

Shocking social safety: Evidence from violence and

drought in North-east Nigeria

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Abstract

Polycrises created by violent conflict and climate change are ubiquitous. Yet, the impacts of conflict and climatic shocks on human behavior and welfare have largely been studied in isolation. This paper studies the joint impact of conflict and climatic shocks on households' social safety nets in fragile settings. Drawing on unique panel survey data from 1,293 households in North-east Nigeria, we document that experiencing a violence shock increases the strength of households' social safety nets (SSN) when they do not experience a simultaneous drought shock. Yet, experiencing a violence shock decreases SSN strength when they experience a drought shock in addition. This perilous interaction between violence and drought shocks is concentrated in poorer local environments. When the local level of economic resources is high, in relative terms, the positive impact of a violence shock on SSN is dominant. However, when the level of economic resources is low, the influence of droughts shocks rises substantially and experiencing both a drought and a violence shock diminishes social safety drastically. Our findings emphasize the need for and potential of concerted social protection programs that account for the compounding vulnerability from poverty, conflict and climatic change in fragile settings.

Keywords

Polycrisis, armed conflict, climate change, drought, social safety nets

JEL Classifications D71, D74, I32, O12, Q54

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1 Introduction

In fragile settings, adverse shocks are widespread, including weather and conflict shocks (Homer-Dixon, 2010; Fankhauser & McDermott, 2014). These shocks can induce instability and vulnerability but the social impacts are far from uniform. Weather shocks, such as unusually high temperatures or low precipitation, have been associated with social instability (Hsiang et al., 2013; Burke et al., 2015; Burke et al., 2024) but the evidence on the existence and nature of the link remains mixed and inconclusive (Mach et al., 2019; Ide et al., 2020). Similarly, evidence on the impacts of conflict shocks on social cohesion and stability is growing but is markedly mixed – sometimes violence leads to more violence, but in other cases it does not or creates prosociality (Rohner et al., 2013; Bauer et al., 2016). For each type of shock, the local context is often considered as a key driver of such divergent outcomes. Given that many regions are prone to both weather and conflict shocks (that is, experience polycrises), it is surprising that the social impacts of weather shocks and violence shocks in fragile settings have largely been studied in isolation rather than jointly.

In this study, we aim to help to fill this gap by studying the compounding impacts of violent conflict and weather shocks in North-east Nigeria, a triple nexus setting experiencing humanitarian, development and conflict crises. Specifically, we test if and how violence and weather shocks jointly affect the strength of households' social safety nets (SSN). SSN are often equated with formal social assistance programs by the government or other agencies tasked to support poor and vulnerable people (World Bank, 2018). Yet, in less developed and fragile countries support for the poor and vulnerable is often primarily organized through private ties and networks complementing formal support (Brück et al., 2019; Devereux & Getu, 2013; Hill & Verwimp, 2017). In fact, the volume of informal transfers can be as high as 75 percent of that of formal transfers in such contexts (Freund & Spatafora 2008).

We define a household's SSN as its capacity to access assistance from formal institutions, such as from the government or non-governmental organizations (NGOs), as well as from informal institutions, such as family and other social networks (FAO, 2016; FAO, 2019). Notably, the strength of the SSN does not only capture economic relations and capacity but also social and redistribution

preferences of multiple actors. For example, a household in need might have little access to informal transfers even when other households have the capacity to deliver them if levels of solidarity and cooperation are low. Similarly, the distribution of formal support is complex and hinges on preferences and incentives of key stakeholders and the social contract, especially in fragile settings (Bossuroy & Coudouel, 2018).

Studying SSN in the context of shock exposure is pertinent for two reasons. First, SSN are key to households' social protection and economic well-being in less developed and fragile contexts (Fafchamps et al., 2007, Mane et al., 2015). Second, existing evidence from North-east Nigeria suggests that strengthening SSN is an effective and dominant pathway for agricultural support interventions to boost resilience in violence-affected regions (Stojetz et al., 2024).

North-east Nigeria is a sadly well-suited area to study the compounding impacts of shocks on SSN. On the one hand, the protracted conflict and high levels of violence by the Boko Haram terrorist group present severe challenges to lives and livelihoods (IOM, 2020; IOM, 2022). In addition to conflict conditions and shocks, the region is also increasingly vulnerable to climate change and occasional but intense weather shocks that pose additional challenges to economic well-being and social stability. As a result, the region now "faces among the highest compound fragility-climate risks globally" (USAID, 2018: 1).

For the empirical analysis, we draw on a balanced panel of two rounds of survey data, collected from 1,293 households in 2018 and 2021. The surveys were conducted in Borno State by the Food and Agriculture Organization of the United Nations (FAO), the World Food Programme (WFP), and the United Nations Entity for Gender Equality and the Empowerment of Women (UN Women). The resulting data provide self-reported information on exposure to violence and drought shocks, social safety nets and other socio-economic information. To construct our main outcome indicator, the strength of a household's SSN, we follow the FAO-RIMA methodology, which integrates four dimensions: (i) access to formal transfers, (ii) access to informal transfers, (iii) access to credit and (iv) participation in social groups and networks (FAO, 2016).

We spatio-temporally match the panel survey data with external data on local conditions. Most importantly, these data include fine-grained information on local conflict events from the Armed Conflict Location & Event Data Project (ACLED)¹ and drought conditions from the Standardised Precipitation-Evapotranspiration Index (SPEI).² In addition, we also match the data with information on other local conditions such as altitude, soil-crop suitability, road density and distance to the capital of the local government area (LGA). Such factors are important sources of heterogeneity and important control variables as, for example, topography is not independent from rainfall (Ballinger, 2022).

We find that the impacts of violence shocks on SSN are fundamentally shaped by the presence or absence of experiencing a drought shock. When households do not experience a drought, violence shocks *strengthen* the average household's social safety net by .2 standard deviations. By contrast, when a household also experiences a drought shock, violence shocks *decrease* the strength of the social safety net by .3 standard deviations. This pattern holds for several vulnerable groups of households, including internally displaced people (IDPs), female-headed households and large households.

Our findings contribute to the literature on the socio-economic impacts of violent conflict (Verwimp et al., 2019; Vesco et al., 2024). A large body of studies focus on children and documents how exposure to violent conflict situations in-utero or in early childhood creates enormous risks to well-being in the short or medium run and intergenerationally (Bundervoet et al., 2009; Akresh et al., 2012, 2023; Singhal, 2019). More recently, a growing number of studies measure how individuals, households, and communities experience violent conflict heterogeneously (Brück et al., 2016) and how such experiences code social behaviors and outcomes (Bauer et al. 2016; Stojetz & Brück, 2023a; Oh et al., 2024). Yet, how other shocks combine and interact with conflict shocks in shaping social outcomes remains surprisingly ill-understood.

Our paper also adds to the discussion on the societal risks of climate change and extreme weather. As noted above the causal relationship between climatic

¹ URL: <u>https://acleddata.com/</u>.

² URL: <u>https://spei.csic.es/</u>.

anomalies and conflict risk remains contested (Hsiang et al., 2013; Burke et al. 2015; Mach et al., 2019; Ide et al., 2020; Burke et al. 2024;). These studies model the occurrence of conflict as an outcome. Yet, most contexts where conflict occurs are notoriously fragile (Brück & d'Errico, 2019; Martin-Shields & Stojetz, 2019); and many climatic shocks do not occur in environments that are free from conflict to begin with. We contribute to this literature by studying the role of climatic shocks for conflict *impacts* rather than outcomes.

Our findings are of particular interest to policy and practice in polycrises (Homer-Dixon et al., 2022; Lawrence et al., 2024). Understanding how shocks of different nature in fragile settings act on economic and social dynamics is critical to be able to design and implement much-needed interventions that are effective and efficient. There is growing awareness and evidence that polycrises create compounding, not just additive, challenges (UNICEF, 2023; Stojetz & Brück, 2023b), which means that policies cannot focus on challenges in isolation but must address them comprehensively. Specifically, our findings suggest that addressing polycrises with policies and programs requires acknowledging the intricate and heterogenous simultaneity of the conflict and climate crises themselves.

The rest of the paper is organized as follows. Section 2 provides information on the study background. Section 3 outlines the research design. Section 4 presents and discusses the results. Section 5 provides concluding remarks.

2 Study background: North-east Nigeria

Since 2009, Boko Haram has triggered bouts of violence in North-east Nigeria. The conflict has devastated agricultural livelihoods in various ways, including livestock losses, reduced access to fishing grounds, destruction of irrigation and farming facilities, the collapse of extension services and key agriculture-based value chains. Losses caused by Boko Haram imposed levies on transported production, market and trade facilities (including fish markets), and reduced production due to mass displacement and limited access to markets. Multiple factors contribute to the conflict in North-east Nigeria. The North-East Nigeria Recovery and Peace Building Assessment (RPBA) highlights the social, political, economic and environmental drivers of the crisis (World Bank, 2015). Weak systems of governance are a driver of conflict and a constraint on effective responses to both conflict and displacement. Limited government support, poor management and limited access to new technologies and inputs have contributed to erode rural livelihoods in agriculture, pastoralism and fisheries. In addition, the lack of employment and livelihood opportunities is a possible 'push factor' towards violence, in particular for young people. The fragility of the natural environment also undermines food security and causes social tensions.

Borno State in particular has faced escalating levels of insecurity which led to massive population movements and food insecurity combined with human, social and economic losses. According to the International Organization for Migration (IOM), as of August 2020 Borno is Nigeria's state most affected by conflict-related displacements, and still is today (IOM, 2020; IOM, 2022). In 2020, the IOM estimated that out of a total of 2,118,550 IDPs, 1,566,011 of them (74 percent) were located in Borno State. The steady increase in IDP numbers in Borno State and the high number of inaccessible LGAs in the State indicate that the humanitarian situation is continuously deteriorating.

Figure 1 visualizes the high levels of conflict intensity and illustrates the available conflict data by showing conflict events at the LGA level before survey wave 1 (2018). In Figure 1a, we plot the cumulative number of conflict events that occurred in each surveyed LGA over a growing period of time, from 3 months to 60 months prior to the survey. Figure 1b focuses on the 12-month reference period and visualizes that the whole region of the North-east is affected by conflict, with varying intensity. The black dots denote the spread of the survey sample.

In addition, North-east Nigeria is increasingly vulnerable to climate change. Recent numbers and projections suggest that climatic changes and shocks are gradually becoming more frequent across the country (Shiru et al., 2020). Droughts, floods, shorter seasons, and associated pests and diseases, reduce yields, which contributes to serious challenges to food security and survival (FAO,

2022). As a result, North-east Nigeria has been identified as a polycrisis characterized by one of the highest vulnerability at the intersection of climatic and conflict challenges worldwide (USAID, 2018).

a) 3 to 60 months before survey 150 - LGA Bama Damboa 100 Number of events Jere Kala Balge Konduga Kukawa Kwaya Kusar 50 **-**Mafa Monguno Ngala 0-3 60 6 12 Months before the survey b) 12-month reference period 1 to 4 5 to 14 15 to 29 30 to 44 45 to 60

Figure 1. Conflict intensity (2018)



(Raleigh et al., 2010).

3 Methods

3.1 Formal and informal social safety

We define a household's social safety net (SSN) as its capacity to access assistance from formal institutions, such as from the government or NGOs, as well as from informal institutions, such as family and other social networks (FAO, 2016; FAO, 2019). We deploy FAO's RIMA methodology (FAO, 2016) to construct an SSN index through factor analysis, including both formal and informal components. The resulting SSN indicator is an index built from four categories: access to formal transfers, access to informal transfers, access to credit, and access to social groups and networks.

3.2 Adverse conditions and shocks

It is critical to distinguish between local conditions and the shocks a household is exposed to. For example, conflict event data might suggest that local conflict intensity was high in a given region, but that does not mean that every household residing in that region experienced a violence shock. Our main interest is in studying the impacts of what households are exposed to, based on their subjective assessment. This information is taken from the survey data which we triangulate with external information on weather and conflict from other sources.

3.3 Data

For the empirical analysis, we rely on two waves of unique panel survey data from July–August 2018 and December 2021, collected by the Food and Agriculture Organization of the United Nations (FAO), UN WOMEN and the World Food Programme (WFP). The surveys were based on a comprehensive questionnaire, including standard modules on socio-demographic and socio-economic variables, but also on self-reported experiences of violence and other shocks. Importantly, the survey data includes information on households' location in the form of GPS coordinates.

Based on survey information on households' location and the time of the interview, we spatio-temporally match the survey data with information on conflict, weather, and socio-economic conditions at the local level. To capture

local conflict conditions, we use conflict event data from the Armed Conflict Location & Event Data Project (ACLED), using detailed geo-tags and timestamps for each event (Raleigh et al., 2010). We calculate the total number of conflict events at the LGA level as well as for a 50km radius around a households' locations and for varying reference periods (3 months and 12 months). We use the total number of conflict events in a 50km radius over the 3-month period to capture short-term shocks and over the 12-month period to capture longer-term conditions. We choose the 50km radius for our main specifications as we assume that conflict events usually have strong implications beyond the immediate surrounding. In that case too small radii fail to capture relevant conflict dynamics.

As an external measure of local drought conditions, we draw on the Standardised Precipitation-Evapotranspiration Index (SPEI), a novel measure of local drought intensity. It is now widely used and available at the monthly, .5-degree grid-cell level.³ To capture further local conditions we calculate altitude and crop suitability measures. For altitude, we use high-resolution from the Global Multi-resolution Terrain Elevation Data (GMTED2010).⁴ We also calculate local crop suitability indices for maize and cassava, two main crops grown in North-east Nigeria, based on Version 4 of the Agro-Ecological Zoning (GAEZ v4) database provided by FAO.⁵ The indices proxy the suitability of land for growing a specific crop based on factors such as land and water resources. We consider all land in the grid cell instead of only current cropland and we select the time period from 1981 to 2010, which is the latest period based on historic data only, rather than relying on forecasting (e.g., 2011 - 2040).

3.4 Descriptive statistics

Table 1 provides descriptive statistics on a number of household characteristics for the pooled sample. Our main outcome variable, the strength of a household's safety net (SSN), is standardized to zero mean and unit standard deviation. There is substantive variation in the SSN, which is normally distributed around zero (Figure A1).

³ URL: <u>https://spei.csic.es/</u>.

⁴ URL: <u>https://earthexplorer.usgs.gov/</u>.

⁵ URL: <u>https://gaez.fao.org/pages/data-viewer</u>.

46 percent of households report having recently experienced a violence shock, showing that such shocks are highly prevalent and widespread. 11 percent of households report having experienced a drought. On average, households have 6.8 members, including 3.5 children. 16 percent of households are female-headed and about one in three are former refugee or internally displaced households who have returned home. For the vast majority (74 percent), crop cultivation is the main economic activity. This makes weather shocks and droughts extremely relevant because they pose a direct threat to the productivity and subsistence of the families and the community as a whole.

	Mean	S.D.	Min.	Max.	N
Social safety net (SSN)	0.00	1.00	-4	11	2586
Shock variables					
Violence shock	0.46	0.50	0	1	2586
Drought shock	0.11	0.32	0	1	2580
Local conflict and climatic conditions					
Conflict events (3 months): r < 50 km	17.88	12.99	0	45	2581
Conflict events (12 months): r < 50 km	65.15	43.29	6	150	2581
SPEI (12 months)	-0.66	0.16	-1	-0	2581
Other local conditions					
Altitude	327.38	38.64	285	871	2581
Road density	196.06	68.58	0	322	2581
Soil suitability Maize	3056.76	1061.36	548	5560	2581
Soil suitability Cassava	2375.27	904.05	0	5455	2581
Household characteristics					
Distance to LGA capital	15.88	23.52	0	132	2581
Female household head	0.16	0.37	0	1	2586
IDP household	0.47	0.50	0	1	2586
Returnee household	0.28	0.45	0	1	2586
Household size	6.84	3.25	1	28	2586
Number of children	3.46	2.35	0	15	2586
Farming household	0.74	0.44	0	1	2586

Table 1. Summary statistics

3.5 Econometric specification

To assess shock impacts, we estimate linear panel models with two-way fixed effects at the time and household levels. In our main specifications, the regression model is:

$$Y_{it} = A_i + B_t + \beta_1 V_{it} + \beta_2 D_{it} + \beta_3 (V_{it} \times D_{it}) + X_{it} + \varepsilon_{ist}$$

Here, Y_{it} is a social or economic household outcome per survey round *t* and household *i*, A_i denotes household fixed effects, B_t denotes wave fixed effects, V_{it} indicates exposure to violence shocks, D_{it} indicates exposure to drought shocks, X_{it} is a flexible vector of time-varying control variables, and ε_{ist} is the error term.

Our main parameter of interest is β_3 , which captures the interactive effects of experiencing violence and drought shocks. By incorporating wave and household fixed effects, we control for particular temporal trends and for time-invariant household characteristics. Further, we assume that household experiences of violence and drought are exogenous shocks that households have no control over. At the same time, certain households might be more likely to experience a shock or more likely to report such an experience than others. However, we posit that even if that were the case *the interaction* of the two types of experiences can still be considered as exogenous. We provide supporting evidence on this assumption in Section 4 below.

4 Findings

4.1 Shock exposure

Nature of shocks. To gain insight into the nature of household-level shocks, we inspect the share of households reporting violence and drought shocks across survey clusters. These clusters are defined by survey time and location, generating clusters at the wave-LGA level. In other words, how many of the households residing in a given location at time t do report having experienced a certain shock.

As shown in Figure 2a, the fraction of households reporting violence shocks varies markedly across clusters, from only a tiny fraction (values close to zero) to almost every surveyed household (values close to one). Notably, the minimum is 6 percent, which means that there is no cluster in which no household reports a violence shock. At the same time, the maximum is 92 percent, which suggests that there is no cluster in which every household reports a violence shock. Overall, the large number of clusters with shares above 50 percent underlines that conflict intensity in North-east Nigeria is generally high and widespread.

By contrast, the fraction of households reporting a drought shock varies much less across clusters. In 60 percent of all clusters, no surveyed household reports a drought shock and in 80 percent of all clusters less than one quarter of surveyed households report a drought shock. The highest fraction overall is 45 percent of households reporting a drought shock.

A key insight for the analysis of shock impacts of social safety nets is that when a household experiences a violence shock it is probable that other households in the local environment also experience a violence shock in the same period. Yet, when a household experiences a drought shock it will often be the case that many other households in the local environment do not experience a drought shock simultaneously. This insight challenges the widespread idea of conceptualizing droughts as covariate shocks. Instead, our results suggest a more nuanced approach to droughts as not all households residing in an area will perceive a drought as suggested by external data in the same way.



Figure 2. Cluster-level shares of households reporting shocks

a) Violence shock

b) Drought shock



Figure A2 shows the distribution at the household level, which differs from the cluster-level distribution as the number of households surveyed by cluster varies across clusters.

Selection. As noted above, certain households might be more likely to experience a shock or more likely to report such an experience than others but we argue that even if that is the case *the interaction* of the two types of experiences can still be considered as exogenous.

To explore the exogeneity of the interaction term, we test if reporting violence shocks and drought shocks is correlated with the several household characteristics (Table 2). The results suggest that experiences of either shock predict specific household characteristics that may be associated with vulnerability only very weakly and not systematically. Tested characteristics include the number of household characteristics, including the sex of the head, IDP status, returnee status, size and the number of children. As expected, shock interactions do not meaningfully predict any household characteristic. The estimated correlations are very small in magnitude and not statistically significant, which supports the validity of our assumption that there is some selection into exposure to a specific shock but that the shock interaction can be considered as exogenous.

	(1)	(2)	(3)	(4)	(5)	(6)
	Female	IDP	Returnee	Household	Large	No. of
	head	household	household	size (z)	household	children (z)
Violence x drought	0.025	-0.071	-0.005	-0.123	-0.080	-0.020
	(0.028)	(0.053)	(0.035)	(0.119)	(0.058)	(0.120)
Violence shock	0.002	0.019	0.036*	0.041	0.054***	0.112**
	(0.015)	(0.024)	(0.019)	(0.041)	(0.019)	(0.044)
Drought shock	-0.112***	0.064*	-0.215***	0.055	0.066	-0.007
	(0.018)	(0.038)	(0.022)	(0.078)	(0.043)	(0.081)
Local conditions	Yes	Yes	Yes	Yes	Yes	Yes
M-Y FE	Yes	Yes	Yes	Yes	Yes	Yes
N	2575	2575	2575	2575	2575	2575
R^2	0.018	0.117	0.110	0.072	0.068	0.066

Table 2. Shocks and household characteristics

Note: * p < 0.1, ** p < 0.05, *** p < 0.01, bootstrapped standard errors in parentheses.

The interpretation of the interactive effects between reported violence and drought shock also hinges on the relationship between the two indicators. For example, reporting one shock during the interview might make it systematically less likely to report another shock for shame reasons or more likely if gains expected for the case of reporting more shock exposure. The results reported in Table 3 suggest that reporting a violence shock is not systematically associated with also reporting a drought shock. With and without control variables the magnitude of the association is very low and not statistically significant at any level.

		Outcome: Drought shock				
	(1)	(2)	(3)	(4)	(5)	(6)
Violence shock	0.010	0.016	0.016	0.017	0.021	-0.010
	(0.020)	(0.021)	(0.016)	(0.023)	(0.016)	(0.019)
Local conflict (3m)	No	No	Yes	Yes	Yes	Yes
Local conflict (12m)	No	No	No	Yes	Yes	Yes
Local SPEI (12m)	No	No	No	No	No	Yes
HH controls	No	No	No	No	Yes	Yes
Local econ	No	Yes	Yes	Yes	Yes	Yes
HH and M-Y FE	Yes	Yes	Yes	Yes	Yes	Yes
N	2580	2575	2575	2575	2575	2575
R^2	0.074	0.086	0.090	0.093	0.168	0.234

Table 3. Violence shocks and drought shocks

Note: * p < 0.1, ** p < 0.05, *** p < 0.01, bootstrapped standard errors in parentheses.

4.2 Shocks and the social safety net

Main results. Table 4 shows that experiencing a violence shock is significantly associated with a .16 SD increase in the strength of the SSN (column 1). This result is robust to different model specifications and corroborates evidence in the literature that exposure to violence can increase social cohesion. Conversely, experiencing a drought shock is not robustly related to the strength of SSN, conditional on violence shocks.

	Outcome: Strength of social safety net					
	(1)	(2)	(3)	(4)	(5)	(6)
Violence shock	0.159***	0.163***	0.162***	0.159***	0.159***	0.132**
	(0.053)	(0.045)	(0.053)	(0.050)	(0.055)	(0.051)
Drought shock	-0.013	-0.018	-0.025	-0.017	-0.118	-0.191**
	(0.085)	(0.076)	(0.078)	(0.094)	(0.082)	(0.089)
Local conflict (3m)	No	No	Yes	Yes	Yes	Yes
Local conflict (12m)	No	No	No	Yes	Yes	Yes
Local SPEI (12m)	No	No	No	No	No	Yes
HH controls	No	No	No	No	Yes	Yes
Local econ	No	Yes	Yes	Yes	Yes	Yes
HH and M-Y FE	Yes	Yes	Yes	Yes	Yes	Yes
Ν	2580	2575	2575	2575	2575	2575
R^2	0.008	0.011	0.012	0.014	0.039	0.045

Table 4. Shocks and the strength of the social safety net

Note: * p < 0.1, ** p < 0.05, *** p < 0.01, bootstrapped standard errors in parentheses.

In Table 5, we test for compounding effects of experiencing violence and drought shocks by including an interaction term in the model. The results suggest that the additive model tested in Table 4 masks important compounding dynamics between violence and drought shocks in affecting social safety nets. Regardless of model specification, there is a very strong and negative interaction between exposure to violence and drought in the SSN: when households do not experience a drought, a violence shock strongly increases their SSN; when households also experience a drought, a violence shock strongly *decreases* their SSN.

		Outcome: Strength of social safety net					
	(1)	(2)	(3)	(4)	(5)	(6)	
Violence x drought	-0.601***	-0.588***	-0.597***	-0.588***	-0.495**	-0.490***	
	(0.181)	(0.180)	(0.191)	(0.172)	(0.211)	(0.170)	
Violence shock	0.232***	0.236***	0.237***	0.233***	0.188***	0.197***	
	(0.066)	(0.060)	(0.059)	(0.055)	(0.064)	(0.062)	
Drought shock	0.263**	0.250**	0.247*	0.250**	0.103	0.042	
	(0.115)	(0.107)	(0.131)	(0.113)	(0.135)	(0.113)	
Local conflict (3m)	No	No	Yes	Yes	Yes	Yes	
Local conflict (12m)	No	No	No	Yes	Yes	Yes	
Local SPEI (12m)	No	No	No	No	Yes	Yes	
Local other	No	Yes	Yes	Yes	Yes	Yes	
HH controls	No	No	No	No	No	Yes	
HH and M-Y FE	Yes	Yes	Yes	Yes	Yes	Yes	
Ν	2580	2575	2575	2575	2575	2575	
R^2	0.017	0.020	0.021	0.023	0.032	0.051	

Table 5. Shock interactions and the strength of the social safety net

Note: * p < 0.1, ** p < 0.05, *** p < 0.01, bootstrapped standard errors in parentheses.

Heterogeneity. In Figure 3, we study if the strong interaction between violence and drought shocks obtains across various sub-samples of households that might be particularly vulnerable. We find that the main pattern is robust across different types of vulnerable households, including IDP, female-headed and large households. Interestingly, the only exception seems to be rural households, for which the experience of a violence shock strengthens the SSN also when the households experiences a drought shock.





Note: p-values refer to the interaction term. 95% confidence levels, bootstrapped standard errors.

4.3 Mechanisms

SSN components. To gain deeper understanding into impact mechanisms, we study the four variables that make up the SSN measure separately: access to formal transfers, credit, network strategies, and group participation. As illustrated in Figure 4, we find a strong interaction effect for coping strategies relying on informal networks, such as borrowing food and buying food for credit. Experiencing a violence shock has strongly positive impacts on access to such network strategies in the absence of a drought shock, which decreases significantly when a household experiences a drought shock and becomes statistically indistinguishable from zero. While not statistically significant from zero the point estimate of the impact of experiencing a violence shock under a drought is also negative, as is that on group participation independently of

experiencing a drought in addition. These findings suggest that the underlying mechanism depressing SSN strength when experiencing both a violence and a drought shock could be both social and economic in nature.



Figure 4. Shock interactions and different components of the social safety net

Note: p-values refer to the interaction term. 95% confidence levels, bootstrapped standard errors.

Other social and economic outcomes. Looking at other social behaviors (Figure 5) we also find that the impacts of violence shocks do not vary significantly based on the experience (or absence) of a drought shock. This includes disputes and attitudes toward violence.



Figure 5. Shock interactions and other social outcomes

Note: p-values refer to the interaction term. 95% confidence levels, bootstrapped standard errors.

Figure 6 shows the effect of the interaction of shocks with key economic variables related to resilience such as assets, access to basic services, adaptive capacity, diversification of crops and income generating activities. In general, we observe a pattern similar to that observed for SSN for a number of economic variables. In particular, when households experience a violence and a drought shock this strongly reduces with their adaptive capacity and the diversity of income-generating activities. These patterns suggest that a key threat to social safety from extreme adversity in North-east Nigeria is based on economic channels, which is in line with opportunity cost theories of micro-level relationship between climate and conflict.



Figure 6. Shock interactions and other economic outcomes

Note: p-values refer to the interaction term. 95% confidence levels, bootstrapped standard errors.

Cluster-level resources. If the mechanisms behind the strongly compounding effect of violence and droughts shock on social safety are economic in nature, we expect that their strength varies with the level of available resources at the cluster level, where most informal interactions and transfers take place. The results displayed in Table 6 confirm this intuition. When a household in a relatively poor cluster experiences a drought shock in addition to a violence shock its influence is strong and harms social safety, offsetting positive impacts of violence shocks (column 1). In resource-richer clusters, the influence of drought shocks is much

weaker and becomes statistically insignificant, while violence shocks also have a positive impact in such environments (column 2). As communities in North-east Nigeria depend heavily on agriculture, we also expect to see a similar pattern for agricultural resources. As shown in columns 3 and 4, the same patterns obtains, and the influence of drought shocks is even more damaging than for general wealth.

		Outcome: Strength of social safety net					
	Local p	overty	Local agr	-poverty			
	(1)	(1) (2)		(4)			
	High	Low	High	Low			
Violence x drought	-0.616*	-0.253	-1.492***	-0.213			
	(0.329)	(0.290)	(0.328)	(0.248)			
Violence shock	0.349***	0.213**	0.337***	0.255***			
	(0.090)	(0.085)	(0.104)	(0.081)			
Drought shock	0.692***	0.079	0.646***	0.082			
	(0.119)	(0.257)	(0.129)	(0.205)			
Local other	Yes	Yes	Yes	Yes			
HH and M-Y FE	Yes	Yes	Yes	Yes			
N	1255	1320	1277	1298			
R^2	0.087	0.055	0.072	0.034			

Table 6. Shock interactions and the strength of the social safety net

Note: p-values refer to the interaction term. 95% confidence levels, bootstrapped standard errors.

5 Conclusions

The simultaneous occurrence of violent conflict and climate change constitutes an example of polycrises in fragile settings around the world. Studying an acute polycrisis, North-east Nigeria, we show that the impact of experiencing conflict shocks on households' social safety strongly varies with simultaneously experiencing a climatic shock or not. When households do *not* experience a drought, violence shocks *strengthen* their social safety nets. By contrast, when they *do* experience a drought, a violence shock strongly *weakens* households' social safety nets. The impacts are primarily underpinned by a reduction in access to coping strategies relying on informal networks, such as borrowing food and buying food for credit. It thus appears that households in North-east Nigeria are generally willing and able to support those experiencing a shock. Yet, our results suggest that the capacity to cope with one shock together with local networks is much higher than for multiple shocks. Experiencing simultaneous violent conflict events and drought shocks creates strongly compounding challenges in poor areas, which create serious additional risks and vulnerabilities for households that are already among the most fragile. In other words, social safety nets are finite and can be exhausted by the presence of a polycrisis.

Our findings have strong implications for policy and practice. The growing number of polycrises around the world require policies and programs to support populations in ways that are sensitive to the compounding challenges stemming from poverty, violent conflict and climate change. More specifically, effective support intervening in such situations needs to move beyond immediate emergency responses and prioritize the establishment of sustainable, multi-dimensional resilience, a potential strategy for donors that is not yet commonly practiced. Our research suggests that an essential element of these strategies involves strengthening social safety nets, which are critical to well-being and social stability. Social safety nets can deteriorate drastically and quickly, and indeed exhaust themselves, in the face of polycrises.

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Appendix



Figure A1. Strength of the household's safety net (SSN)

Figure A2. Fraction of households reporting shocks in household's cluster



a) Violence shock



