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The Nexus Between Armed Conflict and Food Insecurity

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ABSTRACT

Hunger and armed conflict are rising global issues that significantly hinder progress toward achieving Sustainable Development Goal (SDG) 2: ending hunger, achieving food security, and promoting sustainable agriculture by 2030. The SDG 2022 progress report indicates that SDG 2 met only about 18% of its global target. This study examines the nexus between armed conflict and food security and agricultural production, using fixed-effect and system-GMM models applied to data from the Uppsala Conflict Data Program (UCDP) covering 44 states and territories from 2000 to 2023. The findings reveal that armed conflict exacerbates food insecurity, undernourishment, and disrupts agricultural production. Specifically, a one-year conflict with average annual direct deaths of 3,000

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increases the prevalence of moderate or severe food insecurity by 0.121% and undernourishment by 0.192%. Additionally, conflict reduces the livestock production index by 0.128%, crop production index by 0.160%, and food production index by 0.144%. This study underscores the negative impact of armed conflict on SDG 2 progress and highlights the need for targeted policy interventions in conflict-affected countries to address food insecurity, nutrition, and agricultural development.

***Keyword*:**ArmedConflict,Cropproduction,Foodproduction,Food Insecurity,Foodproduction,Hunger,SustainableDevelopmentGoal2, Undernourishment,Livestockproduction.

1. INTRODUCTION

اَلْحَمْدُ لله رَبِّ العَالَمِينَ وَالصَّلَاةُ وَالسَّلَامُ عَلى سَيدِالْمُرْسَلِينَ وَعَلَى اَلِهِ وَصَحْبِهِ اَجْمَعِينَ.

According to the World Economic Forum's 2024 global risk report, societal or political polarization is the third most severe global challenge on the rise (World Economic Forum, 2024). It is further evident in the violence-related datasets. For example, the Uppsala Conflict Data Program (UCDP) dataset recorded over 1,900-armed conflict events since 1989 (Davies, Engström, Pettersson, & Öberg, 2024). Furthermore, the Armed Conflict Location and Event Data (ACLED) dataset, reports over 148,000 verified cases of political violence just in 2023 (Raleigh, Kishi, & Linke, 2023). Consistent with the growing number of cases of global violence, the economic and socioeconomic consequences of violence are also documented. The Institute for Economics and Peace estimated the global economic cost of violence at $17.5 trillion in 2022 (Institute for Economics & Peace, June 2023). Scholars also quantify this for a single economy. For instance, institutions impacted by or related to the war in Afghanistan receive approximately 46% of the country's overall government budget (Meng et.al, 2024). In addition, according to the Internal Displacement Monitoring Center (IDMC) reports, conflict-derived internal displaced persons (IDPs) have grown by 50% in the last five years, reaching nearly 76 million across 116 countries at the end of 2023.(https://www.internal-displacement.org/global-report/grid2024/) More arguably, the United Nations Food Programme's Prevention of Violent Extremism (PVE) report shows that at least 2 billion people reside in conflict-affected states, which are responsible for 88% of terrorist attacks and 98% of terror-related deaths in 2022.

On the other hand, data from reputable organizations paints a concerning picture of the rising food insecurity rate and hunger across the globe. A joint report by the Food Security Information Network (FSIN) and the

Global Network Against Food Crises (GRFC) reveals that in 2023, an alarming 282 million people in 59 food-crisis countries faced acute high level of food insecurity. Notably, 135 million of these individuals reside in conflict-affected regions, highlighting the compounding effect of armed conflict on food security.(https://www.fsinplatform.org/grfc2024) Additionally, the Food and Agriculture Organization (FAO) estimates that 2.4 billion people globally experienced moderate or severe food insecurity in 2022. (https://doi.org/10.4060/cc3017en) Furthermore, the World Food Programme (WFP) adds to this concern by projecting a further rise in acute food insecurity, with an estimated 309 million people expected to face critical food shortages across 71 countries by 2024. (https://doi.org/10.4060/cc3017en) Moreover, according to the FAO report, between 691 and 783 million people faced hunger in 2022, and over 3.1 billion were unable to maintain a healthy diet in 2021 around the world.

Yet, Sustainable Development Goal (SDG) 2, as a global commitment, promises to address this problem. However, SDG2 is confronting formidable obstacles in its pursuit of achieving global food security and ending hunger by 2030. According to reports, one in ten people on the planet is estimated to go shortage of food in 2022, and approximately 18% of the SDG2 targets are predicted to be reached globally. (https://doi.org/10.4060/cc3017en)This is especially troublesome in conflict zones since acute malnutrition and food insecurity rates increases as a result of disruptions in the food supply chain (Teodosijević, 2003). For example, owing to the ongoing war between Israel and Hamas, over 96% of the Gaza population faces a high level of acute food insecurity (https://doi.org/10.4060/cc3017en). Furthermore, following the human crisis in the Gaza Strip, 55% of the population in the Syrian Arab Republic, 55% of the population in Yemen, 46% of the population in Afghanistan, and 25% of the population in Ukraine were marginally able to meet minimum food needs in 2022 (FSIN (Food Security Information Network), 2023) (. https://doi.org/10.4060/cc3017en). Moreover, the SDG reports indicate that four out of five fragile and conflict-affected nations are unlikely to meet their SDG targets by 2030.(https://doi.org/10.4060/cc3017en) The stark reality painted by these statistics reveals a pressing global concern due to ongoing conflict around the world: food insecurity and malnutrition are posing a significant public health challenge, particularly in conflict-affected states.

However, the statistics discussed above suggest that armed conflict is a key driver of food insecurity and undernourishment in conflict-affected nations. Armed conflict involves destroying or disrupting agricultural infrastructure, food production, and logistic services, which constrains

food supply, ultimately contributing to a shortage of accessible food in society. Our understanding of the relationship between armed conflict and food insecurity is evolving from a unidirectional to a more nuanced, potentially cyclical model. While existing research provides strong evidence that armed conflict acts as a primary driver of food insecurity (FAO et.al, 2017), scholars argue that armed conflict disrupts land-use systems (Baumann & Kuemmerle, 2016), agricultural production (Arias, Ibáñez, & Zambrano, 2019), and livestock management (Maass et.al, 2012), leading to documented increases in undernourishment as evident by Gates et al. (Gates et.al, 2012) from a global perspective and country-level as child malnutrition in Sudan (Dahab, Bécares, & Brown, 2020). On the other hand, a growing body of scholars suggests a potential causal relationship between armed conflict and food insecurity. For example, Hendrix and Brinkman (2013) and Messer and Cohen (2007) argue that food insecurity itself can exacerbate societal tensions and grievances, potentially fueling further conflict and vice versa. Nonetheless, the negative impact of armed conflict on food security is more evident in case studies. For instance, the case studies on Nigeria (George, Adelaja, & Weatherspoon, 2020) , Afghanistan (Yolchi, Wang, & Pede, 2024) and Ethiopia (Weldegiargis, et al., 2023) provide statistical evidence to conclude that armed conflict is the main driver of food insecurity in conflict-affected areas. Moreover, conflict destabilizes financial institutions, leading to a surge in operational risks in the banking sector, which hinders economic growth and financial stability (Ghafoori et.al, 2018).

Armed conflict has a profound and detrimental impact on both economic and socio-economic development, as evidenced by various studies. In Afghanistan, for example, armed conflict exacerbates poverty and disrupts essential services, such as water and sanitation, which directly affects public health outcomes, including child mortality rates (Ghafoori, 2022). The economic impact of terrorism in South Asia further highlights how violence impedes productivity, trade, and investment, which in turn exacerbates poverty and limits opportunities for education and employment (Meng & Ghafoori, 2024). Armed conflict also exacerbates socio-economic inequalities, as seen in Afghanistan, where poverty and lack of education are key drivers of early female child marriage, perpetuating cycles of disadvantage (Ehsan et.al, 2021a; 2021b). Additionally, conflict disrupts capacity-building initiatives for civil servants, undermining institutional development and governance (Ghafoori, Marat, & Rezaie, 2019). Thus, armed conflict undermines multiple facets of development, creating long-term barriers to progress in both the economic and socio-economic domains.

Despite significant research indicating that armed conflict is associated with food insecurity and malnourishment, there remains a deficiency in academic knowledge regarding cyclical mechanisms. However, this research considers this topic from a global viewpoint that covers both the MDG and SDG time periods. Furthermore, previous studies tend to be country- or case-specific, making it challenging to generalize the findings for a global understanding. To fill these gaps, this study uses a disaggregated methodology to investigate the precise mechanisms by which armed conflict impedes food security and nutrition. In our first strategy, we test the impact of armed conflict on two hunger-related indicators: food insecurity and undernourishment. During armed conflict, the food supply chain may be disrupted and access to enough food may be constrained, ultimately pushing more people into food insecurity and malnutrition. However, armed conflict has the potential to destroy agricultural and livestock activities as well. In our second strategy, to understand how food supply may be disrupted, we simultaneously examined the effect of armed conflict on agricultural activities: food production, crop production, and livestock production. This improved understanding is critical to the creation of comprehensive strategies that support food security in conflict areas and to understand the cyclical mechanisms of armed conflict and food insecurity while simultaneously addressing the underlying tensions that may prolong this cycle of interaction.

2.Literature Review

The relationship between armed conflict and food insecurity has received increasing scholarly attention over the last two decades. Existing literature generally identifies armed conflict as one of the principal drivers of food insecurity, undernourishment, and agricultural disruption, particularly in fragile and conflict-affected states. However, more recent studies also suggest a cyclical relationship in which food insecurity itself may contribute to social instability and conflict recurrence.

A substantial body of literature demonstrates that armed conflict negatively affects food systems through the destruction of infrastructure, displacement of populations, disruption of markets, and reduction in agricultural productivity. Baumann and Kuemmerle (2016) argue that violent conflict significantly alters land-use systems and undermines agricultural sustainability through environmental degradation and forced displacement. Similarly, Arias, Ibáñez, and Zambrano (2019) find that conflict constrains agricultural production by limiting access to farmland, labor, and local markets. Maass et al. (2012) further demonstrate that armed violence disrupts livestock management systems, reducing

livestock productivity and increasing vulnerability among rural households dependent on pastoral livelihoods.

From a broader perspective, empirical evidence consistently links armed conflict to increased food insecurity and undernourishment. Gates et al. (2012) show that countries experiencing prolonged conflict exhibit significantly higher levels of undernourishment compared to relatively peaceful societies. Likewise, Dahab, Bécares, and Brown (2020), in their study of Sudan, reveal that conflict exposure contributed directly to rising child malnutrition and deteriorating public health outcomes. These findings support the argument that conflict undermines both food availability and food accessibility.

Country-specific studies also provide strong evidence regarding the adverse effects of conflict on food security outcomes. In Nigeria, George, Adelaja, and Weatherspoon (2020) conclude that violent insurgency and terrorism significantly reduce household food access and agricultural productivity. In Afghanistan, Yolchi, Wang, and Pede (2024) identify armed conflict as a major determinant of food insecurity through its effects on displacement, rural livelihoods, and economic instability. Similarly, Weldegiargis et al. (2023) find that conflict in Ethiopia severely disrupted agricultural activities and intensified food shortages across affected communities. Collectively, these studies suggest that the destructive effects of conflict on food systems are consistent across different political and geographical contexts.

In addition to its direct impact on food systems, armed conflict also undermines broader socio-economic development. Ghafoori et al. (2018) argue that conflict destabilizes financial institutions and increases operational risks in the banking sector, thereby weakening economic growth and financial stability. Furthermore, studies conducted in Afghanistan demonstrate that conflict exacerbates poverty, weakens public services, and contributes to poor health outcomes and educational inequalities (Ehsan et al., 2021a, 2021b; Ghafoori, 2022). Meng and Ghafoori (2024) further show that terrorism and political violence negatively affect trade, investment, and productivity in South Asia, thereby limiting long-term development opportunities.

While much of the literature treats armed conflict as a primary cause of food insecurity, a growing body of scholarship argues for a bidirectional or cyclical relationship between the two phenomena. Hendrix and Brinkman (2013) contend that food insecurity may intensify grievances, resource competition, and social instability, thereby increasing the likelihood of violent conflict. Similarly, Messer and Cohen (2007) argue that chronic hunger and economic deprivation can contribute to political instability and communal violence. This emerging perspective suggests

that food insecurity is not only a consequence of conflict but may also function as a contributing factor to conflict persistence and recurrence.
Despite the growing body of literature on conflict and food insecurity, several important gaps remain. First, many studies rely heavily on country-specific analyses, limiting the generalizability of findings across regions and time periods. Second, relatively few studies examine the mechanisms through which armed conflict affects multiple dimensions of agricultural production simultaneously, including food, crop, and livestock production. Third, limited attention has been paid to the cyclical interaction between conflict and food insecurity from a global perspective covering both the Millennium Development Goal (MDG) and Sustainable Development Goal (SDG) eras. Addressing these gaps is essential for developing more comprehensive policy responses aimed at improving food security and reducing conflict-related vulnerabilities worldwide.

3.Research Design

31-Data

We employed two datasets: the World Development Indicators (WDI) (World Bank, 2024) and the Upsala Conflict Data Program (UCDP) Battle-Related Deaths Dataset (BRD) version 24.1 (Davies, Engström, Pettersson, & Öberg, 2024). The UCDP dataset, as a comprehensive conflict-related dataset, defines armed conflict as using force in dispute—one party is state government—with at least 25 battle-related deaths in a calendar year. In addition, the UCDP categorizes the armed conflict into extrasystemic, interstate, intrastate, and internationalized intrastate. **(**(https://ucdp.uu.se/downloads/) For armed conflict-related raw data, we employed the UCDP-BRD dataset. For dependent indicators and other control variables, we used the WDI dataset.

3.2-Dependent variable

We separated the dependent variables into hunger-related and agricultural production-related indicators. We measured hunger by the prevalence of malnourishment and moderate or severe food insecurity among the population (%of the population). Simultaneously, we measured agricultural production by the food production index, crop production index, and livestock production index. (http://www.fao.org/faostat/en/#home.)

3.3-Independent variable

The intensity of armed conflict is our main independent variable. We measured the intensity of armed conflict by conflict-related deaths. According to the UCDP dataset, deaths brought on by warring parties and directly connected to fighting are referred to as battle-related deaths.

Combat operations on the battlefield, guerilla tactics, and other forms of bombardment of military installations, towns, and villages are all included. Every death that occurs in these circumstances, whether it be military or civilian, is considered a battle-related death. For more detail, please refer to UCDP Codebook v. 24.1.

3.4-Control variable

To measure the effect of armed conflict on selected SDG indicators, we incorporate several macroeconomic and governance indicators as control variables. Per capita income, military expenditure, and total population are used as proxy for macroeconomic indicators. Moreover, control of corruption, rule of law, government effectiveness, regulatory quality, and voice and accountability variables are proxyes for governance quality. However, in the wake of armed conflict, these macroeconomic and governance indicators are crucial in determining the impact of armed conflict on selected indicators.

3.5-Econometric model

For econometric estimation, we applied both static and dynamic regression models: fixed-effect and system-generalized method of moments (system-GMM). However, fixed effect controls for unobserved heterogeneity and system-GMM address the endogeneity problems (Wooldridge, 2010; Arellano & Bond, 1991; Arellano & Olympia, 1995). We applied system-GMM to address endogeneity because food insecurity and malnutrition can exacerbate existing tensions and grievances (Hendrix & Brinkman, 2013). However, two tests for selecting an appropriate instrument are crucial in system-GMM. The Sargan-Hansen and serial-autocorrelation tests (Arellano & Bond,1991; Arellano & Olympia, 1995). The Sargan-Hansen test evaluates the validity of the instruments used in the model, and serial autocorrelation examines whether the error term is serially correlated or not. The rejection of the null hypothesis in both tests gives support to the models. Nevertheless, these approaches are anticipated to address the heteroskedasticity, cross-sectional dependency, serial autocorrelation, and endogeneity problems in our data, which panel data often faces.

3.6-Empirical Results

a. Descriptive analysis

Tabel 1 presents the summary statisitcs of variables. A nuanced analysis of the data reveals a potentially intricate interplay between armed conflict, hunger, and agricultural production. The alarmingly high average number of battle-related deaths (3,020 annual average) underscores the pervasive nature of armed conflict. This, coupled with the substantial prevalence of

undernourishment(17.3%)and food insecurity(44.8%), suggests a complex relationship between conflict and hunger. It is plausible that conflict disrupts agricultural production, leading to food insecurity and malnutrition. The fluctuating crop production index (standard deviation: 34.6) compared to the more stable livestock and food production indexes lends credence to this possibility. Investing in agricultural resilience in conflict-affected regions could be a critical strategy to bolster food security

Table 1. Summary statistics of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Battle-related deaths (person)	684	3,020	12,895	25	170,047
Prevalence of undernourishment (%)	927	17.307	14.784	2.5	75.6
Prevalence of food insecurity (%)	372	44.821	25.608	3.4	89.4
Livestock production index	1057	91.143	21.31	18.68	189.99
Food production index	1057	91.052	21.057	32.16	183.45
Crop production index	1058	92.404	34.619	25.49	922.1
Per capita income (current US$)	1048	4,238	9,149	110	76,329
Military expenditure (% of GDP)	984	2.442	1.837	.22	33.547
Population, total (million)	1081	7.981	1,857.567	2.895	1,417.453

Note: All three agricultural production indexes, according to the Food and Agriculture Organization of the United Nations (FAO), show the relative level of the aggregate volume of agricultural production for each year in comparison with the base period of 2014–2016. To obtain the index, the aggregate for a given year is divided by the average aggregate for the base period (2014–2016 = 100).

b. Baseline Findings

investigates the association between armed conflict and hunger. Part II (Models 3-5) looks at the impact of armed conflict on agricultural production. Model 1 examines the effect of armed conflict on the prevalence of undernourishment. The result indicates the detrimental impact of armed conflict. The estimate of 0.015 at the 5% significance level suggests that a medium-sized armed conflict with an intensity of annual battle deaths of on average 3,000 increases the likelihood of a prevalence of undernourishment among the population by around 0.121 percentage points.(The log coefficient (0.015) multiplied by the log average battle-related deaths (log 3,020 = 8.013) is 0.121.) In the calculation and interpretation of the coefficient, we followed the (Gates, Hegre, Nygård, & Strand, 2012) approaches. Model 2 tests the impact of armed conflict on the prevalence of food insecurity. The result also reveals the negative impact of armed conflict. The analysis of 0.024 at the 5% significance

level indicates that the same severity of armed conflict is associated with a rise in moderate or severe food insecurity among the population, with 0.192 percentage points. In terms of elasticity, a one percent increase in battle-related deaths is estimated to increase malnutrition by around 0.051% and food insecurity by around 0.024% among the population.

Table 2 presents the baseline empirical results. Part I (Models 1 and 2)

Table 2. The fixed-effect analysis results of armed conflict, hunger, and agricultural productions: baseline findings

VARIABLES	**Part I**: Hunger		**Part II**: Agricultural Production		
	(1)	(2)	(3)	(4)	(5)
	Undernourishment	Food insecurity	Livestock production	Crop production	Food production
Battle-related deaths (ln)	0.051**	0.024**	-0.016*	-0.020*	-0.018**
	(0.023)	(0.009)	(0.009)	(0.011)	(0.008)
Per capita income (ln)	-0.343**	-0.085	0.223***	0.106***	0.114***
	(0.159)	(0.054)	(0.052)	(0.036)	(0.030)
Military Expenditure (ln)	-0.113	0.088	0.035	0.015	0.033
	(0.116)	(0.056)	(0.049)	(0.066)	(0.045)
Population (ln)	-0.271	0.888**	0.713***	0.963***	0.956***
	(0.379)	(0.325)	(0.175)	(0.196)	(0.172)
Conflict type (Interstate reference)					
Intrastate	-0.101	0.069**	0.052	0.043	0.047
	(0.144)	(0.031)	(0.068)	(0.057)	(0.043)
Internationalized	0.094	-0.073*	0.071	0.010	0.031
	(0.180)	(0.042)	(0.071)	(0.071)	(0.053)
Constant	9.625	-11.760***	-9.798***	-13.245***	-13.233***
	(5.961)	(5.479)	(2.898)	(3.390)	(2.967)
Observations	506	254	564	564	564
R-squared	0.335	0.248	0.598	0.463	0.619
Number of countries	42	31	44	44	44
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Note: All dependent variables considered in their natural logarithm forms. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

In Model 3, we examine the effect of armed conflict on the livestock production index. We find that armed conflict constrains livestock production. The estimated data shows, on average, 3,000 annual deaths due to armed conflict associated with a reduction in livestock production index by 0.128 percentage points. In Model 4, we further gauge the effect of armed conflict on crop production. The results also confirm the detrimental effect of armed conflict. The analysis indicates that crop production index is reduced by at least 0.160 percentage points for every 3,000 battle-related deaths. Moreover, in Model 5, we test the impact of armed conflict on the food production index. The result is in line with the above findings. Armed conflict also disrupts food production. Armed conflict with the same severity of battle-related deaths is estimated to reduce food production index by around 0.144 percentage points. The above findings suggest that armed conflict has a detrimental impact on the reduction of undernourishment and food insecurity, while the main impact could be more severe due to a decrease in agricultural production.

c. Robustness Checks

For robustness checks, we applied two methods. In our first strategy, we tested the quality of governance in determining the impact of armed conflict. On the other hand, food insecurity and malnourishment can exacerbate existence volatility; therefore, in our second strategy, we applied the system-GMM model. The results for both approaches are presented in Tables A1 and A2 (see appendix). The results are still quantitatively consistent with baseline findings in both approaches, confirming the detrimental impact of armed conflict on progress toward achieving SDG2 targets. It implies that the inclusion of governance indicators or addressing the endogeneity problem in our baseline investigation does not change the statistically negative impact of armed conflict on the ending of hunger and the promotion of agricultural production. However, among the included governance indicators, control of corruption statistically reduces undernourishment and promotes crop and food production. In addition, the results form system-GMM indicate that the one-year-lag of dependent variables is significantly associated with their current values. For example, the one-year lagged value of undernourishment at the 1% significance level with a strong coefficient increases the current value of undernourishment. Another example is that the result of the previous value of food production is positively associated with the current value of food production. Nevertheless, the findings, unveil a potentially intricate dynamic between hunger, agricultural production, and the lingering effects of armed conflict. The significant positive coefficient on the lagged undernourishment variable suggests a

path dependence, where past experiences of undernourishment, potentially exacerbated by conflict-related disruptions, exert a persistent influence on current levels. This underscores the potential for a vicious cycle, where existing undernourishment becomes entrenched without significant interventions. Conversely, the positive and statistically significant coefficient on the lagged food production variable lends credence to the possibility of positive inertia. However, it is crucial to acknowledge the potential for endogeneity bias, where factors influencing food production might also correlate with the error term. Despite this caveat, the results tentatively suggest that higher food production in the previous year can contribute to increased production in the current year. This highlights the potential importance of agricultural development initiatives aimed at bolstering food security and potentially mitigating the negative impacts of conflict on sustenance.

-Discussion and Conclusion

Contribution of the Study

This study contributes to the literature on armed conflict and food security in several important ways. First, unlike many previous studies that focus on a single dimension of food insecurity or rely primarily on country-specific analyses, this study adopts a multidimensional and global approach by simultaneously examining five interconnected indicators: food insecurity, undernourishment, crop production, livestock production, and overall food production. This approach provides a more comprehensive understanding of the mechanisms through which armed conflict disrupts food systems and contributes to hunger and malnutrition. Second, the study utilizes annual panel data from 44 conflict-affected countries and territories covering both the Millennium Development Goal (MDG) and Sustainable Development Goal (SDG) periods from 2000 to 2023. This broader temporal and geographical coverage enables a more comprehensive assessment of how food security challenges have evolved in conflict-affected settings over time.

Third, this research advances the theoretical understanding of the relationship between armed conflict and food insecurity by recognizing their potentially cyclical interaction. While previous studies primarily emphasize conflict as a driver of food insecurity (FAO et al., 2017; Gates et al., 2012), this study also acknowledges that persistent food insecurity and deprivation may intensify grievances and contribute to social instability and conflict recurrence (Hendrix & Brinkman, 2013; Messer & Cohen, 2007).

Finally, the study contributes methodologically by examining the mechanisms through which armed conflict affects agricultural and

livestock production, thereby linking conflict dynamics directly to disruptions in food systems and progress toward achieving SDG2 targets.

DISCUSSION

The findings of this study demonstrate that armed conflict significantly increases food insecurity and undernourishment in conflict-affected countries. These results are consistent with previous research showing that violent conflict disrupts food systems, damages infrastructure, limits market access, and weakens agricultural productivity (Arias et al., 2019; Baumann & Kuemmerle, 2016; Gates et al., 2012). The results further indicate that conflict negatively affects crop production, livestock production, and overall food production, thereby reducing food availability and increasing vulnerability to hunger.

The findings also highlight the interconnected nature of SDG2 targets. Disruptions in agricultural productivity contribute directly to food shortages, rising food prices, and worsening nutritional outcomes. In conflict settings, these disruptions are often compounded by displacement, poverty, institutional fragility, and declining purchasing power, all of which further limit access to adequate food. The prolonged conflict in the Tigray region of Ethiopia illustrates these dynamics, where disruptions in food production, market access, and humanitarian assistance contributed to severe food insecurity (Weldegiargis et al., 2023).

Importantly, the study supports the growing argument that the relationship between armed conflict and food insecurity is not solely unidirectional. The evidence suggests a mutually reinforcing relationship in which conflict intensifies food insecurity, while persistent hunger and deprivation may increase grievances, social tensions, and the likelihood of further instability (Hendrix & Brinkman, 2013; Messer & Cohen, 2007). This cyclical interaction indicates that food insecurity should not only be viewed as a humanitarian consequence of conflict but also as a factor that may contribute to conflict persistence and recurrence.

Furthermore, the findings emphasize that armed conflict undermines broader socio-economic development by weakening rural livelihoods, reducing agricultural resilience, and destabilizing local economies. Since agriculture remains a primary source of employment and income in many conflict-affected countries, disruptions in agricultural systems have far-reaching implications for poverty reduction, nutrition, and long-term sustainable development.

Policy Implications

The findings of this study carry important policy implications for governments, international organizations, humanitarian agencies, and development practitioners. First, addressing food insecurity in conflict-affected regions requires integrating peacebuilding and food security strategies rather than treating them as separate policy domains. Sustainable progress toward achieving SDG2 cannot be realized without reducing violence and political instability.

Second, policymakers should prioritize the protection of agricultural infrastructure, rural livelihoods, and food supply chains during periods of conflict. Investments in conflict-resilient and climate-resilient agricultural systems, including support for smallholder farmers and livestock producers, are essential for maintaining food production in fragile settings.

Third, humanitarian responses should extend beyond short-term food assistance and include long-term recovery strategies aimed at rebuilding agricultural capacity, restoring local markets, and strengthening institutional resilience. Improving transportation infrastructure, irrigation systems, market accessibility, and rural financial services can help reduce the vulnerability of food systems to conflict-related shocks.

Fourth, governments and international development partners should incorporate conflict risk assessments into national food security and development planning. Strengthening early warning systems that monitor both food insecurity and conflict indicators may help identify vulnerable populations before crises escalate.

Finally, greater international cooperation and financial assistance are necessary to support conflict-affected countries in achieving SDG2 targets. International organizations and donor agencies should coordinate efforts to address both the immediate humanitarian consequences of conflict and the structural drivers of food insecurity.

4. CONCLUSION

This study examined the impact of armed conflict on food insecurity, undernourishment, and agricultural production in 44 conflict-affected countries and territories between 2000 and 2023. The findings demonstrate that armed conflict significantly increases food insecurity and undernourishment while simultaneously reducing crop production, livestock production, and overall food production. These results confirm that conflict undermines progress toward achieving SDG2 targets related to ending hunger, eliminating malnutrition, and improving agricultural productivity.

The study further reveals that the relationship between armed conflict and food insecurity is complex and potentially cyclical. Armed conflict disrupts food systems and reduces food availability, while persistent food insecurity and deprivation may contribute to social instability and conflict recurrence. This interconnected relationship highlights the importance of adopting integrated and conflict-sensitive approaches to food security and development policy.

By adopting a multidimensional and global perspective, this study contributes to a broader understanding of how armed conflict affects food systems and sustainable development outcomes. The findings underscore that achieving SDG2 in fragile and conflict-affected settings requires not only humanitarian assistance but also long-term investments in peacebuilding, agricultural recovery, institutional resilience, and socio-economic development. Ultimately, reducing hunger and malnutrition in conflict-affected regions depends on addressing both the immediate consequences and the structural drivers of violence and food insecurity.

Table A1. The fixed-effect analysis results of armed conflict, hunger and agricultural productions: robustness check using governance indicators					
VARIABLES	**Part I**: Hunger		**Part II**: Agricultural Production		
	(1)	(2)	(1)	(2)	(1)
	Undernourishment	Food insecurity	Livestock production	Crop production	Food production
Battle-related deaths (ln)	0.058***	0.027***	-0.017**	-0.020**	-0.019***
	(0.021)	(0.010)	(0.008)	(0.009)	(0.007)
Per capita income (ln)	-0.325**	-0.114*	0.192***	0.093***	0.105***
	(0.127)	(0.059)	(0.053)	(0.034)	(0.032)
Military Expenditure (ln)	-0.097	0.097	0.039	-0.008	0.007
	(0.102)	(0.059)	(0.053)	(0.047)	(0.034)
Population (ln)	-0.365	0.824**	0.752***	0.997***	0.983***
	(0.348)	(0.319)	(0.177)	(0.179)	(0.162)
Control of corruption	-0.012**	0.002	0.003	0.008***	0.007***
	(0.006)	(0.003)	(0.002)	(0.002)	(0.002)
Government effectiveness	-0.000	0.003*	0.001	0.005**	0.003
	(0.004)	(0.001)	(0.002)	(0.003)	(0.003)
Regulatory quality	-0.000	-0.003	-0.001	-0.009***	-0.007***
	(0.005)	(0.004)	(0.003)	(0.002)	(0.002)
Rule of law	0.012*	0.005	0.003	-0.005*	-0.003
	(0.007)	(0.005)	(0.003)	(0.003)	(0.003)
Voice and accountability	-0.006	-0.000	-0.005*	-0.002	-0.003
	(0.008)	(0.004)	(0.003)	(0.002)	(0.002)
Conflict type (Interstate reference)					
Intrastate	-0.009	0.013	0.064	0.054	0.066
	(0.230)	(0.039)	(0.103)	(0.048)	(0.068)
Internationalized	0.192	-0.109*	0.071	0.024	0.047
	(0.258)	(0.057)	(0.100)	(0.063)	(0.075)
Constant	11.205*	-10.584*	-10.278***	-13.623***	-13.491***
	(5.686)	(5.386)	(2.913)	(3.133)	(2.838)
Observations	486	249	543	543	543
R-squared	0.372	0.266	0.583	0.514	0.659
Number of countries	42	31	44	44	44
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Note: All dependent variables considered in their natural logarithm forms. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1					

Table A2. The system-GMM analysis results of armed conflict, hunger, and agricultural production: robustness checks					
VARIABLES	**Part I**: Hunger		**Part II**: Agricultural Production		
	(1)	(2)	(3)	(4)	(5)
	Undernourishment	Food insecurity	Livestock production	Livestock production	Food production
Lagged undernourishment (ln)	0.821***				
	(0.065)				
Lagged food insecurity (ln)		0.935***			
		(0.096)			
Lagged livestock production (ln)			0.937***		
			(0.059)		
Lagged crop production (ln)				0.554**	
				(0.230)	
Lagged food production (ln)					0.761***
					(0.140)
Battle-related deaths (ln)	0.024***	0.009*	-0.005***	-0.016***	-0.013***
	(0.008)	(0.006)	(0.002)	(0.004)	(0.002)
Per capita income (ln)	-0.087***	-0.039	-0.001	0.002	-0.002
	(0.031)	(0.055)	(0.003)	(0.008)	(0.004)
Military Expenditure (ln)	-0.039	-0.006	-0.006	0.015	0.005
	(0.029)	(0.016)	(0.005)	(0.016)	(0.006)
Population (ln)	-0.014	-0.015	0.004*	-0.005	0.002
	(0.012)	(0.011)	(0.002)	(0.007)	(0.003)
Conflict type (Interstate reference)					
Intrastate	-0.013	-0.042	0.010	0.107**	0.066**
	(0.111)	(0.065)	(0.018)	(0.044)	(0.028)
Internationalized	0.057	-0.034	0.018	0.152**	0.099***
	(0.112)	(0.059)	(0.018)	(0.058)	(0.033)
year	0.001	0.006	-0.000	0.010	0.005
	(0.002)	(0.005)	(0.002)	(0.006)	(0.004)
Constant	-1.347	-12.197	0.736	-18.499	-8.766
	(4.450)	(8.234)	(3.227)	(11.671)	(7.319)
Observations	482	217	542	542	542
Number of countries	42	31	44	44	44
AR(1)	0.000	0.109	0.072	0.014	0.001
AR(2)	0.132	0.146	0.472	0.399	0.661
Sargan test	0.354	0.535	0.335	0.635	0.052
Hansen test	0.468	0.713	0.665	0.582	0.262
Note: All dependent variables considered in their natural logarithm forms. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.					

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