Violent Conflict Exposure in Nigeria and Household Welfare: What Can We Learn from Panel Data?[*]

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Abstract

Violent conflict has increased significantly over the past 15 years, primarily in Northern Nigeria, due to the 2009 insurgency of Boko Haram, the ongoing conflict between Fulani herders and farmers, and the rise of jihadist bandits. However, since the country's independence in 1960, violent clashes have occasionally broken out in other communities across the nation. We analyze whether exposure to conflict in Nigeria impacts household welfare using four waves of panel data from 2010 to 2018. We used six welfare measures: wages, HH-Income, PC-Income, poverty incidence, poverty gap, and poverty severity. Furthermore, we employ a fixed-effect strategy, take advantage of the panel nature of our data, and control for a wide range of variables that could affect a household's welfare to reduce potential bias in estimated effects. Our results provide strong evidence of a negative association between the level of conflict exposure in the recent past and current household income. We also find that past conflict in Nigeria increases the incidence of poverty, the poverty gap, and poverty severity.

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1 Introduction

Nigeria is currently Africa's largest economy. Despite its emergence as one of the fastest growing economies in Africa between 2006 and 2014, it is viewed by some as an enigma given its rich natural resource yet history of eclectic growth, political instability and high poverty. According to Eigbiremolen (2018), poverty incidence was 65.6% in 1996. It has declined rapidly since the start of the twenty first century from 60.9% in 2010 according to the National Bureau of Statistics (NBS) to 37.7% in 2018 (World Poverty Clock). Absolute poverty has risen to 38.8% in 2021 (World Poverty Clock) and current levels of poverty place Nigeria in the second top position with respect to the country with the most people in extreme poverty in the world.

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 potential factor. In Nigeria, violent conflict is purported 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. We elaborate on these channels in the next section of the paper.

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. Our main question of interest is does recent exposure to conflict, and accumulated exposure to conflict over a long period of time affect welfare? In particular we examine the association between exposure to conflict on wages, 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. Figure 1 highlights the mapping across LGAs of conflict related death in Nigeria from 1997-2018. This map shows that while some areas in Nigeria have experienced more conflict than others, violent conflict is not restricted to only one part of Nigeria and a robust analysis of average effect of conflict in Nigeria overall is value adding.

To estimate the effect of conflict on welfare outcomes we primarily make use of the Nigeria General Household Survey (GHS) *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).* In addition, to measure conflict exposure,

we turn to the Armed Conflict Location and Event Data (ACLED) by Raleigh, Hegre & Carlson (2009).[1]

To examine the potential effect on welfare of exposure to conflict, we construct two measures of conflict exposure. One measure captures recent exposure to conflict and the other accumulated/long term exposure to conflict. To estimate the effect of conflict, we employ a fixed-effects approach exploiting the panel nature of our data and including several control variables. This approach attenuates potential biases caused by unobserved time invariant differences across individuals that affect welfare and are also correlated with conflict exposure. Our results suggest that recent exposure to conflict significantly decreases household income, increases poverty incidence, expands the poverty gap and increases the severity of poverty in Nigeria. We also find some evidence supporting negative effects on welfare of long-term/ accumulated exposure to conflict.

Our research contributes to the literature by providing the first broad scale look at the average effect of violent conflict on income, poverty incidence, gap and severity in Nigeria using panel data. While there have been other important studies that have considered the impact of conflict on education and health 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, 2009-2018 exploiting 4 waves of the panel data. Investigating the impact of violent conflict on welfare provides insights for policy makers needed to facilitate intervention in areas with significant conflict exposure.

The rest of our paper proceeds as follows. In section 2 we discuss potential pathways to explain how conflict can affect welfare. In section three, we review the history of violent conflict in Nigeria. In section four we provide a detailed review of the past literature. In section five we present the empirical framework and justification of the modeling strategy. In Section six we describe the data used and present some descriptive analysis. Section seven summarizes our results and provides robustness checks. We conclude in the last section.

2 Conflict and Welfare: Potential Pathways

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 & Gupta, 1986; Alesina & Perotti, 1996; Barro, 1991).

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[1]We elaborate more on these datasets in section 6.

Long Conflict Exposure
Fatalities,1997-2018

(3000,5000]
(500,3000]
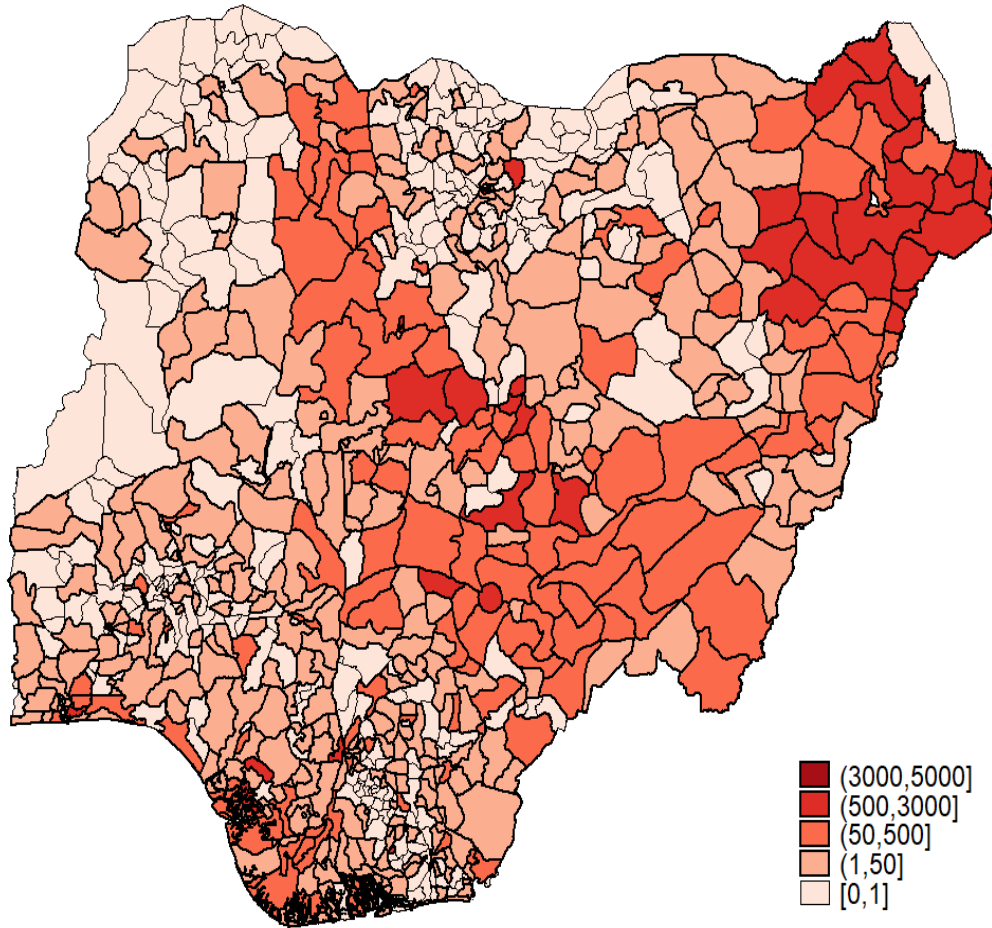**(50,500]**
(1,50]
[0,1]

Figure 1: Conflict Exposure in Nigeria between 1997-2018

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.

3   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 areas and kingdoms that would later be put together to form Nigeria. Best & 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 and take over 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 & Moses (2014) led to the death of one to three million people[2].

In the 70s and 80s Nigeria cycled through different military administrations. During this decades, bouts of political conflicts were common place in different parts of the country. While these events were intense, they were relatively secluded to

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[2]For more details see Heerten & Moses, 2014: 169

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, Neelam & Mogaka (2015) 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.

Another common kind of violent conflict that has intensified over time in Nigeria are religious and ethnic related conflict events. 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 2018. 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 & 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 worship places, motor parks, police stations, military barracks have been hit by suicide attacks linked to Boko Haram (Iyekekpolo, 2016:1).

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

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[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.

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]

Another kind of conflict has also emerged since 2011. This conflict refereed to as the Nigerian bandit conflict is linked with the farmer-herder conflicts and the Boko Haram insurgency. This conflict concentrated in the northwest Nigeria involves various gangs, criminal and jihadist groups and ethnic militias. These groups have been involved in mass kidnapping and massacres. For example in 2021, 279 secondary school girls were kidnapped in Zamfara state in Jangebe and in June 50 villagers were massacred in Zurmi. In January 2022 the attacks continued which led to airstrikes by the government forces January 3rd in an attempt to disrupt these bandit groups. Unfortunately this led to reprisal attacks by the bandits from January 4-6th and the death of over 200 civilians in Zamfara state. This growing conflict has been linked to the death of thousand of people since 2011.

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 four zones with the highest prevalence rates are the North East, North West North Central and South South regions of Nigeria. According to Azad, Crawford & 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 a little more than One-fifth of households (22%) have been directly affected by conflict events or violence.

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[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.

4 Literature Review

4.1 General Empirical Evidence for the Effect of Conflict

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.[5]

For brevity we expatiate solely on recent research on conflict in Nigeria and other studies on conflict and poverty in Africa.

4.2 Effect of Conflict - Studies on Nigeria

In the last 10 years, studies examining the effect of conflict in Nigeria have increased. Nwokolo (2015) investigated the impact of the Boko Haram Insurgency (BHI) on children's health. Their finding suggests that exposure to terror-related fatalities increases the risk of low birth weight in both male and female fetuses. Similarly, Ekhator & Asfaw(2019) specifically look at how the Boko Haram insurgency has affected health indicators for children. They find the insurgency had a negative impact on weight-for-height and weight-for-age z-scores and increased the likelihood of wasting. Other recent papers have focused on effects of conflict on education and agricultural related outcomes. Bertoni et al. (2017) examined the effects of civil conflict (specifically Boko Haram) on school attendance and achievement using the three rounds of the GHS-Panel dataset. The number of completed years of education for the cohort exposed to conflict during primary school is found to be 0.6 years lower for the exposed cohort compared to the non-exposed cohort for every one standard deviation increase in the number of fatalities within a 20 km radius of each household.

With respect to agriculture related outcomes, there have been a number of recent papers using the GHS-Panel Dataset. Specifically, George, Adelaja & Weatherspoon (2020) used the GHS combined with Boko Haram terrorist incident data to examine

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[5]See Blattman and Miguel (2010); Akresh & de Walque (2008); Tom Bundervoet, Verwimp & Akresh (2009); Shemyakina (2011); Chamarbagwala & Moran (2011); Oyelere & Wharton (2013); Rodriguez & Sanchez (2012), Currie & Vogl (2013); Camacho (2008); Minoiu & Shemyakina(2012),Mansour & Rees(2012), Minoiu & Shemyakina(2012), Verwimp & Van Bavel (2014), Dabalen & Saumik (2014a), Dabalen & Saumik (2014b); Kondylis (2010); Leon (2012); Valente (2014); Justino, Leone, & Salardi (2013), for research focused on the impact of conflict using microdata.

the impact of armed conflicts on food insecurity. According to their findings, food insecurity increased as conflict intensity, as indicated by the number of fatalities, increased. In a related paper, Adelaja & George (2019a) also analyzed the effects of violent conflict on plot ownership, cultivated land, rented land, land values, and cropping patterns. More recently, Odozi & Uwaifo-Oyelere (2021) investigated the effect of violent conflict on farm household labour supply. They find exposure to violent conflict significantly lowers the total number of hours that families are willing to work in agriculture.

4.3 Conflict and Poverty

Despite the growing literature related to the effects of conflict, research focused on trying to comprehend how violent conflict exposure affects poverty related outcomes is scant. Justino and Verwimp (2006) is one of the few papers that have demonstrated how exposure to violent conflict and war situations affect household poverty levels and changes. In particular, they investigated poverty dynamics, violent conflict and convergence in Rwanda. Using both violent and non violent conflict shock variables, the study compared the differential impact on changes in household income and poverty. They find changes in poverty across provinces and overall increase in poverty as a result of the war. They also find income per adult equivalent decreased via channels of property destruction. Similarly, Mercier et al., (2018) looked into the impact of the Burundi Civil War, which began in 1993 on household food poverty, the dynamics and the mechanisms at play. Families were followed over three data rounds that were collected in 1998, 2007, and 2012, respectively. The study finds that the probability of poverty was higher for households that were more exposed to the war compared to non-exposed households using a fixed effects model and a time varying heterogeneity at the province level.

It is also important to note that while we concentrate on the effects of conflict on welfare outcomes such as the prevalence and severity of poverty, the opposite direction of relationship has also been examined. The majority of studies looking at this inverse relationship suggest that poverty and the likelihood of civil unrest are positively correlated (see Collier, 1999; White, 2005; Kondylis, 2008, Pinstrup-Andersen & Shimokawa (2018)).

Our paper adds value to the current literature in three distinct and significant ways. First, our paper considers the effects of exposure on income and poverty related outcomes in Nigeria. To the best of our knowledge, our paper is the first that focuses on investigating these effects. Other papers on Nigeria focused on health, agricultural and school related outcomes and while those investigations are important, our

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paper complements these papers by focusing on important measure of household welfare. Given the extensive nature of poverty in Nigeria and the potential association between past conflict and current income levels, examining this potential association is warranted. Second, we do not focus on a region of Nigeria or a particular type of violent conflict. Rather we estimate the average effect of exposure to violent conflict any where in Nigeria on a household's welfare. This distinguishes our paper from the aforementioned papers on Nigeria that focus on a specific conflict type- Boko Haram or region. 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 and there could be lingering effects on welfare. Third, our approach is unique. We examine both the short term and long term effects of exposure to conflict and incorporate intensity in our measure using violent conflict related deaths standardized by population in a household's LGA.

5 Empirical Strategy

Isolating conflict exposure effects on development outcomes using cross sectional data poses several challenges. Hence, we investigate how violent conflict affects household welfare by 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.[6]

The general form of the estimation equation is as follows:

$$Y_{ijt} = \beta_0 + \beta_1 W_{jt} + \mathbf{x_{ijt}}\beta_2 + \mathbf{c_{jt}}\beta_3 + \gamma_t + \delta_i + \epsilon_{ijt} \qquad (1)$$

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 on capturing recent conflict exposure. By recent we mean exposure to conflict in the current and last two years. We also consider a measure for long term exposure by looking at the cumulative exposure to conflict from 1997 to the year of the survey.[7] In the next section we describe in detail how we construct this measure. $\mathbf{x_{ijt}}$ is a vector of individual and household time varying regressors that affect household

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[6]We are not the first to use this method for identifying effects of conflict. See Pivovarova & Swee (2015) or George, Adelaja, & Weatherspoon (2020).

[7]We use two measures of violent conflict.

welfare and $\mathbf{c_{jt}}$ represents time varying local government area characteristics such as the rainfall levels, population density, the availability of police stations, banks, hospitals etc. 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. We discuss in more detail in section 7 possible challenges to our fixed-effects estimation strategy including omitted variable bias linked with time varying unobservables, reverse causality and simultaneity bias.

6   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' socioeconomic changes over time. The survey was undertaken by the National Bureau of Statistics in partnership with the Federal Ministry of Agriculture and Rural Development(FMA&RD), the National Food Reserve Agency (NFRA), the Bill and Melinda Gates Foundation (BMGF) and the World Bank (WB). There are four waves currently of the panel (2010, 2012 and 2015, 2018). The GHS−Panel is a nationally representative survey of about 5,000 households, more households were added in future waves. This panel survey is 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.

For the first three waves, only a few additional households were added. However a major change was implemented in the fourth survey of 2018/2019. In particular, for the fourth wave of the GHS survey, a significant number of households in the prior three panels were dropped and replaced with 3,600 refresh households. Only 1,507 households from the original 2010 panel were re-interviewed in 2018. This significant change combined with the normal marginal attrition of households given the length of time since the survey began, reduced significantly the size of the balanced panel over

the four waves.[8]. This significant reduction in the households originally interviewed in 2010 in the most recent survey create some challenges. However, the world bank specifically stated that this sub-sample our 1507 households was designed to be nationally representative. In addition this sub-sample allows a continued longitudinal analysis for the sample going back to 2010.

To measure conflict exposure, we turn to the Armed Conflict Location and Event Data (ACLED) by Raleigh, Hegre & 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 1997-2022 for all countries including Nigeria.[9] A number of studies have used ACLED data in constructing conflict measures for conflict analysis in different countries including Nigeria[10]. "Violence against civilians" is a substantial chunk of the violent events overtime in Nigeria making the ACLED data appropriate for capturing conflict exposure in Nigeria. Raleigh, Hegre & 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)"*[11].

Following previous empirical research using this data, we constructed two measures of conflict exposure using armed conflict related fatalities at the local government area level. Given our focus on intensity as a predictor of level of exposure we do not measure exposure using conflict events but focus on fatalities linked with conflict. Our rational is linked with the fact that mere experiencing a conflict event in a households LGA does not affect a household as much as having fatalities linked with conflict in a household's LGA. The first measure of conflict exposure we consider focuses on the effect of recent conflict exposure while the second is focused on the effect of long term accumulated exposure to conflict. In particular, 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 years of available data (1997 to the year of the survey).[12] We normalize our conflict measures using

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[8]See the World Bank micro-data website for more details on the sampling `https://microdata.worldbank.org/index.php/catalog/3557#metadata-sampling`

[9]We make use of the 1997−2018 conflict data for our paper.

[10]Examples include Minoiu & Shemyakina, 2012; Bertoni et.al., 2017; Adelaja & George 2019b

[11]See Raleigh, Hegre & Carlson,2009 for more details.

[12]While some authors have looked at conflict events as a measure of exposure, we choose to focus

the projected population in each LGA to get at intensity of effect.[13]

Figure 1 provides part of our rationale for looking at the effect of violent conflict in Nigeria as a whole. It highlighting the total fatalities from conflict by LGAs, from 1997 to 2018 and show that exposure to conflict in Nigeria is pervasive.

Figure 2 and 3 provide a clear picture of the changes in exposure to violent conflict overtime. Figure 2 provides a mapping of the evolution in recent conflict exposure from 2008 to 2018 while figure 3 is a similar picture albeit we focus on conflict events versus fatalities. Not only do these figures highlight the changes in violent conflict hot spots in Nigeria and the changes in where events of conflict occur, they also shows that more people and more areas of Nigeria were exposed to conflict by 2018 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 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 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 2018, 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 for over 50 years. Conflict in this region is 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 think they are reaping the benefits of oil being derived from their community. While the South-South region of Nigeria has one of the highest total conflict exposures between 2008-2015, if we focused solely on just the recent exposure (2013-2015) captured in the third map in figure 3, it is possible to incorrectly conclude that this region has not been significantly affected by conflict. In this paper we want to provide the reader with a complete picture which is why we first examine the welfare effect of recent exposure to conflict. However, it

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on fatalities in LGAs given our focus on violent conflict and our belief that fatalities is a cleaner way to identify exposure to violent conflict. Moreover, there is the significant difference in the impact on households of a non-deadly conflict event versus one that leads to fatalities.

[13]Just using fatalities without accounting for the population size is limiting as one death in a small population would have a greater impact than one death in a large population. We express our measures as percentages of the population in each LGA to ease interpretation.
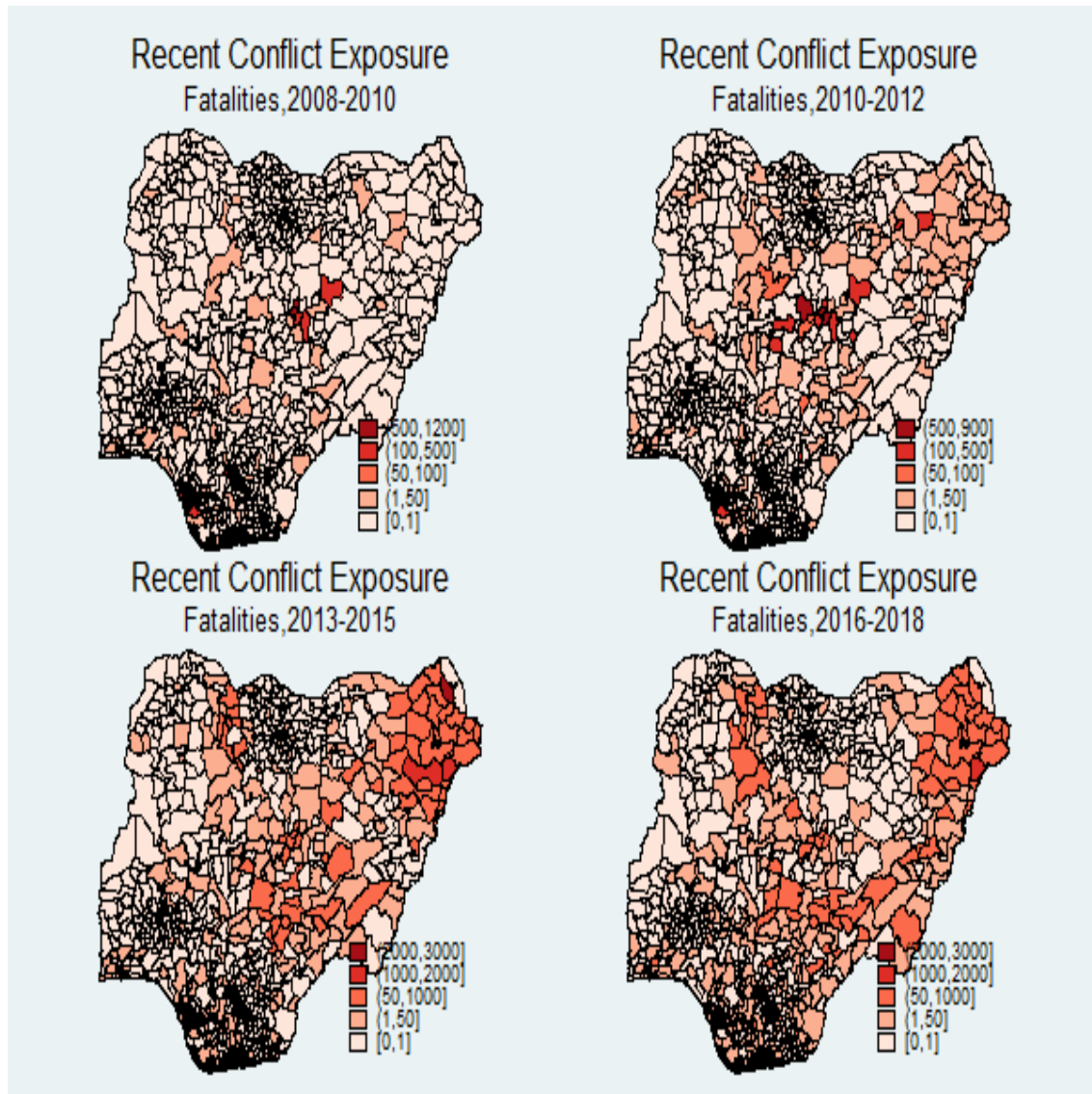
Figure 2: Evolution of Conflict Exposure in Nigeria 1997-2018.
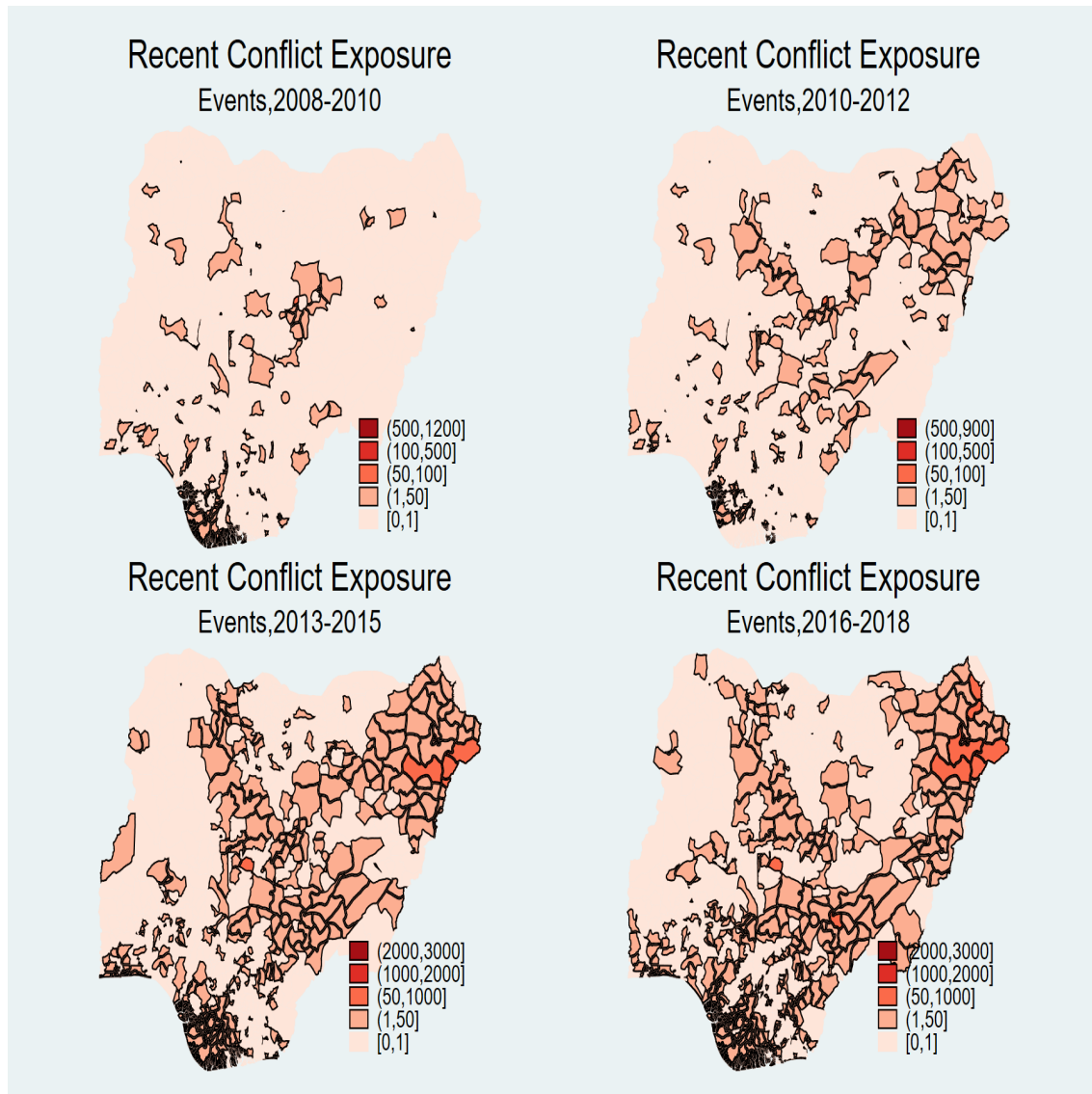
Figure 3: Evolution of Conflict Events in Nigeria 1997-2018.

is also useful to examine for example, if past exposure to conflict has lingering effects for people living in areas with lower recent conflict exposure such as the Niger Delta region. This is partly our rationale for constructing a long term conflict exposure measure and trying to identify the effect on welfare currently.

There are several ways welfare can be measured. The dependent variables we use are common 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 GHS panel data. 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 the data using information from the World Bank and converting 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 are presented.

We present summary statistics for the full dataset (4 waves) in column (1) and the first 3 waves column (2). In columns (3) and (4) the balanced panel for the 4 waves and first 3 waves respectively are summarized.Our rationale for presenting both is linked with the significant changes that occurred during the fourth wave of the survey as described above. Notice that the sample of the balanced panel using the 4 waves declines to 4126 individuals and about 1774 households. We worry about the potential impact of the significant decline in the balanced panel sample on the precision of estimated effects. One of the limitations of fixed effect estimators is amplified measurement error in the Xs which is attenuated with larger Ns. Given our concern about attenuated effects in the small balanced sample of the four waves, we leverage the large balanced sample for the first three waves and also estimate our empirical model using these three waves solely. This is the rationale behind presenting the summary statistics for the four survey years and three years separately in Table 1.

Table 1: Summary Statistics

	All(2010 - 2018) (1)	All(2010 - 2015) (2)	Bal.Panel(2010-2018) (3)	Bal.Panel(2010-2015) (4)
Panel A	Income/Poverty/Conflict Variables			
Real Wage Income(Naira/Y)	8.5e+05	9.2e+05	7.1e+05	9.1e+05
	(7139484.5)	(7654291.2)	(3055635.7)	(7742947.5)
Real Per Capita Income(Naira/Y)	2.0e+05	2.3e+05	1.4e+05	2.3e+05
	(4127481.1)	(4760464.1)	(808805.0)	(4875441.1)
Real Total HH Income(Naira/Y)	8.2e+05	9.7e+05	5.9e+05	9.8e+05
	(17421259.7)	(20094560.9)	(2296431.0)	(20603242.7)
Poverty Severity	20.40	27.03	2.91	28.01
	(948.2)	(1094.1)	(102.3)	(1121.6)
Poverty Gap	0.66	0.71	0.51	0.72
	(4.468)	(5.150)	(1.625)	(5.243)
Poverty Incidence	0.63	0.58	0.62	0.59
	(0.483)	(0.493)	(0.487)	(0.492)
Recent Conflict Deaths	15.42	14.31	10.62	14.27
	(96.40)	(103.9)	(44.32)	(102.3)
Long Term Conflict Deaths	62.31	46.72	37.44	46.96
	(328.9)	(235.9)	(110.9)	(236.2)
Recent Deaths per LGA pop(%)	0.00	0.00	0.00	0.00
	(0.0236)	(0.0253)	(0.0207)	(0.0250)
Long Term Deaths per LGA pop(%)	0.02	0.01	0.01	0.01
	(0.0654)	(0.0559)	(0.0433)	(0.0558)
Exposure to Shock	0.37	0.34	0.36	0.34
	(0.483)	(0.472)	(0.479)	(0.473)
Panel B	Demographic Characteristics			
Age in years	51.26	51.90	51.23	52.15
	(15.00)	(14.93)	(13.57)	(14.95)
$Ages^2$	2852.35	2916.05	2808.30	2943.26
	(1651.1)	(1659.8)	(1456.3)	(1666.4)
Urban Location	0.39	0.39	0.39	0.37
	(0.487)	(0.487)	(0.488)	(0.483)
Male Gender	0.83	0.83	0.82	0.83
	(0.380)	(0.377)	(0.384)	(0.375)
Years of Schooling	7.85	6.93	8.17	6.78
	(6.204)	(5.752)	(6.274)	(5.721)
Household size	6.38	6.41	6.74	6.42
	(3.381)	(3.248)	(3.303)	(3.210)
Population	4.5e+06	4.5e+06	4.3e+06	4.5e+06
	(1962952.3)	(1964683.6)	(1962129.7)	(1988515.8)
LGA Land Area (Km^2)	1032.67	997.37	1107.76	1014.24
	(1353.9)	(1265.7)	(1618.9)	(1283.3)
N	17291	12702	4129	12186

Standard deviation in parentheses.

| | All(2010 - 2018) | All(2010 - 2015) | Bal.Panel(2010-2018) | Bal.Panel(2010-2015) |
	(1)	(2)	(3)	(4)
Panel C	Infrastructural Access			
	(Proportion of Individuals)			
Population Density	2191.44	2197.37	3274.78	2160.23
	(6484.6)	(6322.1)	(8887.1)	(6290.9)
Av.Labour wage(Naira/Day)	1110.14	940.96	1081.06	939.41
	(753.0)	(610.6)	(738.2)	(609.5)
Rainfall (Millimeters)	1598.17	1535.87	1616.82	1536.95
	(803.7)	(742.3)	(866.8)	(744.2)
Gov.Sec Sch	0.47	0.42	0.49	0.42
	(0.499)	(0.494)	(0.500)	(0.494)
health centre	0.64	0.60	0.63	0.60
	(0.481)	(0.491)	(0.483)	(0.491)
Public Hospital	0.24	0.20	0.26	0.20
	(0.427)	(0.397)	(0.439)	(0.397)
Primary hospital	0.44	0.46	0.47	0.46
	(0.496)	(0.499)	(0.499)	(0.498)
Pharmacy	0.32	0.30	0.36	0.30
	(0.466)	(0.457)	(0.480)	(0.457)
Post Office	0.20	0.21	0.20	0.21
	(0.399)	(0.411)	(0.400)	(0.411)
Bus Stop	0.43	0.41	0.49	0.41
	(0.495)	(0.492)	(0.500)	(0.492)
Micro finance	0.33	0.39	0.34	0.39
	(0.472)	(0.489)	(0.475)	(0.488)
Police station	0.34	0.28	0.39	0.29
	(0.474)	(0.450)	(0.487)	(0.455)
Market	0.56	0.47	0.57	0.47
	(0.496)	(0.499)	(0.496)	(0.499)
Community center	0.45	0.43	0.44	0.43
	(0.497)	(0.495)	(0.496)	(0.495)
Community Health Center	0.48	0.47	0.51	0.47
	(1.666)	(1.859)	(1.875)	(1.867)
Community School	0.98	0.79	0.98	0.80
	(2.853)	(1.748)	(2.095)	(1.755)
N	17291	12702	4129	12186

Standard deviation in parentheses.

	All(2010 - 2018)	All(2010 - 2015)	Bal.Panel(2010-2018)	Bal.Panel(2010-2015)
	(1)	(2)	(3)	(4)
Panel D				Social Network Membership
				(Number)
Village association	1.37	1.34	1.35	1.35
	(3.395)	(3.697)	(3.606)	(3.713)
Agric.Cooperative	0.92	0.87	0.76	0.87
	(2.910)	(2.374)	(2.046)	(2.383)
Savings cooperative	1.85	1.33	1.26	1.33
	(9.145)	(5.269)	(4.976)	(5.289)
Business Association	2.11	2.05	2.79	2.06
	(10.08)	(11.29)	(15.08)	(11.35)
Women group	2.59	2.28	2.80	2.27
	(5.596)	(4.858)	(6.489)	(4.844)
NGO	0.14	0.10	0.10	0.10
	(0.700)	(0.467)	(0.469)	(0.469)
Vigilante Group	1.00	0.94	0.98	0.94
	(1.681)	(1.811)	(2.054)	(1.817)
Disabled Association	0.12	0.12	0.13	0.12
	(0.490)	(0.507)	(0.539)	(0.510)
N	17291	12702	4129	12186

Standard deviation in parentheses

7 Results

Tables 2-10 capture the results from multiple regressions using a fixed-effect estimator. All standard errors are clustered by households. It is worth mentioning prior to presenting these results that despite the strengths of a fixed-effect estimation strategy, we recognize its limitations. In particular, While a fixed-effects strategy reduces the potential of deriving estimates that are inconsistent, it may not fully eliminate potential bias in the coefficients of interest. A fixed-effects strategy allows us estimate parameters using variation at the individual or household level over time thus eliminating potential bias due to time-invariant unobservables. We worry about these time-invariant unobservables because they could be potentially correlated with our exposure to conflict measures and our dependent variable. 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 conflict could be correlated with time-varying variable not included as controls in the analysis, and also correlated with our welfare measures. In the results summarized in Tables 2-10, we attempt to reduce this potential source of bias by including control variables that are time-varying and could be correlated with a household's exposure to conflict, and potentially affect welfare of individuals and households.

Some of the control variables we include in our analysis summarized in Table 2-10 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 LGAs.

Table 2 summarizes the fixed-effects estimates of 6 regressions focused on estimating the association between conflict and our first 3 measures of welfare: real wages, total real household income per adult equivalence and total real household income.Going forward for brevity we will refer to total real household income as HH-Income and total real household income per adult equivalence as PC-Income. In our analysis we use the natural log of each of our income related variables. For each of these measures we test separately the association with recent conflict exposure and accumulated/long-term conflict exposure. In columns (1) and (2) the results using real wages as the dependent variable are summarized. In columns (3) and (4) the results using PC-Income are summarized, and in columns (5) and (6) the results using HH-Income are summarized.[14] In Table 2 we present the results using the balanced panel from the 4 waves. Table 3 is similar to Table 2 in terms of the regression results summarized. The difference being the sample used in the estimation. In Table 3 we make use of the unbalanced panel over the 4 waves instead of the balanced panel

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[14]We estimate the model using the natural log of these variables.

(Table 2). Our rational for doing this is the likelihood of imprecise estimates in Table 2 given the small sample size and the use of a fixed-effect estimator. When we do not restrict the sample to the balanced panel (Table 2), the sample size for the analysis increases significantly and estimates are less likely to be noisy. The downside of an unbalanced panel is the potential issue of biased estimates. In particular estimated effects could be biased if attrition or reasons for missing observations are non-random or correlated with ϵ_{ijt}. While current evidence from the World Bank do not suggest that the change in the sample in 2018 was non-random, we present our unbalanced panel results using the four waves with some caution. In addition, as a robustness check we re-estimate all regressions restricting the sample to the balanced panel in the first three waves. The balanced panel for 2010-2015 has a robust sample size, attenuating noise in the estimated effects.[15]

Our results in Table 2 suggest no statistically significant effects of conflict exposure on income measures. However as alluded to above, we suspect these estimates could be imprecise given the small sample. The results in Table 3 support this speculation as we now find a significant association between recent exposure to conflict and both HH-Income and PC-Income (columns (3) and (5)). We also note a significant association between long-term exposure to conflict and and both HH-Income and PC-Income (columns (4) and (6)). The long-term coefficients magnitude are a third compared with the recent exposure magnitude. Just as in Table 2, we do not note significant effects of recent exposure to conflict on wages.

Table 4 serves as a robustness check on the estimated effects in Table 3. The models estimated are similar to those in Tables 2 and 3. The difference is that the regressions are estimated restricting the sample to the balanced panel from the first 3 waves, which captures a larger sample than the balanced panel sample from the 4 waves (Table 2) Given these results are derived from a balanced panel, the possible challenges and criticisms of using an unbalanced panel are avoided. While the coefficient estimates differ, the inference from Table 3 and 4 are identical. In particular the results in Table 4 suggest a statistically significant negative association between recent exposure to conflict and both HH-Income and PC-Income and no significant effects on wages. Noting no effect of conflict on wages is not surprising giving the stickiness of wages. Moreover, the effects of the conflict in Nigeria is more concentrated in the rural areas where wage earners are few. Just as in Table 4, we also note long-term effects that are about a third in magnitude than the recent effects.

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[15]We also explore the possible effects migration or attrition could have on our analysis. While there is some attrition of some households from the sample, the attrition from 2010-2012 survey was very low and though the attrition from 2010-2015 was more, it was still less than 10%.

Table 2: Violent Conflict and Income (Balanced Panel 2010-2018)

	Log Real Wage		Log Household income/ capita		Log Household Income	
	(1)	(2)	(3)	(4)	(5)	(6)
	Recent	Long-term	Recent	Long-term	Recent	Long-term
	Exposure	Exposure	Exposure	Exposure	Exposure	Exposure
	b/se	b/se	b/se	b/se	b/se	b/se
Years of School	-0.014	-0.015	0.023***	0.024***	0.028***	0.028***
	(0.019)	(0.019)	(0.009)	(0.009)	(0.009)	(0.009)
Age	0.046*	0.043	-0.049	-0.049	-0.001	-0.001
	(0.027)	(0.027)	(0.032)	(0.032)	(0.031)	(0.031)
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	-0.064	-0.072	0.037	0.036	0.044	0.043
	(0.065)	(0.066)	(0.068)	(0.068)	(0.066)	(0.066)
Recent Conflict Exposure	1.589		-1.062		-0.725	
	(1.447)		(1.358)		(1.293)	
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 of a LGA	-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	0.153	0.165	0.157*	0.153	0.158*	0.155*
	(0.114)	(0.114)	(0.093)	(0.093)	(0.092)	(0.092)
Year==2015	-0.065	-0.054	-0.537***	-0.547***	-0.691***	-0.699***
	(0.129)	(0.127)	(0.113)	(0.111)	(0.111)	(0.110)
Year==2018	-0.151	-0.150	-0.554***	-0.558***	-0.785***	-0.789***
	(0.166)	(0.166)	(0.124)	(0.124)	(0.123)	(0.123)
Household Size	0.030	0.034	-0.078***	-0.078***	0.050**	0.050**
	(0.032)	(0.032)	(0.024)	(0.024)	(0.024)	(0.024)
Busstop Availability	-0.057	-0.039	-0.055	-0.055	-0.070	-0.073
	(0.107)	(0.111)	(0.090)	(0.091)	(0.088)	(0.088)
Market Availability	-0.017	-0.041	-0.042	-0.040	-0.027	-0.024
	(0.079)	(0.081)	(0.091)	(0.091)	(0.086)	(0.087)
Num. Agric Coops.	-0.008	-0.007	-0.001	-0.001	0.003	0.003
	(0.023)	(0.023)	(0.028)	(0.028)	(0.027)	(0.027)
Num. Bus Assoc.	0.011***	0.011***	-0.000	-0.000	0.000	0.000
	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)
Num. Vigilant Grps.	-0.074***	-0.076***	-0.062**	-0.062**	-0.064**	-0.064**
	(0.028)	(0.028)	(0.029)	(0.029)	(0.028)	(0.028)
Police St Availability	-0.150	-0.152*	0.025	0.027	0.062	0.063
	(0.091)	(0.092)	(0.108)	(0.108)	(0.105)	(0.105)
Long Term Conflict Exposure		-2.078*		0.139		0.229
		(1.090)		(1.035)		(1.028)
Constant	11.139***	11.226***	12.910***	12.900***	12.337***	12.328***
	(0.689)	(0.682)	(0.863)	(0.863)	(0.852)	(0.852)
R^2	0.098	0.099	0.161	0.161	0.162	0.162
N	1319	1319	2286	2286	2286	2286

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

Table 3: Violent Conflict and Income (UN-Balanced Panel 2010-2018)

	Log Real Wage		Log Total HH income per capita		Total Household Income	
	(1)	(2)	(3)	(4)	(5)	(6)
	Recent Exposure	Long-term Exposure	Recent Exposure	Long-term Exposure	Recent Exposure	Long-term Exposure
	b/se	b/se	b/se	b/se	b/se	b/se
Years of School	0.019*	0.019*	0.016**	0.016**	0.021***	0.021***
	(0.010)	(0.010)	(0.006)	(0.006)	(0.006)	(0.006)
Age	0.016	0.016	-0.017	-0.017	0.014	0.014
	(0.019)	(0.019)	(0.018)	(0.018)	(0.018)	(0.018)
$Age2$	-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	-0.039	-0.032	-0.056	-0.060	-0.052	-0.055
	(0.046)	(0.046)	(0.045)	(0.045)	(0.044)	(0.044)
Recent Conflict Exposure	0.635		-2.938***		-2.548***	
	(1.187)		(0.825)		(0.788)	
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 of a LGA	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	0.146***	0.154***	0.150***	0.152***	0.137***	0.139***
	(0.049)	(0.049)	(0.047)	(0.047)	(0.047)	(0.047)
Year==2015	-0.025	-0.015	-0.478***	-0.488***	-0.664***	-0.671***
	(0.076)	(0.076)	(0.063)	(0.063)	(0.062)	(0.062)
Year==2018	-0.242**	-0.250**	-0.512***	-0.509***	-0.769***	-0.766***
	(0.103)	(0.104)	(0.091)	(0.091)	(0.089)	(0.089)
Household Size	0.019	0.020	-0.081***	-0.081***	0.050***	0.050***
	(0.022)	(0.022)	(0.018)	(0.018)	(0.018)	(0.018)
Busstop Availability	-0.054	-0.043	-0.064	-0.059	-0.076	-0.070
	(0.058)	(0.059)	(0.052)	(0.052)	(0.051)	(0.051)
Market Availability	-0.032	-0.030	-0.058	-0.062	-0.026	-0.029
	(0.061)	(0.061)	(0.057)	(0.057)	(0.055)	(0.055)
Num. Agric Coops.	-0.004	-0.005	0.001	0.001	0.000	-0.000
	(0.014)	(0.014)	(0.010)	(0.010)	(0.010)	(0.010)
Num. Bus Assoc.	0.006**	0.006**	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Num. Vigilant Grps.	-0.020	-0.024	-0.051***	-0.052***	-0.052***	-0.053***
	(0.018)	(0.018)	(0.016)	(0.016)	(0.016)	(0.016)
Police St Availability	-0.100*	-0.074	0.043	0.055	0.038	0.050
	(0.055)	(0.056)	(0.060)	(0.061)	(0.059)	(0.060)
Long Term Conflict Exposure		-0.351		-0.870**		-0.881**
		(0.412)		(0.412)		(0.411)
Constant	11.527***	11.483***	12.116***	12.099***	11.951***	11.933***
	(0.502)	(0.502)	(0.507)	(0.507)	(0.494)	(0.494)
R^2	0.034	0.034	0.123	0.121	0.134	0.133
N	6387	6387	10152	10152	10152	10152

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

Table 4: Violent Conflict and Income Indicators (Balanced Panel 2010-2015)

	Log Real Wage		Log Total HH income per capita		Total Household Income	
	(1)	(2)	(3)	(4)	(5)	(6)
	Recent Exposure	Long-term Exposure	Recent Exposure	Long-term Exposure	Recent Exposure	Long-term Exposure
	b/se	b/se	b/se	b/se	b/se	b/se
Years of School	0.020*	0.020*	0.007	0.007	0.011	0.012
	(0.011)	(0.011)	(0.008)	(0.008)	(0.008)	(0.008)
Age	0.021	0.021	-0.001	-0.000	0.025	0.026
	(0.021)	(0.021)	(0.020)	(0.020)	(0.019)	(0.019)
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	-0.040	-0.038	-0.095*	-0.098*	-0.091*	-0.092*
	(0.052)	(0.052)	(0.051)	(0.051)	(0.051)	(0.051)
Recent Conflict Exposure	-1.073		-3.104***		-2.731***	
	(2.037)		(0.894)		(0.869)	
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 of a LGA	-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	0.146***	0.148***	0.158***	0.159***	0.141***	0.143***
	(0.051)	(0.051)	(0.051)	(0.051)	(0.050)	(0.050)
Year==2015	0.017	0.017	-0.474***	-0.486***	-0.663***	-0.671***
	(0.084)	(0.084)	(0.070)	(0.070)	(0.069)	(0.069)
Household Size	0.020	0.020	-0.104***	-0.104***	0.032	0.032
	(0.026)	(0.026)	(0.024)	(0.024)	(0.024)	(0.024)
Busstop Availability	-0.029	-0.026	-0.103*	-0.105*	-0.117**	-0.117**
	(0.063)	(0.064)	(0.057)	(0.057)	(0.057)	(0.057)
Market Availability	-0.002	-0.001	-0.069	-0.073	-0.028	-0.030
	(0.059)	(0.059)	(0.060)	(0.060)	(0.059)	(0.059)
Num. Agric Coops.	-0.005	-0.005	-0.004	-0.004	-0.005	-0.006
	(0.015)	(0.015)	(0.011)	(0.011)	(0.011)	(0.011)
Num. Bus Assoc.	0.004	0.004	0.001	0.001	0.001	0.001
	(0.003)	(0.003)	(0.001)	(0.001)	(0.002)	(0.002)
Num. Vigilant Grps.	-0.011	-0.012	-0.060***	-0.062***	-0.059***	-0.061***
	(0.022)	(0.022)	(0.017)	(0.017)	(0.016)	(0.016)
Police St Availability	-0.058	-0.051	0.024	0.036	0.005	0.017
	(0.055)	(0.057)	(0.062)	(0.063)	(0.062)	(0.063)
Long Term Conflict Exposure		-0.328		-0.827*		-0.833*
		(0.440)		(0.442)		(0.442)
Constant	11.417***	11.392***	11.982***	11.938***	11.939***	11.894***
	(0.605)	(0.607)	(0.607)	(0.608)	(0.585)	(0.586)
R^2	0.025	0.025	0.125	0.123	0.137	0.136
N	5125	5125	6831	6831	6831	6831

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

In Tables 5-7 we summarize the results estimating the association between conflict and poverty related measures of welfare (incidence, gap and severity). These regressions are similar to the regressions in Tables 2-4 in terms of estimation strategy and controls included. The difference for these regressions is the dependent variable.[16] In columns (1), (3) and (5) we summarize the results of the estimation using the recent conflict measure while in columns (2), (4) and (6) estimates using the long-term conflict measure are summarized. In Table 5 the estimates restricting the sample to the balanced panel (4 waves) are presented whereas in Table 6 the estimates using the unbalanced panel (4 waves) sample are summarized. Similar to Table 4 above, Table 7 serves as a robustness check on the results in Table 6. We restrict the sample to the balanced panel from the first three waves.

The general trends in the results across tables continues but there are some differences. First similar to the results in Table 3 we do not find any significant effects when we restrict the sample to the balanced panel over the 4 waves. Just as above, we suspect the insignificant effects are linked with the small sample size. The results using the unbalanced panel (Table 6) suggest that the non-statistically significant effect of exposure to conflict on poverty measures may have been due to imprecision. The results suggest a statistically significant positive association between recent exposure to conflict and the poverty gap and severity of poverty. We do not find any effect on poverty incidence. We also do not find any evidence of long-term effects of exposure to conflict on poverty measures. This finding is in contrast to earlier results where we noted long-term effects of conflict on household income per adult equivalence. The results in Table 7 are mostly consistent with those in Table 6 with respect to the effect of recent exposure to conflict. The major difference is that we also find a statistically significant association between a households' recent exposure to conflict and the incidence of poverty. In addition, the results from the balanced panel over the first three waves suggests long-term conflict effects of conflict on both poverty gap and poverty severity.

So far assuming assuming no omitted variable bias linked with time-varying unobservables, the results in Tables 3, 4, 6, 7 suggest that increased exposure to recent conflict reduces a HH-Income, PC-Income, and increases the poverty gap and poverty severity of a Household.

Potential criticism of our current estimation strategy is that estimated effects

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[16]It is important to mention that in all our analysis, we restrict the sample to those who record household income. We drop any household with zero household income. Our rationale for doing this is the assumption that income information for these households are missing and were incorrectly coded as zero. While individuals can have zero wages, its hard to imagine zero total income for a household.

Table 5: The Effect of Violent Conflict on Poverty Indicators (Household Level)
Balanced Panel 2010-2018

Variables	Poverty Incidence		Poverty Gap		Poverty Severity	
	(1)	(2)	(3)	(4)	(5)	(6)
	Recent Exposure	Long-term Exposure	Recent Exposure	Long-term Exposure	Recent Exposure	Long-term Exposure
	b/se	b/se	b/se	b/se	b/se	b/se
Years of School	-0.006*	-0.006*	-0.006**	-0.006**	-0.006***	-0.006***
	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Age	0.009	0.009	0.009	0.009	0.006	0.006
	(0.012)	(0.012)	(0.009)	(0.009)	(0.008)	(0.008)
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	0.028	0.027	-0.010	-0.010	-0.018	-0.017
	(0.026)	(0.026)	(0.019)	(0.019)	(0.017)	(0.017)
Recent Conflict Exposure	-0.287		0.077		0.216	
	(0.393)		(0.328)		(0.322)	
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 of a LGA	-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	0.031	0.031	0.020	0.021	0.013	0.014
	(0.037)	(0.037)	(0.023)	(0.023)	(0.020)	(0.020)
Year==2015	0.290***	0.288***	0.215***	0.217***	0.181***	0.183***
	(0.041)	(0.040)	(0.028)	(0.028)	(0.025)	(0.025)
Year==2018	0.360***	0.362***	0.271***	0.272***	0.223***	0.223***
	(0.051)	(0.051)	(0.035)	(0.035)	(0.030)	(0.030)
Household Size	0.027***	0.027***	0.023***	0.023***	0.017***	0.017***
	(0.009)	(0.009)	(0.007)	(0.007)	(0.007)	(0.007)
Busstop Availability	0.049	0.054	0.018	0.019	0.009	0.009
	(0.033)	(0.034)	(0.023)	(0.023)	(0.020)	(0.021)
Market Availability	-0.018	-0.021	0.003	0.002	0.005	0.005
	(0.034)	(0.034)	(0.024)	(0.025)	(0.022)	(0.022)
Num. Agric Coops.	0.012*	0.012*	0.000	0.000	-0.003	-0.003
	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)
Num. Bus Assoc.	0.001	0.001	0.000	0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Num. Vigilant Grps.	0.017***	0.018***	0.011***	0.011***	0.010**	0.010**
	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Police St Availability	0.024	0.022	-0.008	-0.009	-0.018	-0.018
	(0.042)	(0.043)	(0.028)	(0.028)	(0.025)	(0.025)
Long-term Conflict Exposure		-0.337		-0.102		0.014
		(0.328)		(0.182)		(0.178)
Constant	0.068	0.071	-0.150	-0.149	-0.122	-0.121
	(0.339)	(0.339)	(0.234)	(0.234)	(0.206)	(0.206)
R^2	0.210	0.210	0.245	0.245	0.217	0.216
N	2286	2286	2286	2286	2286	2286

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

Table 6: The Effect of Violent Conflict on Poverty Indicators (Household Level) Un-
Balanced Panel 2010-2018

Variables	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	-0.004**	-0.004**	-0.004***	-0.004***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Age	0.004	0.004	0.002	0.002	0.002	0.002
	(0.007)	(0.007)	(0.005)	(0.005)	(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	0.014	0.014	0.003	0.005	0.001	0.002
	(0.016)	(0.016)	(0.012)	(0.012)	(0.010)	(0.010)
Recent Conflict Exposure	0.560		0.817***		0.857***	
	(0.342)		(0.233)		(0.216)	
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 of a LGA	-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	0.034*	0.033*	0.026**	0.026**	0.022**	0.021**
	(0.019)	(0.019)	(0.012)	(0.012)	(0.010)	(0.010)
Year==2015	0.241***	0.243***	0.215***	0.219***	0.188***	0.192***
	(0.023)	(0.023)	(0.016)	(0.016)	(0.014)	(0.014)
Year==2018	0.327***	0.326***	0.270***	0.270***	0.226***	0.225***
	(0.034)	(0.034)	(0.024)	(0.024)	(0.022)	(0.022)
Household Size	0.027***	0.027***	0.024***	0.024***	0.019***	0.019***
	(0.007)	(0.007)	(0.005)	(0.005)	(0.005)	(0.005)
Busstop Availability	0.037*	0.036*	0.025*	0.025*	0.020*	0.019
	(0.019)	(0.020)	(0.013)	(0.013)	(0.012)	(0.012)
Market Availability	-0.009	-0.008	0.017	0.018	0.019	0.021
	(0.021)	(0.021)	(0.014)	(0.014)	(0.013)	(0.013)
Num. Agric Coops.	0.004	0.004	-0.000	-0.000	-0.001	-0.001
	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Num. Bus Assoc.	0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Num. Vigilant Grps.	0.016***	0.016***	0.010***	0.010***	0.008***	0.009***
	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Police St Availability	0.008	0.005	-0.019	-0.022	-0.025*	-0.027*
	(0.023)	(0.023)	(0.016)	(0.016)	(0.014)	(0.014)
Long Term Conflict Exposure		0.198		0.176		0.188
		(0.166)		(0.127)		(0.117)
Constant	0.182	0.186	0.035	0.039	0.010	0.013
	(0.198)	(0.198)	(0.134)	(0.134)	(0.117)	(0.117)
R^2	0.143	0.142	0.202	0.200	0.191	0.189
N	10152	10152	10152	10152	10152	10152

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 7: The Effect of Violent Conflict on Poverty Balanced Panel 2010-2015

Variables	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	-0.000	-0.000	-0.003	-0.003	-0.003*	-0.003*
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Age	0.001	0.001	-0.001	-0.001	-0.002	-0.002
	(0.007)	(0.007)	(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	0.009	0.010	0.008	0.009
	(0.019)	(0.019)	(0.013)	(0.013)	(0.011)	(0.012)
Recent Conflict Exposure	0.643*		0.972***		1.032***	
	(0.381)		(0.244)		(0.227)	
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 of a LGA	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	0.034*	0.033*	0.024*	0.024*	0.020*	0.020*
	(0.019)	(0.019)	(0.013)	(0.013)	(0.011)	(0.011)
Year==2015	0.231***	0.232***	0.214***	0.218***	0.190***	0.194***
	(0.025)	(0.025)	(0.018)	(0.018)	(0.016)	(0.016)
Household Size	0.033***	0.033***	0.028***	0.028***	0.023***	0.023***
	(0.009)	(0.009)	(0.006)	(0.006)	(0.006)	(0.006)
Busstop Availability	0.048**	0.047**	0.034**	0.035**	0.026**	0.027**
	(0.022)	(0.022)	(0.014)	(0.014)	(0.012)	(0.012)
Market Availability	-0.009	-0.009	0.019	0.020	0.022	0.023*
	(0.023)	(0.023)	(0.015)	(0.015)	(0.013)	(0.013)
Num. Agric Coops.	0.003	0.004	0.000	0.000	0.000	0.000
	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Num. Bus Assoc.	0.001	0.001	0.000	0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Num. Vigilant Grps.	0.020***	0.021***	0.013***	0.013***	0.010***	0.010***
	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)
Police St Availability	-0.003	-0.006	-0.019	-0.023	-0.022	-0.025*
	(0.025)	(0.025)	(0.016)	(0.017)	(0.014)	(0.014)
Long Term Conflict Exposure		0.252		0.227*		0.219*
		(0.172)		(0.137)		(0.127)
Constant	0.111	0.124	0.077	0.089	0.077	0.089
	(0.234)	(0.234)	(0.160)	(0.160)	(0.140)	(0.140)
R^2	0.129	0.129	0.196	0.194	0.192	0.189
N	6831	6831	6831	6831	6831	6831

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

could be affected by reverse causality or simultaneity bias. Simultaneity bias is one cause of endogeneity and will occur in our case if both exposure to conflict and welfare outcomes are determined simultaneously. Meaning conflict exposure and welfare impact one another at the same time. The past literature does not support this argument. Moreover, while it is possible to argue based on the past literature that conflict can affect welfare related outcomes, the possible link between poverty and conflict is more nuanced and is not immediate. Hence the argument that accumulated conflict exposure causes poverty or income level of a household today and at the same time, a household's income or poverty status today also causes conflict today and in the recent past is not tenable.

With respect to reverse causality, this occurs when the model suggest that X causes Y, but in reality Y actually causes X. In our case we model that conflict affects the welfare of households. If there is reverse causality then it is actually a household's welfare that is causing an increase in conflict exposure in the LGA. We do not believe this is the case for several reasons. First, while there is past macro research that suggest that past income levels can affect or predict future conflict, our analysis involves current welfare measures being explained by past levels of conflict exposure for the most part. One of the basic criteria for causality is temporality. Meaning the effect has to occur after the cause. Since our model is setup using past levels of conflict for the most part creating an effect on current welfare measures, reverse causality is not plausible in our case given our empirical model structure. In particular, reverse causality given our model would imply for example that a household's income in 2015 or 2016, caused conflict fatalities in the past (2013-2015) or caused conflict events in (2013-2015). This is not possible.

It is important to reiterate that we are not arguing that poverty today cannot trigger conflict tomorrow. Rather we are modelling how past conflict both recent and long-term can affect current outcomes and testing for evidence supporting this direction of causation. Moreover, we are making use of a fixed-effect strategy which is a within estimator. Identifying effects using variation within a household over time with a measure of conflict at the LGA- level further negates a reverse causality argument.Arguing that a household's level of income currently causes conflict at the LGA-level in the past or present is flawed.

While bias in estimated coefficients due to reverse causality is not a call for concern, we still worry about time-varying unobservables. In particular we worry about the potential correlation between a time-varying unobservable and both our dependent variable and variable of interest. To attenuate this potential source of

Table 8: The Effect of Violent Conflict on Wages, PCI and Income 2010-2018 additional controls [Balanced Panel]

	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
Years of School	0.012	0.008	0.027***	0.028***	0.032***	0.032***
	(0.019)	(0.019)	(0.010)	(0.010)	(0.010)	(0.010)
Age	0.068	0.062	-0.046	-0.047	-0.004	-0.005
	(0.047)	(0.047)	(0.038)	(0.038)	(0.038)	(0.038)
Age^2	-0.000	-0.000	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Exposure to Shock	-0.203**	-0.204**	0.034	0.033	0.048	0.048
	(0.101)	(0.101)	(0.090)	(0.090)	(0.087)	(0.087)
Percent Recent Death/Population	1.117		-0.885		-0.435	
	(1.686)		(1.391)		(1.334)	
Long Term Conflict Exposure		-2.301		0.846		1.092
		(1.662)		(1.042)		(1.019)
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 of a LGA	-0.000	-0.000	0.001**	0.001**	0.001**	0.001**
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Year==2012	-0.047	-0.043	0.339***	0.334***	0.352***	0.348***
	(0.121)	(0.122)	(0.119)	(0.118)	(0.117)	(0.117)
Year==2015	-0.325	-0.328	-0.640***	-0.647***	-0.732***	-0.734***
	(0.222)	(0.220)	(0.192)	(0.190)	(0.188)	(0.186)
Year==2018	-0.459**	-0.443**	-0.615***	-0.628***	-0.854***	-0.865***
	(0.205)	(0.206)	(0.160)	(0.160)	(0.159)	(0.159)
Household Size	0.034	0.028	-0.051*	-0.051*	0.073**	0.073**
	(0.037)	(0.036)	(0.030)	(0.030)	(0.031)	(0.031)
Sec Sch Availability	-0.030	-0.053	-0.010	-0.007	-0.014	-0.014
	(0.131)	(0.134)	(0.121)	(0.121)	(0.116)	(0.116)
Health Availability	-0.113	-0.096	0.094	0.090	0.081	0.076
	(0.109)	(0.107)	(0.107)	(0.107)	(0.104)	(0.104)
pub hosp. Availability	-0.325**	-0.351**	-0.026	-0.014	-0.004	0.004
	(0.151)	(0.151)	(0.131)	(0.129)	(0.128)	(0.126)
pri hosp. Availability	0.068	0.073	0.120	0.114	0.102	0.094
	(0.154)	(0.153)	(0.125)	(0.126)	(0.122)	(0.122)
pharmacy Availability	-0.011	0.024	-0.092	-0.091	-0.071	-0.071
	(0.129)	(0.128)	(0.116)	(0.116)	(0.114)	(0.114)
Post office Availability	0.024	-0.010	-0.044	-0.062	-0.074	-0.087
	(0.130)	(0.131)	(0.164)	(0.165)	(0.163)	(0.164)
Busstop Availability	0.157	0.146	0.088	0.080	0.086	0.073
	(0.192)	(0.183)	(0.108)	(0.108)	(0.109)	(0.108)
Micofinance Availability	0.310*	0.325*	0.097	0.094	0.019	0.015
	(0.185)	(0.185)	(0.148)	(0.148)	(0.142)	(0.143)
Police St Availability	0.329	0.364*	0.191	0.199	0.173	0.186
	(0.202)	(0.196)	(0.158)	(0.159)	(0.158)	(0.158)
Market Availability	-0.197	-0.234*	-0.078	-0.072	-0.048	-0.041
	(0.137)	(0.137)	(0.113)	(0.113)	(0.109)	(0.108)
Comm cent Availability	0.148	0.134	0.013	0.027	0.041	0.056
	(0.111)	(0.112)	(0.109)	(0.110)	(0.109)	(0.109)
Num. village Grps	-0.081**	-0.075**	-0.025	-0.027	-0.014	-0.016
	(0.038)	(0.038)	(0.038)	(0.038)	(0.037)	(0.037)
Num. Agric Coops.	-0.010	-0.012	-0.026	-0.025	-0.030	-0.029
	(0.024)	(0.024)	(0.045)	(0.045)	(0.043)	(0.043)
Num. saving Coops.	0.024	0.024	-0.016	-0.016	-0.015	-0.015
	(0.015)	(0.015)	(0.014)	(0.014)	(0.015)	(0.015)
Num. Bus Assoc.	-0.041***	-0.042***	-0.000	-0.000	0.000	-0.000
	(0.014)	(0.014)	(0.003)	(0.003)	(0.003)	(0.003)
Num. Women Grps.	-0.007	-0.006	-0.014	-0.014	-0.014	-0.014
	(0.013)	(0.013)	(0.014)	(0.014)	(0.011)	(0.011)
Num. Health Grps.	0.104*	0.099*	-0.037*	-0.037*	-0.044**	-0.044**
	(0.058)	(0.058)	(0.020)	(0.020)	(0.019)	(0.019)
Num. School Grps.	-0.059	-0.061	0.033	0.034	0.043	0.044
	(0.038)	(0.038)	(0.036)	(0.036)	(0.035)	(0.035)
Num. of NGOS	0.119	0.125	-0.140**	-0.140**	-0.124*	-0.124*
	(0.091)	(0.091)	(0.066)	(0.066)	(0.066)	(0.066)
Num. Vigilant Grps.	-0.099**	-0.099**	-0.093**	-0.093**	-0.093***	-0.093***
	(0.050)	(0.049)	(0.038)	(0.038)	(0.036)	(0.036)
Num. Disability Grps.	0.171	0.178	0.281**	0.283**	0.324***	0.326***
	(0.150)	(0.149)	(0.115)	(0.115)	(0.113)	(0.113)
Constant	10.731***	10.812***	12.297***	12.302***	11.876***	11.897***
	(1.218)	(1.200)	(1.086)	(1.088)	(1.086)	(1.088)
R^2	0.197	0.200	0.213	0.214	0.216	0.217
N	913	913	1820	1820	1820	1820

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

bias, we re-estimate all models including a number of time varying community level variables that are not typical welfare predictors. These controls however capture an environment's infrastructure and social capital which can vary overtime, could be correlated with conflict and possibly may affect welfare. The limitation with this analysis with extra controls is the lack of information on social variables for certain communities (LGA's). Hence, this analysis is restricted to the sub-sample for which community variables are available. The results of this analysis with extra controls are summarized in Tables 8-10.

In Table 8 similar to Table 2 the sample is the 4-wave balanced panel and dependent variables are income measures. The estimated effects on all the control variables are also included so readers get a sense of what these controls are. In Table 9 and 10 for brevity, we do not include the coefficients for the control variables even though these variables are included in the estimation. Only estimates of our variables of interest, the constant term and a control for other kinds of shocks are displayed. In Table 9 the core results using the unbalanced panel over the four waves is presented in panel A and in panel B as a robustness check the core results of the balanced panel over the first three waves is summarized. [17] Table 10 which summarizes the results for which the poverty measures are the dependent variable, is divided into three panels. Panel A is focused on the results from the regressions estimated using the 4 wave balanced panel. Panel B is focused on the results using the unbalanced 4-waves panel and panel C summarizes regression results using the balanced panel from the first three waves.

The results in Table 8 similar to Table 2 show no significant effects. Table 9 and Table 10 panel B & C on the other hand, confirm earlier results suggesting strong statistically significant effects of recent conflict on PC-Income, HH-Income, poverty severity and poverty gap. While we find some evidence of the impact of conflict on poverty incidence, this result is sensitive.[18]

It is worth noting that the results summarized in Table 9 and 10 panel B & C provide support for including additional controls. The magnitude of the effects change significantly for long-term exposure to conflict. In particular in the earlier analysis, the long-term effects were less than a third of the recent effects. However with the extra controls, they are a little less than half. A general takeaway from

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[17]Estimates for all the control variables included in the regression summarized in this table are omitted for brevity.

[18]We find recent exposure to conflict has an effect on poverty incidence when we focus on the 4 waves unbalanced panel but note no effects when we focus on the three wave balanced panel Similarly we note long term exposure to conflict is associated with poverty incidence when we focus on the balanced panel from the three waves but we do not note this association when we focus on the 4 wave un-balanced panel.

the results in Tables 9-10 is that the more significant effect of conflict on welfare occurs in the short run. However there appears to be lingering effects over longer periods of time [10 years-16 years]. It is also worth noting that the estimates of the effect of recent exposure to conflict with the extra controls are of slightly higher magnitude than the estimated effects summarized in Table 2-7. This could suggest that our earlier estimates were downward biased. Alternatively, these estimates of higher magnitude in Tables 9-10 could be a reflection of the sub-sample used in this analysis.

How do we interpret these estimates? For example the results in Table 9 panel B suggests that a 0.01 percentage point increase in recent conflict exposure is association with a 3.3% decrease in PC-Income and a 2.8% decrease in HH-income. We focus on a 0.1% versus a 1% point change because the latter is unlikely. The current mean of recent exposure to conflict is approximately 0.01%. A doubling to 0.02% is equivalent to a 0.01% point change, which is a reasonable change consistent with conflict increase in some LGA's from 2012-2018. For our poverty measures in Table 10 panel B we can interpret the results as follows: a 0.01 percentage point increase in recent conflict exposure leads to approximately a 0.7 percentage point increase in poverty incidence. While a 0.01 percentage point increase in recent conflict exposure will lead to an approximate increase of 0.96 and 0.97 percentage points in a household's poverty gap and poverty severity, respectively. For long-term conflict exposure, a 0.01 percentage point increase leads an increase of 0.5 percentage points in both the poverty gap and poverty severity.

An important question to ask given the above findings is how does conflict lead to a decline in welfare or what is the potential pathways or channel through which recent conflict exposure affects a household's income leading to poverty or an increase in its severity? One possible channel is the effect of conflict on the resource endowments of households. In Nigeria, labor is an important resource in the livelihood strategy of households and determines to a large extent the level of income that can be generated across urban and rural markets. Odozi and Oyelere(2021) investigated the labor channel effects of violent conflict exposure in Nigeria and find a reduction in the hours of family labor supplied in agriculture as a result of conflict. The direct effect of violent conflict exposure on hours of labor supplied and used is a mediating mechanism that modifies other decisions of households such as production and consumption. Through victims displacement, death of household members, injury and fear, hours of labor supplied or used by households are affected negatively. This in turn affects household income increasing the probability a household falls into poverty or for a household already poor, increasing the poverty gap or severity of poverty.

Table 9: The Effect of Violent Conflict on Income indicators-Analysis with Additional Controls

	(1) Wage (1) b/se	(2) Wage (2) b/se	(3) Per capita Income (3) b/se	(4) Per capita Income (4) b/se	(5) Total Income (5) b/se	(6) Total Income (6) b/se
Panel A			Un-Balanced Panel 2010-2018			
Exposure to Shock	-0.054	-0.041	-0.058	-0.064	-0.053	-0.058
	(0.061)	(0.061)	(0.054)	(0.054)	(0.053)	(0.053)
Recent Conflict Exposure	-0.173		-3.291***		-2.801***	
	(1.391)		(0.924)		(0.873)	
Long Term Conflict Exposure		-1.798***		-1.464**		-1.143**
		(0.698)		(0.592)		(0.579)
Constant	11.557***	11.539***	11.435***	11.344***	11.419***	11.348***
	(0.784)	(0.781)	(0.622)	(0.623)	(0.612)	(0.613)
R^2	0.057	0.064	0.154	0.153	0.166	0.165
N	4703	4703	8232	8232	8232	8232
Panel B			Balanced Panel 2010-2015			
Exposure to Shock	-0.101	-0.097	-0.110*	-0.114*	-0.106*	-0.111*
	(0.078)	(0.078)	(0.060)	(0.060)	(0.059)	(0.059)
Percent Recent Death/Population	0.877		-3.216***		-2.870***	
	(3.077)		(1.013)		(0.978)	
Long Term Conflict Exposure		-0.367		-1.166*		-0.842
		(1.018)		(0.677)		(0.670)
Constant	11.731***	11.709***	11.898***	11.924***	11.910***	11.946***
	(1.199)	(1.200)	(0.722)	(0.722)	(0.705)	(0.705)
R^2	0.102	0.102	0.159	0.157	0.173	0.171
N	1935	1935	5285	5285	5285	5285

Note: The control variables for the regressions in Panels A, B are similar to those in Table 8. Significance level*** p<0.01, ** p<0.05, * p<0.1

8   Conclusions

In this paper we address the question of if recent and long-term exposure to conflict affects households' welfare in Nigeria. To answer this question we make use of conflict related fatality data from ACLED and 4 waves of GHS panel data from 2010-2018. We focus on 6 welfare measures: wages, HH-Income, PC-Income, poverty incidence, poverty gap and poverty severity. In an attempt to attenuate potential bias in estimated effects, we make use of a fixed-effect strategy, exploit the panel nature of our data and controlling for numerous factors that may potentially affect the welfare of a household.

Our results suggest that recent increased exposure to conflict decreases HH-Income and PC-Income. Our findings also suggest that recent increased conflict

exposure increases households' poverty gap and poverty severity. We also find weaker evidence of an association between conflict exposure and poverty incidence. We do not find a significant effect of conflict exposure on wages. The lack of significant effects on wages could be due to the sticky nature of wages in the short run. Our results also provide evidence of a long-term or lingering effect of violent conflict exposure on household income, poverty severity and the poverty gap.

Our estimated effects are economically significant. For example the results from Table 10 panel C suggest that a 0.1% point increase in a households' recent exposure to conflict from the approximate mean of 0.01 to 0.11, leads on average to an increase of 10% points in the poverty gap and a 11% point increase in poverty severity. This is a huge increase in both poverty incidence and the poverty gap. 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, a current hotbed for conflict in Nigeria, the recent conflict measure increased between 2010 and 2015 by 0.21% points.

What can we take away from these results? Conflict affects welfare negatively and the short-term effects can be significant. Moreover long-term effects exist. Given the significant effect of violent conflict on welfare and its short and long-term effects, it is important for policy makers to identify current and past conflict hot spots and target poverty alleviation programs towards these areas. In addition policy makers need to be intentional in investing in research aimed at understanding what leads to violence in order to implement effective programs that could stem current conflict, and attenuate future conflict events.

Finally, it is important to reiterate that our 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 eliminates bias from time invariant unobservables, estimated effects could still be inconsistent if there are time varying factors, at the household level, correlated with both conflict and welfare that we failed to account for. While we cannot think of examples of such variables, we cannot eliminate this possibility.

References

[1] Abdu, Hussaini; Cochran Cybèle, Ganet Felicia, Samie Ihejirika, Olorunmola, A Ben & Shyne James (2014). Nigeria CrossSectoral Conflict Assessment. A report submitted to USAID/NIGERIA (https://pdf.usaid.gov/pdfdocs/PBAAB607.pdf).

[2] Adelaja, Adesoji & George, Justin (2019a).Terrorism and land use in agriculture: The case of Boko Haram in Nigeria. *Land Use Policy, 88*(2019),104116

[3] Adelaja, Adesoji & George, Justin (2019b). Effects of conflict on agriculture: Evidence from the Boko Haram insurgency. *World Development, 117*,184-195.

[4] George, Justin, Adelaja, Adesoji & Weatherspoon, Dave (2020). Armed Conflicts and Food Insecurity: Evidence from Boko Haram's Attacks. American Journal of Agricultural Economics, 102(1), 114-131.

[5] Akresh, Richard; de Walque, Damien(2008). Armed Conflict and Schooling : Evidence from the 1994 Rwandan Genocide. Policy Research Working Paper; No. 4606. World Bank, Washington, DC.(https://openknowledge.worldbank.org/handle/10986/6646 License: CC BY 3.0 IGO).

[6] Alesina, Alberto & Perotti, Roberto (1996). Income distribution, political instability, and investment. *European Economic Review,40*(6), 1203–1228.

[7] Atkinson, AB (1983). The Economics of Inequality (2nd Edition). Clarendon Press Oxford.

[8] Azad, Abul, Crawford, Emily & Kaila Heidi (2018) Conflict and Violence in Nigeria. Results from the North East, North Central, and South South zones Preliminary Draft Report. World Bank and National Bureau of Statistics, Nigeria. https://documents1.worldbank.org/curated/en/111851538025875054/pdf/130198-WP-P160999-PUBLIC-26-9-2018-14-42-49-ConflictViolenceinNigeriaResultsfromNENCSSzonesFinal.pdf

[9] Barro, RJ (1991). Economic growth in a cross section of countries. *The Quarterly Journal of Economics,106*(2), 407–443.

[10] Bertoni; Eleonora, Di Maio, Michele, Molini, Vasco & Nistico, Roberto (2017). Education is forbidden:The effect of the Boko Haram conflict on schooling in Nigeria.(http://hdl.handle.net/10986/33208)

[11] Best, S Gaya & Rakodi, Carole (2011). Violent Conflict and its Aftermath in Jos and Kano, Nigeria: What is the Role of Religion? Working Paper 69. Religions and Development Research Programme.

[12] Blattman, Christopher & Miguel, Edward.(2010). Civil war.*Journal of Economic Literature,48*(1).

[13] Tom Bundervoet, Philip, Verwimp & Akresh, Richard (2009). Health and civil war in rural Burundi. *Journal of Human Resources,44*(2), 536–563.

[14] Camacho, Adriana (2008). Stress and Birth Weight: Evidence from Terrorist Attacks. *The American Economic Review,98*(2), 511–15.

[15] Chamarbagwala, Rubiana & Hilcias E Moran(2011). The human capital consequences of civil war: Evidence from Guatemala. *Journal of Development Economics,94*(1), 41−61.

[16] Collier, Paul (1999). On the economic consequences of civil war. *Oxford Economic Papers,51*(1), 168–183.

[17] Currie, Janet & Vogl, Tom (2013). Early-Life Health and Adult Circumstance in Developing Countries. *Annual Review of Economics,5*(1), 1–36.

[18] Dabalen,L Andrew & Saumik, Paul (2014a). Estimating the Effects of Conflict on Education in Cote d'Ivoire.*The Journal of Development Studies, 50*(12): 1631−1646.

[19] Dabalen L Andrew & Saumik, Paul (2014b). Effect of Conflict on Dietary Diversity: Evidence from Cote d'Ivoire. *World Development, 58*,143–158. http://dx.doi.org/10.1016/j.worlddev.2014.01.010

[20] Davis, R Donald & Weinstein, DE (2002) Bones, Bombs, and Break Points: The Geography of Economic Activity. *American Economic Review, 92*(5),1269–89.

[21] Eigbiremolen, GO (2018) Poverty Trends And Poverty Dynamics: Analysis Of Nigerian's First-Ever National Panel Survey Data. *Journal of International Development,30*, 691–706. DOI: 10.1002/jid.3342.

[22] Ekhator-Mobayode, U Esosa & Asfaw, A Abraham (2019) The child health effects of terrorism: evidence from the Boko Haram Insurgency in Nigeria, Applied Economics, 51(6), 624−638, DOI: 10.1080/00036846.2018.1502871.

[23] George Justine, Adelaja Adesoji & Weatherspoon Dave (2019) Armed conflicts and food insecurity: Evidence from Boko Haram's attacks. (In Press). *Amer. J. Agric. Econ.*

[24] Global Terrorism Index 2015. Institute for Economics and Peace. Retrieved 23 March 2016. (http://economics and peace.org/wpcontent/uploads/2015/11/Global-Terrorism-Index2015.pdf).

[25] Heerten, Lasse & Moses, A Dirk (2014) The Nigeria–Biafra war: postcolonial conflict and the question of genocide, *Journal of Genocide Research*, *16*(2−3), 169−203.

[26] Iyekekpolo, WO (2016). Boko Haram: Understanding the context. *Third World Quarterly*, *37*(12), 2211−2228.

[27] John, AI Aminu, ZM Andrew, D Pinto & Celestine AN (2007). Gun Violence in Nigeria: A Focus on Ethno-Religious Conflict in Kano. *Journal of Public Health Policy,28*, 420–431. doi:10.1057/palgrave.jphp.3200155.

[28] Jones, Amir & Naylor, Ruth (2014). The quantitative impact of armed conflict on education in Nigeria: case study. A report submitted to Protect Education in Insecurity and Conflict (PEIC).(https://www.educationdevelopmenttrust.com/our-research-and-insights/research/the-quantitative-impact-of-armed-conflict-on-e-(4))

[29] Justino, Patricia & Verwimp, Philip (2006) Poverty Dynamics, Violent Conflict and Convergence in Rwanda, HiCN Working Paper 16, Households in Conflict (Network, www.hicn.org).

[30] Justino, Patricia. (2009). Poverty and Violent Conflict: A MicroLevel Perspective on the Causes and Duration of Warfare. *Journal of Peace Research*, *46*(3), 315–333.

[31] Justino, Patricia, Leone, Marinella & Salardi, Paola (2013). Short and LongTerm Impact of Violence on Education: The Case of Timor Leste. *The World Bank Economic Review,28*(2),320−353.

[32] Kondylis, Florence (2010). Conflict displacement and labor market outcomes in post war Bosnia and Herzegovina. *Journal of Development Economics,93*(2), 235−248.

[33] Kondylis, Florence (2008). Agricultural Outputs and Conflict Displacement: Evidence from a Policy Intervention in Rwanda. *Economic Development and Cultural Change*, *57*,31–66.

[34] Leon, Gianmarco (2012). Civil conflict and human capital accumulation the long-term effects of political violence in perú. *Journal of Human Resources*, *47*(4), 991−1022.

[35] Mansour, Hani & Rees, Daniel (2012). Armed conflict and birth weight: Evidence from the alAqsa Intifada. *Journal of Development Economics,99*(1), 190–199.

[36] Marc, Alexandre, Neelam Verjee & Mogaka, Stephen(2015). The Challenge of Stability and Security in West Africa. World Bank. License: Creative Commons Attribution CC BY 3.0 IGO., Washington, DC.(http://hdl.handle.net/10986/22033)

[37] Minoiu, Camelia & Shemyakina, N Olga (2012). Child health and conflict in Cote d'Ivoire.*American Economic Review,Papers & Proceedings,102*(3), 294–299 http://dx.doi.org/10.1257/aer.102.3.294.

[38] Nwokolo, Arinze (2015) Terror and Birth Weight: Evidence from Boko Haram Attacks Department of Economics, University of Navarra. `https://novafrica.org/wp-content/uploads/2019/05/Terror_Birth_Weight.pdf`.

[39] Olayoku, A Philip (2014).Trends and patterns of cattle grazing and rural violence in Nigeria,(2006−2014) IFRANigeria working papers series, n3 (http://www.nigeriawatch.org/media/html/WP5OlayokuV6Final.pdf).

[40] Gilbert, EnyidahOkey, Ordu (2017), Trends and patterns of Boko Haram terrorist and militants' aggression in Nigeria, *Aggression and Violent Behaviour,37*, 35−41.

[41] Odozi, John, Chiwuzulum & Ruth Uwaifo Oyelere(2021) "Does violent conflict affect the labor supply of farm households? The Nigerian experience." *Agricultural and Resource Review,50*, 401−435.

[42] Oyelere Ruth, Uwaifo & Wharton, Kate (2013) The Impact of Conflict on Education Attainment and Enrollment in Colombia: lessons from recent IDPs HiCN Working Paper 141 The Institute of Development Studies at the University of Sussex Falmer Brighton BN1 9RE www.hicn.org.

[43] PinstrupAndersen, Per & Shimokawa, Satoru (2008). Do poverty and poor health and nutrition increase the risk of armed conflict onset? *Food Policy,33*, 512−520.

[44] Pivovarova, Margarita & Eik Leong Swee (2015). Quantifying the microeconomic effects of war using panel data: Evidence from Nepal.*World Development, 66*, 308−321.

[45] Przeworski, Adam; Alvarez, E Michael, Cheibub, J Anthonio & Limongi, Fernando (2000) Democracy and Development: Political Institutions and Wellbeing in the World 1950–1990, Cambridge: Cambridge University Press.

[46] Rodriguez, Catherine & Fabio Sanchez (2012). Armed Conflict Exposure, Human Capital Investments and Child Labor: Evidence from Colombia. *Defence and Peace Economics,23*(2), 161−184.

[47] Raleigh, Clionadh, Andrew Linke, Havard Hegre & Joakim Karlsen (2010). Introducing ACLED: An Armed Conflict Location and Event Dataset. *Journal of Peace Research, 47*(5), 651−660.

[48] Shemyakina, Olga (2011). The effect of armed conflict on accumulation of schooling: Results from Tajikistan.*Journal of Development Economics*,*95*(2),186−200.

[49] Valente Christine (2014). Education and civil conflict in Nepal. *World Bank Economic Review*,*28*(2), 354–83.

[50] Venieris, P Yiannis & Gupta, K Dipak (1986). Income distribution and sociopolitical instability as determinants of savings: a cross-sectional model. *Journal of Political Economy*, 94(4), 873-883.

[51] Verwimp, Philip & Van Bavel, Jan (2014). Schooling, violent conflict, and gender in Burundi. *The World Bank Economic Review*,*28*(2), 384–411.

[52] World Bank(n.d) World Bank Data (electronic dataset, World Data)(https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=NG)

[53] World Poverty Clock (n.d.) World Poverty Clock (electronic dataset, World Data Lab) (http://worldpoverty.io)

Table 10: The Effect of Violent Conflict on Poverty Indicators- Additional Controls

	(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
Panel A			Balanced Panel 2010-2018			
Exposure to Shock	0.005	0.004	-0.004	-0.004	-0.005	-0.004
	(0.029)	(0.029)	(0.022)	(0.022)	(0.021)	(0.021)
Percent Recent Death/Population	-0.458		0.001		0.174	
	(0.379)		(0.336)		(0.336)	
Percent Longterm Death/Population		-0.526		-0.156		0.004
		(0.342)		(0.185)		(0.178)
Constant	0.244	0.219	0.015	0.010	0.028	0.032
	(0.367)	(0.367)	(0.263)	(0.263)	(0.241)	(0.242)
R^2	0.275	0.276	0.309	0.309	0.273	0.273
N	1820	1820	1820	1820	1820	1820
Panel B			UN-Balanced Panel 2010-2018			
Exposure to Shock	0.005	0.006	0.004	0.006	0.005	0.007
	(0.019)	(0.019)	(0.013)	(0.013)	(0.012)	(0.012)
Percent Recent Death/Population	0.704*		0.957***		0.968***	
	(0.359)		(0.249)		(0.233)	
Percent Longterm Death/Population		0.374		0.490***		0.496***
		(0.236)		(0.163)		(0.147)
Constant	0.318	0.341	0.155	0.185	0.122	0.153
	(0.240)	(0.240)	(0.165)	(0.165)	(0.146)	(0.146)
R^2	0.166	0.166	0.247	0.247	0.239	0.238
N	8232	8232	8232	8232	8232	8232
Panel C			Balanced Panel 2010-2015			
Exposure to Shock	0.013	0.013	0.014	0.015	0.014	0.015
	(0.022)	(0.022)	(0.015)	(0.015)	(0.013)	(0.013)
Percent Recent Death/Population	0.588		1.026***		1.095***	
	(0.404)		(0.265)		(0.250)	
Percent Longterm Death/Population		0.469*		0.538***		0.500***
		(0.250)		(0.171)		(0.162)
Constant	0.026	0.038	0.016	0.019	0.056	0.054
	(0.283)	(0.284)	(0.192)	(0.193)	(0.171)	(0.171)
R^2	0.155	0.156	0.241	0.240	0.242	0.240
N	5285	5285	5285	5285	5285	5285

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