Food and Peace? Exploring the Link between Conflict and Food Insecurity in Africa

d'Agostino, Giorgio and Dunne, J. Paul and Pieroni, Luca

Roma Tre University, University of Cape Town, University of Perugia

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Food and Peace? Exploring the Link between Conflict and Food Insecurity in Africa*

Giorgio d'Agostino[†] J Paul Dunne[‡] Luca Pieroni[§]
Roma Tre University University of Cape Town University of Perugia

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Abstract

This paper contributes to the literature on the costs of conflict, focusing on the important channel of its effect on food security. It does this by examining whether people in conflict zones lack sufficient food and whether this can be directly attributed to armed conflicts. It uses the Afrobarometer household survey and data from the Armed Conflict Location and Event Data Project (ACLED) for conflict indicators, specifically the number of battle-related events at the regional level. The dataset spans 2012–2022 across 29 African countries.The effect of battle-related events (i.e., battle deaths) on food insecurity is evaluated using a two-way fixed effect and a weighted regression framework that directly addresses unobserved heterogeneity. The model shows that a rise in battle-related events in a region leads to increased food insecurity and this result is found to be robust. When more intense food insecurity is considered conflict is also found to have an even larger effect. This provides evidence that conflict has a significant impact on food security in Africa. This has important health implications and adds to the evidence of the important legacy costs of conflict that can last long after the conflict ends.

JEL classification: D74; O55; Q18.
Keywords: Food insecurity; Armed conflicts; African regions.

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[†]Economics Department, Roma Tre University, Via Silvio D'Amico 77, 00145 Rome, giorgio.dagostino@uniroma3.it.

[‡]School of Economics, University of Cape Town, South Africa, jpdbris@gmail.com.

[§]Department of Political Science, University of Perugia, via Pascoli 20, 06123 Perugia, luca.pieroni@unipg.it.

1 Introduction

While there is no unanimity, it is generally accepted that conflict can have negative effects on developing economies, with large economic, social and health costs and none of the countries in conflict meeting the UN Sustainable Development Goals. Much of the literature on the cost of conflict has taken the country as the unit of analysis and used a simple neoclassical growth model to estimate the impact of conflict (Bove et al. 2016 and Crippa et al. 2024 review the studies). Issues with identification at the cross-country level led to a focus on specific potential costs using case studies and sub-national level studies, including the impact on health, education. A similar structure of studies is found in studies of the causes of conflict and violence reviewed in (Dunne and Tian, 2019).

One significant cost with long-term effects is the detrimental impact of conflict on food security. This is highlighted by the fact that over 80% of the world's stunted children and about 60% of undernourished people reside in conflict-affected countries. Its relevance has grown as the number of chronically undernourished individuals has been on the rise since 2016, potentially reversing the previous downward trend in food insecurity observed post-2000. The situation has particularly worsened in regions of sub-Saharan Africa, South-Eastern Asia, and Western Asia, especially in areas affected by armed conflict (FAO, 2017).

This paper contributes to the literature on the relationship between conflict and food insecurity by examining whether people in conflict zones have gone without sufficient food and if this can be directly attributed to armed conflicts. Information from the Afrobarometer household survey *(AHS)* is used to measure both incidence and severity of food insecurity. Data from the Armed Conflict Location and Event Data Project (ACLED) on the number of battle-related events at the regional level is used as the main indicator of conflict (Raleigh et al., 2023).

The dataset used covers the period from 2012 to 2022 across 29 African countries. This is significant because much of the previous research has relied on geographically specific country studies with small sample sizes, making generalisation of the findings uncertain. An attempt is made to estimate the relative importance of battle-related events and the intensity of these events (i.e., battle deaths) on food insecurity.

A two-way fixed effect and a weighted regression framework is used, considering unobserved heterogeneity. A propensity score at the country level is estimated, allowing regions within the same country not affected by conflict to be identified and used for comparison with those involved in conflict. Additionally, the geo-referenced coordinates of each region are used to ensure that the nearest region to the one experiencing a battle-related event is used as a control. The benchmark model demonstrates that an increase in the number of battle-related events in a region leads to a corresponding rise in food insecurity, and is not negligible. Extending the model to consider the heterogeneous influence of the net inflow of Official Development Assistance (ODA) at the country level and the democratic structure of the country gives a larger effect.

The rest of the paper is laid out as follows. Section 2 provides background information and motivation, through a literature review. This is followed by section 3, which introduces the empirical methods and then by section 4 which introduces

and discusses some key features of the data. Section 5 presents the empirical results and provides some robustness tests. Section 6 concludes with a discussion of findings and some policy implications.

2 Conflict and food insecurity

Much of the empirical analysis aims to identify the factors that can create uncertainty in an economic system and lead to food insecurity. These include climate change, price changes, and conflict (Brück et al., 2019; Verpoorten et al., 2013a; Ahrens, 2015).[1]

Conflict can create food insecurity through a number of channels. First, it impacts household sources of income if society is mainly composed of peasants. Poorer farmers produce crops primarily for their own consumption, so conflicts can directly reduce food production. It can also lead to displacement, as producers may need to flee. It is likely to reduce the time that can be spent in the fields and result in a loss of family labour, as members may leave to fight or become killed or injured by attacks and landmines. There can also be the destruction and looting of food, livestock products, and equipment (Verwimp and Muñoz-Mora, 2017).

Second, conflict affects the sale of crops, which is needed to bring in money for other goods and services. Some may produce cash crops and buy food with the sales, while others may use sales to purchase much-needed equipment and seeds (Verwimp and Muñoz-Mora, 2017). More generally, conflict disrupts transport infrastructure, markets, and distribution systems and can also lead to an increase in criminality.[2] Indirectly, conflict can affect other income sources for households. Family members may have jobs outside the farm, and conflict can reduce their employment. Armed forces may target family members because of the roles they have played, and they may enlist family members, reducing labour or income. However, there are possible positive effects, as militias or the military may provide work for household members and pay them. Transfers of income can be affected by conflict, interrupting any social networks that provide support to families or communities, such as remittance flows from the diaspora, thereby causing hardship.

A third impact is on livestock products, which are income-producing assets that can be used for working the land and can provide manure to fertilise crops. They are also an important asset that can be sold in times of distress. Conflict can lead to the loss of these animals or may reduce their price or make it difficult to get them to the market. This can cause households to resort to low-risk, low-return activities and can lead to poverty traps. Conflict may also force pastoralists to move, resulting in competition and conflict with established farmers in the areas they relocate to

[1] This contrasts with the approaches to understanding food security and its links with conflict as systemic, where conflicts are then just shocks that make things worse. This implies that continued food insecurity is inevitable but could be exacerbated by climate change and shocks, such as conflict. One may also expect reverse forms of crises as changes take place, which can lead to violent conflict (Akram-Lodhi, 2013) or food uncertainty.

[2] Bozzoli and Brück (2009) found that conflict led to a retreat into subsistence farming by peasant households in Mozambique. The warring groups often demand shares of farmers' output and may take it if not given voluntarily.

(Brück et al., 2016).

While there is evidence that increases in prices lead to conflict and riots, the question is whether the reverse holds. In fact, consumer grievances, economic constraints, and relative deprivation can lead to conflict and a breakdown in state authority and legitimacy, as failure to deal with price increases and affordability creates insecurity. Households become more dependent on markets to replace lost food, so unless imports can increase, prices will rise. Hostile actions increase transaction costs and may reduce supply. Increases in import prices are also likely to affect social groups differently, impacting the urban poor more than the rural poor.[3]

There are other mechanisms through which conflict may affect food security. External intervention of some form is likely, brokering deals to allow supplies and food aid from international agencies to be made available. The effectiveness of this depends on the political situation. If care is not taken, aid may harm farmers who continue to produce by destroying the demand for their produce. This can result in food insecurity, as well as loss of income and employment opportunities, potentially leading to migration. In such situations, households' usual coping mechanisms can fail, and increasing food prices can affect groups differently, which could lead to conflict between them. Land-poor farmers tend to be net consumers, while land-rich farmers and landowners are net producers. Urban groups will see the increasing prices and reduced availability, which may lead to food riots (Martin-Shields and Stojetz, 2019).

Conflict affecting food security is certainly not the end of the story, as food insecurity can have considerable long-term consequences and legacy effects, including antisocial behaviour and conflict. The society involved could experience long-term impacts on food security. Health impacts include disease, domestic violence, and the existence of refugee/IDP camps. Child health problems can be distressing and long-lasting, resulting from missed schooling and training, and involvement in conflicts as child soldiers. Additionally, it can create incentives to engage in antisocial behaviour, which can lead to retaliations and further conflict. Conflicts often lead to the construction of the 'other,' where the opposing side is seen as different to justify brutal treatment and blamed for any food insecurity. Meanwhile, populations often support armed groups that blame the government for the problems.[4]

It would appear that to consider the relation between conflict and food insecurity is not straightforward and confounding factors may play a relevant role in affecting the magnitude of the point estimates so that a precise identification needs to be implemented.

[3]Poor people, especially in urban areas, spend a large share of their income on food and may suffer severely from food price increases (Verpoorten et al., 2013b).

[4]In recent years, climate change has been recognised as important in creating both food insecurity and conflict. Brzoska and Fröhlich (2016) examines the relationship between environmental/ecological problems and conflict, providing a valuable conceptual framework that questions simple arguments. The usual argument posits that environmental change leads to migration and conflict. However, they argue that the processes are more complex and that conflict is not an inevitable outcome. The complexity of these processes may be one of the reasons researchers tend to focus on particular aspects.

3 Empirical Methods

The objective of our empirical analysis is to determine the effect of conflict on food insecurity and the extent to which these effects differ between countries and regions.

A conventional two-way fixed effects model provides the starting point for the empirical analysis, specified as follows:

$$y_{r,t} = \alpha + \phi_r + \delta_t + \gamma Bat - event_{r,t} + X'_{r,t}\beta + \epsilon_{r,t} \tag{1}$$

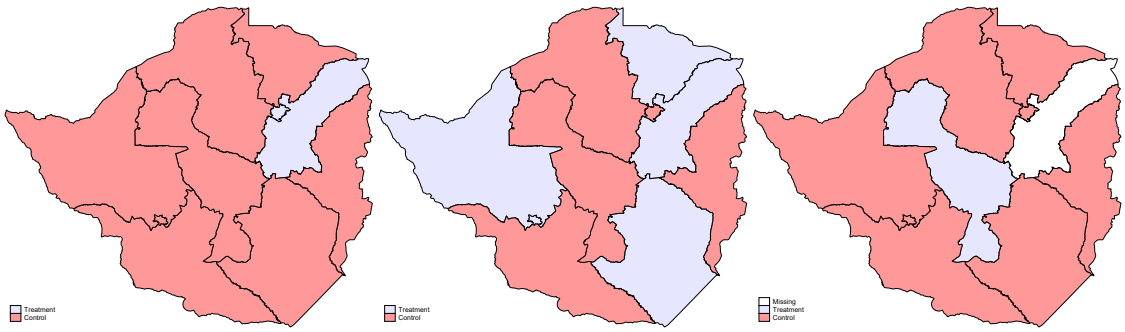
where ϕ_r and δ_t are the administrative region and time fixed effects, γ the core estimated parameter related to the number of conflict-related events and the vector $X_{r,t}$ represents all the relevant covariates. Through the inclusion of fixed effects and covariates, the model estimated by Equation 1 can identify the causal effect of interest, provided that any relevant variables omitted from $X_{r,t}$, are not time-varying.

Imai et al. (2021) show that the two-way fixed effects method may not be suitable for estimating causal effects, as it implies linear additive effects and its justification based on it being equivalent to a DID estimator only holds in the simplest settings,

To consider this issue, a two-step matching weighted estimation strategy is employed. First, a dummy variable is created to indicate whether a region in a country has experienced at least one conflict event in the relevant year, assigning a value of one if it has ($Cexp_{r,t}$). Countries that have not experienced any conflict events in any region during the analysed period are then excluded. This allows for different treatment and comparison groups each year within each country.[5]

As an illustration, Zimbabwe had the regional distribution of conflict shown in Figure 1. In 2012, Zimbabwe had only one conflict in its 8 regions, one region in the 'treatment group' and the others able to serve as 'controls'. By 2017 the number of treated regions had increased to four, including the previously treated region. In 2021, the composition of the two groups shifted, with regions formerly in the treated group now serving as controls.

Figure 1: Example of the used identification strategy in Zimbabwe



(a) 2012 (b) 2017 (c) 2021

In the second step, this dummy variable is used to create weights based on the inverse probability of experiencing a conflict event. A logit model that includes

[5]It also leads to a reduced sample, from 29 countries to 17 countries

all relevant covariates, along with the geographical coordinates of each region, is estimated separately for each country. The logit model for a country is:

$$\text{logit}(P(Cexp_{r,t})) = \eta + X'_{r,t}\nu + \theta_1 Lat_r + \theta_2 Long_r \tag{2}$$

where Lat_r and $Long_r$ represent the latitude and longitude of the region under consideration. Using the predicted probabilities ($\hat{P}(Cexp_{r,t})$) obtained from Equation 2, the inverse probability weights are calculated as follows:

$$w_i = \frac{Cexp_{r,t}}{\hat{P}(Cexp_{r,t})} + \frac{1 - Cexp_{r,t}}{1 - \hat{P}(Cexp_{r,t})}$$

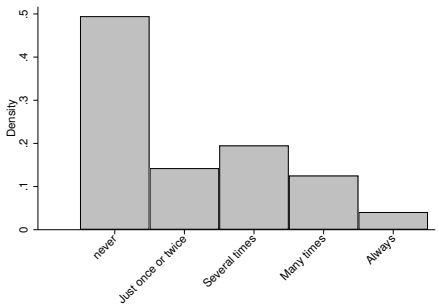
Applying these weights in Equation 1 allows for the comparison of regions within the same country that are similar in terms of their observable characteristics. Additionally, incorporating geographical coordinates helps identify counterfactual regions that are as spatially close as possible.

4 Data & descriptive statistics

To operationalise and estimate the model, the primary data source to construct the regional data is four waves (i.e. 4 to 8) of the Afrobarometer Household Survey *AHS*, covering the years 2012 to 2022 and 29 African countries. The sample surveys, detailed in Table A1 in Appendix A, are representative of adult citizens aged 18 years or older and are stratified at the regional level. Each country-year within the dataset boasts a significant number of respondents, totalling approximately 113,000 observations across the various survey rounds conducted in these countries.

From the survey, food insecurity information is available in the following question of the heads of household: 'Over the past year, how often, if ever, have you or anyone in your family gone without enough food to eat?' The response options are coded as follows: 0 = Never, 1 = Just once or twice, 2 = Several times, 3 = Many times, 4 = Always.

Figure 2: Distribution of food insecurity categories

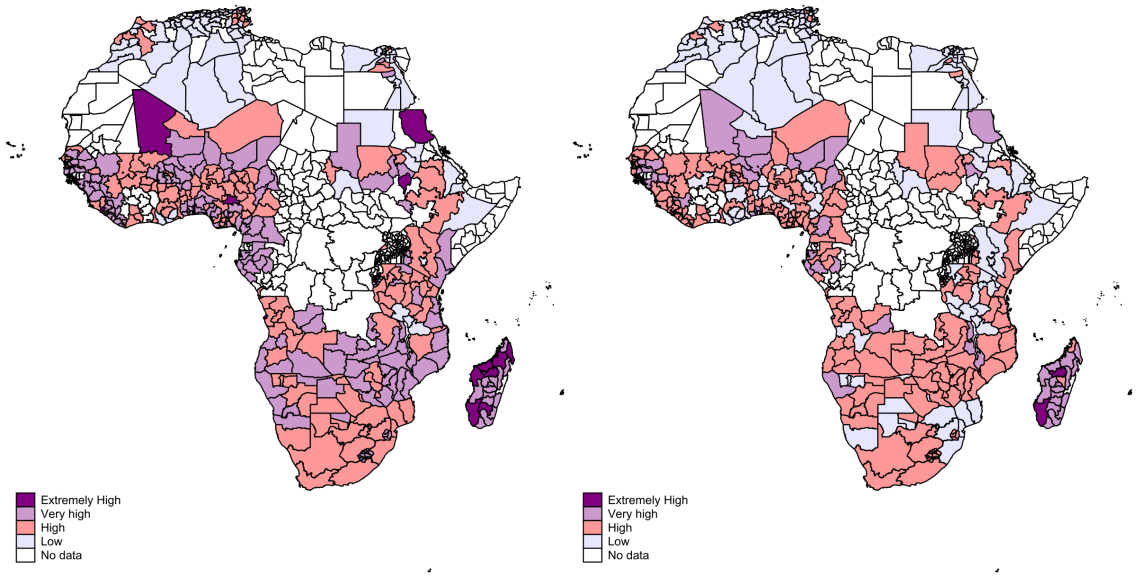


Notes: The food insecurity categories are averaged over the four waves extracted by the *AHS*.

This gives the distribution of the responses by each of the five categories of the food insecurity variable in Figure 2. Headey (2011) discussed the questionnaire

phrase "you or anyone in your family" and suggest that the response will be sensitive to unequal intra-household distribution of food.[6] As shown by the figure, about the 50% of the sample report having experienced a food insecurity issue.

Figure 3: Regional distribution of the select food security indicators



(a) Incidence of food insecurity (b) Food insecurity severity

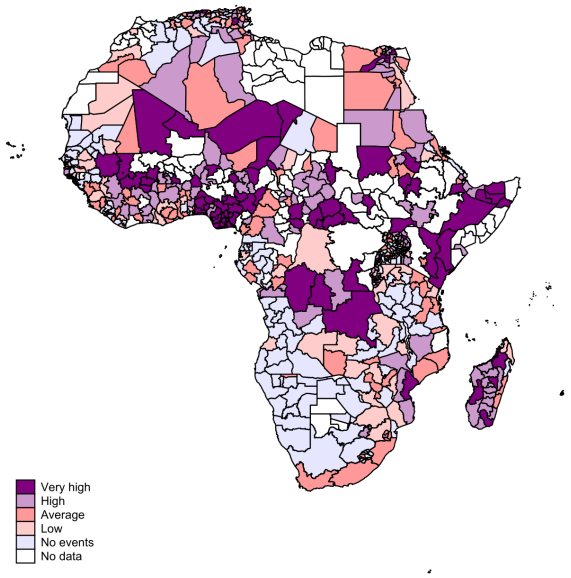
Using these categories, a general measure of the incidence of food insecurity, along with an extension to consider its severity (Verpoorten et al., 2013a).

So two dichotomous indicators of food insecurity were created: (i) the *incidence of food insecurity* , which equals one when households report any level of food insecurity (greater or equal to one), and zero otherwise, (ii) *severe food insecurity*, which equals one for 'several times', 'many times', and 'always' (three and above), and zero otherwise. Figure 3 shows the regional distribution of the constructed variables for the incidence of food insecurity and food insecurity severity and illustrates considerable regional disparity. This analysis will of course provide an underestimate of the impact of conflict, as it is more than likely that intense conflict will reduce the coverage and reliability of the data.

Other relevant variables from the same data source included the household's area of residence and reports of regular army soldiers or police roadblocks within the area. Based on the household's residence, a variable distinguishing between rural and urban areas was created, along with the administrative region in which the household was located. Information on the education level of the household head was also available and used to construct an indicator detailing formal education levels, ranging from primary to tertiary education. Additionally, an indicator for the extent of democracy was developed, represented by a dummy variable indicating whether the country is considered a democracy with at least minor problems (coded

[6]The response could depend on the diet the respondent is accustomed to. For poorer individuals it would likely be staple foods, but for more well-off individuals it is likely to include some more expensive items.

Figure 4: Regional distribution of battle-related events



as 1) or not (coded as 0).[7]

To complete the dataset, some potentially important country-level data on the net inflow of Official Development Assistance (ODA) was introduced. This was used to create a dummy variable indicating whether a country had ODA inflows higher than the yearly sample average.To integrate the household data with the conflict data, aggregation to the regional level was required. For this, variables were constructed to represent the share of a particular response within the region. For example, the extent of democracy variable became the proportion of household heads in a region reporting that they live in a democratic country.[8] Regional conflict data is available from the ACLED database, focusing specifically on the number of battle-related events and associated fatalities, (Raleigh et al., 2010),[9] Figure 4 illustrates the regional incidence of battle-related events the African continent. The indicator shows considerable regional disparity and the highest concentration of conflict events and fatalities in the eastern, western, and central regions of Africa (Raleigh et al., 2010).

It is possible that conflict at the national level may impact upon regions that are not directly affected by conflict. To allow for this, the usual conflict dummy variable was constructed, taking the value one when there were more than 25 battle deaths in the country and zero otherwise.

[7]The survey question was: "In your opinion, how much of a democracy is your country today?" Responses were coded as: 0 = Not a democracy, 1 = A democracy with major problems, 2 = A democracy with minor problems, 3 = A full democracy.

[8]Appendix A, Table A2, presents the mean and standard deviation of all variables, along with the number of observations.

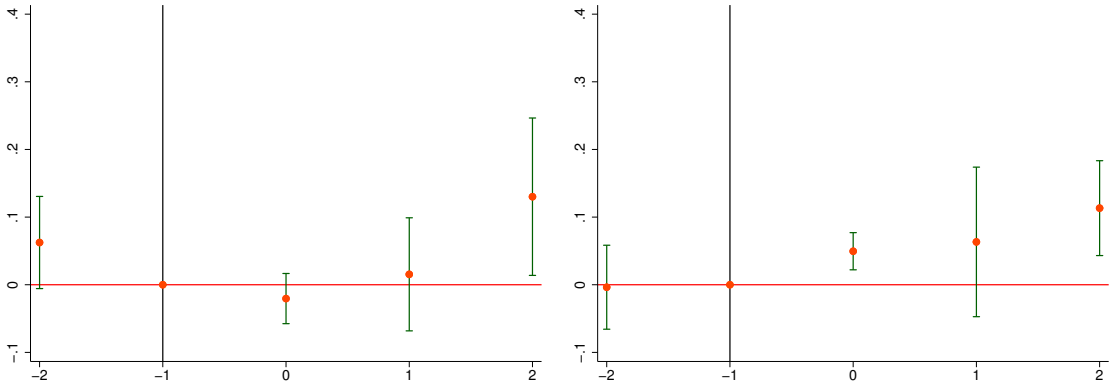
[9]The Armed Conflict Location & Event Data Project (ACLED) is a research initiative dedicated to providing comprehensive and disaggregated data on political violence and protest events globally. ACLED's data collection spans over 170 countries and is meticulously gathered through a network of trained data collectors who meticulously scour news sources, social media platforms, and other open-source materials to identify and categorise incidents of political violence.

5 Empirical Results

As a check on the validity of the identification strategy, a Difference-in-Differences (DiD) analysis was undertaken. This considers whether the changes in food insecurity occurred only after the region was exposed to a conflict event, ensuring that no significant changes occurred beforehand. Figure 5 displays periods prior to the onset of conflict (years: -1 and -2), alongside three periods post-conflict onset (from year 0 to 2). The panel on the left of the figure, treats all regions experiencing at least one battle-related event as exposed, while the one on the right follows Del Prete et al. (2023), in focusing solely on large conflict events, i.e. those with fatalities exceeding the mean plus one standard deviation.

As Figure 5 shows, in the absence of conflict shocks, regions show no significant differences in food insecurity prior to conflict. A clear increase in food insecurity is apparent after the conflict shock. The effect is more pronounced when considering the larger conflict events and the contemporaneous effect is significant. These results are consistent with the conflict shock preceding the changes in food insecurity and justifying the approach taken.

Figure 5: Event study



(a) Conflict events

(b) Large conflict events

Table 1 presents the baseline results from the two-way fixed effect model, which accounts for the incidence of food insecurity, measured as the proportion of households in the region reporting any level of food insecurity. The key independent variable is the number of conflict events in the region, as well as their distribution above and below the sample median. The effect is not negligible: a 10% increase in conflict events is estimated to lead to a 3% rise in the risk of food insecurity. As shown in the Table, all the included covariates exhibit the expected signs, although in most cases they are only marginally significant. As expected, the presence of conflict at the national level, rebel forces in the region, and a higher share of households experiencing income loss all increase the likelihood of food insecurity. Conversely, residing in a country perceived to be more democratic appears to reduce it.

One concern is that the impact of conflict may vary as the number of events increases. To account for this potential non-linearity, columns 2 of Table 1 adopt

the approach suggested by (Del Prete et al., 2023), replacing the conflict count variable with an ordered variable: 0 for regions with no battle events, 1 for regions where the number of events is below the median of the sample distribution, and 2 for regions where the number of events exceeds the sample median. As shown in the second column of the table, while the number of battle-related events below the median is not significant, the number of events above the median yields a positive and significant result.

Table 1: Estimation Results of the two-way fixed effect estimator

	(1)	(2)
Number Conflict Events	0.003	
	(0.001)	
	[0.016]	
Number Conflict Events:		
below the median		-0.019
		(0.018)
		[0.295]
above the median		0.053
		(0.019)
		[0.005]
Conflict (country)	0.041	0.037
	(0.024)	(0.025)
	[0.089]	[0.134]
Presence of regular soldiers	-0.082	-0.076
	(0.064)	(0.063)
	[0.201]	[0.232]
Presence of rebel forces	0.098	0.079
	(0.056)	(0.058)
	[0.079]	[0.173]
Share of urban population	-0.146	-0.098
	(0.099)	(0.099)
	[0.140]	[0.324]
Presence of a democratic regime	-0.056	-0.057
	(0.020)	(0.020)
	[0.005]	[0.005]
High ODA inflow	-0.013	-0.020
	(0.034)	(0.036)
	[0.696]	[0.585]
Share of educated population	-0.076	-0.068
	(0.081)	(0.083)
	[0.351]	[0.413]
Share of population experienced an income loss	0.584	0.581
	(0.081)	(0.081)
	[0.000]	[0.000]
Region FE	yes	yes
Year FE	yes	yes
Observations	878	878
Countries	29	29

Notes: Standard errors are in brackets and p-values are presented in square brackets.

Using inverse probability weighting method gave the results in Table 2. This method reduces the sample size, as it focuses only on countries where at least one region experienced a conflict event during the period under analysis. Consequently, the number of observations is lower compared to the two-way fixed effects model.[10]

[10]Descriptive statistics for the selected sample are reported in Table A3, found in Appendix A.

Table 2, reports the estimated coefficients for the conflict variables. To estimate the inverse probability weight, the covariates used included police or army presence in the area, rural versus urban classification, education level of the household head, degree of democracy, inflows of official development assistance (ODA) at the country level higher than the sample median, the share of households experiencing an income loss and the latitude and longitude of the selected region.

Column 1 shows that the coefficient estimate for conflict events is again significant, though smaller in magnitude. This suggests that part of the earlier observed effect may have been due to a lack of comparability between the two groups. Nevertheless, the impact remains notable: a 10% increase in conflict events is estimated to lead to a 1% rise in the risk of becoming food insecure. Column 2 presents the results for conflict events above and below the sample median. While the number of battle-related events below the median is not significant, the number of events above the median yields a positive and significant result. This suggests that food insecurity is more likely to be affected by larger regional conflicts, whereas smaller conflicts may involve different dynamics, potentially due to varying levels of resilience. In this case while the impact of smaller number conflicts is insignificant, the effect of a larger number of conflict events is significant and larger.

Table 2: Estimation Results of the inverse probability weight regression

	(1)	(2)
Number Conflict Events	0.001	
	(0.000)	
	[0.003]	
Number Conflict Events:		
below the median		-0.015
		(0.030)
		[0.627]
above the median		0.068
		(0.027)
		[0.010]
Observations	700	700
Countries	17	17

Notes: Standard errors are reported in parentheses, and p-values are presented in square brackets.

Two robustness checks were undertaken, on the indicator of conflict and the weights . First, using the number of battle-related deaths as a second indicator of conflict. In principle this would allow the intensity of the conflict within a region to be gauged more precisely than using a dummy variable.[11] Using the same specification as Table 1, the results in Table 3 show the estimated coefficients to align with the benchmark model, implying that the findings do not depend on the nature of the conflict indicator. In this case, both the two-way fixed effect and the

[11]There is always the concern that the actual number of battle death recorded may suffer from measurement problems and not recognising this could lead to spurious accuracy in gauging the impact. That is, a simple dummy based on a threshold gives a good indication that a conflict taking place, but to suggest that the number of battle deaths reflect some continuous indication of changes in intensity would be misguided.

inverse probability weighting model give a significant positive coefficient on the large number of conflict events.

Table 3: Benchmark model, using battle related deaths

	FE (1)	FE (2)	IPW (3)	IPW (4)
Number Conflict Events	0.002		0.001	
	(0.001)		(0.001)	
	[0.039]		[0.032]	
Number Conflict Events:				
below the median		-0.024		0.007
		(0.015)		(0.030)
		[0.113]		[0.806]
above the median		0.090		0.086
		(0.019)		(0.031)
		[0.000]		[0.005]
Region FE	yes	yes	no	no
Year FE	yes	yes	no	no
Covariates	yes	yes	no	no
Observations	878	878	700	700
Countries	29	29	17	17

Notes: Standard errors are in brackets and p-values are presented in square brackets. Results from two-way fixed effects (FE) models and inverse probability weighted (IPW) regressions are reported.

A second potential concern relates to the construction of the weights. Estimating a propensity score for each region within a country enables regions experiencing conflicts to be compared with similar regions that were not. However, in Africa, borders are often arbitrary, drawn along colonial lines, which raises the possibility that regions outside a given country might serve as better counterfactual. Additionally, calculating a propensity score within each country may result in limited observations, particularly in smaller countries. Table 3, reports the results of using all potential regional comparators and shows that the estimated results are robust to the change in the weighting scheme used.

Table 4: Different weighting scheme in the regression

	(1)	(2)
Number Conflict Events	0.001	
	(0.001)	
	[0.003]	
Number Conflict Events:		
below the median		-0.028
		(0.025)
		[0.251]
above the median		0.064
		(0.023)
		[0.006]
Observations	700	700

Notes: Standard errors are in brackets and p-values are presented in square brackets.

A further consideration is the possibility that the relation between food insecurity and some key factors is more complex than considered. While high ODA inflows

and democratic regime perception has been taken into account, it is possible that they will have different effects at different levels of conflict.

First, large inflows of net development assistance might be used by the government to restore the loss of income of households affected by conflict. Indeed, in conflict and post-conflict countries, it provides crucial financial resources that can help stabilize economies and promote sustainable development by addressing key economic challenges and fostering recovery efforts (Collier and Hoeffler, 2004).

Second, there may be important difference between government responses in different political systems. Conflict can increase the use of social safety nets (expressed in the form of cash, in-kind, or other transfers received by households) and access to basic services (mainly access to sanitation) for households exposed to conflict. Well-functioning democratic institutions, with entitlement and strong social cohesion, may support households in the face of conflict, reducing the risk of their becoming food insecure (Brück et al., 2019).

To consider these potential effects, the high ODA inflow and presence of democratic regime variables were interacted with the number of battle-related events. The results in Table 5 shows the marginal coefficients and a significant effect of conflict on food security only for countries receiving an inflow of net ordinary development assistance below the sample median. This result seems to confirm that a large inflow of net ordinary development assistance could mitigate the negative effects of conflict on food insecurity. This is not the case for the form of government, with conflict significantly impacting on food insecurity for both forms of government. However, as shown by the last two columns of the table, the effect of conflict on food insecurity is three times larger in non-democratic countries, with respect to the democratic ones.

Table 5: The effect of net ordinary development assistance and democracy in the relationship between conflict and food insecurity, marginal effects

	ODA		Perceived democracy	
	Low ODA	High ODA	No democratic government	Democratic government
Number Conflict Events	0.001	0.000	0.004	0.001
	(0.000)	(0.001)	(0.001)	(0.000)
	[0.004]	[0.959]	[0.002]	[0.010]
Observations	700	700	700	700

Notes: Standard errors are in brackets and p-values are presented in square brackets. Low and high ODA are measured by a dummy variable equal to 1 when the inflow of net Official Development Assistance is higher than the sample median. Non-democratic and democratic governments are measured by a dummy variable equal to 1 when the share of heads of households assessing that there is democracy in their country is higher than the sample median.

A final concern relates to the possibility of conflict having a somewhat larger impact on those households that are severely affected by food insecurity. The results in Table 6 use the measure of the more intense food insecurity reported, namely several times or more. Interestingly, the results do indeed suggest a slightly larger significant effect of conflict events. For both methods the number of conflict vents above the median are significant.

Table 6: Estimation Results for intense food insecurity

	FE (1)	FE (2)	IPW (3)	IPW (4)
Number Conflict Events	0.004		0.002	
	(0.002)		(0.001)	
	[0.011]		[0.007]	
Number Conflict Events:				
below the median		-0.032		-0.018
		(0.016)		(0.028)
		[0.048]		[0.527]
above the median		0.050		0.052
		(0.020)		(0.025)
		[0.015]		[0.037]
Region FE	yes	yes	no	no
Year FE	yes	yes	no	no
Covariates	yes	yes	no	no
Observations	878	878	700	700
Countries	29	29	17	17

Notes: Standard errors are in brackets and p-values are presented in square brackets. Results from two-way fixed effects (FE) models and inverse probability weighted (IPW) regressions are reported.

6 Conclusions

This paper has contributed to the literature on the costs of conflict by focussing on an important but relatively less researched channel of food insecurity. It has evaluated the overall impact of conflicts and account for variations in food insecurity caused by localized conflicts using a large, nationally representative sample from Africa. This is significant because much of the previous research relies on geographically specific country studies with small sample sizes, making generalization of the findings uncertain.

It has taken the Afrobarometer household survey *(AHS)* which asked respondents about their food security, aggregated the data to regional level(i.e., administrative African regions) and combined with battle event data from the Armed Conflict Location and Event Data Project (ACLED) for the period 2012 to 2022 across 29 African countries. The relationship was modelled and first estimated using a two-way fixed effect and a weighted regression framework. It showed that an increase in the number of battle-related events in a region leads to a corresponding rise in food insecurity. Specifically.

A significant empirical challenge in studying this relationship is that unobserved factors, such as income shocks and climate change-induced natural disasters, may also contribute to increased food insecurity, which in turn raises the likelihood of conflict (Shemyakina, 2022). Using the Imai and Kim (2020); Imai et al. (2021) approach addressed this issue of endogeneity directly. by defining a dummy variable for countries experiencing at least one battle-related event. Measuring a propensity score at the country level enabled identification of regions within the same country that were not affected by conflict and these were used as comparator. Using the geo-referenced coordinates of each region within the country, ensured that the nearest region to the one experiencing a battle-related event was used as a control.

An extended model considered the possible effects of net inflows of Official Development Assistance (ODA) at the country level and the democratic structure of the country. The results indicated that the effect of conflict on food insecurity is significantly influenced by a lack of adequate ODA inflows and the presence of a non-democratic government. In the latter case, 10% more battle-related events increased the incidence of food insecurity of about 4% and its severity of about 5%.

Using interactive term between ODA and democracy perception did suggest that low ODA high conflict observations have the strongest effect.

Finally, when a variable that reflects a more intense level of food insecurity was used, an increase in the effect of conflict events was found. This suggests that more intense conflicts are likely to have larger effects on food insecurity, as might be expected.

Overall, these results provide clear statistical support for a causal link from conflict to food insecurity. This is evident at regional level. It also represents a significant impact of conflict and illustrates that relatively low levels of conflict will still impact on food security. Given the already low levels of nourishment in most affected countries, this is a major concern.

It is also, of course, likely to be an underestimate of these effects, as regions and countries suffering from major conflicts are less likely to provide data and/or may produce less reliable data. It also shows that the impact of conflict goes beyond the usual focus of cross-country studies on loss of output and has clear health implications. These are part of the legacy costs of conflict that have long term implications for development. They receive relatively less attention in the literature and these results suggest that they deserve more.

Appendix A Descriptive statistics by sample

Table A1: Sample composition

	Survey years										
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Benin	-	-	-	-	584	16	-	-	1,136	-	1,736
Burkina Faso	1,104	-	-	792	-	1,200	-	1,200	-	-	4,296
Cameroon	-	768	-	597	-	-	1,058	-	-	1,096	3,519
Cote d'Ivoire	-	-	143	-	-	80	-	88	-	-	311
Gabon	-	-	-	814	-	711	-	-	800	-	2,325
Ghana	2,400	-	1,496	-	-	2,400	-	2,152	-	-	8,448
Guinea	-	936	-	736	-	840	-	1,200	-	-	3,712
Kenya	-	-	1,805	-	1,201	-	-	1,400	-	-	4,406
Lesotho	893	-	320	-	-	288	-	-	576	-	2,077
Liberia	632	-	-	887	-	-	904	-	936	-	3,359
Madagascar	-	856	935	152	-	-	1,104	-	-	-	3,047
Malawi	2,095	-	2,088	-	832	312	-	1,040	-	-	6,367
Mali	992	24	456	-	-	1,200	-	-	1,200	-	3,872
Morocco	-	539	-	416	-	-	336	-	-	336	1,627
Mozambique	1,504	-	-	2,248	-	-	2,264	-	-	974	6,990
Namibia	328	-	624	-	-	360	-	464	-	-	1,776
Niger	-	192	-	584	-	-	816	-	1,199	-	2,791
Nigeria	2,268	36	2,319	81	-	1,600	-	-	1,599	-	7,903
Senegal	-	816	768	-	-	710	-	-	925	194	3,413
Sierra Leone	1,190	-	-	799	-	-	1,200	-	1,200	-	4,389
South Africa	-	-	-	2,390	-	-	1,840	-	-	1,600	5,830
Sudan	-	1,089	-	728	-	-	720	-	-	1,088	3,625
Swaziland	-	1,200	-	960	-	-	-	-	-	1,200	3,360
Togo	352	-	544	-	-	1,200	-	-	832	344	3,272
Tunisia	-	1,180	-	1,072	-	-	1,031	-	1,032	-	4,315
Uganda	385	-	-	664	72	56	-	792	-	-	1,969
Republic of Tanzania	1,464	-	1,739	-	-	1,264	-	-	-	-	4,467
Zambia	4	844	1,039	-	-	552	-	-	896	-	3,335
Zimbabwe	2,400	-	2,400	-	-	1,200	-	-	-	1,080	7,080
Total	18,011	8,480	16,676	13,920	2,689	13,989	11,273	8,336	12,331	7,912	113,617

Table A2: Descriptive statistics of the original sample

	Observations	Mean	Standard deviation
Incidence of food insecurity	884	0.49	0.20
Food insecurity severity	884	0.35	0.19
Battle related events	884	2149.69	25176.41
Battle related deaths	884	436.71	5160.61
Presence of regular soldiers	884	0.11	0.18
Presence of rebel forces	884	0.11	0.20
Share of urban population	884	0.38	0.27
Presence of a democratic regime	884	0.51	0.50
Share of ODA at the country level	884	0.47	0.49
Share of educated population	884	0.64	0.24

Table A3: Descriptive statistics of the identified sample

	Full-sample	Treated	Non treated
Incidence of food insecurity	0.50	0.50	0.51
Food insecurity severity	0.36	0.36	0.35
Battle related events	530.73	0.00	919.25
Battle related deaths	2617.39	0.00	4533.48
Presence of regular soldiers	0.12	0.09	0.15
Presence of rebel forces	0.12	0.08	0.16
Share of urban population	0.38	0.37	0.39
Presence of a democratic regime	0.50	0.57	0.45
Share of ODA at the country level	0.50	0.64	0.40
Share of educated population	0.64	0.62	0.66
Observations	724	418	306

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