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Does Violent Conflict Affect Labor Supply of Farm Households? The Nigerian Experience

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Abstract: Nigeria has experienced bouts of violent conflict in different regions over the last few decades leading to significant loss of life. In this paper, we explore the potential short and accumulated long term effects of such conflict on labor supply of agricultural households. Using a nationally representative panel dataset for Nigeria in combination with armed conflict data, we estimate the effect of violent conflict on a farm household members labor supply. Our findings suggest that exposure to violent conflict significantly reduces the total number of hours the farm household head works and also deceases total family labor supply for agricultural households.

Key words: Violence; Nigeria; Conflict; Boko Haram; Farm Households; Labor Supply

JEL Classifications: Q10, Q12, O1, D74,

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1 Introduction

The agricultural sector holds a significant role in developing countries and Nigeria is no exception. According to data from the World Bank, agriculture is the largest employer of labor in Nigeria. Employment in agriculture (% of total employment) in Nigeria was reported at 36.38% in 2019. The sector is also the largest income generating activity, with contributions to Gross Domestic Product (GDP) of about 24-30% . Unfortunately, the agricultural sector is particularly vulnerable to violent conflict[1]. In particular, through killings, injuries, maiming of individuals, threats, fear, migration and displacement, violent conflict affects directly the labor supply and demand of agricultural households.

Over the last few years, studies examining the impact of violent conflict on agricultural outcomes using microlevel data have increased. Many of these papers provide evidence of the adverse effect of conflict on agricultural production through different pathways including reduced access to credit and decline in labor supply (See Verpoorten, 2009; Blattman & Miguel, 2010; Brück, d'Errico, & Pietrelli, 2018; Verwimp, Justino, & Brück, 2018.). With respect to Nigeria, research on the impact of conflict on agriculture related outcomes has increased. However, there is still room for more knowledge on the impact of conflict in Nigeria on certain agricultural outcomes.[2] In particular, while Adelaja and George (2019a) examined the effects of Boko Haram insurgency on output and input demand including the demand for hired labour and supply of family labor, the impact of conflict on the labor supply of a household head, spouse and children were not examined separately. Given the possibility of heterogeneous impact of conflict on labor supply, a more robust

[1]See Adelaja and George, (2019a) and Adelaja and George, (2019b) for reasons behind this vulnerability.

[2]See the literature review section for a detailed summary of all past literature on Nigeria.

investigation is useful.

In addition, the recent past literature focused primarily on the impact of the Boko Haram insurgency. This narrow focus could be limiting in perspective given Nigeria's past history. The reality is that armed conflict has plagued Nigeria long before the onset of the Boko Haram crises. Currently in Nigeria, the largest source of ongoing violence is the farmers-herdsmen conflict. The location area of this conflict is different from the communities that have been significantly affected by Boko Haram. The changes in violence hot-spots in Nigeria is a reminder of the spread and heterogeneity in conflict exposure across communities within this country. As conflict in Nigeria goes beyond Boko Haram and recent results on Nigeria by Odozi and Uwaifo Oyelere (2019) suggest negative welfare effects of violent conflict in general, then, examining the average effect of conflict on labor supply of farm households is promising and could provide valuable insights.

In this paper, we focus on two related questions as we attempt to bridge the gap in the existing literature on the effect of conflict on agricultural labor supply. First, what is the effect of recent exposure to violent conflict on the number of hours worked by the household head, spouse, children, relatives and total family labor? Second, what is the effect of long term accumulated exposure to conflict on the number of hours worked by the household head, spouse, children, relatives and total family labor? We attempt to answer these questions using household survey panel data for Nigeria in combination with The Armed Conflict Location & Event Data (ACLED) data.[3]

To examine both the short term and long term effects of conflict exposure on labor supply, we construct two measures of conflict exposure based on conflict related fatalities. We refer to our first measure as recent exposure to conflict and the second

[3]We define farm households as agricultural households with at least one plot.

measure as long-term exposure to conflict.[4] To estimate the effect of conflict on actual hours worked, we first use a Heckman selection model and we subsequently use a fixed effects approach exploiting the panel nature of our data. The fixed effects approach is our preferred method for our analysis because this approach attenuates potential biases caused by unobserved time invariant differences across households that affect welfare and are also correlated to conflict exposure.

Our results provides evidence of the significant negative effect of both recent exposure to conflict and accumulated exposure to conflict on farm household heads' supply of labor. We find consistent effects using both the Heckman selection and the fixed effects model. We do not find any significant effects on the labor supply of the spouse and children. We also find that both recent exposure to conflict and accumulated exposure to conflict significantly reduced total family labor supply for farm households.

Our paper contributes to the literature by providing the first analysis in Nigeria on the overall effect of exposure to conflict between 1999 and 2015 on the labor supply of farm households. While we are not the first to examine the effect of conflict in Nigeria on agricultural outcomes such as productivity or number of hours worked, our paper provides a broad perspective which is important. Adelaja and George (2019a) focusing solely on the effects of Boko Haram did not find any impact of that particular conflict on total family labor supply. In contrast, our results suggest that violent conflict in Nigeria on average negatively affects the labor supply of both household heads, and total family labor supply.

Another contribution of our paper is that our result suggests significant lingering negative effects of armed conflict on labor supply which has relevant policy implications. As mentioned above, the agricultural sector in Nigeria is a major employer

[4]We explain in detail how we construct these measures in other sections of the paper.

of labor and contributes significantly to GDP. Farm households are both users and suppliers of labor for upstream primary agricultural production activities whether planting/rearing, weeding/nurturing and harvesting. The link of farm household activities with down stream agricultural activities raises the policy importance of farm labor supply as a channel of poverty reduction and national food security. Hence, shocks that negatively affect labor supply have downstream effects that ultimately could affect welfare negatively leading to increases in poverty incidence and severity. Odozi and Uwaifo Oyelere (2019) provide evidence that exposure to violent conflict significantly reduces income and increases poverty incidence, depth and severity in Nigeria. However, the pathways through which conflict decreases income or increases poverty were not investigated. The results in our paper also contributes to the literature by providing one possible pathway through which conflict could have increased poverty. In particular violent conflict reduces hours of labor supplied by farm households. This reduction in labor supply decreases production and earnings and increases the vulnerability of farm households to falling under the poverty line or sinking deeper into poverty.

The rest of our paper proceeds as follows. In the next section we review the past literature. In section 3 we present our empirical strategy for answering our questions of interest. In section 4 we present our data. In section 5 we present our results. We conclude in the last section.

2 Literature Review

Literature on the micro-economic consequences of conflict across African countries have advanced in the last couple of decades(Akresh and de Walque (2008) Minoiu and Shemyakina(2012), Justino and Shemyakina(2012). There is also an established

literature on shock events such as bad weather, price and unemployment shocks and their effects on off farm labour supply (Kochar, 1999; Rose, 2001; Cameron and Worswick, 2003; Lamb (2003) Cunguara et al. (2011) Mathengea and Tschirley(2015), Mueller and Quisumbing (2010)). This strand of literature suggests that farmers increase the supply of off-farm labor under unfavorable conditions in order to maintain consumption levels, which reduces farm work time.

With respect to Nigeria, there is a growing literature on the effects of conflict on different economic and welfare related outcomes. For example, Nwokolo (2015) used the Nigerian demographic data and ACLED data to examine the effect of Boko Haram Insurgency(BHI) on child health. Child health was also considered by Ekhator and Asfaw (2019). Their study examines the effect of BHI on measures of children health. Bertoni et. al.(2017) examined the impact of civil conflict (specifically Boko Haram) on school attendance and attainment. They find a one standard deviation increase in the number of fatalities in the 20 km radius of each household decreases the number of completed years of education for the cohort exposed to conflict during primary school by 0.6 years, compared to the non-exposed cohort.

There is also a growing literature on the impact of conflict on food and agriculture related outcomes in Nigeria. The effect of conflict on food insecurity was explored by Adelaja et al,(2019). They examined the effect of armed conflicts on food insecurity using the General Household Survey (GHS) panel data for Nigeria and Boko Haram terrorist incidence data. Adelaja et al,(2019) find that an increase in conflict intensity, measured by number of fatalities, increases the number of days where the household consumed foods that were less preferred. In addition they found negative effects on the variety of foods the household consumed and the portion size of the meals. In a related paper that focused on food insecurity, using the GHS panel data complemented with a 2017 phone survey, Kaila and Azad (2019) explored the effect

of conflict victimization on consumption and food security noting heterogeneity in the effects of conflict. In particular they find that conflicts involving Boko Haram had more severe negative effects on consumption and food security than conflicts involving the Fulani herdsmen or militant groups in the Niger Delta.

With respect to agricultural related outcomes, Sidney, Zummo and Kwajafa (2017) examined the effect of Boko Haram on peasant farmers productivity in selected localities in Adamawa state (an area that has been directly affected by Boko Haram activities) finding significant negative effects. Adelaja and George(2019b) estimated the causal effects of exposure to attacks on plot ownership, cultivated land, rented land, land values and cropping patterns. They provide results suggesting that an increase in the intensity of terrorist attacks results in increases in the percentage of land left fallow, increases in the average distance between plots farmed and the homestead and increased attacks discourages mono cropping and encourages mixed cropping. They also find that farmers expectations about the values of their lands decreased with increased exposure to violent conflict.

In yet another paper, Adelaja and George(2019a) examined the effects of Boko Haram insurgency on farm output and the demand for farm inputs including the demand for hired labour for harvest operations. Using the same data, their results suggest that violent conflict reduces the hours of hired labor but does not affect the use of family labor. Meaning that conflict mainly affect hired labour and not family labor. Mitchell(2019) also used the same data set as Adelaja to estimate the effects of conflict events on household input use, cattle holdings, and cropping decisions. The paper differs from the Adelaja and George paper in the methodology employed to estimate the effect of conflict and in some of the outcomes considered. Mitchell(2019) also differentiates between the Boko Haram conflict and the Fulani herdsmen conflict. Using an events study framework, he finds evidence of negative

effects of the Fulani herdsmen conflict on a household's cattle holding in the following season. The author does not find significant effects of the Boko Haram conflict on most of the outcomes considered using the events studies method.

Our paper makes use of the same GHS panel data sets used by Adelaja and George(2019a and b) and other aforementioned papers. Like these papers, we look at the effect of conflict at an area level (LGA or EA). However, our paper differs from most of the papers discussed because these papers focus either on the effect of the Boko Haram insurgency or compare effects of that insurgency with those of the Fulani herdsmen conflict. In contrast we take a more generalized approach. We believe this approach is justified given the prolonged exposure to violent conflict in different parts of Nigeria and the potential value of exploring the average treatment of conflict in Nigeria on labor supply of agricultural households. Moreover, we focus on the overall effect of violent conflict in Nigeria both recent and accumulated. Our paper is the first in Nigeria that has attempted to explore both long term and short term effects of conflict. Furthermore, another unique aspect of our paper is that we complement the covariate conflict exposure measure with household level idiosyncratic shocks. Controlling for households idiosyncratic shocks attenuates bias in estimated effects and differentiates our paper from the aforementioned papers that assigned conflict at the community level or LGA and do not control for other idiosyncratic shocks.[5]

3 Empirical strategy

To answer both our questions of interest, we estimate the impact of armed conflict on hours of labor supplied.

We make use of two estimation strategies. Specifically we make use of a Heckman

[5]Only Kaila and Azad (2019) consider the impact of conflict at the individual level. However, the endogenous nature of individual level exposure to conflict could bias their estimated coefficients.

selection model and a fixed effects(FE) approach. For the Heckman selection models, the selection equation is captured with equation (1) and the outcome equation is captured with equation (2).

$$L_{ij}^{*} = \alpha_0 + \alpha_1 Y_{ij} + \alpha_3 Z_{ij} + \alpha_4 C_j + \alpha_5 VCevents_j + \alpha_6 ConflictEXP_j + \epsilon_{ij} \quad (1)$$

$L_{ij} = 0$ if $L_{ij}^{*} \leqslant 0$
$L_{ij} = 1$ if $L_{ij}^{*} > 0$

$$H_{ij}^{*} = \beta_0 + \beta_1 Y_{ij} + \beta_3 Z_{ij} + \beta_4 Cj + \beta_6 ConflictEXP_j + \delta_s + \psi_t^{*}\gamma_z + \mu_{ij} \quad (2)$$

$H_{ij} = H_{ij}^{*}$ if $L_i^{*} = 1$
$H_{ij} = 0$ if $L_{ij}^{*} = 0$

In equation 1 L_{ij}^{*} captures labor force participation of household head i in local government j and H_{ij}^{*} captures hours worked by individual or a select subsection of the household. Our primary focus is on the hours worked by household head in the harvest season. We choose to focus more on this dependent variable since the individual level variables in our data are for the household head. However, we also consider other dependent variables. Specifically hours worked by spouse, children, relatives and total family labor supply (aggregate of the labor supplied for all the aforementioned groups). L_{ij} is a dummy variable and it takes the value of 1 if a household head participates in the labor force and 0 otherwise. $ConflictEXP$ is our main independent variable and our measure of the intensity of conflict exposure. For our first question we focus on recent conflict exposure (last 24 months) and for our

second question we focus on accumulated exposure to conflict from 1997 to the year of the survey.[6] Y_{ij} captures controls for farm productivity using plot characteristics and local climate conditions such as nutrient availability of the soil, annual mean temperature and annual rainfall. C_j is the vector of community characteristics that vary at the local government area level used to control for the demand-side factors regarding the availability of off-farm work. These variables include distances to major road, population centre, market, border and administrative centre. Z_ij is a vector of household characteristics to control for household preferences and includes age and age squared, level of education of the household head, gender and household size. This vector includes control for exposure to idiosyncratic shocks. Following Kochar(1995) and Rose(2001), we also used Z_ij to control for the endogeneity of market wage with unobserved characteristics affecting hours of labor market work. Other variables included to control for household wealth is the value of land (self reported by farmers) and the use of land size and agricultural wage as controls for aggregate consumption.δ_s are state fixed effects, $\psi_t^*\gamma_z$ are interaction between zone and time fixed effects and μ_{ij} represents the error term. The variable $VCevents_j$ is the one variable that is included in the selection equation but not in the outcome equation. $VCevents_j$ captures the total number of conflict events in a LGA from 1997 until the year of the survey. Our argument is that these accumulated events provide a history that could affect if an individual participates in the labor force but does not affect the hours an individual will choose to work currently (hence its non inclusion in the outcome equation).

While the Heckman selection model has advantages, its limitations in addressing endogeneity issues leads us to our preferred estimation strategy, the fixed effects (FE)

[6]Our accumulated exposure measure begins in 1997 because that was the year the ACLED data was first collected for Nigeria.

approach. The FE model can be specified as follow

$$H_{ijt} = \beta_0 + \beta_1 W_{jt} + \mathbf{x_{ijt}}\rho + \mathbf{c_{ijt}}\beta_3 + \gamma_t + \delta_i + \psi_{zt} + \epsilon_{ijt} \tag{3}$$

W_{jt} is a measure of violent conflict in LGA j and year t. $\mathbf{x_{ij}}$ is a vector of individual and household variable regressors that affect hours worked and $\mathbf{c_{ij}}$ represents time varying local government area characteristics such as the rainfall levels, population density, nutrient availability in plots, temperature. δ are time-invariant household-specific effects that could be correlated with the observed covariates; γ_t are year fixed effects; ψ_{zt} are interactions of zone and year dummies to control for time-varying zone 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 labor supply.

Using panel data and a fixed effect strategy attenuates biases in coefficients, and increases the likelihood that estimated effects are consistent. The fixed effect approach accounts for time invariant characteristics of households that could be correlated with conflict and also correlated with our variable of interest- hours worked. Hence biases emanating from household heterogeneity are attenuated with this method. While the fixed effect strategy cannot remove biases stemming from unobserved time varying household characteristics, we can attenuate this kind of bias by including as many time varying controls as possible in our analysis.[7] It is useful to mention that reverse causality and simultaneity can hinder deriving consistent estimates even when a fixed effects strategy is used for estimating the effect of conflict. In the case of the question we are interested in, we do not worry as much about reverse causality or simultaneity bias even though we cannot rule it out. In particular in both the questions we consider, we are looking at the effect of past conflict on

[7]In every regression, we cluster the standard errors at the level of the household to allow household decisions to be correlated over time.

current farm labor supply. It is harder to argue that individual i's current farm labor supply is causing a change or driving their past accumulated conflict exposure.

4 Data and Descriptive analysis

The socioeconomic data 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)". [8] The survey was undertaken by the National Bureau of Statistics in partnership with the Federal Ministry of Agriculture and Rural Development(FMARD), the National Food Reserve Agency (NFRA), the Bill and Melinda Gates Foundation (BMGF) and the World Bank (WB).

All sampled households were administered a multi-topic Household Questionnaire. The Questionnaire geo-references the dwelling's location and collects individual-disaggregated information on demographics, education, health, employment, anthropometrics, various income sources, housing, food and non-food consumption and expenditures, and asset ownership. There is also an agricultural questionnaire module with observations on geo-referenced plot locations and Global Positioning System (GPS)-based plot areas, plot-level information on input use, cultivation and production, (the household members that manage and/or own each plot, and individual-disaggregated labor input at the plot-level. The survey information is provided for post-planting/pre-harvest and the post-harvest outcomes. The GHS-Panel is a nationally representative survey of approximately 5,000 households, which is also

[8] The World Bank in its description of the data also notes that the panel data survey was launched for tracking farm and rural households social economic changes over time.

representative of the geopolitical zones in Nigeria at both the urban and rural level. There are four waves currently of the panel (2010, 2012, 2015 and 2018) and we used the labor file questions in the agricultural and household modules. The labor file in the agricultural module provides information on the total hours of work supplied to farm work during harvest season. Despite the availability of the four waves, we only made use of the first 3 waves in our analysis because of observed significant inconsistency in the labor file for wave 4 compared to the earlier waves of the survey. For example, in wave 4, the labor time is not disaggregated by household head, spouse, children and relative which was available in the first 3 waves and is of interest to us. In addition wave 4 does not provide information on labor time in weeks. In waves 1,2 and 3, the labor file has information on the number of weeks, days and hours of work, disaggregated by household head, spouse, children and relatives. These shortcomings in how the data was collected in wave 4 makes it impossible to construct labor supply for household heads, spouse, children and relatives, in similar ways we were able to do it in the first 3 waves.

For our analysis, we derived total hours worked by household heads by combining hours worked on each plot. The hours worked on each plot is derived using information from the harvest survey. Information is collected on the number of hours worked on the plot, the number of days worked on the plot, the number of weeks worked in the season on the plot. The data set also includes a number of specific household and individual characteristics which we include as controls.[9]

[9]For our analysis we restricted our sample to household heads in agricultural households who participated in labor supply during the survey.

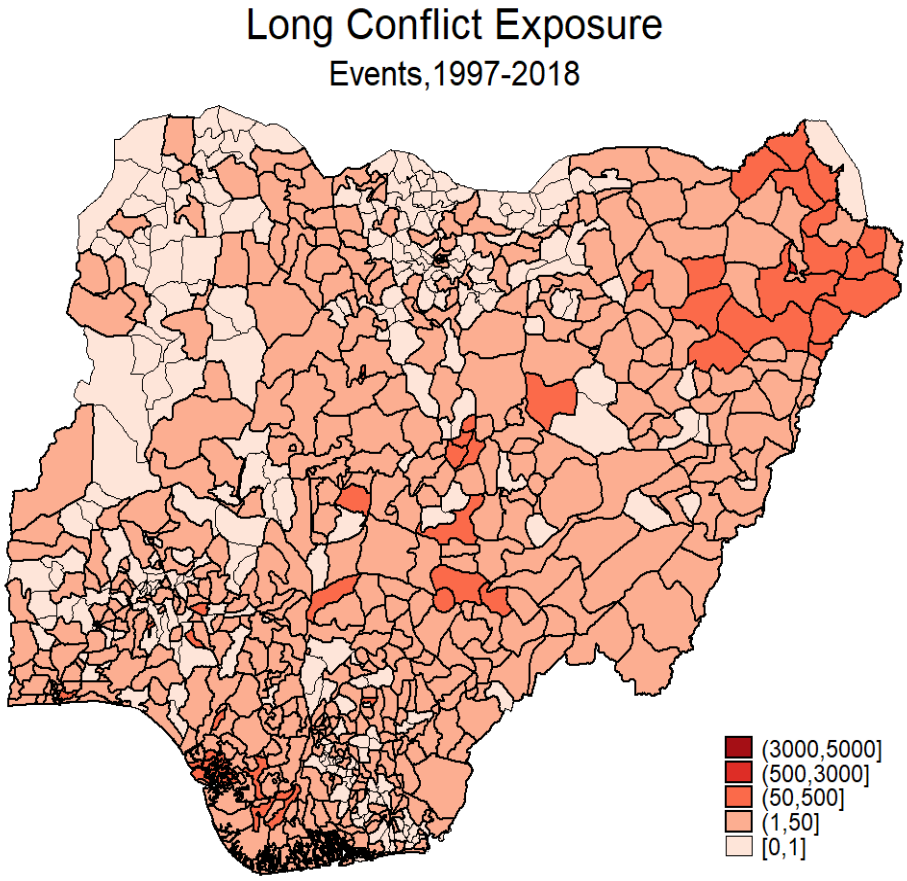

Figure 1: Conflict Events in Nigeria between 1997 and 2018

To measure conflict exposure, we turn to the Armed Conflict Location and Event Data (ACLED) by Raleigh, Hegre, and Carlson, (2009). This database focuses on a range of violent and non-violent actions by governments, rebels, militias, communal groups, political parties, rioters, protesters and civilians. It records event date, event type, location and conflict fatalities and covers period from 1997-2020 for all countries including Nigeria.[10] Following Odozi and Uwaifo Oyelere (2019) we use this data to

[10]We only make use of data from 1997 to to 2016.

construct two measures of conflict exposure using fatalities at the local government area level. We also create conflict event measures using the ACLED data. We construct these measures primarily to provide readers with a visual representation of conflict events in Nigeria. Figure 1 provides a map of accumulated conflict events in Nigeria from 1997-2018. Notice that most parts of Nigeria have experienced violent conflict events and a fewer number of locations have had very high number of conflict events over time.

Figure 2 shows conflict events in different periods of time over 10 years. This evolution style map of conflict events shows that the number of conflict events have been increasing in different communities in Nigeria and the location of these events exhibit significant heterogeneity over time.[11]

While conflict events have been frequently used by many past researchers to proxy for conflict exposure we do not follow this approach. We are interested in the intensity of impact which we argue is better captured by violence related fatalities. Hence for measuring recent exposure in our analysis, we consider the total number of conflict related fatalities in the local government in the year of the survey plus the two years preceding it. For the long term measure of conflict, we consider the total number of conflict related fatalities in the local government area in the year of the survey plus all other preceding year of available data (1997 to the year of the survey). We normalized these measures using projected population figures for the local government for the respective years to better capture the intensity of exposure in a community. For example, 10 conflict related fatalities in a low population LGA is clearly going to have more impact than 10 fatalities in a high population LGA.[12]

[11] While we present conflict events or fatalities up until 2018 in figures 1-4, we limit our analysis to the first 3 surveys. We are unable to use the more recent conflict data from 2016-2018 in our analysis because we do not include wave 4 of the household survey for reasons mentioned above.

[12] We construct our conflict measures as percentages of the population in each LGA to better get

Figure 3 provides a mapping of total violent fatalities in Nigeria from 1997-2018. This map provides extra support as to why we take the approach of estimating the average treatment effect of violent conflict in Nigeria. Notice that a significant part of the country has been exposed to violent conflict as captured by fatalities in different parts of the country. Figure 3 highlights that the zones with the most intense conflict exposure in Nigeria are the North East, the South South and the North Central parts of Nigeria.

Figure 4 shows 4 maps of Nigeria designed to capture how conflict fatality has evolved over the 2008-2018 period. Notice over time that not only has the locations experiencing fatality increased, the areas with the most intense conflict exposure in terms of fatalities have changed. Figure 1-4 provide further support for our approach. We focus on estimating the overall effect of conflict in Nigeria given its wide spread prevalence rather than focus solely on the effect of particular conflicts on households in the affected area. Apart from the ACLED data, we also use made use of information on rainfall and population density in our analysis. We obtain rainfall data from the Central Bank of Nigeria(CBN) annual statistics for 2016. Information on land surface area and population for each states were sourced from the National Population Commission.

at intensity of effect and also to ease interpretation.

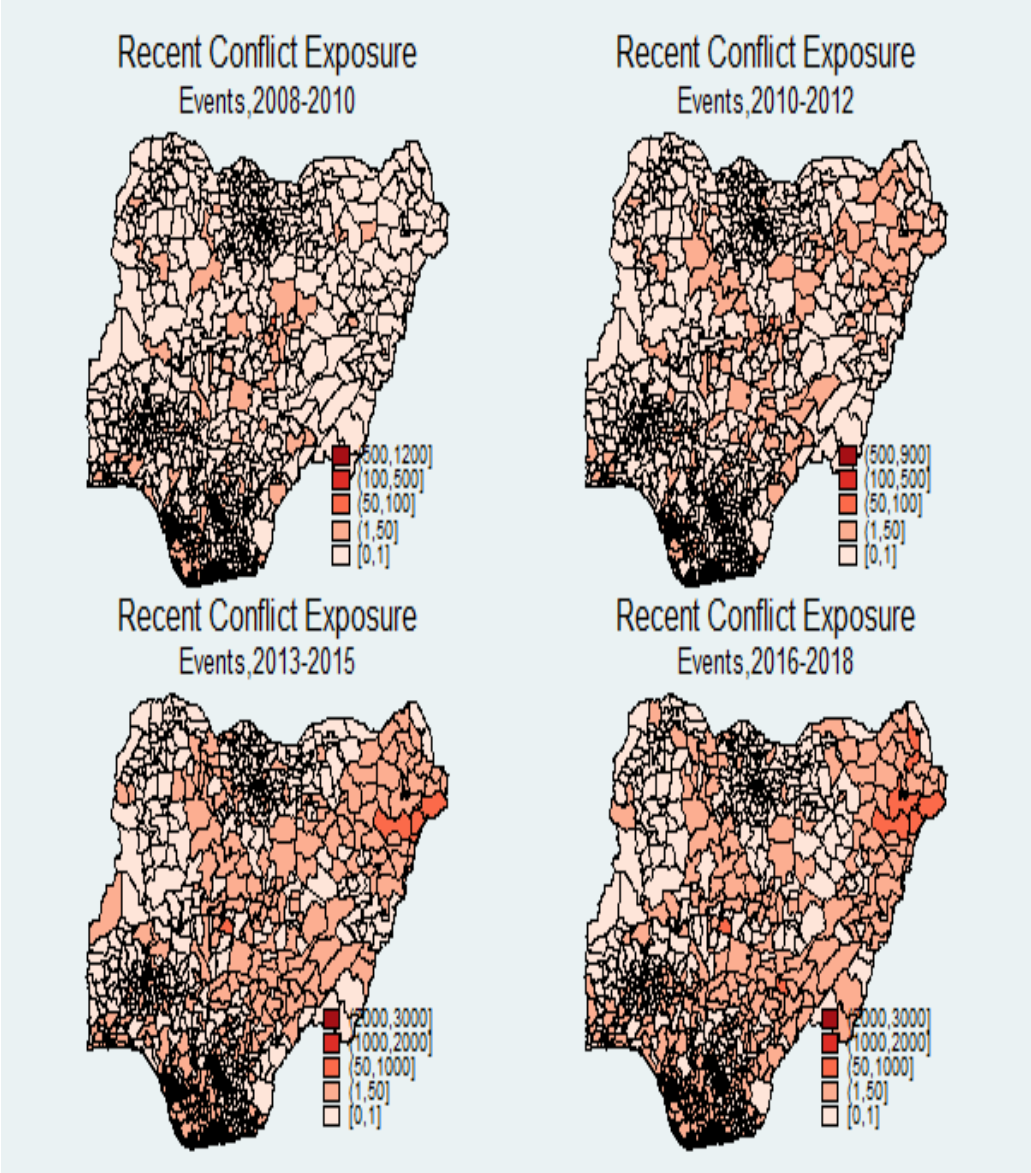

Figure 2: Evolution of Conflict Event in Nigeria 1997-2018

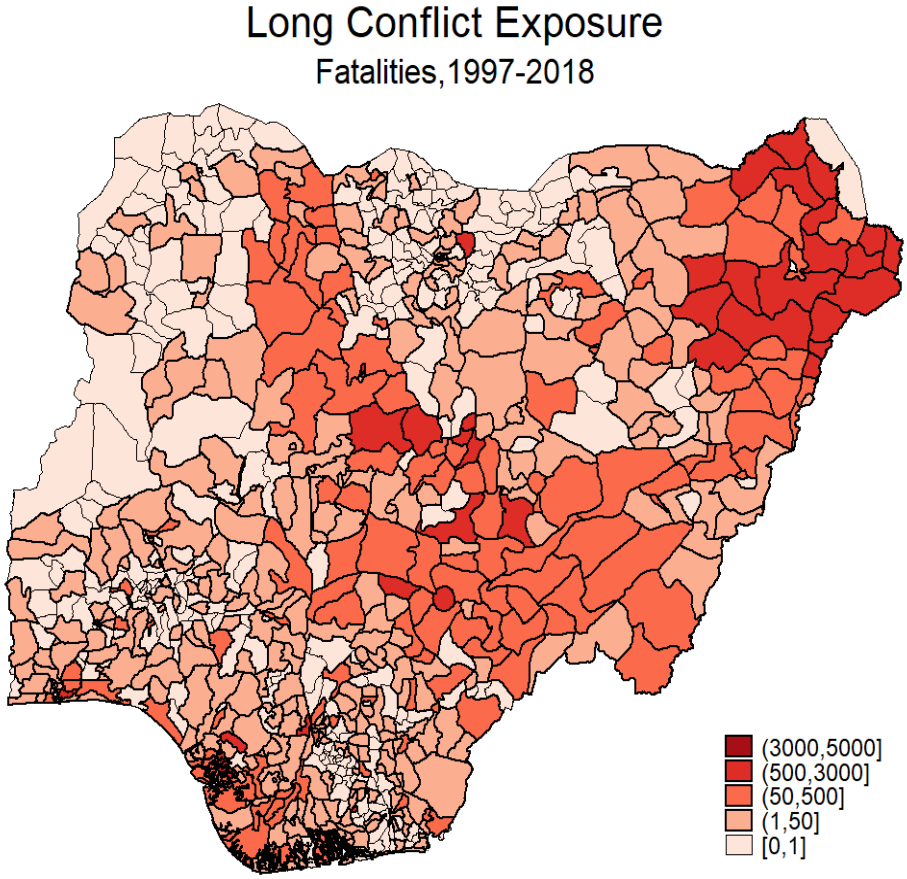

Figure 3: Conflict Fatalities in Nigeria between 1997 and 2018

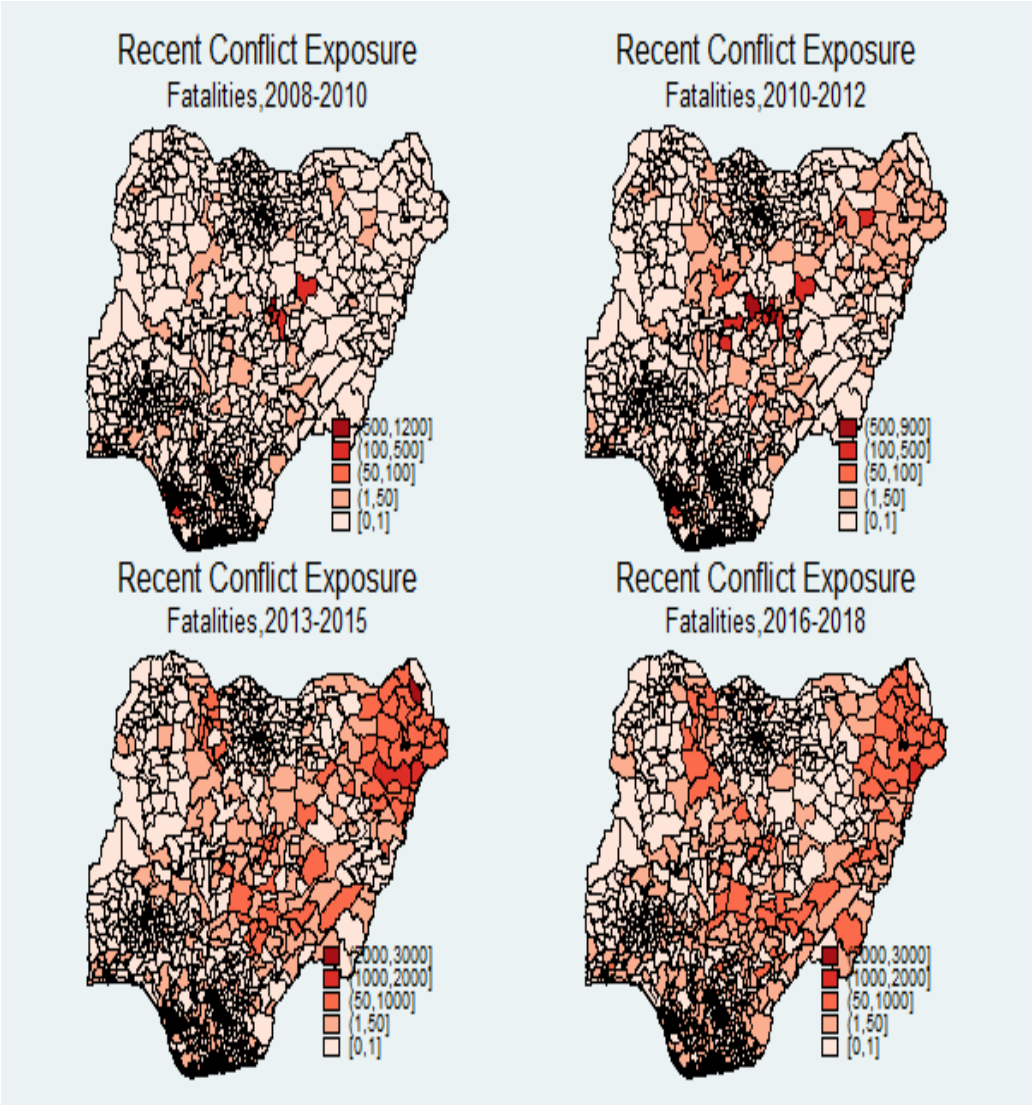

Figure 4: Evolution of Conflict Fatalities in Nigeria 1997-2018

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5 Results

Table 1 and 2 presents summary statistics of the variables used in the regression analyses. Table 2 shows that 91% of farm household heads supplied labor in 2010 but this figure declined slightly in 2012 and 2015 respectively to 90% and 87%. Total labour hours supplied by household heads to harvest season farm work was on average 540.19 hours in 2010. This share k increased in 2012 to 556.06 hours but declined to 476.31 hours in 2015. We find a substantial decline in total hours of work for spouses and children across years. While spouses supplied 319.41 hours of labour in 2010, hours declined respectively to 299.30 hours and 266.28 hours in 2012 and 2015.

Table one also show that all conflict measures on average increased from 2010 to 2015. An interesting observation from Table 1 is the percentage of households that are exposed to idiosyncratic shocks in the past year. This share increased between 2010 and 2012 but decreased to its 2010 levels by 2015.

Tables 3 and 4 present the results of the Heckman selection model. In Table 3, we focus on the effect of recent violent conflict exposure on hours worked for farm households while in Table 4, we summarize the results focused on the effects on labor supply of accumulated long term conflict exposure. Part A of these tables presents results for select variables from the participation equation and part B summarizes select results for the main outcome equation.

Table 1: Summary Statistics

	2010		2012		2015	
	N= 5,009		**N= 4,807**		**N= 4,622**	
Variables	Mean	SD	Mean	SD	Mean	SD
Prop labour force	0.91	0.28	0.90	0.30	0.87	0.34
Total hours worked(Head)	540.19	1736.10	556.06	2938.72	476.31	1169.58
Total hours worked(Spouse)	319.41	1053.79	299.30	909.89	266.28	752.13
Total hours worked(Children)	181.03	2271.06	138.34	538.87	129.80	599.01
Total hours worked(Relatives)	62.98	285.23	71.34	402.27	52.71	257.95
Total hours worked	1206.69	5616.96	1317.46	5428.83	1065.69	2683.21
Recent event per LGA	1.527	5.474	2.818	15.843	4.900	13.529
Long term event per LGA	4.389	14.442	6.033	23.361	12.021	39.934
Recent death per LGA pop(%)	0.002	0.013	0.005	0.022	0.013	0.049
Long term death per LGA pop(%)	0.011	0.054	0.012	0.047	0.025	0.079
Exposed to shock	0.30	0.46	0.41	0.49	0.30	0.46
Age in years	50.20	15.21	52.37	14.90	53.01	14.55
Age squared	2751.16	1653.92	2964.45	1681.81	3021.44	1633.51
Years of schooling	6.81	5.64	6.74	5.79	7.21	5.81
Household size	5.84	3.02	6.31	3.11	7.02	3.46
Distance to major road (Km)	7.99	12.19	7.80	11.81	7.63	11.66
Distance to pop center(Km)	19.40	17.61	18.96	17.59	18.85	17.70
Distance to market (Km)	62.85	44.39	63.39	44.97	62.88	45.32
Distance to border post (Km)	294.77	181.24	292.46	180.07	292.19	180.99
Distance to Administrative center(Km)	58.99	52.21	57.81	51.54	56.63	51.21
Annual mean temperature	263.42	9.59	263.44	9.58	263.42	9.45
Annual precipitation(mm)	1471.40	633.01	1475.05	627.56	1486.46	626.58
Nutrient availability	1.95	0.95	1.93	0.93	1.95	0.97
Total rainfall(average 12 months)	1283.68	412.87	1285.35	409.36	1292.24	405.55
Population density	304.28	343.58	319.43	362.25	344.40	392.71
Farm daily wage(Male)	1904.86	4915.74	1980.19	4633.89	1936.15	4467.16

Table 2: Summary Statistics Additional Variables

	2010		2012		2015	
	(N= 4,137)		**(N= 4,132)**		**(N= 4,054)**	
Variables	Mean	SD	Mean	SD	Mean	SD
BALANCED PANEL						
Prop labour force	0.91	0.28	0.90	0.30	0.88	0.33
Total hours worked(Head)	541.75	1739.77	558.57	2954.04	477.88	1174.46
Total hours worked(Spouse)	319.78	1055.75	301.42	914.39	271.53	766.96
Total hours worked(Children)	181.38	2276.10	139.56	541.55	133.99	613.78
Total hours worked(Relatives)	62.92	285.21	71.88	404.34	54.51	262.80
Total hours worked	1156.18	4709.72	1332.30	5671.86	1089.92	2751.85
Farm daily wage(Male)	1903.21	4920.30	1984.33	4616.69	1885.94	4429.10
	(N= 5,009)		**(N= 4,807)**		**(N= 4,622)**	
Variables	Mean	SD	Mean	SD	Mean	SD
UNBALANCED PANEL						
Prop labour force	0.91	0.28	0.90	0.30	0.87	0.34
Total hours worked(Head)	540.19	1736.10	556.06	2938.72	476.31	1169.58
Total hours worked(Spouse)	319.41	1053.79	299.30	909.89	266.28	752.13
Total hours worked(Children)	181.03	2271.06	138.34	538.87	129.80	599.01
Total hours worked(Relatives)	62.98	285.23	71.34	402.27	52.71	257.95
Total hours worked	1206.69	5616.96	1317.46	5428.83	1065.69	2683.21
Farm daily wage(Male)	1904.86	4915.74	1980.19	4633.89	1936.15	4467.16

We include accumulated conflict events in an LGA from 1997 to the survey year in our participation equation but we exclude it in our outcome equation. This variable generates significant variation in the participation variable but not in hours of labor supplied. The Wald test of the independence of equations suggests that conducting a Heckman selection model may not be necessary as we fail to reject the hypothesis that $\rho = 0$. Hence the hypothesis that the two equations are independent cannot be rejected. In columns (1) of both tables we present the result for the household head. In columns (2) we present the results for spouse hours, column (3) children, column(4) relatives. In column (5) the result for the total hours worked for the entire

household is presented.[13]

We only present estimates of key variables in our tables but highlight all the other controls included in the estimation under the table. Part A of Table 3 and 4 provide evidence that the number of conflict events in an LGA overtime decreases household heads' labor force participation. The results from the outcome equation in Table 3 part B suggests that an increase in recent exposure to conflict is correlated with a significant decline in the hours the household head worked on the farm. In particular for household heads, our result suggests that a 1% point increase in recent exposure to conflict decreases hours worked on the farm in the post planting season by 1123 hours. A 1% point increase in the fatalities per population is really large. The mean value for fatalities per population is 0.005%. A reasonable change is about 0.056 (the change in the mean recent measure between 2012 and 2015 in Adamawa). Such a change will result in approximately a 63 hour decline in hours worked by a household head during the season. We do not find any effects of recent conflict exposure on change in hours worked for the spouse, children and relatives.

In Table 4 we focus on providing answers to our second question. We consider the effect of accumulated long term exposure to conflict and the results are similar. The main difference between the results using this measure compared to the former is that we find significant effects on hours of labor supplied by household heads (column 1) and the family overall (column 5). In contrast in Table 3, significant negative effects were only noted for household heads. Another difference worth nothing is that the magnitude of the effect is significantly less for household heads in Table 4 compared to Table 3. The big take away from the result in Table 4 is that the negative effect of conflict exposure on labor supply persists and affects hours of labor supply years after.

[13]This includes household head, spouse, children and relatives.

Table 3. The Effect of Recent Violent Conflict on Total Hours of Labour Supply During Harvest Season(Heckman Model)

	(HECKMAN MODEL)				
	(1)	(2)	(3)	(4)	(5)
	Head	Spouse	Children	Relatives	Family
	b/se	b/se	b/se	b/se	b/se
Panel A	Participation Equation				
Recent Conflict death as % of LGA	1.548	1.557	1.549	1.561	1.551
	(1.529)	(1.534)	(1.529)	(1.532)	(1.530)
Accumulated conflict events	-0.006**	-0.006**	-0.006**	-0.006**	-0.006**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Exposed to Shock	-0.281***	-0.281***	-0.281***	-0.281***	-0.281***
	(0.066)	(0.066)	(0.066)	(0.066)	(0.066)
Age in completed years	0.052***	0.052***	0.052***	0.052***	0.052***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Age^2	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Years of School	-0.005	-0.005	-0.005	-0.005	-0.005
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Constant	0.064	0.062	0.060	0.053	0.064
	(1.691)	(1.691)	(1.691)	(1.691)	(1.691)
Panel B	Hours Supplied Equation				
	Head	Spouse	Children	Relatives	Family
Recent Conflict death as % of LGA	-1123.141**	-54.376	0.526	131.271	-1045.604
	(503.948)	(700.575)	(251.400)	(145.825)	(1122.579)
Exposed to Shock	-14.515	-30.998	37.373	1.350	-6.885
	(54.542)	(22.766)	(39.495)	(8.451)	(95.714)
Age in completed years	-5.813	8.582**	9.276**	3.016**	15.115
	(12.294)	(3.723)	(4.203)	(1.458)	(15.668)
age^2	0.058	-0.056	-0.075*	-0.018	-0.091
	(0.135)	(0.035)	(0.045)	(0.014)	(0.166)
Years of School	-16.894**	-0.123	-6.999	-1.200	-25.218**
	(7.538)	(2.420)	(4.329)	(0.739)	(10.939)
Household Size	7.378	15.372***	19.269***	13.691***	55.707***
	(6.805)	(3.331)	(4.036)	(1.778)	(11.918)
Pop Density	-0.348	-0.214	0.996	-0.008	0.425
	(0.602)	(0.386)	(0.834)	(0.163)	(1.621)
Value of land self reported by households	0.000**	0.000**	0.000	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Farm daily wage(Men)	0.011***	0.003	-0.001	0.001	0.015**
	(0.003)	(0.002)	(0.002)	(0.001)	(0.007)
Constant	2071.213	-742.551	-1129.974***	-405.204*	-208.203
	(1323.048)	(586.910)	(432.142)	(215.267)	(1923.705)
athrho					
Constant	-0.004	-0.009	-0.006	-0.017	-0.008
	(0.004)	(0.009)	(0.007)	(0.012)	(0.006)
lnsigma					
Constant	7.687***	6.844***	7.327***	5.787***	8.219***
	(0.320)	(0.087)	(0.428)	(0.133)	(0.222)
chi^2	886.653	771.694	501.987	318.660	870.240
N	7713	7713	7713	7713	7713

se Robust standard errors in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: For a description of the variables, see Table 1. The following variable included in the analysis are not shown in the table: time and zone interaction variables, Distance to major road, Distance to pop center, Distance to market. Distance to border post. Distance to administrative center, Annual mean temperature,Annual precipitation, Nutrient availability, Total rainfall and Population density.

Table 4 provides evidence of lingering effects of conflict exposure on household heads, and the total family labor supply. A 0.06 percentage point increase in our long term measure of conflict exposure is associated with a decrease of approximately 77 hours in family labor supply and a decrease of approximately 41 hours in labor supply by the household head.

In Tables 5 and 6 we present the labor supply estimates using a fixed effects (FE) model which is our preferred empirical strategy. In column (1) of Table 5 we present the results for the model with hours worked by household head as the dependent variable. In column (2) the dependent variable is hour worked by spouse. In column (3) the dependent variable is hours worked by children and in column (4) the dependent variable is hours worked by relatives. In Panel A we present the relevant estimates using the recent exposure to conflict measure and in Panel B we present the estimates using the long term accumulated exposure to conflict measure. In Table 5 we present the results for total hours worked for the entire family on plots in the harvest season. In column (1) of Table 6 we present the results using the recent conflict measure and in column (2) we present the results using the long term measure of conflict.

As noted in the empirical section of the paper, the FE model controls for time invariant unobservable household-level characteristics, which attenuates bias in estimated effects of conflict on labor supply (hours worked). To address the potential of bias in our estimated effects of conflict linked with time varying unobservables correlated with our conflict measure and our outcome variable, we include several controls. In particular, we include in our analysis several time varying controls such as idiosyncratic shocks, controls for time varying social characteristics of the LGA, precipitation, average farm wages and population density. We also include year and zone fixed effects and zone and year interactions.

Table 4. The Effect of Long Violent Conflict on Total Hours of Labour Supply During Harvest Season(Heckman Model)

	(HECKMAN MODEL)				
	(1)	(2)	(3)	(4)	(5)
	Head	Spouse	Children	Relatives	Family
	b/se	b/se	b/se	b/se	b/se
Panel A	Participation Equation				
Long term Conflict death per LGA pop(%)	1.664	1.668	1.664	1.672	1.666
	(1.292)	(1.293)	(1.292)	(1.292)	(1.293)
Accumulated conflict events	-0.010**	-0.010**	-0.010**	-0.010**	-0.010**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Exposed to Shock	-0.282***	-0.282***	-0.282***	-0.282***	-0.282***
	(0.066)	(0.066)	(0.066)	(0.066)	(0.066)
Age in completed years	0.051***	0.051***	0.051***	0.051***	0.051***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Age^2	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Years of Schooling	-0.006	-0.006	-0.006	-0.006	-0.006
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Household Size	0.007	0.007	0.007	0.007	0.007
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Pop density	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Farm daily wage(Men)	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.332	0.332	0.329	0.325	0.333
	(1.683)	(1.683)	(1.683)	(1.683)	(1.683)
Panel B	Hours Supplied Equation				
	Head	Spouse	Children	Relatives	Family
Longterm Conflict death per LGA pop(%)	-678.623**	-290.178	-324.558	-5.629	-1299.048**
	(301.178)	(235.742)	(226.446)	(74.874)	(656.469)
Exposed to Shock	-14.273	-30.228	38.295	1.579	-4.688
	(54.637)	(22.749)	(40.117)	(8.459)	(96.411)
Age in completed years	-5.574	8.665**	9.386**	3.008**	15.518
	(12.343)	(3.710)	(4.267)	(1.461)	(15.747)
Age^2	0.056	-0.056	-0.076*	-0.018	-0.094
	(0.135)	(0.035)	(0.045)	(0.014)	(0.166)
Years of Schooling	-16.958**	-0.116	-6.987	-1.189	-25.250**
	(7.524)	(2.443)	(4.313)	(0.737)	(10.919)
Household Size	7.335	15.399***	19.305***	13.706***	55.743***
	(6.806)	(3.330)	(4.010)	(1.781)	(11.892)
Pop density	-0.350	-0.222	0.986	-0.011	0.404
	(0.599)	(0.384)	(0.827)	(0.163)	(1.610)
Value of land self reported by households	0.000**	0.000**	0.000	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Farm daily wage(Men)	0.011***	0.003	-0.001	0.001	0.015**
	(0.003)	(0.002)	(0.002)	(0.001)	(0.007)
Constant	1970.876	-743.489	-1125.604***	-392.045*	-291.347
	(1332.182)	(613.428)	(435.729)	(215.349)	(1941.281)
athrho					
Constant	-0.003	-0.008	-0.005	-0.017	-0.007
	(0.004)	(0.009)	(0.008)	(0.012)	(0.006)
lnsigma					
Constant	7.686***	6.844***	7.327***	5.787***	8.219***
	(0.320)	(0.087)	(0.428)	(0.133)	(0.222)
chi^2	878.649	766.493	497.441	317.995	866.473
N	7713	7713	7713	7713	7713

se Robust standard errors in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: For a description of the variables, see Table 1. The following variable included in the analysis are not shown in the table: time and zone interaction variables, Distance to major road, Distance to pop center, Distance to market. Distance to border post. Distance to administrative center, Annual mean temperature,Annual precipitation, Nutrient availability, Total rainfall and Population density.

The results of our fixed effects model are mostly consistent with the results from the Heckman model. The results summarized in Tables 5 and 6 suggest that exposure to conflict (recent or over a long time), reduces hours worked significantly for household heads. For a family's total labor supply, our fixed effects model suggests significant negative effects of both recent and long term conflict exposure. In contrast with the Heckman model, we only found significant effects on total family labor supply using the long term measure. Similar to the results in the Heckman model, we do not find evidence of significant negative effects of recent or longer term exposure to conflict on hours worked by children and spouse. For hours supplied by relatives, we find significant negative effects with our longer term exposure measure but no significant effects using our recent exposure measure.

Our results are in contrast with Adelaja and George(2019a) who do not find any effect of the Boko Haram conflict on total family hours supplied. We find significant effects of both recent and longer term violent conflict exposure, on total family hours supplied. It is important to note that the aforementioned paper focused solely on the Boko Haram conflict while we focus on any violent conflict in Nigeria from 1997-2015. Also Adelaja and George(2019a) measures conflict exposure using conflict event which we do not use. Our argument for not using conflict event count as a measure of conflict exposure is that it may not be as effective for measuring intensity of exposure. A conflict event in a LGA where people only riot is very different in impact from a conflict event in an LGA that leads to fatalities. This is why we measure conflict exposure using deaths via armed conflict and to further get at intensity we normalized fatalities with the LGA population.

How can we interpret the results in Tables 5 and 6? A 0.01% point increase in recent exposure to conflict leads to an approximate decrease of 11 hours worked in the harvest season by the household head. Similarly, a 0.01% increase in accumu-

lated long-term exposure to conflict leads to approximately an 8 hours decrease in labor supplied in the harvest season by the household head. These are significant impacts of conflict. Moreover some states in the North Eastern part of Nigeria and the North Central parts of Nigeria have experience conflict increases far greater than this. For example between 2012 and 2015 the mean recent conflict exposure increase in the North Eastern part of Nigeria was 0.043. This significant increase was linked primarily with the Boko Haram insurgence. If we calculate what such an increase in conflict will lead to using our FE model estimates, we find that a 0.043% point increase in recent exposure leads to a 48.6 decrease in hours worked, which is really significant.[14] For total family labor supply, our results summarized in Table 6 suggest that a 0.01% point increase in recent conflict exposure leads to a decrease of approximately 21 hours of total family labor supply. While the accumulated impact of past conflict exposure is approximately 17 hours. Again if we consider the mean change in conflict exposure in the North Eastern zone between 2012 and 2015, our results for our recent conflict exposure measure suggests approximately a 90 hour decline in total family labor supply. A decline of such magnitude in labor supply for farm households is substantial.

[14]If we assume a 40 hour week, the estimated decline is about a week less of labor supply.

Table 5. The Effect of Violent Conflict on Total Hours of Labour Supply During Harvest Season

	(FIXED EFFECT MODEL)			
	(1)	(2)	(3)	(4)
	Head	Spouse	Children	Relatives
	b/se	b/se	b/se	b/se
Panel A	RECENT CONFLICT EFFECT)			
Conflict recent term death as % of LGA	-1129.236**	-538.600	-142.521	-252.337
	(441.082)	(387.834)	(269.263)	(214.472)
Exposed to shock	-141.158	9.516	27.826	8.960
	(154.576)	(22.781)	(16.914)	(9.420)
Age in completed years	0.524	22.415**	7.507	0.193
	(30.425)	(11.067)	(6.860)	(2.881)
Age^2	0.148	-0.147*	-0.056	-0.015
	(0.355)	(0.089)	(0.057)	(0.024)
Years of Schooling	-33.814	-0.133	0.015	1.977
	(23.750)	(4.030)	(2.696)	(1.905)
Household Size	5.551	-23.358	7.557	2.315
	(18.389)	(22.836)	(8.928)	(4.617)
Farm daily wage(Men)	0.014***	0.003	0.001	0.002*
	(0.004)	(0.003)	(0.002)	(0.001)
Constant	-155.277	684.335	-1714.986	-391.675
	(4789.699)	(2744.520)	(1171.152)	(676.842)
R^2	0.013	0.007	0.005	0.011
N	7761	7761	7761	7761
Panel B	LONG CONFLICT EFFECT			
Conflict long term death as % of LGA	-814.874**	-551.479	-166.858	-157.102*
	(406.164)	(379.552)	(107.030)	(80.295)
Exposed to shock	-140.910	9.881	27.954*	8.978
	(154.641)	(22.710)	(16.924)	(9.446)
Age in completed years	1.117	22.806**	7.625	0.309
	(30.394)	(11.107)	(6.863)	(2.888)
Age^2	0.144	-0.150*	-0.057	-0.015
	(0.354)	(0.089)	(0.057)	(0.024)
Years of Schooling	-33.753	-0.132	0.012	1.995
	(23.733)	(4.024)	(2.693)	(1.907)
Household Size	6.668	-22.738	7.732	2.551
	(18.441)	(22.583)	(8.930)	(4.591)
Farm daily wage(Men)	0.014***	0.003	0.001	0.002*
	(0.004)	(0.003)	(0.002)	(0.001)
Constant	44.855	776.485	-1691.026	-346.447
	(4786.147)	(2756.800)	(1162.886)	(674.325)
R^2	0.013	0.008	0.005	0.011
N	7761	7761	7761	7761

se statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: For a description of the variables, see Table 1. The following variable estimates are not shown:time fixed effect, zone fixed effect, zone and time interaction variables, Distance to major road, Distance to pop center, Distance to market. Distance to border post. Distance to Administrative center, Annual mean temperature, Annual precipitation, Nutrient availability, Total rainfall and Population density.

Table 6. The Effect of Violent Conflict on Family Total Labour Supply During Harvest Season

	(1) Recent Conflict b/se	(2) Long Conflict b/se
Conflict recent death as % of LGA		-2062.694*
		(1090.514)
Conflict long term death as % of LGA	-1690.314**	
	(664.603)	
Exposed to Shock	-94.098	-94.856
	(165.373)	(165.303)
Age in completed years	31.856	30.639
	(39.540)	(39.542)
Age^2	-0.079	-0.070
	(0.408)	(0.408)
Years of Schooling	-31.878	-31.954
	(25.896)	(25.912)
Household Size	-5.786	-7.935
	(40.577)	(40.730)
Pop density	-0.126	-0.110
	(1.020)	(1.021)
Value of land self-reported by households	0.000*	0.000*
	(0.000)	(0.000)
Distance to major road	-0.028	-0.047
	(2.976)	(2.981)
Distance to population center	-2.272	-2.224
	(2.838)	(2.836)
Distance to market	44.091	45.216
	(36.289)	(36.285)
Distance to border post	-3.507	-3.497
	(2.904)	(2.904)
Distance to administrative center	0.332	0.272
	(3.008)	(3.003)
Annual mean temperature	-13.861	-12.989
	(25.443)	(25.429)
Annual mean precipitation	4.832	4.881
	(4.108)	(4.115)
Nutrient availability	-81.153	-78.084
	(214.694)	(214.075)
Total rainfall	-2.801	-2.788
	(3.163)	(3.161)
Farm daily wage(Men)	0.020***	0.020***
	(0.007)	(0.007)
Constant	-1216.133	-1577.603
	(6836.171)	(6854.221)
R^2	0.012	0.012
N	7761	7761

Note:Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For a description of the variables, see Table 1. The following variable estimates are not shown:time fixed effect, zone fixed effect, zone and time interaction variables.

6 Summary and Conclusion

In this paper we examine the impact of conflict on labor supply of farm households. We focus on two related questions: what is the effect of recent exposure to conflict on the number of hours worked by household head, spouse, children, relatives and the family as a whole? Second, is there evidence that accumulated exposure to conflict over a long period of time affects labor supply currently of a household head, spouse, children, relatives and the family as a whole? We attempt to answer these questions combining household survey panel data for Nigeria with ACLED data, and exploiting multiple econometric techniques.

Our results suggest that conflict negatively affects labor supply of household heads. We also find evidence of the negative significant effect of conflict on total family labor supply. Simple back of the envelope calculation based on our estimates suggest that the impact on farm household labor supply could be severe in magnitude in areas with sudden spikes in violent conflict. For example the Boko Haram crises in the North Eastern region of Nigeria and the farmers-herdsmen conflict in the North Central region of Nigeria. Finding significant negative effects of conflict on total family labor supply is new given Adelaja and George(2019a) do not find significant effects of conflict on family labor supply. Our analysis differs from their in many ways. First, we look at the average recent effect of conflict in Nigeria (3 years) while they consider only one year. In addition, we focus on average treatment effect of any type of violent conflict while they focus on Boko Haram. Finally, we measure exposure to conflict using mortality normalized with population in LGA while they focus on conflict events count.

Odozi and Uwaifo Oyelere (2019) provide evidence of the negative impact of violent conflict on income, poverty incidence, poverty severity and poverty depth in

Nigeria. The results in our paper provide one possible pathway for their findings. In particular, if agricultural households affected by violent conflict are forced to decrease their labor hours worked, then their incomes will decline, and the probability they slip into poverty will increase.

It is important to mention one caveat when using ACLED fatality data. In particular, the collectors of the ACLED dataset are very careful in attributing any death to being linked to armed conflict. Many deaths that could have been caused by armed conflict may not have been included in the data if there was uncertainty and lack of clear information on if the death was caused by armed conflict or other factors. This limitation in the reporting of deaths by armed conflict can create potential downward bias in the estimated effects. Hence the actual effect on hours worked could be even larger.

Finally, it is worth noting that while the FE model mitigates biases in estimated effects, it does not deal with possible time varying unobservables that could be correlated with our measures of conflict, and also correlated with our dependent variable. Such variables if they exist can confound estimated causal effects. We attenuate this possible source of bias by including as many time varying controls in our regression analysis as are available in our data. Two important control we include are controls for idiosyncratic shocks and controls for economic and social conditions in the LGA. However, despite these aforementioned controls and others we include, we cannot completely eliminate the potential for this source of bias.

As stated at the beginning of this paper, a good portion of Nigeria's labor force is employed in agriculture and it still remains the largest sector of the Nigerian economy. The agricultural sector is particularly vulnerable to violent conflict and investigating the impact of conflict in this sector is necessary. Given the significant negative effect of conflict on agricultural labor supply noted in our paper, there is

need for Nigeria's leadership to to do more to curb the growth of violent conflict in Nigeria. In addition, partnerships between academics and policy makers in designing policies that can effectively alleviate the short term and longer term micro and macro effects of reductions in labor supply is paramount.

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