnings	Employment	Education	Migration
inter15km	-0.00414	0.0244**	0.0187**	-0.0229***	0.0199***	-0.0393**
	(0.0109)	(0.0106)	(0.00809)	(0.00855)	(0.00602)	(0.0166)
post2009	-0.264***	0.0419	0.0517	-0.0863**	0.0928***	0.0709
	(0.0574)	(0.0544)	(0.0399)	(0.0439)	(0.0311)	(0.0562)
inter15km_post2009	0.0208	0.0139	-0.0244**	0.0295**	-0.0135	0.0379
	(0.0181)	(0.0156)	(0.0119)	(0.0126)	(0.00888)	(0.0240)
Observations	9,806	18,270	14,890	18,195	18,293	7,300
R-squared	0.161	0.108	0.166	0.107	0.164	0.092
F-test	37.40	43.32	57.83	42.46	69.99	16.02
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. Also, we control for additional variables (education, mother's employment, earnings, hospital visitation) in the case of infant mortality. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

b.) Insurgency/terrorism and child health outcomes

Given the intensity of major conflicts, we extract information on insurgency/terrorism conflicts to fully understand the impact of this conflict type on child health outcomes and provide appropriate policy recommendations. Existing studies (such as Chukwuma and Ekhator-Mobayode, 2019; Dunn, 2018; Ekhator-Mobayode and Asfaw, 2018) have undoubtedly studied the effect of insurgency on child health outcomes, but data gaps caused by reliance on a single conflict dataset necessitate reconsidering this relationship. As a result, Table 7 presents the effect of insurgency/terrorism on child health outcomes. The findings demonstrate that living in insurgency-affected areas increases the likelihood of a child having low height-for-age and weight-for-age z-scores. Therefore, if children who are exposed to insurgency had not been exposed, their mean HAZ and WAZ would be 44 and 45 percentage points higher. The coefficients are statistically significant at 5% and 1% levels for HAZ and WAZ, respectively. The persistence of insurgency in Nigeria's north-eastern region continues to worsen child health outcomes. Unlike Ekhator-Mobayode and Asfaw (2018), who found that conflict had a substantial effect on only one of the multiple child health outcomes examined (wasting), this study found that insurgency significantly worsened the HAZ and WAZ z-scores of children exposed to insurgency conflict.

Table 7: Impact of insurgency on child health outcomes in Nigeria

Variables	Infant Mortality	Height-to-Age Z-score	Weight-to-Age Z-score	Weight-to-Height Z-score
InsurgencyActiveArea	0.0806	0.431**	0.670***	0.188
	(0.0873)	(0.208)	(0.133)	(0.127)
post2009	0.460	-7.563***	-6.082***	-0.305**
	(0.327)	(0.257)	(0.143)	(0.148)
InsurgencyActiveArea_post2009	-0.105	-0.441**	-0.447***	-0.126
	(0.0789)	(0.207)	(0.132)	(0.125)
Observations	1,039	13,737	16,966	16,374
R-squared	0.255	0.361	0.524	0.088
F-test	1.771	27.49	62.36	5.334
Prob > F	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects, region-fixed effects, ethnicity-fixed effects, and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, father's age, father's education, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

The consequences of insurgency on different mechanisms (vaccination, maternal hospital visits, mothers' earnings, employment, education status, and migration) are reported in Table 8. As a result of the insurgency, vaccination, earnings, and employment suffer. At the 1% significance level, the results suggest that exposure to

insurgency-active areas reduces the likelihood of a child being vaccinated and the mother's education by 13.8, 0.3, and 0.6 percentage points, respectively. Furthermore, the results confirm the findings of Ekhator-Mobayode and Asfaw (2018), which found a negative effect of insurgency on vaccination. In addition, the table reveals that exposure to insurgency positively influences migration. The result suggests that exposure to insurgency-active areas increases the likelihood of a mother's migration to non-conflict areas, which has led to the displacement of over 2.1 million people in Nigeria, according to statistics from the United Nations Refugee Agency. The study also considers the severity of insurgency (see Tables G1-G2 in the Appendix) represented by death per 100,000 population (pre-conflict population, i.e., 2006). The results are not robust compared to the number of attacks per State.

Table 8: Impact of insurgency on child health mechanisms in Nigeria

Variables	Vaccinated	Hospital Visit	Earnings	Employment	Education	Migration
Insurgency	0.161***	0.0015	-0.0497***	0.0613***	0.0148	-0.0870***
	(0.0191)	(0.0164)	(0.0147)	(0.0167)	(0.0134)	(0.0235)
post2009	-0.272***	0.188***	-0.0335	-0.112***	0.0728***	-0.0040
	(0.0334)	(0.0275)	(0.0234)	(0.0281)	(0.0224)	(0.0283)
Insurgency_ post2009	-0.138***	0.0036	-0.0302**	-0.0660***	-0.0018	0.0407*
	(0.0199)	(0.0169)	(0.0151)	(0.0172)	(0.0138)	(0.0241)
Observations	38,452	55,936	39,370	55,935	56,191	21,996
R-squared	0.145	0.167	0.169	0.123	0.499	0.116
F-test	90.63	153.1	109.2	106.9	766.3	42.19
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index.
***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

c.) Herdsmen/farmers conflict and child health outcomes

The growing concerns in Nigeria about the severity of the herdsmen/farmers conflict cannot be overstated. As a result, this study extends the argument in the current literature by exploring the effects of herdsmen/farmers' conflict on child health outcomes in the country. Table 9 presents the effect of herdsmen/farmers' conflict on child health outcomes. The findings suggest that being exposed to herdsmen/farmers conflict is linked with an increase in infant mortality rate. According to the findings, children exposed to herdsmen/farmers conflict have a 15.7 percentage point higher risk of dying before the age of 12 months. The associated coefficient is statistically

significant at 5% level. More so, children exposed to herdsmen/farmers conflict have a lower mean of HAZ, WAZ, and WHZ by 0.65, 0.76, and 0.32, respectively, than children who are not exposed to herdsmen/farmers' conflict. The associated coefficients are statistically significant at 1% level. Therefore, this evidence shows that exposure to herdsmen/farmers conflict type worsens child health outcomes. It is important to emphasize that there is no evidence of the effect of herdsmen/farmers' conflict on health outcomes in existing studies.

Table 9: Impact of herdsmen/farmers conflict child health outcomes in Nigeria

Variables	Infant Mortality	Height-to-Age Z-score	Weight-to-Age Z-score	Weight-to-Height Z-score
HerdsFarmersActiveArea	-0.107	0.467**	0.934***	0.563***
	(0.0791)	(0.193)	(0.124)	(0.115)
post2009	0.344	-7.535***	-6.058***	-0.330**
	(0.327)	(0.256)	(0.142)	(0.147)
HerdsFarmersActiveArea_post2009	0.157**	-0.647***	-0.763***	-0.322***
	(0.0751)	(0.196)	(0.125)	(0.116)
Observations	1,039	13,737	16,966	16,374
R-squared	0.257	0.362	0.525	0.090
F-test	1.794	27.53	62.57	5.471
Prob > F	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects, region-fixed effects, ethnicity-fixed effects, and year of birth-fixed effects. Other control variables are Child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, father's age, father's education, migration status, mother's employment, hospital visitation, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table 10 presents the effects of herdsmen/farmers' conflict on mechanisms. The study examines the mechanisms through which herdsmen/farmers' conflicts may affect child health outcomes. The table shows that exposure to herdsmen/farmers conflict reduces the likelihood of children being vaccinated, earnings, and employment of a mother by 16.5, 0.3, and 0.8 percentage points, respectively. The findings suggest that the presence of herdsmen/farmers conflict prevents mothers from presenting their children for vaccination and worsens the socio-economic factors of mothers. More so, the results show that exposure to herdsmen/farmers conflict increases the likelihood that a family will undergo an internal migration by 0.4 percentage points. The study further examines the severity of herdsmen/farmer conflict (see Tables H1-H2 in the Appendix) captured by death per 100,000 population (pre-conflict population, i.e., 2006). The results are less robust compared to the frequency of attacks per state used.

Table 10: Impact of herdsmen/farmers conflict on child health mechanisms in Nigeria

Variables	Vaccinated	Hospital Visit	Earnings	Employment	Education	Migration
Herds/Farmers	0.179***	-0.0039	0.0367***	0.0838***	-0.0053	-0.0237
	(0.0185)	(0.0154)	(0.0129)	(0.0157)	(0.0126)	(0.0210)
post2009	-0.287***	0.181***	-0.0508**	-0.111***	0.0733***	-0.0121
	(0.0342)	(0.0281)	(0.0240)	(0.0288)	(0.0231)	(0.0290)
Herds/Farmers_ post2009	-0.165***	0.0004	-0.0352***	-0.0836***	-0.00217	0.0367*
	(0.0197)	(0.0163)	(0.0136)	(0.0166)	(0.0132)	(0.0220)
Observations	36,685	53,238	37,487	53,264	53,479	21,020
R-squared	0.144	0.167	0.162	0.122	0.498	0.114
F-test	87.02	148.3	100.8	102.9	736.6	40.04
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, father's age, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

6. Conclusion

Without a doubt, Nigeria continues to face challenges in improving child health outcomes. This is worsened by the severity and prevalence of different conflicts in many parts of the country. Furthermore, available evidence suggests that previous studies were preoccupied with insurgency. As a result, the study provides extensive evidence on the consequences of aggregate conflicts, insurgency, and herdsmen/farmers conflict on child well-being (using different child health outcomes -infant mortality, stunting, wasting and underweight and mechanisms - vaccination, hospital visitation, earnings, employment, and education). Furthermore, the study employs different sensitivity analyses to determine the differential impacts of these conflict types on child health outcomes. Specifically, it explores three conflict datasets (ACLED, UCDP-GED, and GTD), in contrast to previous studies that used a single conflict dataset. The MELTT protocol developed by Donnay et al (2019) is used to merge these datasets. Furthermore, the study explores four DHS waves (2003, 2008, 2013, and 2018). The combination of robust datasets allows us to investigate different dimensions of conflict and their implications for child outcomes. The study employs a difference-in-differences approach to achieve our objectives.

The findings clearly show that proximity to conflict areas within a 15km radius (aggregate) in Nigeria significantly worsens infant mortality, wasting, and underweight. Similar findings were found when the country was dichotomized into North and South. However, the consequence of conflicts on health outcomes is weighty in the North. Furthermore, we found that exposing children to insurgency had detrimental effects on some health outcomes. Children, as non-combatants in conflicts, are impacted indirectly and severely by the consequences of conflict. This poses a significant challenge to Nigeria's future human capital production. More so, the effect of the herdsmen/farmers conflict is telling. Additionally, there is strong evidence for a significant decline in the number of vaccinated children, hospital visitation, mothers' earnings, employment, and educational attainment for children and mothers living within a 15km radius of a conflict. The conflicts also forced mothers in affected areas to move to non-conflict affected areas. Similarly, exposure to herdsmen/farmers' conflict has a large and detrimental effect on these mechanisms. More so, exposure to insurgency affects only vaccination, earnings, and employment. Therefore, the prevalence of conflict types hinders access to vaccination and worsens the livelihood of mothers, which most likely affects the child's health. This may also result in high child mortality. The consequence of conflicts is enormous as essential services are

cut off, thus putting the children in danger. In terms of socioeconomic activities, proximity and exposure to conflicts results in economic loss due to disruption of productive activities, which affects the mother's earnings and employment. More specifically, a mother's educational aspirations are likely to be jeopardized because of conflict-related insecurity.

From the foregoing, a number of relatable policy issues ensue. First, the government needs to take proactive measures towards addressing the prevalence of conflicts across the country. Specifically, protection of children (under-5 children) from exposure to conflict is essential. Given the complexity of conflict, it is important to devise means to evacuate vulnerable mothers from conflict. By this, the government can protect the future production of quality human capital. Since evidence has shown how child's health is affected across different parts of the country, developing a national framework in collaboration with states may be a way forward. Second, designing interventions and programmes to improve child health outcomes in the conflict areas in the country should focus on conflict-affected areas. Although resource allocation may differ, interventions and programmes should be holistic due to overwhelming evidence that conflicts in the country are not confined to the north-eastern region. Third, the interventions and programmes should be targeted towards increasing access to vaccination, hospital visitation, and restoring productive activities for mothers to regain their economic strength.

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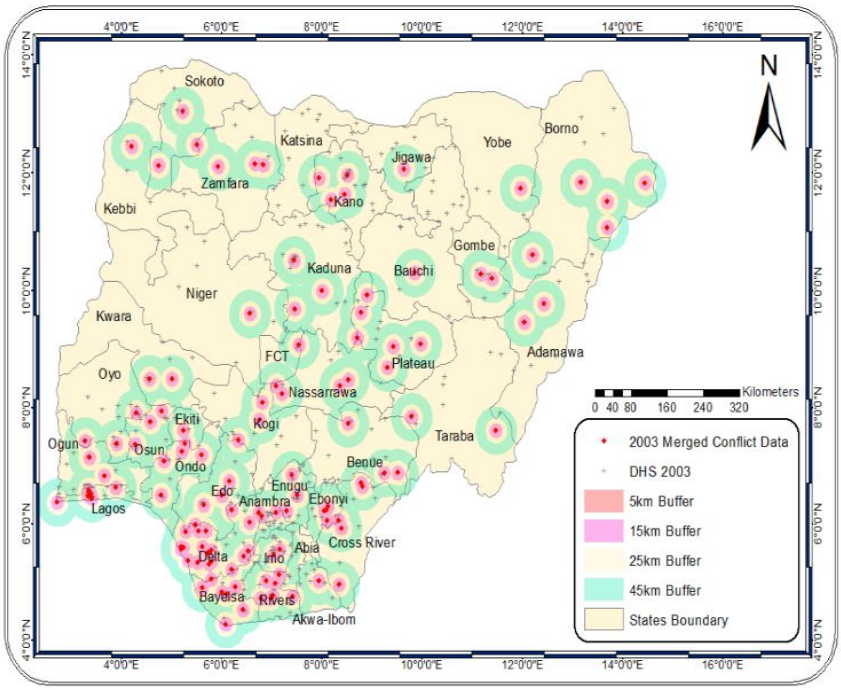
Appendix

Figure 4a: Integrated conflict events proximities and DHS clustering distribution



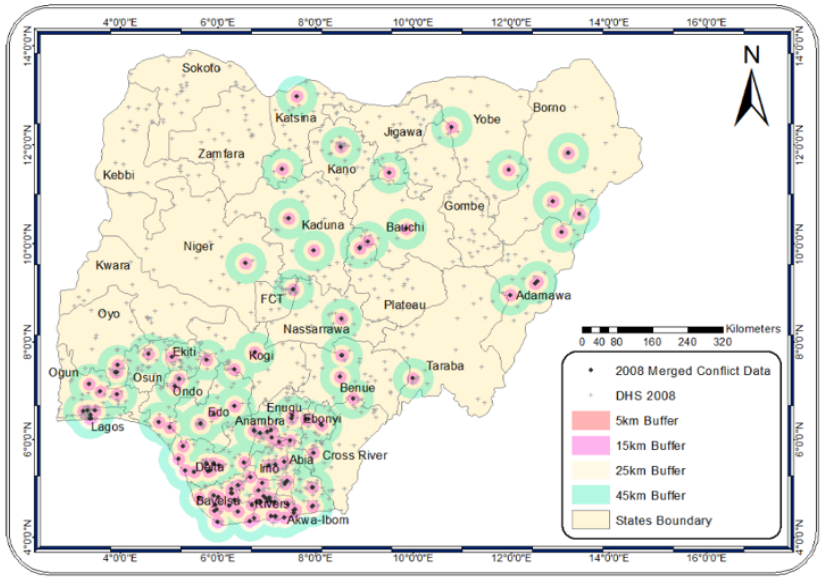
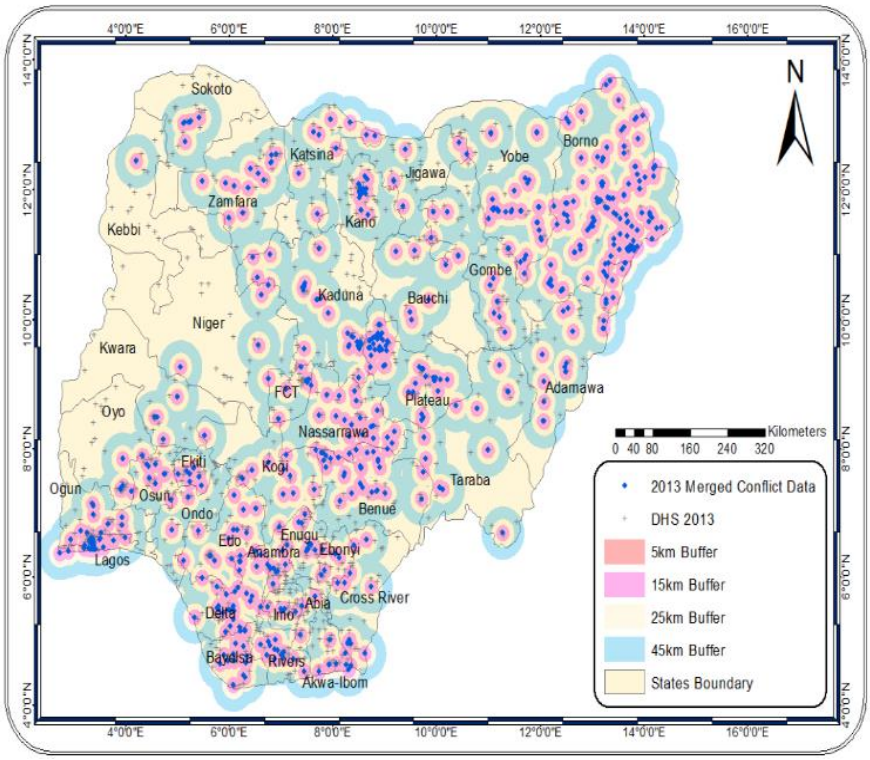


Figure 4b: Integrated conflict events proximities and DHS clustering distribution



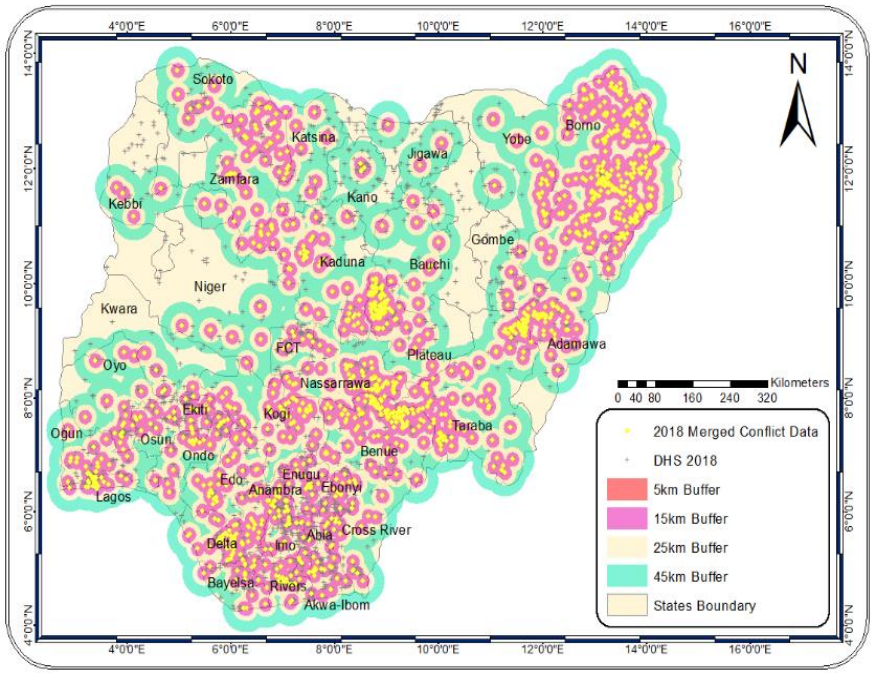
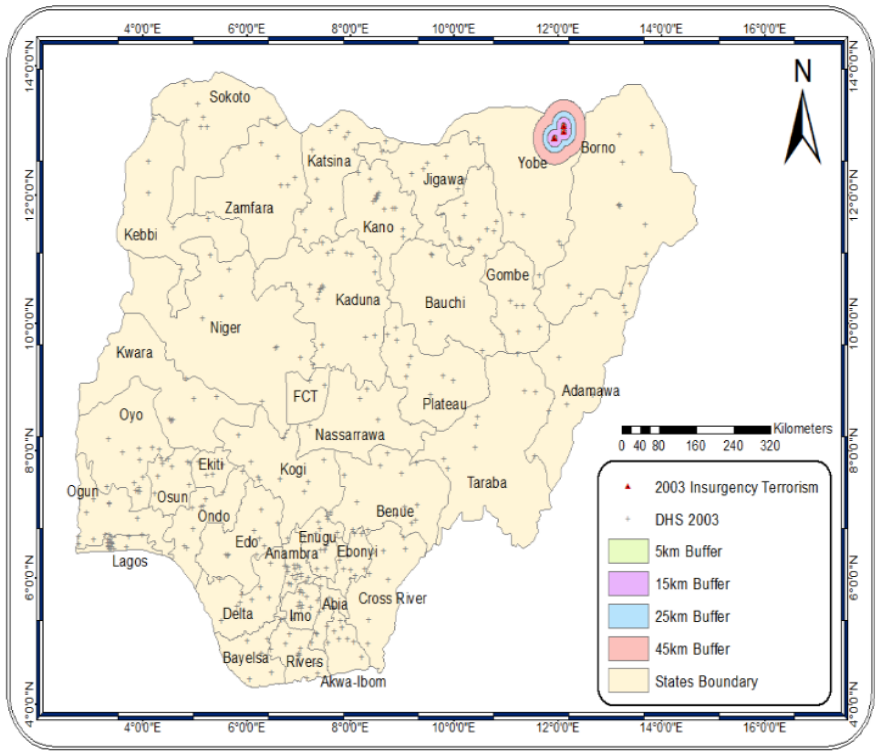


Figure 5a: Integrated insurgency/terrorism events proximities and DHS clustering distribution



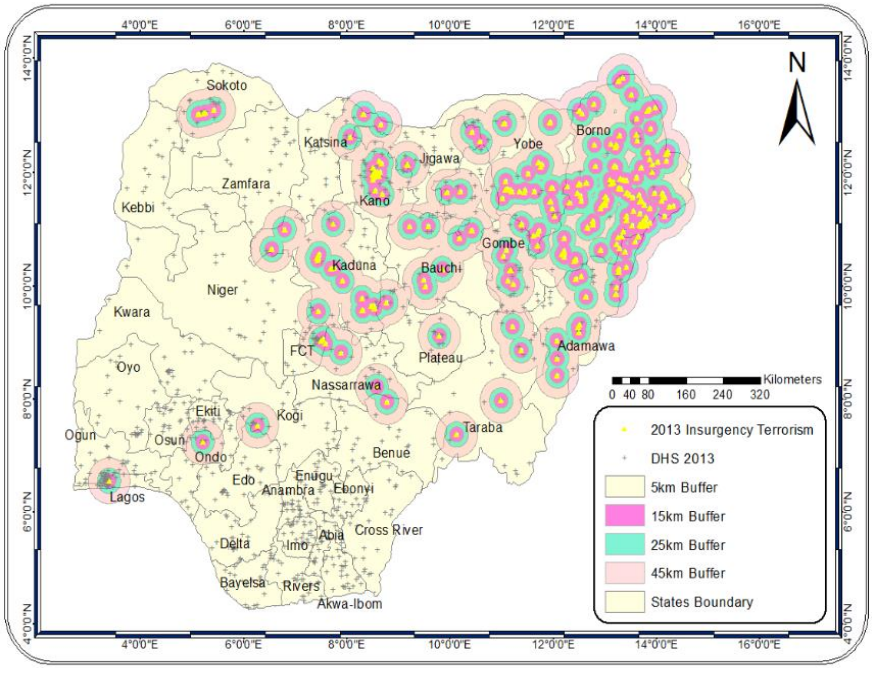


Figure 5b: Integrated insurgency/terrorism events proximities and DHS clustering distribution

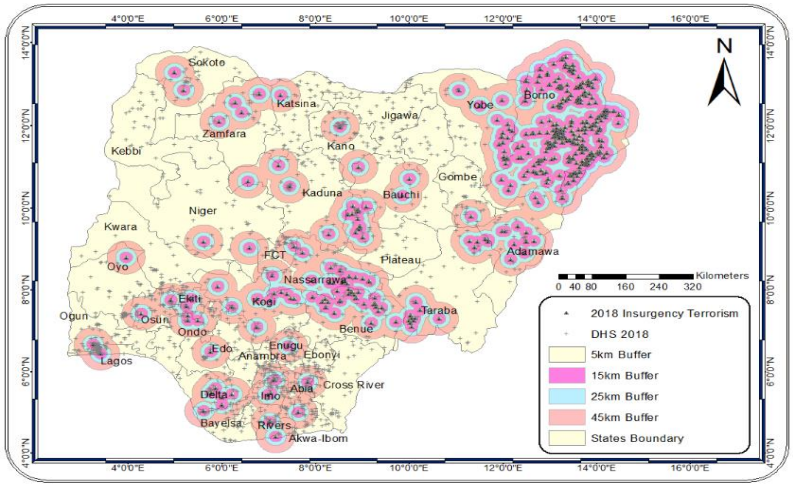
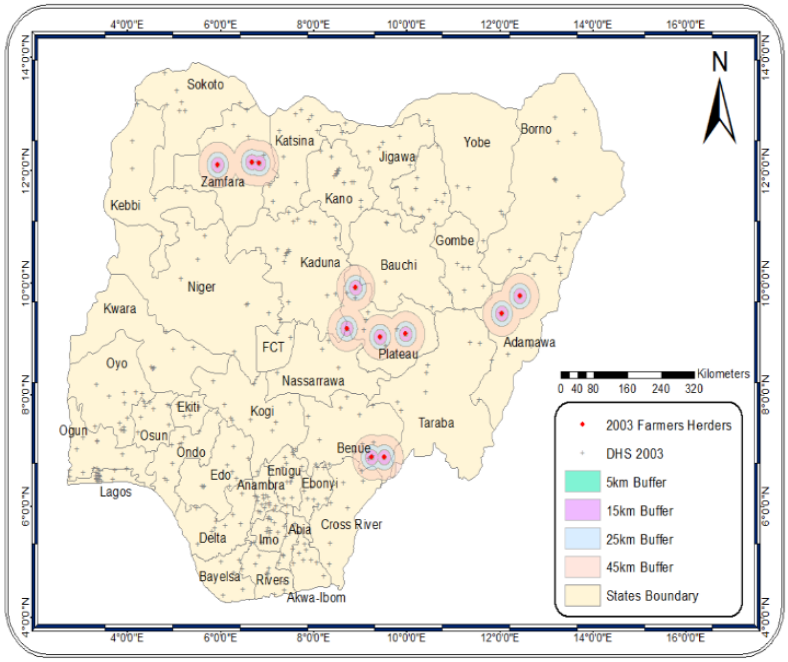


Figure 6a: Integrated farmers/Herdsmen conflict events proximities and DHS clustering distribution



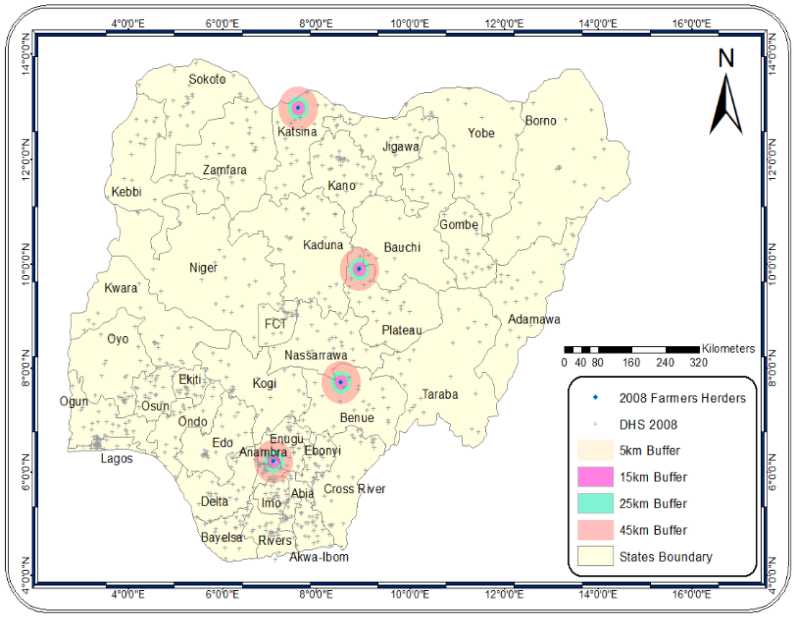
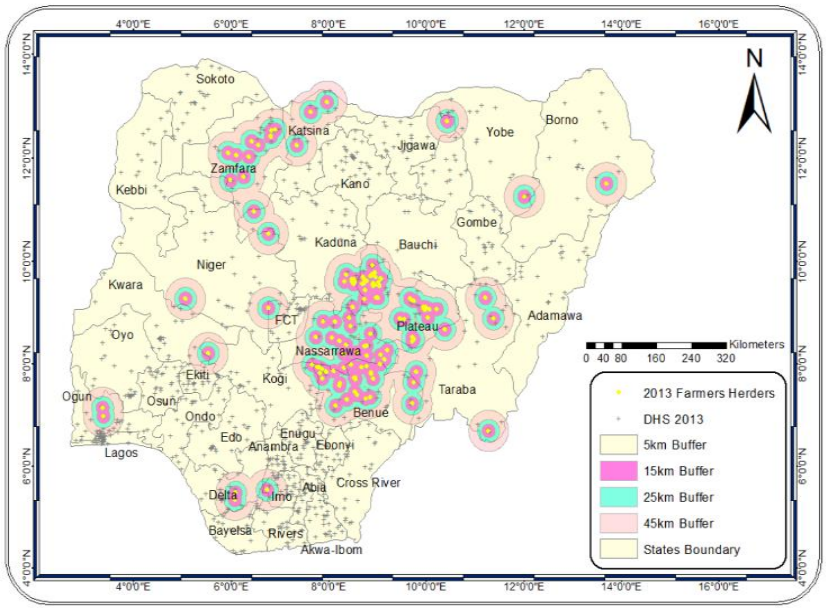


Figure 6b: Integrated farmers/Herdsmen conflict events proximities and DHS clustering distribution



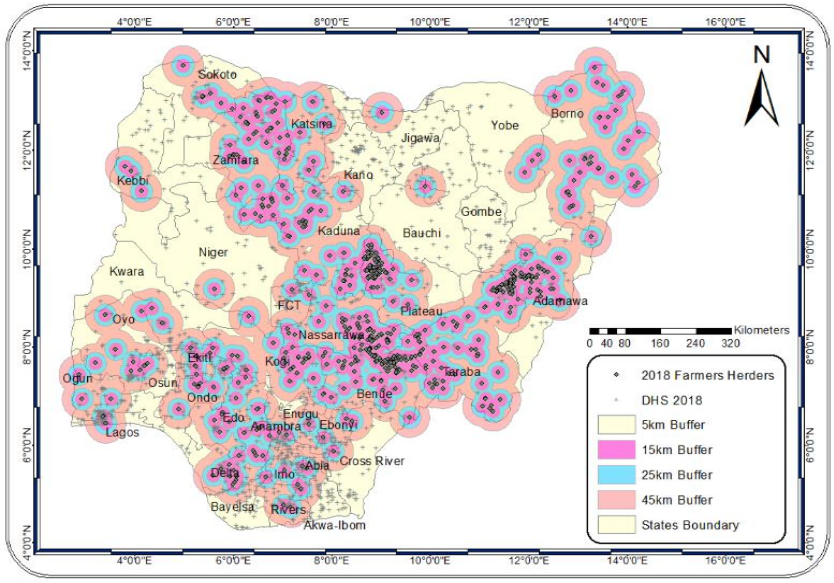


Figure 7: MELTT

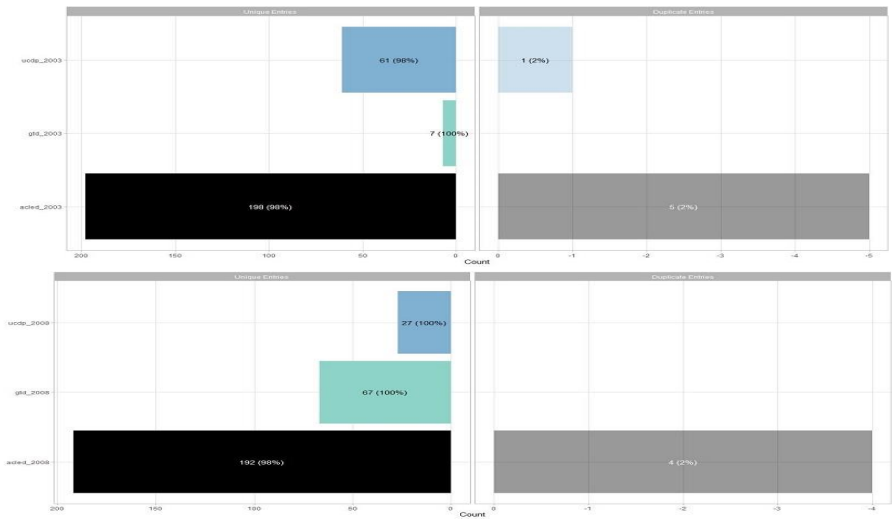


Figure 8: MELTT graphical illustration of data integration

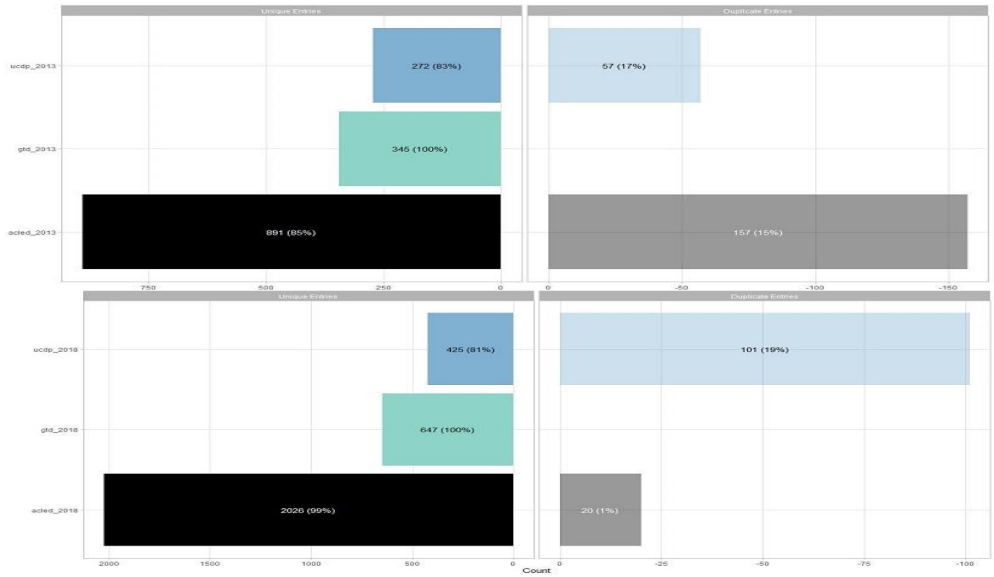


Table A1: Impact of aggregate conflict on child health outcomes in Nigeria (North Central)

Variables	Infant Deaths	HAZ06	WAZ06	WHZ06
inter15km	-0.0695	0.649***	0.563***	0.0390
	(0.135)	(0.133)	(0.0954)	(0.0844)
post2009	0.234*	-5.137***	-5.003***	-0.213
	(0.134)	(0.389)	(0.259)	(0.232)
inter15km_post2009	0.0754	-0.690***	-0.689***	-0.0330
	(0.144)	(0.169)	(0.116)	(0.101)
Observations	305	7,331	8,904	8,627
R-squared	0.165	0.270	0.423	0.083
F-test	1.565	67.37	162.7	19.34
Prob > F	0.0283	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. Also, we control for additional variables (education, mother's employment, earnings, hospital visitation) in the case of infant mortality. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table A2: Impact of aggregate conflict on child health mechanisms in Nigeria (North Central)

Variables	Vaccinated	Hospital Visit	Earnings	Employment	Education	Migration
inter15km	0.0814***	0.0236	0.103***	0.0365	0.0446**	0.104***
	(0.0284)	(0.0235)	(0.0214)	(0.0222)	(0.0208)	(0.0388)
post2009	-0.224***	0.289***	-0.0194	-0.0474	0.167***	0.0156
	(0.0750)	(0.0644)	(0.0589)	(0.0609)	(0.0570)	(0.0665)
inter15km_post2009	-0.104***	-0.0655**	-0.0807***	-0.0673**	-0.0125	-0.0691
	(0.0353)	(0.0280)	(0.0254)	(0.0264)	(0.0247)	(0.0448)
Observations	6,343	10,387	7,956	10,411	10,439	3,847
R-squared	0.124	0.150	0.175	0.110	0.327	0.037
F-test	22.94	45.71	41.83	32.01	126.3	4.171
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table B1: Impact of aggregate conflict on child health outcomes in Nigeria (North-East)

Variables	Infant Deaths	HAZ06	WAZ06	WHZ06
inter15km	0.0970	0.194	0.252***	-0.0791
	(0.145)	(0.130)	(0.0903)	(0.0930)
post2009	0.313*	-3.813***	-4.416***	-0.447
	(0.172)	(0.487)	(0.267)	(0.280)
inter15km_post2009	-0.224	-0.0290	-0.216*	-0.0828
	(0.159)	(0.190)	(0.123)	(0.126)
Observations	324	8,318	10,023	9,529
R-squared	0.205	0.198	0.374	0.065
F-test	2.270	51.17	149.4	16.39
Prob > F	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. Also, we control for additional variables (education, mother's employment, earnings, hospital visitation) in the case of infant mortality. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table B2: Impact of aggregate conflict on child health mechanisms in Nigeria (North-East)

Variables	Vaccinated	Hospital Visit	Earnings	Employment	Education	Migration
inter15km	0.0337	0.0499**	-0.0150	0.0797***	0.0886***	-0.0139
	(0.0243)	(0.0209)	(0.0225)	(0.0236)	(0.0198)	(0.0279)
post2009	-0.229***	0.315***	-0.170***	-0.0284	0.0253	-0.177***
	(0.0704)	(0.0561)	(0.0626)	(0.0636)	(0.0532)	(0.0572)
inter15km_post2009	-0.124***	-0.0375	0.0752**	-0.0629**	-0.0862***	-0.0199
	(0.0343)	(0.0272)	(0.0308)	(0.0307)	(0.0257)	(0.0343)
Observations	9,055	11,811	7,098	11,808	11,853	5,370
R-squared	0.190	0.129	0.174	0.103	0.275	0.061
F-test	54.05	43.61	37.07	33.67	112.2	9.961
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth fixed effects. Other control variables are Child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table C1: Impact of aggregate conflict on child health outcomes in Nigeria (North-West)

Variables	Infant Deaths	HAZ06	WAZ06	WHZ06
inter15km	-0.290**	0.437***	0.588***	0.230**
	(0.118)	(0.126)	(0.0896)	(0.0930)
post2009	0.366*	-3.913***	-3.957***	-0.502*
	(0.215)	(0.471)	(0.282)	(0.287)
inter15km_post2009	0.254*	-0.144	-0.730***	-0.564***
	(0.132)	(0.169)	(0.114)	(0.118)
Observations	528	10,135	12,758	11,772
R-squared	0.157	0.211	0.353	0.058
F-test	2.702	65.87	168.9	17.51
Prob > F	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. Also, we control for additional variables (education, mother's employment, earnings, hospital visitation) in the case of infant mortality. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table C2: Impact of aggregate conflict on child health mechanisms in Nigeria (North West)

Variables	Vaccinated	Hospital Visit	Earnings	Employment	Education	Migration
inter15km	0.192***	0.0842***	0.0306***	-0.00839	0.113***	0.0185
	(0.0228)	(0.0172)	(0.0101)	(0.0224)	(0.0164)	(0.0260)
post2009	-0.281***	0.154***	-0.0345	-0.232***	0.0345	0.00717
	(0.0652)	(0.0485)	(0.0281)	(0.0633)	(0.0465)	(0.0474)
inter15km_post2009	-0.217*** (0.0288)	-0.0507** (0.0210)	-0.0141 (0.0123)	-0.0116 (0.0274)	-0.101*** (0.0201)	-0.0263 (0.0298)
Observations	13,248	15,468	9,426	15,521	15,606	5,479
R-squared	0.120	0.205	0.114	0.052	0.250	0.046
F-test	45.21	97.15	29.52	20.55	126.6	7.302
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table D1: Impact of aggregate conflict on child health outcomes in Nigeria (South East)

Variables	Infant Deaths	HAZ06	WAZ06	WHZ06
inter15km	-0.359**	0.0974	0.142**	0.144**
	(0.138)	(0.101)	(0.0725)	(0.0639)
post2009	0.00142	-5.585***	-4.615***	0.369
	(0.221)	(0.601)	(0.369)	(0.320)
inter15km_post2009	0.451***	-0.148	-0.184	-0.153
	(0.151)	(0.168)	(0.112)	(0.0954)
Observations	168	3,512	4,164	4,060
R-squared	0.260	0.251	0.426	0.075
F-test	1.545	29.91	78.39	8.341
Prob > F	0.0476	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. Also, we control for additional variables (education, mother's employment, earnings, hospital visitation) in the case of infant mortality. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table D2: Impact of aggregate conflict on child health mechanisms in Nigeria (South-East)

Variables	Vaccinated	Hospital Visit	Earnings	Employment	Education	Migration
inter15km	0.00190	0.0388**	0.00154	-0.0445***	0.0330***	0.0244
	(0.0228)	(0.0195)	(0.0180)	(0.0169)	(0.00970)	(0.0364)
post2009	-0.138	0.177*	0.303***	0.00374	0.140***	0.136
	(0.123)	(0.0971)	(0.0861)	(0.0836)	(0.0482)	(0.128)
inter15km_post2009	0.0466	-0.00711	-0.0277	0.00589	-0.0266*	-0.0233
	(0.0392)	(0.0290)	(0.0264)	(0.0250)	(0.0144)	(0.0507)
Observations	2,371	4,933	3,840	4,896	4,938	1,510
R-squared	0.148	0.099	0.087	0.112	0.232	0.044
F-test	10.68	13.76	9.247	15.75	37.89	2.011
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table E1: Impact of aggregate conflict on child health outcomes in Nigeria (South-South)

Variables	Infant Deaths	HAZ06	WAZ06	WHZ06
inter15km	-0.245	-0.0390	-0.0218	-0.0504
	(0.179)	(0.0925)	(0.0646)	(0.0575)
post2009	0.231	-4.887***	-4.979***	-0.0879
	(0.202)	(0.540)	(0.315)	(0.279)
inter15km_post2009	0.250	0.0137	-8.48e-06	-0.0289
	(0.189)	(0.159)	(0.103)	(0.0896)
Observations	187	5,134	6,086	6,076
R-squared	0.253	0.246	0.437	0.059
F-test	1.632	42.69	120.3	9.776
Prob > F	0.0268	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. Also, we control for additional variables (education, mother's employment, earnings, hospital visitation) in the case of infant mortality. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table E2: Impact of aggregate conflict on child health mechanisms in Nigeria (South-South)

Variables	Vaccinated	Hospital Visit	Earnings	Employment	Education	Migration
inter15km	-0.0116	0.0171	0.0242**	-0.0184	0.0152	-0.0216
	(0.0176)	(0.0183)	(0.00968)	(0.0127)	(0.0114)	(0.0264)
post2009	-0.431***	-0.0834	-0.0481	-0.0917	0.0314	0.0804
	(0.0792)	(0.0859)	(0.0434)	(0.0592)	(0.0535)	(0.0807)
inter15km_post2009	0.00996	0.00384	-0.0523***	0.0546***	-0.00292	0.00643
	(0.0298)	(0.0276)	(0.0144)	(0.0191)	(0.0172)	(0.0392)
Observations	3,844	7,044	6,195	7,030	7,047	3,039
R-squared	0.184	0.104	0.199	0.094	0.225	0.045
F-test	22.57	20.94	39.21	18.56	52.28	4.200
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table F1: Impact of aggregate conflict on child health outcomes in Nigeria (South-West)

Variables	Infant Deaths	HAZ06	WAZ06	WHZ06
inter15km	0.0356	0.0569	0.229***	0.0223
	(0.161)	(0.0937)	(0.0654)	(0.0605)
post2009	-0.0335	-4.486***	-5.389***	-0.895**
	(0.262)	(0.645)	(0.403)	(0.380)
inter15km_post2009	-0.0156	-0.129	-0.281***	-0.0757
	(0.174)	(0.155)	(0.101)	(0.0905)
Observations	147	4,487	5,432	5,145
R-squared	0.389	0.196	0.394	0.076
F-test	2.265	27.74	89.86	10.75
Prob > F	0.0009	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. Also, we control for additional variables (education, mother's employment, earnings, hospital visitation) in the case of infant mortality. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table F2: Impact of aggregate conflict on child health mechanisms in Nigeria (South-West)

Variables	Vaccinated	Hospital Visit	Earnings	Employment	Education	Migration
inter15km	-0.00996	0.0220	0.0467***	-0.0140	0.000776	-0.0863***
	(0.0178)	(0.0173)	(0.0154)	(0.0154)	(0.00935)	(0.0272)
post2009	-0.121	0.118	-0.0196	-0.187**	0.117**	-0.0265
	(0.111)	(0.102)	(0.0886)	(0.0905)	(0.0553)	(0.107)
inter15km_post2009	0.0155	0.0238	-0.0289	0.0294	-0.00457	0.0846**
	(0.0290)	(0.0254)	(0.0228)	(0.0226)	(0.0137)	(0.0397)
Observations	3,591	6,293	4,855	6,269	6,308	2,751
R-squared	0.161	0.108	0.192	0.099	0.075	0.085
F-test	17.89	19.37	29.39	17.63	12.97	7.402
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table G1: Impact of insurgency on child health outcomes in Nigeria (intensity)

Variables	Infant Deaths	HAZ06	WAZ06	WHZ06
insurgencyintense	0.00321**	0.00105	7.19e-05	-0.000444
	(0.00162)	(0.000793)	(0.000572)	(0.000563)
post2009	0.324***	-4.461***	-4.682***	-0.395***
	(0.0656)	(0.199)	(0.121)	(0.117)
insurgencyintense_ post2009	-0.00402**	0.000899	0.000847	0.000919
	(0.00169)	(0.00133)	(0.000892)	(0.000844)
Observations	2,255	38,917	47,367	45,209
R-squared	0.138	0.221	0.400	0.068
F-test	5.679	157.5	450	46.78
Prob > F	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects, region-fixed effects, ethnicity-fixed effects, and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, father's age, father's education, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table G2: Impact of insurgency on child health mechanisms in Nigeria (intensity)

Variables	Vaccinated	Hospital Visits	Earnings	Employment	Education	Migration
insurgencyintense	0.000123	-9.82e-05	-0.000157	0.000165	-3.10e-05	-0.000143
	(0.000162)	(0.000140)	(0.000122)	(0.000144)	(0.000114)	(0.000218)
post2009	-0.234***	0.186***	-0.0513**	-0.107***	0.0807***	-0.0131
	(0.0335)	(0.0274)	(0.0234)	(0.0280)	(0.0224)	(0.0282)
insurgencyintense_post2009	-0.000202	0.000216	0.000387**	-0.000139	0.000282*	8.69e-05
	(0.000261)	(0.000204)	(0.000179)	(0.000210)	(0.000167)	(0.000290)
Observations	38,452	55,936	39,370	55,935	56,191	21,996
R-squared	0.132	0.165	0.163	0.121	0.498	0.114
F-test	84.66	157.6	109.7	110.2	794.6	43.58
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table H1: Impact of herdsmen/farmers conflict on child health outcomes in Nigeria (intensity)

Variables	Infant Deaths	HAZ06	WAZ06	WHZ06
herdsmenintense	0.00150	-0.000891	0.00186	0.00242*
	(0.00202)	(0.00212)	(0.00141)	(0.00137)
post2009	0.358***	-4.437***	-4.660***	-0.429***
	(0.0995)	(0.205)	(0.124)	(0.121)
insurgencyintense_post2009	-0.000956	0.00205*	0.000819	0.000392
	(0.000779)	(0.00109)	(0.000700)	(0.000645)
Observations	1,039	36,202	44,146	42,140
R-squared	0.182	0.223	0.403	0.069
F-test	3.321	139.8	402.1	42.06
Prob > F	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects, region-fixed effects, ethnicity-fixed effects, and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, father's age, father's education, migration status, mother's employment, hospital visitation, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table H2: Impact of herdsmen/farmers conflict on child health mechanisms in Nigeria (intensity)

Variables	Vaccinated	Hospital Visits	Earnings	Employment	Education	Migration
herdsmenintense	-0.000263	-0.000416	0.000362	0.000306	8.71e-05	0.000512
	(0.000410)	(0.000323)	(0.000280)	(0.000330)	(0.000264)	(0.000464)
post2009	-0.249***	0.175***	-0.0534**	-0.102***	0.0747***	-0.00981
	(0.0344)	(0.0281)	(0.0239)	(0.0287)	(0.0230)	(0.0289)
insurgencyintense_post2009	-6.93e-05	0.000117	0.000246*	1.36e-05	0.000250**	-6.51e-05
	(0.000208)	(0.000152)	(0.000134)	(0.000155)	(0.000124)	(0.000193)
Observations	36,685	53,238	37,487	53,264	53,479	21,020
R-squared	0.132	0.167	0.162	0.121	0.498	0.113
F-test	79.21	150	101.9	103.2	746.2	40.61
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include state fixed effects and year of birth fixed effects. Other control variables are Child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, father's age, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table I1: Impact of Aggregate Conflict on Child Health Outcomes in Nigeria (45 km buffer zone)

Variables	infant Mortality	Height-for-Age Z-score	Weight-for-Age Z-score	Weight-for-Height Z-score
inter45km	0.0418	0.0253	0.0546*	0.0319
	(0.0516)	(0.0402)	(0.0283)	(0.0277)
post2009	0.338***	-4.441***	-4.678***	-0.402***
	(0.0750)	(0.199)	(0.121)	(0.117)
inter45km_post2009	-0.00727	-0.109*	-0.00573	0.0877**
	(0.0571)	(0.0660)	(0.0432)	(0.0414)
Observations	1,659	38,917	47,367	45,209
R-squared	0.140	0.221	0.400	0.068
F-test	4.050	157.4	450.1	47.01
Prob > F	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. Also, we control for additional variables (education, mother's employment, earnings, hospital visitation) in the case of infant mortality. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table I2: Impact of Aggregate Conflict on Child Health Mechanisms in Nigeria (45km buffer zone)

Variables	Vaccinated	Hospital Visit	Earnings	Employment	Education	Migration
inter45km	0.00926	-0.0295***	-0.0203***	0.00581	-0.00466	0.0128
	(0.00810)	(0.00681)	(0.00585)	(0.00696)	(0.00556)	(0.0108)
post2009	-0.237***	0.180***	-0.0502**	-0.104***	0.0837***	-0.0118
	(0.0335)	(0.0274)	(0.0234)	(0.0280)	(0.0224)	(0.0283)
inter45km_ post2009	0.0121	0.0439***	-0.00442	-0.0204**	-0.0149*	-0.00326
	(0.0122)	(0.00980)	(0.00856)	(0.0100)	(0.00799)	(0.0146)
Observations	38,452	55,936	39,370	55,935	56,191	21,996
R-squared	0.132	0.165	0.164	0.121	0.498	0.114
F-test	84.76	158	110	110.2	794.9	43.61
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standards errors are in parentheses. All regressions include State-fixed effects and year of birth-fixed effects. Other control variables are child gender, child age, number of children under-5, birth order, religion, residence, multiple births, mother's height, marital status, number of household members, mother's age, and wealth index. ***, **, and * represent level of statistical significance at 1%, 5% and 10%, respectively.

Table J: Definition of variables

Variables	Definition
Infant Mortality	Likelihood of dying either at birth or before 12 months (=1 if child died before 12 months, 0 if not)
HAZ	Height-for-age z-score
WAZ	Weight-for-age z-score
WHZ	Weight-for-height z-score
Inter15km	(=1 if a child lives 15km close to conflict areas, 0 if not)
Insurgency Active Area	(=1 if a state experiences at least 12 events of insurgency conflict in a year, 0 otherwise)
Herds/Farmers Active Area	(=1 if a State experiences at least 12 events of herdsmen/ farmers conflict in a year, 0 otherwise)
Post2009	(=1 if a child was born after 2009, 0 if not)
Chid Age	Age of child in months
Child Gender	(= if a child is male, 0 if child is female)
Hospital Visitation	(=1 if a child visited hospital in last 12 months, 0 if not)
Number of children U-5	Number of children under the age of 5 years in the household
Vaccinated	(=1 if a child has ever been vaccinated, 0 if not)
Multiple births	(=1 if a child is from multiple births, 0 if not)
Birth order	Birth order of the children in the household
Christianity	(=1 if a child belongs to a Christian household, 0 if not)
Islam	(=1 if a child belongs to an Islam household, 0 if not)
Residence Area	Place of residence (=1 if Rural, 0 if urban)
Mother's age	Mother's age in years
Mother's height	Mother's height in cm
Mother's marital status	Mother's marital status (=1 if currently married, 0 if not)
Mother's Education	Mother has some education (= 1 if primary, secondary, or higher education, 0 if none)
Earnings	Mother has earnings (= 1 if in cash, kind, or both, 0 if none)
Mother is employed	(= 1 if yes, 0 if not)
Migration	(= 1 if yes, 0 if not)
No household members	Number of household members
Wealth Index	(1= if a child lives in a poor household, 0 if not)
Father's Education	Father has some education (= 1 if primary, secondary, or higher education, 0 if none)
Father's age	Mother's age in years

Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

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