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ABSTRACT

Violent Conflict Exposure in Nigeria and Economic Welfare*

Several papers have attempted to estimate and document the impact of conflict on several education, health and socioeconomic outcomes. One lesson from the past research is the heterogeneity in the effect of violent conflict across and within countries. In this paper we attempt to estimate the casual impact of conflict in Nigeria on welfare related outcomes. The 2009 insurgence of Boko Haram and the Fulani herdsmen versus farmers conflicts have led to a significant increase in violent conflict in the North Eastern and Central parts of Nigeria. However, bouts of violent conflict have existed in different communities across the country since independence. We estimate the average effect of violent conflict exposure on welfare, across Nigeria using the three waves of the Nigerian General Household Survey (GHS) panel combined with The Armed Conflict Location & Event Data (ACLED). Employing a fixed effect approach, our results suggest that recent and long term exposure to conflict increased the incidence, intensity and severity of poverty in Nigeria. In addition we find that exposure to violent conflict also decreased household income.

JEL Classification: I10, I30, O1, D74

Keywords: violence, Nigeria, conflict, Boko Haram, economic welfare, poverty

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1 Introduction

Nigeria was one of the fastest growing economies in Africa between 2006 and 2014. Long before the emergence as Africa's largest economy following its statistical rebasing of GDP in 2014, real gross domestic product (GDP) growth was eclectic. Chete et al. (2016) document that during the period of 1960-70, GDP grew at 3.1% annually but grew at 6.2% annually between 1970 and 1978. In the early 1980s, they also document that growth rate was negative but increased to 4% in the period of 1998-1997. The heterogeneity in growth has continued in the twenty first century with high rates of 6.9%, 7.8% , 4.9%, 6.2% and 2.7% in 2009, 2010, 2011, 2014 and 2015 respectively (Source: World Bank data). Despite the significant increases in GDP growth in the twenty first century, poverty has remained very high and poverty incidence has sometimes increased during periods of significant GDP growth. According to Eigbiremolen (2018), poverty rose from 42.7% in 1992 to 65.6% in 1996. Though poverty has been on a decline in Nigeria since the start of the twenty first century, the percentage of people living in extreme poverty is still very high. For example, the National Bureau of Statistics (NBS) notes that 60.9% of Nigerians in 2010 were living in "absolute poverty". According to data from 2018, nearly 46.7% of Nigerians live in extreme poverty (World Poverty Clock). While these levels of poverty incidence are lower than 2010 levels, they are higher than levels in 2017 (45.6% according to data from the World Poverty Clock). Current levels of poverty place Nigeria in the top position as the country with the most people in extreme poverty in the world (World Poverty Clock).

Many factors can impede the process of economic development resulting in persistent high levels of poverty despite significant growth in GDP. Violent conflict is one of such factors. Recent literature suggests that conflict can negatively affect various

economic, health and labor related outcomes. In Nigeria, violent conflict is viewed as a critical variable impeding the development process but empirical estimates of its impact on development and welfare related outcomes are scant.

Conflict can reduce welfare for households and impose costs on individuals and the economy through several broad channels. First, conflict can lead to economic devastation resulting in economic decline. There are several cross country studies suggesting that violent conflict has a negative effect on investment, savings and economic growth (see Venieris and Gupta, 1986; Alesina and Perotti, 1996, Barro, 1991 and Mauro, 1995). Second, conflict can impose costs on households directly through a decline in an individual's health. In particular it can affect individuals mentally and can also cause physical and psychological harm. Third, conflict can lead to a decline in trust and an increase in fear and uncertainty. Fear and lack of trust can lead to a decline in social capital, an increase in transaction costs, a decline in school enrollment and education attainment. It can also lead to displacement which affects economic, social outcomes and health. Justino (2009) noted that conflict can lead to a decline in access to safety nets and a decline in social, economic and political institutions, community relations, and overall levels of security.

Other effects of conflict include a disruption of economic activities, a shrinkage in the productive base of a community and a decline in human capital whether health or education. All these effects of conflict can lead to a decrease in household income and/or wealth and consumption. A decline in income can lead to more households falling below the poverty line and others who are already poor falling more deeply into poverty. Investigating the potential welfare effects on households in Nigeria from being exposed to violent conflict over time is the primary focus of our current research.

In this paper, our question of interest is the impact of recent exposure to conflict,

and accumulated exposure to conflict over a long period of time on households' welfare. In particular we examine the impact of conflict on households' per capita income, total income, poverty incidence, poverty gap and poverty severity.

Violent conflict is part of Nigeria's history. It began with civil war in the 60s, which claimed thousands of lives, and has evolved over time to new threats in different regions and communities in Nigeria. The ACLED database reports a total number of 9998 conflict events in Nigeria between 1997 and 2016. "Violence against civilians" is a substantial chunk of the violent events overtime in Nigeria. In this paper, we measure exposure to conflict using deaths linked with conflict in a local government area (LGA). Figure 1 highlights the mapping across LGAs of conflict related death in Nigeria from 1997-2015. This map shows that while some areas in Nigeria have experienced more conflict than others, violent conflict is not restricted to the North Eastern part of Nigeria and a robust analysis of the average effect of conflict is value adding.

To examine both the short term and long term effect of conflict exposure, we construct two measures of conflict exposure: recent exposure to conflict and long term exposure to conflict.[1] To estimate the effect of conflict, we employ a fixed effects approach. This approach attenuates potential biases caused by unobserved time invariant differences across individuals that affect welfare and are also correlated to conflict exposure.

Our results suggest that recent and long term exposure to conflict increases poverty incidence, poverty gap and poverty severity for households in Nigeria. In addition, exposure to conflict decreases per capita income and total household income. We find larger effects for long term exposure than short term exposure suggesting an accumulative effect of conflict.

[1]Details on these measures can be found in section 5 of the paper.

Our results contribute to the literature by providing the first broad scale look at the effect of violent conflict on income, poverty incidence, gap and severity in Nigeria. While there have been other important studies that have considered the impact of conflict on education outcomes and health outcomes in Nigeria, to the best of our knowledge we are the first to consider carefully the impact of conflict more broadly on welfare in Nigeria over the period,2009-2015. Investigating the impact of violent conflict on welfare should provide insights for policy makers needed to facilitate intervention in areas with significant conflict exposure.

The rest of our paper proceeds as follows. In section two, we review the history of violence in Nigeria especially over 2010-2015. In section three we review the past literature and provide a conceptual framework. In section four we provide the empirical framework and justification of the modeling strategy. In Section five we describe the data used and present some descriptive analysis. Section six summarizes our results and provides robustness checks. We conclude in the last section.

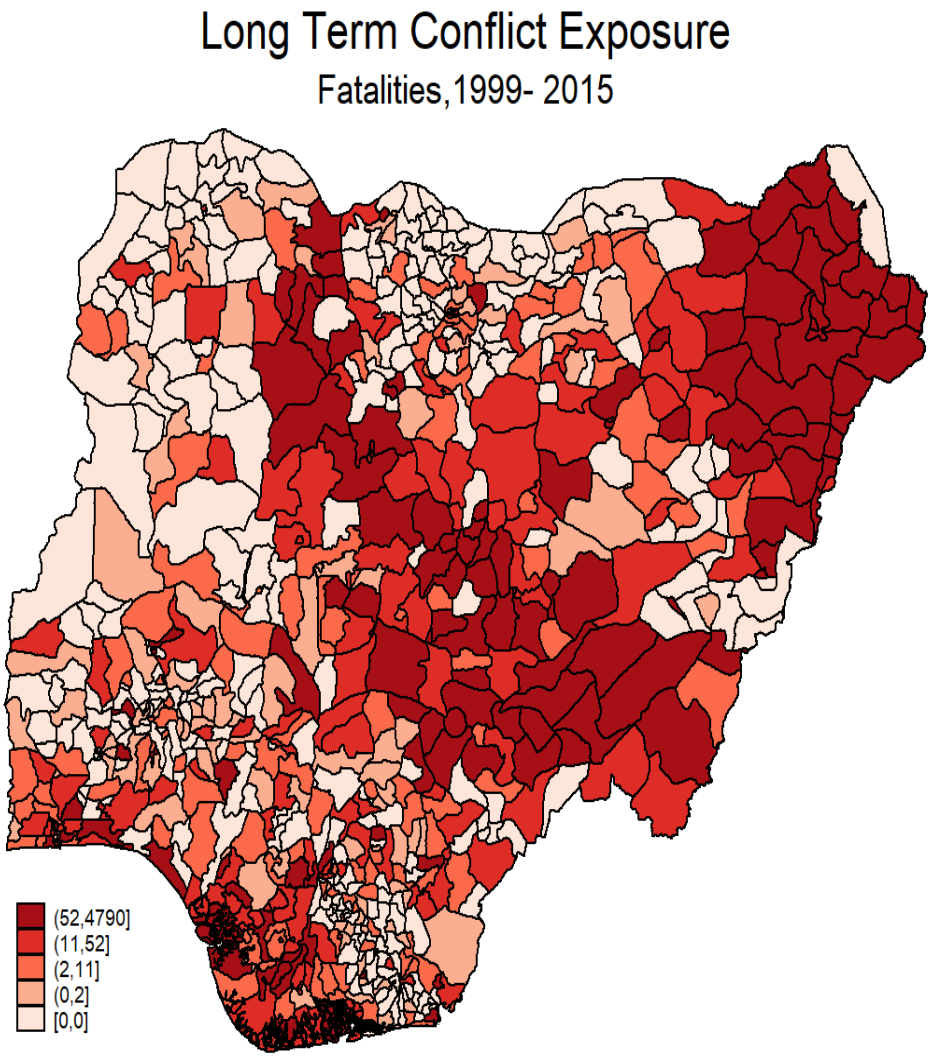

Figure 1: Long term conflict exposure in Nigeria 1997-2015.

2 History and Nature of Conflict in Nigeria

Long before Nigeria became a country in 1914, conflict and wars were a significant part of the history of the area and kingdoms that would later be put together to form Nigeria. Best and Rakodi (2011) link this early history of conflict to contention over access to resources (including land, cattle, slaves and oil), and conquests that sought to spread Islam, especially the 19th century Dan Fodio Jihad.

In 1960, Nigeria gained independence from the British but it did not take long for political tension to build up leading to the murder of political leaders in January 1966 by a group of military officers. One explanation for why this happened is that the regions that were artificially brought together by the British to form Nigeria, contained diverse kingdoms some of which were already at war with each other before the arrival of the British. This preexisting rivalry facilitated tribalism, corruption, lack of trust and competition for power, culminating into the Biafran Civil War of 1967-1970. This war according to Heerten and Moses (2014) led to the death of one to three million people.[2]

In the 70s and 80s as Nigeria cycled through different military administrations, bouts of political conflicts were common place in different parts of the country but these events, while intense, were relatively secluded to the communities within which the events occurred. Although Nigeria transitioned successfully to democratic rule in 1999, violence linked with political conflict has persisted. John et al (2007) notes that electoral violence still occurs in Nigeria even with democratic rule as politicians support and arm youths. Marc, Verjee and Mogaka (2015,p 20) provide data on fatalities as a result of election related deaths in Nigeria. For example they note that the 2011 election cycle led to a death toll of 800 people.

[2]For more details see Heerten and Moses, 2014, p169,

Another common kind of violent conflict that has intensified over time in Nigeria is religious and ethnic related conflict. Religious and ethno-religious conflict events became quite common place in Nigeria in the 80s and 90s especially in the Northern part of the country. Also communal and indigene/settler conflicts have also increased and intensified during different times between 1980 and 2015. According to Jones and Naylor (2014) there have been numerous and often intense bouts of communal violence, particularly in the Niger Delta region, Plateau state and the north east of the country. Marc, Verjee and Mogaka, (2015) also note that local insurgencies over time have mutated into criminality and maritime piracy in the Niger Delta region. However the impact of these different kinds of conflict were relatively localized. It is important to note that the conflict in the Niger Delta region of Nigeria has existed for a much longer period of time than other recent communal conflict and is not an example of a new kind of conflict in Nigeria. According to Abdu et al (2014) violent conflict in Nigeria's Niger Delta has existed for almost 50 years. It is driven by the struggle among local communities, multinational oil companies, and the Nigerian state for control over oil revenues derived from this resource rich territory.

Unfortunately, violence has evolved over time in Nigeria from civil wars, military coups and the Niger Delta conflict to a new generation of threats. Since 2009, Boko Haram and Ansaru group have been perpetrating violence in Northern Nigeria with suicide bombing becoming common place[3]. Boko Haram is a militant Islamist organization, which according to the Global Terrorism Index, over took ISIS as the world's deadliest terrorist group in 2014 (see Global Terrorism Index report, 2015). Iyekekpolo, (2016) notes that diverse public location like markets, schools, religious

[3]See Ordu 2017 for an exploration of the trends and patterns of Boko Haram and militancy violent conflict in Nigeria and Iyekekpolo (2016) for an examination of the causes and perspective of Boko Haram.

worship places, motor parks, police stations, military barracks have been hit by suicide attacks linked to Boko Haram (Iyekekpolo, 2016:p1).

In the last 20 years another kind of conflict has emerged referred to by some as farmers-herdsmen conflict or cultivator- herder conflicts. The Fulanis are the herders who want access to land for their cattle. Deaths arising from this kind of conflict are concentrated in the North central geopolitical zone, with highest intensity of conflicts in Benue, Taraba and Nasarawa. Plateau is another state where these conflicts have been noted but land conflict deaths are less. This growing conflict has led to the death of a significant number of people. Olayoku (2014) notes that conflicts resulting from cattle grazing accounted for 35% of all reported crises between 1991 and 2005 in Nigeria. In addition, information from the Nigerian Watch project database suggests that land conflicts accounted for 12 percent (2846) of violent deaths in Nigeria over the period 2006 to 2014 and of these, cattle grazing- cultivator conflicts accounted for 21 % (609) of violent deaths.[4]

While violent conflict is found in all parts of Nigeria, it is important to mention that the intensity of conflict exposure varies across regions. The three zones with the highest prevalence rates are the North East, North Central and South South regions of Nigeria. According to Azad, Crawford and Kaila (2018), from 2010 to 2017, 49% of households in the North East experienced at least one event of conflict or violence against a household member. In the North Central region, 25% of households experienced some type of conflict event and in the South South region One-fifth of households (22%) have been directly affected by conflict events or violence.

[4]This number could be higher given the fact that land conflict estimates are frequently nested in the estimates of ethnic and political conflicts which according to the Nigeria Watch database account respectively for 32 % and 56% of violent deaths over the period considered.

3 Literature Review on the Effects of Conflict

General Empirical Evidence for the Effect of Conflict

There is a wide literature that has considered the effects of conflict on various outcomes at the macro and the household level. Early cross country research focused on the links between conflict and economic performance or growth (Alesina and Perotti, 1996; Barro, 1991; Collier, 1999). The evidence from the past literature focusing on the long-term developmental effects of violent conflict is mixed. Some studies find rapid recovery on a variety of welfare outcomes, fast post conflict growth rates and social progress[5]. In contrast, other studies point to the long-term destructive effects of civil wars (see Abadie and Gardeazabal, 2003, ERD 2009, OECD 2009, Blattman and Miguel 2010).

Over the last 15 years, a number of studies have emerged examining the micro level effect of violent conflict on several economic, health and productivity indicators. Most of these studies have considered conflict in Latin America, Asia and a few African countries. These studies generally suggest negative impacts of conflict on education, labor and health of individuals and households. Moreover some of these papers provide evidence that these negative effects can be observed decades after the conflict.[6]

[5]See Organski and Kugler (1980), Przeworski et al. (2000),Davis and Weinstein (2002), Brakman, Garrtesen and Shramm (2004) Miguel and Roland (2006), Justino and Verwimp (2006), Chen Loayza and Reynal-Querol (2008), Cerra and Saxena (2008)

[6]See Alderman, Hoddinott and Kinsey (2006); Bundervoet, Verwimp and Akresh (2009); Shemyakina (2011), Colino (2013), Nillesen, 2016, Blattman and Annan (2010), Guidolin and La Ferrara (2007), Chamarbagwala and Moran (2011) and Uwaifo Oyelere and Wharton (2013), Rodriguez and Sanchez (2012), Almond and Currie (2011); Almond et al. (2005); Oreopoulos et al.(2008), Royer (2009), Currie and Vogl, (2013), Camacho, (2008), Smits et al. (2006), Mansour and Rees(2012) and Verwimp and Van Bavel (2014), Barrera and Ibánez (2004), Kondylis (2008), Leon (2012), Valente (2014), Justino, Leone, and Salardi. (2013) for research focused on the impact of conflict using microdata.

Effect of Conflict - Studies on African Countries

There is a growing literature focused on the effect of conflict in African countries. One of the first attempts at considering the effect of conflict was Akresh and de Walque (2008). They study the effects of the 1994 Rwandan genocide on schooling. Their results suggest that children who lived through the Rwandan genocide, lost nearly a half year of schooling compared to their peers who were not exposed. They were also 15% less likely to complete grades three and four. Leon (2012) also considered the Rwandan conflict but focused on it from a different angle used the classic education production function model to identify the long- and short-term effects of the civil war on educational attainment. The study finds that exposure to violence affects adult human capital accumulation through both supply and demand side effects. Overall, the results show that the average person exposed to political violence before school-age (during in utero, early childhood, and preschool age) accumulated 0.31 fewer years of schooling upon reaching adulthood. With respect to the Côte d'Ivoire crises, Minoiu and Shemyakina(2012) used the postconflict survey data from the cross-sectional 2002 and 2008 Household Living Standards Surveys (HLSS) and the Armed Conflict Location and Event Database (ACLED)data for Côte d'Ivoire to examine the impact of armed conflict on children's health status, measured by height-for-age. Their results suggest that children exposed to the conflict either in utero or during early childhood and who lived in conflict-affected regions had height-for-age z-scores lower than those who lived in less-affected regions. Dabalen and Saumik (2014) also examined the impact of the conflict in Côte d'Ivoire using ACLED data and the HLSS. The difference between their paper and Minoiu and Shemyakina(2012) was the focus on the impact on households' food security using dietary diversity scores. Their findings suggest that households in conflict areas of highest intensity

and individuals who are the direct victims of the conflict are more food insecure with lower dietary diversity. Another paper by Dabalen and Saumik (2014b) on Côte d'Ivoire considered the average causal effect of the conflict on education attainment over the same time period. They note 0.2 to 0.9 fewer average years of education for war victims compared to the control group.

Effect of Conflict - Studies on Nigeria

In the last 10 years,studies examining the effect of conflict in Nigeria have increased. For example Nwokolo (2015) used the Nigerian demographic data and ACLED data to examine the effect of Boko Haram Insurgency(BHI) on child health. The study finds increase in terror fatalities reduces birth weight and increases low birth weight probability for cohorts exposed within six months of pregnancy. His results suggest that male and female child in utero have a higher probability of having a low birth weight due to exposure to terror fatalities.

Another more recent study on Nigeria is Ekhator and Asfaw (2019). They consider a similar question also using the Nigerian demographic data but combined it with data from the Global Terrorism Database. In particular the study examines the effect of Boko Haram insurgency on measures of children health such as stunting, wasting, height-for-age z-scores and weight-for-age z-scores and weight-for-height z-scores. Their results suggest negative effects of the insurgency on weight-for-age and weight-for-height z-scores and an increase in the probability of wasting.

The paper most similar to ours in terms of the microdata used is Bertoni et. al.(2017). They used the three rounds of the GHS-Panel dataset but examined the impact of civil conflict (specifically Boko Haram) on school attendance and attainment. A difference between our paper and this paper is the fact that while we focus on Nigeria, they focus solely on the north eastern part of Nigeria. In addition we

consider economic welfare effects of conflict whereas they focus on human capital effects. Bertoni et al.(2017) make use of a panel regression estimation approach and complement the panel regression with the standard cohort difference in difference analysis. They find a one standard deviation increase in the number of fatalities in the 20 km radius of each household decreases the number of completed years of education for the cohort exposed to conflict during primary school by 0.6 years, compared to the non-exposed cohort.

Our paper complement all the aforementioned papers in that we also consider at the effects of conflict in Nigeria. However, we do not focus on a region of Nigeria or a particular type of violent conflict such as recent Boko Haram terrorism. Rather we focus on any type of violent conflict in the whole country. Our rationale for doing this is the recognition that different regions in Nigeria have been plagued with significant violent conflict at different times since Nigeria's independence in 1960. Hence, we attempt to identify the average recent and long term effect of exposure to any violent conflict on an individual's welfare over the period of 2010-2016. Our paper also differs from the other three papers given our outcome variables of interest. In particular we focus on economic welfare related outcomes while the other papers focused on health and school related outcomes. Both health and education outcomes are important and our paper complements these papers by focusing on another important outcome-household economic welfare.

In this paper we focus on the impact of conflict on welfare outcomes such as poverty incidence and severity. Most research suggests the existence of a positive correlation between poverty and the likelihood of civil strife (Collier, 1999; White, 2005; Kondylis, 2007). Some authors have focused on linking poverty or food shocks to conflict. For example Pinstrup-Andersen and Shimokawa (2008) explain how poverty, hunger and food insecurity together with inequality of income, land and

other material goods generate anger, hopelessness, a sense of unfairness and lack of social justice all of which provide a fertile ground for grievance and conflict. Abidoye and Cali (2014) examined the relationship between income shocks and conflict across states in Nigeria. They find increases in the price of consumed items induce conflict as well as oil price increases. While these papers suggest that poverty or income or price shocks can lead to conflict, our paper considers the effect of conflict on welfare related outcomes overtime, controlling for other kinds of shocks including price or income shocks.

4 Empirical Strategy

Isolating conflict exposure effect on development outcomes using cross sectional data poses several challenges. Hence, we investigate how violent conflict affects individuals and household welfare exploiting the panel nature of our data and estimating our model using a fixed effect estimator. This technique among other things, allows the researcher to control for all time-invariant unobservables affecting a household or an individual that could affect the outcomes of interest and are correlated to conflict.[7]

The general form of the estimation equation is as follows:

$$Y_{ijt} = \beta_0 + \beta_1 W_{ijt} + \mathbf{x_{ijt}}\rho + \mathbf{c_{ijt}}\beta_3 + \gamma_t + \delta_i + \epsilon_{ijt} \tag{1}$$

where our outcome variable Y_ijt includes different measures of welfare of a household i in Local Government Area (LGA) j and year t. We describe these variables in more detail in the next section. W_{ijt} is a measure of violent conflict in LGA j and year t. We have two main measures of violent conflict. The first measure is focused

[7]We are not the first to use this method for identifying effects of conflict. For example, Pivovarova and Swee (2015) used a two-round panel and controlled for individual unobserved heterogeneity through a difference in-differences fixed-effects model.

on capturing recent conflict exposure. By recent we mean exposure to conflict in the last two years. We also consider a measure for long term exposure by looking at the cumulative effect of exposure to conflict from 1997 to 2015.[8] In the next section we describe in detail how we construct this measure in alternative ways. $\mathbf{x_{ij}}$ is a vector of individual and household variables regressors that affect household welfare and $\mathbf{c_{ij}}$ represents time varying local government area characteristics such as the rainfall levels, population density, the availability of police stations, banks, hospitals. δ are time-invariant household-specific effects that could be correlated with the observed covariates;γ_t are year fixed effects; ϵ_{ijt} is the idiosyncratic error term. β_1 is the parameter of interest to be estimated and captures the effect that exposure to conflict has on the welfare indicators we focus on.

5 Data and Descriptive Analysis

To estimate the effect of conflict on welfare outcomes we make use of two datasets. The socioeconomic dataset used in this study is the Nigeria General Household Survey (GHS). As noted on the World Bank's Central Microdata Catalog website, the GHS is implemented in collaboration with the World Bank Living Standards Measurement Study (LSMS) team as part of the Integrated Surveys on Agriculture (ISA) program and was revised in 2010 to include a panel component (GHS-Panel). The World Bank in its description of the data also notes that the panel data survey was launched for tracking farm and rural households social economic changes over time. The survey was undertaken by the National Bureau of Statistics in partnership with the Federal Ministry of Agriculture and Rural Development(FMARD), the National Food Reserve Agency (NFRA), the Bill and Melinda Gates Foundation (BMGF)

[8]We use two measures of violent conflict.

and the World Bank (WB). There are three waves currently of the panel (2010, 2012 and 2015) and the GHS-Panel is a nationally representative survey of approximately 5,000 households, which are also representative of the geopolitical zones in Nigeria at both the urban and rural levels. It provides information on basic demographics, food and non-food expenditure and household income sources and community variables.

To measure conflict exposure, we turn to the Armed Conflict Location and Event Data (ACLED) by Raleigh, Hegre, and Carlson, (2009). This database focuses on a range of violent and non-violent actions by governments, rebels, militias, communal groups, political parties, rioters, protesters and civilians. It records event date, event type, location and conflict fatalities and covers periods from 1997-2019 for all countries including Nigeria.[9] A number of studies have used ACLED data in constructing conflict measures for conflict analysis in different countries. (See Dabalen and Paul,2012; Shemyakina, 2012; Rohner, Thoenig and Zilibotti, 2012). "Violence against civilians" is a substantial chunk of the violent events overtime in Nigeria making the ACLED data appropriate for capturing exposure in Nigeria. Raleigh, Hegre, and Carlson (2009) defines "Violence against civilians" as *"deliberate violent acts perpetrated by an organized political group such as a rebel, militia or government force against unarmed non-combatants. It also includes inflicting significant harm (e.g. bombing, shooting, torture, rape, mutilation etc) or accosting victims (e.g. kidnapping and disappearances)"*[10].

Following previous empirical research using this data, we constructed two measures of conflict exposure using fatalities at the local government area level. We consider the effect of recent conflict exposure and the effect of long term accumu-

[9]We make use of the 1997-2016 data for our paper given the final wave of the panel contains demographic information up until 2016.

[10]See Raleigh, Hegre, and Carlson,2009 for more details.

lated exposure to conflict. We normalized these measures using projected population figures for the local government for the respective years. For recent exposure we consider the total number of conflict related fatalities in the local government in the year of the survey plus the two years preceding it. For the long term measure of conflict, we consider the total number of conflict related fatalities in the local government area in the year of the survey plus all other preceding year of available data (1997 to the year of the survey). We construct our conflict measures as percentages of the population in each LGA to better get at intensity of effect and also to ease interpretation. Figure 1 provides a map of Nigeria highlighting the varying overall exposure to conflict by LGAs from 1997 to 2015. This figure highlights the varying exposure to conflict across Nigeria. Figure 1 also suggests that exposure to violent conflict is wide spread in Nigeria.

Figure 2 provides the kernel density distribution of our recent conflict exposure measure in 2010, 2012 and 2015. Notice that the distribution is concentrated around 0 which is expected in Nigeria and highlights that conflict in Nigeria is not distributed evenly across the landscape and many households are exposed to low levels of conflict. However, Figure 2 also highlights the general increase in households' conflict exposure post 2010. Notice that the tail of the distribution extends more rightwards in both 2012 and 2015 compared to 2010. Figure 2 also provides evidence that the density of individuals exposed to no conflict declined significantly in 2012 and 2015.

Figure 3 provides a clear picture of what figure 2 highlights. Figure 3 provides a mapping of the evolution in conflict exposure from 2008 to 2015. Not only does this figure highlight the changes in conflict hot spots in Nigeria, it also shows that more people and more areas of Nigeria were exposed to conflict by 2015 compared to 2010. The darker red areas are LGAs with high conflict exposure while the lighter shades of red captures LGAs with lower or zero violent conflict exposure. These red

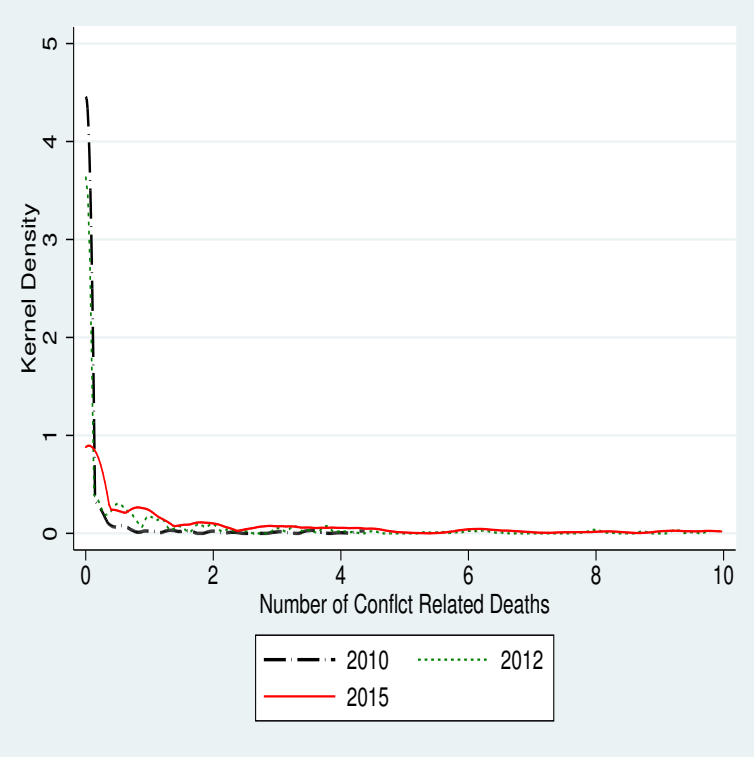

Figure 2: Kernel Density of Measure of Recent Conflict in LGA

hot spots include LGAs in states such as Nasarawa, Borno, Adamawa, Benue and Plateau in the North Eastern and North Central parts of Nigeria. It also includes the FCT-Abuja. Each of these states have passed through prolonged episodes of violent conflict since 2009. For example Borno is the base of operation of Boko Haram. While Plateau and Benue are the states plagued by violent deaths linked with the farmer-herdsmen ongoing conflict. The rationale for considering both long term and recent exposure to conflict on welfare is illustrated by contrasting Figure 3 with Figure 1. There are some areas in Nigeria that have experienced significant exposure to conflict before 2013 but between 2013 and 2015, conflict in these areas attenuated. An example are LGAs in Delta state. As noted in Section 2, the Niger Delta region of Nigeria has been plagued with conflict since the early 1990s. Conflict in this region is

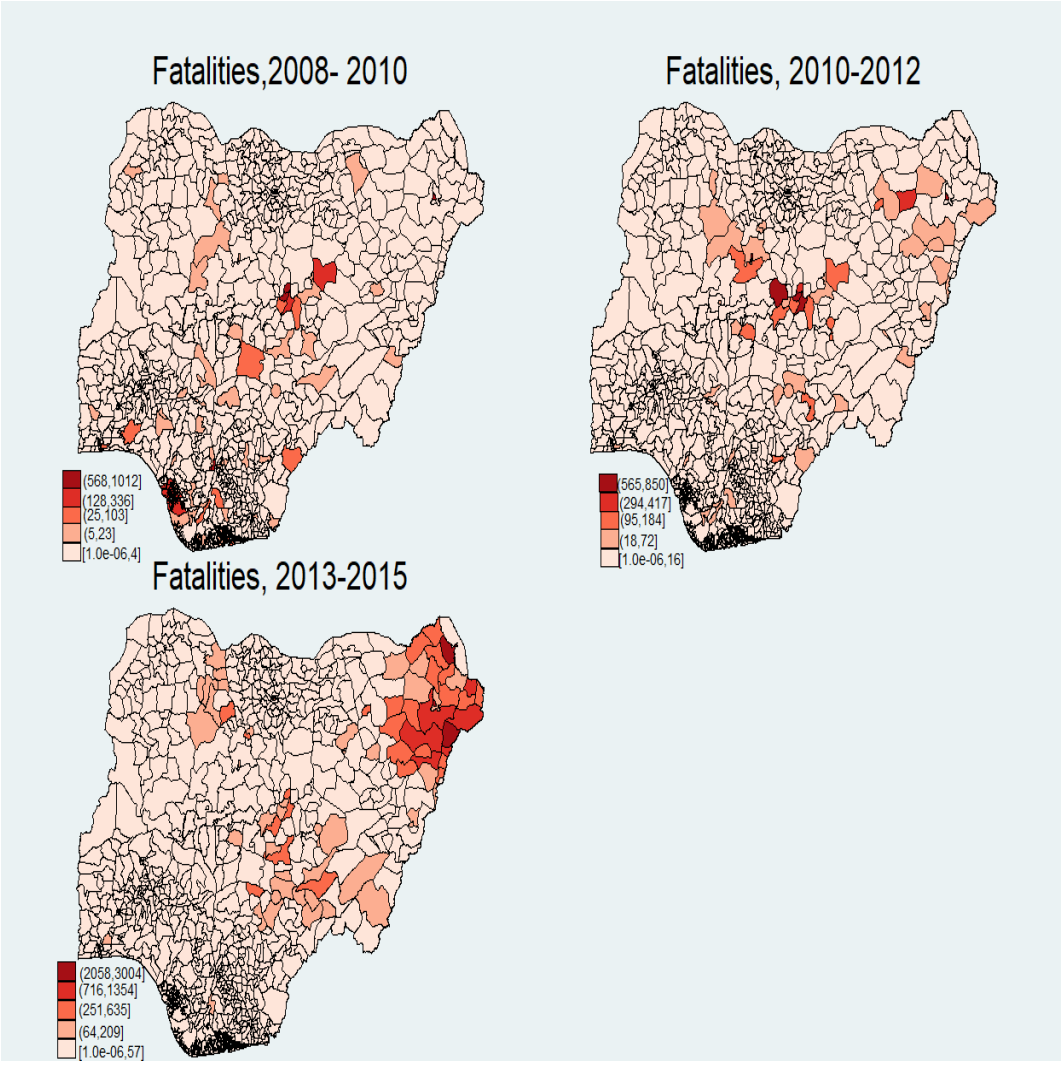

Figure 3: Evolution of Conflict Exposure in Nigeria 1997-2015.

linked with tension between locals (Niger Delta minority ethnic groups) and foreign oil producers and the government. This tension has been attributed to locals feeling exploited because they do not feel they are reaping the benefits of oil being derived from their land. While this south-south region of Nigeria has had one of the highest conflict exposures between 2008-2015, focusing on just the recent exposure (2013-2015) captured in the 3 map in figure 3 suggests minimal conflict exposure. Hence for the Niger Delta region making use of ACLED data from just the 2013-2015 period is misleading with respect to conflict exposure over the last 2 decades.

We focus on the impact of conflict on welfare in this paper. Our dependent variables are commonly used measures of welfare. In particular we consider the impact of conflict exposure on total household income and the impact on income per adult equivalent. We follow the Atkinson (1983) approach of measuring welfare using income given some of the challenges we had with the expenditure data of the LSMS. We also consider other more broad measures of welfare including poverty incidence, poverty gap and poverty severity. We derive the poverty line for each year of data using information from the World Bank and convert these poverty lines to Naira (Nigeria's currency) using the relevant exchange rates for each year of the data. We also convert all monetary values to real values with a base year of 2010.

The data set also includes a number of specific household and individual characteristics which we include as controls. In particular, we use a dummy variable to control for exposure to other idiosyncratic shocks such as the death or disability of an adult working, death of someone who sends remittances, illness of income earning member or job loss. In addition to the information about conflict and socioeconomic conditions captured in the GHS-panel, we also used information on rainfall and population density in our analysis. We obtained rainfall data from the Central Bank of Nigeria(CBN) annual statistics for 2016 while information on land surface area and

population for each states were sourced from the National Population Commission. Summary statistics for the variables we used in our analysis can be found in Table 1. Summary statistics for the full data and the balanced panel (which we use in our analysis) are presented.

Table 1: Summary Statistics

Panel A	**Full Sample N=91352**		**Balanced Panel N=72,984**	
Variable	**Mean**	**SD**	**Mean**	**SD**
Age (Years)	23.79	19.83	25.29	19.86
$Ages^2$	83601	959.24	1415.57	1033.89
Urban	0.28	0.45	0.26	0.44
Male	0.49	0.5	0.5	0.5
Years of Schooling	5.53	5.3	5.55	5.25
Real Wage Income (Naira/Yr)	176222.71	2.39E+07	101661.58	2.03E+06
Real Per Capita Income (Naira/Yr)	269053.69	1.14E+07	199255.67	4.36E+06
Real Total HH income (Naira/Yr)	1.65E+06	5.65E+07	1.31E+06	2.09E+07
Poverty Severity	0.43	0.38	0.43	0.38
Poverty GAP	0.53	0.39	0.52	0.39
Poverty Incidence	0.72	0.45	0.72	0.45
Rainfall (Millimeters)	1495.63	785.1	1516.55	777.72
LGA Land Area (Km^2)	27003.75	18607.91	26019.26	17246.16
Exposure to Shock	0.37	0.48	0.37	0.48
Recent Conflict Deaths	33.62	198.83	19.78	128.12
Long Term Conflict Death	65.84	311.82	50.81	257.13
Population LGA	255115.29	165890.18	249141.02	156371.44
Long Term Death per LGA pop (%)	0.02	0.08	0.02	0.06
Recent Deaths per LGA pop (%)	0.01	0.06	0.01	0.04
Population Density	335.09	454.07	336.42	443.38
HouseHold Size	8.19	3.72	8.12	3.47
Av.Labour wage(Naira/Day)	886.168	590.967	877.225	591.120

	Full Sample N=91352		Balanced Panel N=72,984	
Variable	**Mean**	**SD**	**Mean**	**SD**
Panel B			Infrastructural Access (Proportion of Individuals)	
Gov.Sec Sch	0.386	0.487	0.390	0.488
health centre	0.593	0.491	0.591	0.492
Public hospital	0.184	0.388	0.184	0.388
Primary.hospital	0.422	0.494	0.406	0.491
Pharmacy	0.274	0.446	0.267	0.442
Cell phone	0.174	0.379	0.175	0.380
Post office	0.199	0.399	0.193	0.395
Bus. stop	0.361	0.480	0.357	0.479
Internet cafe	0.188	0.390	0.179	0.384
Bank	0.278	0.448	0.261	0.439
Micro finance	0.378	0.485	0.357	0.479
Police station	0.284	0.451	0.275	0.447
Market	0.444	0.497	0.442	0.497
Community centre	0.416	0.493	0.414	0.493
Fire station	0.325	0.468	0.307	0.461
Panel C			Social Network Membership (Number)	
Village Association	1.205	2.872	1.223	2.836
Agri. Cooperative	0.942	2.473	0.947	2.463
Savings Cooperative	1.155	5.171	1.149	5.255
Bus Association	1.670	10.116	1.682	10.787
Women Group	2.108	4.531	2.130	4.574
Community health centre	0.445	1.685	0.450	1.674
Community School	0.799	1.985	0.818	2.036
NGO	0.088	0.418	0.089	0.423
Vigilante Group	0.890	1.793	0.889	1.841
Disabled Association	0.132	0.543	0.130	0.542

6 Results and Robustness Checks

Table 2 presents the fixed effects estimates from our parsimonious model estimated at the household level using standard control variables that potentially could affect the probability of being poor. These variables include age, years of education, amount of rainfall received. In Table 3 we present estimates from our parsimonious fixed effect model estimated at the individual level versus the household level. In columns(1), (3) and (5) we include the recent conflict measure in our estimation while in columns (2), (4) and (6) we use the long term conflict measure.

Both tables show regression results using three poverty measures (incidence, gap and severity) as the dependent variables. In Table 2 and 3 we present all coefficient estimates from the regression primarily to illustrate that estimates of control variables in a simple model have expected signs.

The results in both tables suggest a positive correlation between exposure to conflict and poverty incidence, poverty gap and poverty severity both in the long term and in the short term. This result suggests that as a household is exposed to higher levels of conflict, the probability the household becomes poor increases. Also increased exposure to conflict is correlated with a higher poverty gap and also increased poverty severity.

We also explore other measures of welfare. In particular we investigate if exposure to conflict affects a households' per capita income and total income. The results from our estimation are summarized in Table 4. In Panel A the results of the parsimonious regression is summarized. In columns (1) and (2) the results using real income per capita as the dependent variable is summarized while in columns (3) and (4) the results using real total household income is summarized.[11] For conciseness in Table

[11]We estimate the model using the natural log of income and per capita income is measured

4, we only present the estimates of the conflict measure (which is our variable of interest) along side our general exposure to shock dummy. In Panel A our result suggests a statistically significant negative relationship between recent conflict and a households' per capita income but not long term conflict. A similar trend is noted for total income, which is summarized in columns (3) and (4) of panel A.

Despite the strengths of a fixed effect estimation strategy, we recognize its limitations. While a fixed effects strategy reduces the potential of deriving estimates that are not consistent, it may not fully eliminate potential bias in our coefficients of interest. As noted above, a fixed effect strategy allows us to identify effect using variation at the individual or household level over time thus eliminating potential bias due to time invariant unoberservables. We worry about these time invariant unobservables because they could be potentially correlated with our exposure to conflict measures and our measures of welfare. However, a fixed effects strategy does not fully eliminate the potential of deriving biased estimates because there is still a possibility that our measures of welfare could be correlated with time varying variable not included in the analysis and also correlated wit our dependent variable. We attempt to reduce this potential source of bias by including control variables that are time varying and may be correlated with an individual's exposure to conflict and potentially affect welfare of individuals and households.

Some of the control variables we include have been shown in previous research to affect welfare. For example rainfall, population density, market access, social services, proxies for social capital and proxies for economic services in communities. The results from running the fixed effect models with these time varying controls are summarized in Table 4 panel B, Table 5, Table 6 and Table 7.

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dividing real income by adult equivalency versus just household size.

Table 2: Violent Conflict and Poverty Indicators (Parsimonious Household level Models)

	Poverty Incidence		Poverty Gap		Poverty Severity	
	(1)	(2)	(3)	(4)	(5)	(6)
	b/se	b/se	b/se	b/se	b/se	b/se
Years of School	-0.003	-0.003	-0.005**	-0.005**	-0.005***	-0.005***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Age	-0.003	-0.003	-0.005	-0.005	-0.006	-0.006
	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Age^2	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Exposure to Shock	0.030**	0.030**	0.017	0.016	0.012	0.012
	(0.014)	(0.014)	(0.011)	(0.011)	(0.011)	(0.011)
Recent Conflict Exposure	0.605***		0.521***		0.462***	
	(0.199)		(0.136)		(0.135)	
Rainfall	-0.000	-0.000	-0.000**	-0.000**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Population Density	0.000	0.000	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year 2012	-0.008	-0.008	-0.028**	-0.028***	-0.043***	-0.043***
	(0.013)	(0.013)	(0.011)	(0.011)	(0.011)	(0.011)
Year 2015	0.196***	0.197***	0.197***	0.198***	0.178***	0.179***
	(0.016)	(0.016)	(0.014)	(0.014)	(0.014)	(0.014)
Long-term Conflict Exposure		0.324*		0.313***		0.277**
		(0.168)		(0.116)		(0.120)
Constant	0.618***	0.614***	0.426***	0.422***	0.326**	0.322**
	(0.157)	(0.158)	(0.131)	(0.131)	(0.134)	(0.134)
R^2	0.079	0.078	0.138	0.137	0.141	0.141
N	10505	10505	10505	10505	10505	10505

Note: For a description of the variables, see Table 1.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Violent Conflict and Poverty Indicators (Parsimonious Individual level Models)

	Poverty Incidence		Poverty Gap		Poverty Severity	
	(1)	(2)	(3)	(4)	(5)	(6)
	b/se	b/se	b/se	b/se	b/se	b/se
Years of School	-0.002**	-0.002**	-0.003***	-0.003***	-0.003***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.001	-0.001	-0.001	-0.001	-0.002	-0.001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Age^2	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Exposure to Shock	0.034***	0.034***	0.021***	0.020***	0.016***	0.016***
	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Recent Conflict Exposure	0.328***		0.307***		0.284***	
	(0.083)		(0.055)		(0.053)	
Rainfall	0.000	0.000	-0.000	-0.000	-0.000*	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Population Density	0.000**	0.000**	0.000***	0.000***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year 2012	-0.010*	-0.011*	-0.022***	-0.022***	-0.035***	-0.036***
	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Year 2015	0.215***	0.215***	0.231***	0.230***	0.211***	0.210***
	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
Long-term Conflict Exposure		0.218***		0.234***		0.226***
		(0.068)		(0.049)		(0.050)
Constant	0.536***	0.535***	0.310***	0.308***	0.187***	0.184***
	(0.037)	(0.037)	(0.031)	(0.031)	(0.031)	(0.031)
R^2	0.087	0.087	0.161	0.161	0.163	0.163
N	52324	52324	52324	52324	52324	52324

Note: For a description of the variables, see Table 1.
Robust standard errors clustered at the household level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: The Effect of Violent Conflict on Income (Household Level Models)

Panel A	Parsimonious			
	Per capita income		Total income	
Variables	(1)	(2)	(3)	(4)
	b/se	b/se	b/se	b/se
Exposure to Shock	-0.042	-0.041	-0.043	-0.043
	(0.053)	(0.053)	(0.052)	(0.052)
Recent Conflict Exposure	-1.208**		-0.934*	
	(0.565)		(0.552)	
Long-term Conflict Exposure		-0.901		-0.637
		(0.559)		(0.542)
Constant	10.225***	10.235***	10.657***	10.663***
	(0.700)	(0.700)	(0.695)	(0.695)
R^2	0.071	0.071	0.085	0.085
N	9451	9451	9451	9451
Panel B	Full Regression			
	Impact of Conflict on Income			
Exposure to Shock	0.012	0.014	0.009	0.012
	(0.067)	(0.067)	(0.066)	(0.066)
Recent Conflict Exposure	-1.652**		-1.481**	
	(0.673)		(0.653)	
Long-term Conflict Exposure		-1.753***		-1.711***
		(0.614)		(0.575)
Constant	10.702***	10.745***	10.530***	10.575***
	(0.879)	(0.876)	(0.871)	(0.867)
R^2	0.071	0.072	0.080	0.081
N	7165	7165	7165	7165

Note: Controls for parsimonious regressions (Panel A) similar to those in Tables 2 and 3; controls for full regression (Panel B) similar to those in Tables 5 and 6.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5: The Effect of Violent Conflict on Poverty Indicators (Household Level)

	Poverty Incidence		Poverty Gap		Poverty Severity	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
	b/se	b/se	b/se	b/se	b/se	b/se
Years of School	-0.002	-0.002	-0.005**	-0.005**	-0.005**	-0.005**
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Age	-0.003	-0.003	-0.006	-0.006	-0.008	-0.008
	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Age^2	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Exposure to Shock	0.013	0.013	0.006	0.006	0.004	0.004
	(0.016)	(0.016)	(0.013)	(0.013)	(0.012)	(0.012)
Recent Conflict Exposure	0.596**		0.627***		0.585***	
	(0.278)		(0.171)		(0.165)	
Long-term Conflict		0.450*		0.571***		0.551***
Exposure		(0.241)		(0.138)		(0.137)
Rainfall	0.000	0.000	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Population Density	0.000	0.000	0.000*	0.000*	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year 2012	0.003	0.001	-0.020	-0.022	-0.032**	-0.033**
	(0.017)	(0.017)	(0.014)	(0.014)	(0.013)	(0.014)
Year 2015	0.185***	0.183***	0.184***	0.181***	0.165***	0.162***
	(0.024)	(0.024)	(0.020)	(0.020)	(0.020)	(0.020)
Household Size	0.029***	0.029***	0.025***	0.025***	0.019***	0.019***
	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
Busstop Availability	0.039**	0.038**	0.016	0.014	0.009	0.008
	(0.018)	(0.018)	(0.015)	(0.015)	(0.015)	(0.015)
Market Availability	-0.013	-0.012	0.009	0.010	0.011	0.012
	(0.020)	(0.020)	(0.016)	(0.016)	(0.015)	(0.015)
Num. Agric Coop	0.004	0.004	0.002	0.002	0.002	0.002
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Num. Bus Assoc.	-0.000	-0.000	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Num of Vigilante Grps	0.011***	0.011***	0.010***	0.011***	0.010***	0.010***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Police St Availability	-0.015	-0.016	-0.013	-0.015	-0.011	-0.012
	(0.020)	(0.020)	(0.017)	(0.017)	(0.017)	(0.017)
Constant	0.431**	0.421**	0.262	0.249	0.177	0.163
	(0.197)	(0.197)	(0.168)	(0.168)	(0.165)	(0.165)
R^2	0.106	0.105	0.169	0.168	0.164	0.164
N	8092	8092	8092	8092	8092	8092

Note: For a description of the variables, see Table 1.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The results including extra controls are consistent with our earlier finding for certain measures but in some model specifications, estimated effects are now significant. In particular our results from Table 4 panel B which summarizes the results analyzed at the household level suggest a statistically significant negative impact of both recent and long term conflict on households' total income and per capita income

Table 6: The Effect of Violent Conflict on Poverty (Individual level)

	Poverty Incidence		Poverty Gap		Poverty Severity	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
	b/se	b/se	b/se	b/se	b/se	b/se
Years of School	-0.001	-0.001	-0.003***	-0.003***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.002	-0.001	-0.002	-0.002	-0.003*	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Age^2	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Exposure to Shock	0.021***	0.021***	0.009*	0.009	0.007	0.006
	(0.007)	(0.007)	(0.006)	(0.006)	(0.005)	(0.005)
Recent Conflict Exposure	0.238**		0.409***		0.419***	
	(0.113)		(0.072)		(0.069)	
Long-term Conflict		0.219**		0.428***		0.443***
Exposure		(0.096)		(0.061)		(0.062)
Rainfall	0.000***	0.000***	0.000**	0.000**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Population Density	0.000*	0.000*	0.000***	0.000***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year 2012	0.001	0.000	-0.010	-0.012*	-0.022***	-0.024***
	(0.008)	(0.008)	(0.006)	(0.006)	(0.006)	(0.006)
Year 2015	0.212***	0.211***	0.222***	0.219***	0.202***	0.198***
	(0.012)	(0.012)	(0.010)	(0.010)	(0.009)	(0.009)
Household Size	0.012***	0.012***	0.018***	0.017***	0.015***	0.015***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Busstop Availability	0.045***	0.044***	0.025***	0.023***	0.021***	0.020***
	(0.009)	(0.009)	(0.007)	(0.007)	(0.007)	(0.007)
Market Availability	-0.030***	-0.029***	-0.002	-0.002	0.002	0.003
	(0.009)	(0.009)	(0.007)	(0.007)	(0.007)	(0.007)
Num. Agric Coops.	0.005***	0.005***	0.003***	0.003***	0.003**	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Num. Bus Assoc.	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Num. Vigilant Grps.	0.010***	0.010***	0.009***	0.009***	0.008***	0.009***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Police St Availability	-0.001	-0.001	-0.010	-0.010	-0.010	-0.011
	(0.010)	(0.010)	(0.008)	(0.008)	(0.008)	(0.008)
Constant	0.378***	0.374***	0.132***	0.121**	0.008	-0.003
	(0.059)	(0.059)	(0.048)	(0.048)	(0.047)	(0.048)
R^2	0.113	0.113	0.191	0.191	0.187	0.187
N	40351	40351	40351	40351	40351	40351

Note: For a description of the variables, see Table 1.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

(PCI). This negative relationship is consistent with expected effects of conflict.[12]. We also find that the estimated effect of recent conflict on income is slightly less than the effect of exposure to conflict over a longer time horizon. This result suggests accumulative effects of conflict on income. As a robustness check, we also estimate the model at the individual level. These results are summarized in Table 7 panel B and panel C. While the magnitude of these estimated effects are smaller, the results also suggest significant negative effects of recent and long term conflict.[13]

The robustness of the significant negative effect of exposure to conflict on welfare is confirmed when we estimate the effects on poverty measures. These results are summarized in Table 5 and 6. In Table 5 we present the full results for the analysis for which the unit of analysis is the household. In both table 5 and 6 columns (1) and (2) the dependent variable is poverty incidence, in columns (3) and (4) the dependent variable is poverty gap and columns (5) and (6) poverty severity. As a robustness check on our estimates, in Table 6 we present the summary of the regression for which the unit of analysis is the individual. Just as in earlier tables, columns (1), (3) and (5) provide estimates using the short term conflict measure while columns (2), (4) and (6) provide estimates using the long- term conflict measure. These results suggest that both short term and long term exposure to conflict increases poverty incidence, poverty gap and severity significantly. The short term effects appears slightly higher than the long term effect but this difference is not robust to the inclusion of more variables (see Table 8). We also estimate the fixed effects model at the individual level and while the coefficients are smaller, the conclusions are similar. Both recent exposure to conflict and long term exposure to conflict negatively affected welfare.

[12]For PCI and total income we expect a negative relationship and for poverty measures we expect a positive correlation

[13]For the individual level fixed effect analysis, the standard errors are clustered at the individual level otherwise, standard errors are clustered at the household level.

Given analysis at the household level is our preferred specification, we will focus our discussions on those estimates.

The results in Table 5 suggest that a 1% point increase in a household's exposure to conflict over a short period of time is associated with a 59.6% point increase in the probability an individual is poor. While a 1 percentage point increase in long term exposure to conflict is associated with a 45% percentage point increase in the probability an individual is poor.

With respect to the poverty gap, our results suggest that a 1% point increase in a household's exposure to conflict over a short period of time (2 years and less) is associated with a 0.627 increase in the average poverty gap while a 1 percentage point increase in long term exposure to conflict is associated with a 0.571 increase in the average poverty gap. Poverty severity also increases on average by 0.585 with a 1 percentage point increase in recent exposure to conflict while a 1% point increase in long term exposure to conflict increases average poverty severity by 0.551.

While the magnitude of these estimated effects may seem high, keep in mind that our measure of conflict exposure is the number of conflict related deaths in a LGA per capita expressed as a percentage. The mean of this measure is 0.01% and 0.02% respectively for recent and long term conflict exposure. If for example our measure of recent conflict doubled from the mean 0.01 to 0.02, which is a reasonable significant change (a 0.01 percentage point change), it would be associated with an increase in poverty incidence by 0.596% points and an approximate increase in the poverty gap and poverty severity by 0.006 and 0.0059 respectively. Hence an increase of 1 percentage point is a significant increase which is why the magnitude of the resulting estimated effects on poverty incidence, severity and gap are large.

What can we learns from these results? Our results suggest that exposure to conflict (long term or recent) reduces a household income, per capita income and

increases poverty incidence, poverty gap and poverty severity. We also check to see if our conflict measures would impact individuals who earn wage income. The summary of the estimated effects are in panel A of Table 7. Our results do not provide any evidence supporting this hypothesis. This may be due to the small sample size of wage earners which could lead to noisy estimates.

Table 7: The Effect of Violent Conflict on Wages, PCI and Income (Individual Level)

	Panel A		Panel B		Panel C	
	Wage	Wage	Per capita Income	Per capita Income	Total Income	Total Income
	(1)	(2)	(3)	(4)	(5)	(6)
	b/se	b/se	b/se	b/se	b/se	b/se
Exposure to Shock	-0.240*	-0.239*	-0.054*	-0.053*	-0.060**	-0.058**
	(0.137)	(0.134)	(0.028)	(0.028)	(0.028)	(0.028)
Recent Conflict Exposure	-0.604		-0.920***		-0.855***	
	(4.896)		(0.285)		(0.282)	
Long-term Conflict Exposure		4.059		-1.044***		-1.157***
		(4.649)		(0.284)		(0.263)
Constant	11.132***	10.960***	11.324***	11.350***	12.031***	12.064***
	(1.589)	(1.606)	(0.218)	(0.219)	(0.218)	(0.218)
R^2	0.034	0.035	0.083	0.084	0.092	0.092
N	5307	5307	36568	36568	36568	36568

Note: The control variables for the regressions in Panels A, B and C are similar to those in Tables 5 and 6.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The main limitation with identifying the effect of conflict using the fixed effect approach is the possible within individual correlation between conflict exposure and a time varying unobservable. As a robustness check we estimate our main models including a number of time varying community level variables that capture an environment's infrastructure and social capital. While these variables are not typical welfare predictors and may not have varied over the period we analyze,they may be correlated with conflict exposure. Hence, we estimate our model including them as a robustness check on our estimated effects. The limitation with this analysis is the lack of information on social variables for certain communities. Hence, this analysis is restricted to the subsample of the balanced panel for which community varies are available. The results are summarized in Table 8 and 9. In table 8 the

results using poverty measures are summarized and the estimated effects on all the control variables are included. In contrast in Table 9 which summarizes the models using income measures as the dependent variable, we only present estimates of our variables of interest, the constant term and a control for other kinds of shocks for brevity. Despite the decline in sample size with this analysis, the results in Table 8 provide more evidence that both recent exposure and long term exposure to shock increases poverty incidence, poverty gap and poverty severity. While the estimated effects were attenuated slightly compared to those in Table 5, the difference is not significant especially for the long term measure[14]. In Table 9 the estimated effects of recent conflict are slightly lower than the estimates in Panel B Table 4. In contrast for long term conflict, the estimate in Table 9 is higher than the estimate in Panel B Table 4. These slight differences are not unexpected given the sample size differences in both tables. The results in Table 9 suggest that a 0.01 percentage point increase in recent and long term conflict respectively will lead to a 1.4% and 2.19% decrease in income per adult equivalence which is a significant decline.[15]

The above analysis including several more control variables suggests that the effects of conflict on income and poverty in Nigeria are long lasting and significant.

[14]For example the effect of long term conflict on poverty incidence with the extra controls is 0.442 compared to 0.45 in Table 5.

[15]As another robustness check, we also estimated the effect of conflict using a more aggregated measure- number of conflict related deaths in a state per 1000 population. This more aggregated measure some view as less likely to suffer from potential endogeneity although as a measure of conflict it is more noisy. We find negative welfare effects on poverty severity and poverty gap but not on income.

Table 8: The Effect of Violent Conflict on Poverty Indicators (Household level)

	(1) Poverty Incidence b/se	(2) Poverty Incidence b/se	(3) Poverty Gap b/se	(4) Poverty Gap b/se	(5) Poverty Severity b/se	(6) Poverty Severity b/se
Years of School	-0.001	-0.001	-0.004	-0.004	-0.005*	-0.005*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Age	-0.004	-0.004	-0.007	-0.007	-0.009	-0.009
	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)
Age^2	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Exposure to Shock	0.024	0.023	0.017	0.016	0.013	0.012
	(0.019)	(0.019)	(0.015)	(0.015)	(0.014)	(0.014)
Recent Conflict Exposure	0.430		0.459***		0.418***	
	(0.280)		(0.159)		(0.153)	
Long-term Conflict Exposure		0.442*		0.534***		0.516***
		(0.253)		(0.146)		(0.144)
Average labour wage per man	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rainfall	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Population Density	-0.000	-0.000	0.000	0.000	0.000*	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year 2012	-0.011	-0.012	-0.032*	-0.032*	-0.043**	-0.043**
	(0.023)	(0.023)	(0.017)	(0.017)	(0.017)	(0.017)
Year 2015	0.217***	0.217***	0.254***	0.253***	0.245***	0.244***
	(0.035)	(0.035)	(0.029)	(0.029)	(0.028)	(0.028)
Household Size	0.033***	0.032***	0.034***	0.034***	0.028***	0.028***
	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
Sec Sch Availability	0.015	0.015	0.016	0.016	0.012	0.012
	(0.025)	(0.025)	(0.021)	(0.021)	(0.021)	(0.021)
Health Availability	-0.035*	-0.036*	-0.024	-0.024	-0.018	-0.019
	(0.020)	(0.020)	(0.016)	(0.016)	(0.016)	(0.016)
Pub hosp. Availability	0.042	0.044	0.055**	0.058**	0.056**	0.059**
	(0.028)	(0.028)	(0.024)	(0.024)	(0.024)	(0.024)
Pri hosp. Availability	-0.004	-0.002	-0.014	-0.013	-0.015	-0.013
	(0.024)	(0.024)	(0.020)	(0.020)	(0.019)	(0.019)
Pharmacy Availability	0.011	0.014	-0.007	-0.004	-0.014	-0.011
	(0.026)	(0.026)	(0.020)	(0.020)	(0.019)	(0.019)
Cell phone Availability	0.085***	0.089***	0.090***	0.094***	0.095***	0.098***
	(0.032)	(0.032)	(0.026)	(0.026)	(0.026)	(0.026)
Post office Availability	-0.006	-0.005	-0.003	-0.003	0.002	0.002
	(0.029)	(0.030)	(0.025)	(0.025)	(0.025)	(0.025)
Busstop Availability	0.033	0.030	0.013	0.010	0.006	0.004
	(0.023)	(0.023)	(0.020)	(0.020)	(0.020)	(0.020)
Int cafe Availability	0.019	0.019	0.007	0.008	0.004	0.005
	(0.030)	(0.030)	(0.027)	(0.027)	(0.027)	(0.027)
Bank Availability	0.028	0.027	0.042*	0.040*	0.041*	0.039*
	(0.025)	(0.025)	(0.022)	(0.022)	(0.023)	(0.023)
Microfinance Availability	-0.034	-0.037	-0.072***	-0.077***	-0.084***	-0.088***
	(0.028)	(0.028)	(0.023)	(0.023)	(0.022)	(0.022)
Police St Availability	-0.093***	-0.095***	-0.046**	-0.047**	-0.025	-0.026
	(0.029)	(0.029)	(0.023)	(0.023)	(0.023)	(0.023)
Market Availability	-0.015	-0.016	0.006	0.004	0.003	0.001
	(0.025)	(0.025)	(0.019)	(0.019)	(0.019)	(0.019)

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

	(1) Poverty Incidence b/se	(2) Poverty Incidence b/se	(3) Poverty Gap b/se	(4) Poverty Gap b/se	(5) Poverty Severity b/se	(6) Poverty Severity b/se
Comm cent Availability	0.019	0.018	0.009	0.008	0.008	0.007
	(0.021)	(0.021)	(0.017)	(0.017)	(0.017)	(0.017)
Num. village Grps	0.003	0.003	0.006***	0.006***	0.007***	0.007***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Num. Agric Coops.	0.003	0.002	0.001	0.000	0.001	0.000
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Num. saving Coops.	0.003	0.003	0.003*	0.003*	0.003*	0.003*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Num. Bus Assoc.	0.001	0.000	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Num. Women Grps.	-0.009***	-0.009***	-0.006**	-0.006**	-0.005**	-0.005**
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Num. Health Grps.	0.018***	0.017***	0.015***	0.014***	0.013***	0.012***
	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Num. School Grps.	-0.011*	-0.010*	-0.011**	-0.010**	-0.011**	-0.010**
	(0.006)	(0.006)	(0.005)	(0.005)	(0.004)	(0.004)
Num. of NGOS	0.030	0.030	0.005	0.005	-0.005	-0.005
	(0.019)	(0.019)	(0.013)	(0.013)	(0.014)	(0.014)
Num. Vigilant Grps.	0.007	0.007	0.011***	0.011***	0.011***	0.011***
	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Num. Disability Grps.	0.022	0.022	0.011	0.011	0.007	0.007
	(0.020)	(0.019)	(0.016)	(0.016)	(0.015)	(0.015)
Constant	0.523**	0.522**	0.285	0.280	0.195	0.190
	(0.228)	(0.228)	(0.186)	(0.186)	(0.182)	(0.182)
R^2	0.141	0.141	0.234	0.234	0.230	0.231
N	6299	6299	6299	6299	6299	6299

Note: Income is adult equivalent adjusted.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 9: The Effect of Violent Conflict on Household Welfare (household level)

	(1) Log Per Capita Income b/se	(2) Log Per Capita Income b/se	(3) Log Total Income b/se	(4) Log Total Income b/se
Exposure to Shock	-0.031	-0.024	-0.032	-0.027
	(0.071)	(0.072)	(0.071)	(0.071)
Recent Conflict Exposure	-1.435**		-1.431**	
	(0.689)		(0.648)	
Long-term Conflict Exposure		-2.193***		-2.094***
		(0.638)		(0.604)
Constant	9.984***	10.017***	9.967***	9.995***
	(0.948)	(0.946)	(0.938)	(0.935)
R^2	0.119	0.120	0.127	0.128
N	5613	5613	5613	5613

Note: The control variables for the regressions in Table 9 are similar to those in Table 8.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

7 Conclusions

In this paper we consider the average impact of exposure to conflict on household welfare in Nigeria. Nigeria has unfortunately been plagued with several intense bouts of conflict since its independence. The spread of Boko Haram in the North Eastern part of Nigeria and the Fulani herds men clashes with farmers in the middle belt region of Nigeria are just two examples of recent ongoing conflict episodes that have led to a significant number of conflict related death. Using data from ACLED to construct two measures of conflict exposure (short term and long term), we estimate the impact of exposure to conflict on per capita income, total household income, poverty incidence, poverty gap and poverty severity. We exploit the panel nature of our data in an attempt to attenuate potential bias in estimated effects. Using a fixed effect strategy and controlling for factors that affect an individual's welfare, we identify relevant effects exploiting within household variation in conflict exposure over time.

Our results suggest that both recent exposure to conflict and long term exposure to conflict decreases per capita income and household income. It also increases poverty incidence, poverty gap and poverty severity. We do not find a significant effect of conflict exposure on wages. This could be due to the small sample size of wage earners. Our results also suggest that long term exposure to conflict has larger effects on a household's welfare than recent conflict exposure. Finding negative welfare effects of prolonged exposure to conflict is worth noting as this highlights the lingering effect on a household's welfare of long term exposure to violent conflict.

Our estimated effects are economically significant. For example the results from Table 5 suggest that that a 0.1% point increase in a households' recent exposure to conflict from the mean of 0.01 to 0.11, leads to an average increase in poverty

incidence by 4.43%. In contrast a 0.1% increase in households' exposure to conflict over a long period of time, from the mean of 0.02 to 0.12, leads to an average increase in poverty incidence by 4.4%. A 0.1% point increase in conflict exposure is not unreasonable given the precipitous increase in conflict intensity in particular parts of Nigeria over the last few years. For example in Borno for example which is currently a hotbed for conflict in Nigeria, the recent conflict measure increased between 2010 and 2015 by 0.34% points.

What can we take away from these results? Conflict affects welfare negatively and the effects over time can be significant. It is important to mention that our current identification strategy has limitations. Even though we have included several variables to reduce the possibility of omitted variable bias and a fixed effect identification strategy can deal with time invariant unobservables, the possibility of time varying unobservables, at the household level, correlated with both conflict and welfare may still exit.

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