War Exposure and Food Insecurity

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Abstract

Armed conflict kills and injure people, inhibits trade and movement, disrupts local livelihood and markets, and destructs agricultural production, cropland, and farming inputs. Locations that are directly or indirectly exposed to violence are thus at high risk of experiencing critical levels of food insecurity. The existing literature points to large negative effects of violence on food consumption, utilization, access, availability, as well as children's nutritional status and health. Although these impacts are context-specific and vary across countries, they are generally higher in locations exposed to other shocks, such as droughts, pandemics, or economic crises. Pregnant and lactating women, children, elderly, and disabled people are particularly vulnerable to food insecurity, as they lack access to support structures and resources that can help them cope with crises. Societies characterized by high levels of trust, social cohesion, and effective and accountable institutions which safeguard property rights, promote rule of law, preserve food markets and trades, and control corruption, are less vulnerable the negative impacts of droughts, armed conflicts, or the combination thereof.

1 Introduction

More than 250 million are currently experiencing acute levels of food insecurity (FSIN and Crises, 2023), and affected populations are increasingly found in conflict-ridden areas (Martin-Shields and Stojetz, 2019). This report provides a review of the literature on the impact of armed conflict on food insecurity, focusing on robust findings from quantitative, empirical, analyses.

The review is structured as follows: first, we provide a definition of conflict and food insecurity; second, we offer an overview of key findings from existing empirical studies linking conflict to various measures of food insecurity. Third, we provide an overview of studies focusing on compound hazards, with an emphasis on the combined effect of armed conflict and droughts on food security. The final section reviews important contextual factors that can exacerbate the impact of violence on food insecurity by increasing the vulnerability of affected populations.

2 Defining conflict and food insecurity

2.1 Predictor: Armed conflict

The effect of armed conflict on food insecurity varies depending on the type, duration, and intensity of violence. Here, we focus on organized political violence, defined according to the Uppsala Conflict Data Program as the sustained use of force that leads to at least 25 battle-related deaths in a calendar year (Davies, Pettersson, and Öberg, 2023). This definition encompasses three types of violence: state-based violence, defined as an incompatibility concerning the government or territory of a state which involves two organized actors, at least one of which is the government of a state; non-state violence, between two non-governmental organized or rebel groups, and one-sided violence, where a governmental or organized actor uses armed force against civilians (Davies, Pettersson, and Öberg, 2023). We do not focus on non-lethal protests, riots, or non-political forms of violence such as criminal violence. Most of the reviewed studies utilize the occurrence of armed conflict as predictor of food insecurity, while research on violence intensity, measured by the number of deaths related to the conflict, is much sparser. In the following, we use the terms conflict, armed conflict, and political violence inter-changeably.

2.2 Outcome: Food insecurity

Food insecurity can be understood as a state where the ability to acquire adequate and safe food is limited or uncertain, as opposed to a situation of food security, where '[...] all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life' (FAO, 2022). Here, we review both the short- and long-term impacts of conflict on different measures of food insecurity, and specifically various anthropometric measures of children nutritional status that are most commonly used in the literature. These include wasting, which is measured as children's weight-for-height and proxies acute malnutrition; the weight-for-age Z-score which indicates general malnutrition, and

stunting, measured as the height-for-age Z-score and signaling chronic malnutrition (Martin-Shields and Stojetz, 2019; Shemyakina, 2022). Another common set of metrics of food insecurity measure patterns of food utilization and consumption, reflecting how households' food intake and attitudes respond to shocks. Examples of these measures are the Household Food Insecurity Access Scale (HFIAS) and the Coping Strategy Index (CSI), two continuous indicators that capture households' anxiety and uncertainty over food insecurity, as well as their behavioral response to shocks (Nnaji et al., 2022). Another comprehensive measure of food insecurity is the Integrated Food Security classification (IPC) scale, although this measure is more often used in the policy domain than in scholarly articles. The IPC scale provides a global framework for assessing food insecurity and malnutrition, according to 5 levels: minimal (1), stressed (2), emergency (3), crisis (4) and famine (5). IPC food security levels are assessed by experts based on information on hazard exposure, food availability, access, utilization and consumption, nutritional status, food prices, as well as livelihood changes, coping strategies and the underlying vulnerability of the exposed population (Partners, 2021).

3 Impact of conflict on food insecurity

In this section, we focus on the impacts of conflict on the most commonly used measures of food insecurity: food production/availability, consumption patterns, and child nutritional status.

Food production and availability

Armed conflicts events can directly impact food insecurity levels by decreasing the amount of food that is produced. The decrease in food output can be a side-effect of fighting, as the destruction and disruption induced by conflicts reduce total factor productivity and economic efficiency (Collier et al., 2003). However, food can be also used as a weapon, including through the deliberate and strategic destruction and theft of food provisions and stores, as well as productive assets such as livestock and croplands, land, dwellings, utensils, crops, and other inputs to agricultural production (e.g. seeds, fertilizers, tools). Armed groups may also take control of agricultural inputs and livestock for their own sustenance or to levy taxes on these products (Kemmerling, Schetter, and Wirkus, 2022). Although victims of mass starvation have decreased in recent years (De Waal, 2017), food deprivation is still used as a war weapon in present conflict zones such as in the Tigray conflict in North Ethiopia, Yemen, South Sudan, and the Central African Republic (Kemmerling, Schetter, and Wirkus, 2022). Other than targeted destruction of food provision, armed groups and/or the government may also purposefully prevent humanitarian aid to reach the affected population as a way to exacerbate food crises, as recently witnessed in the conflicts in Somalia, Syria, Yemen, Ethiopia, and South Sudan (Kemmerling, Schetter, and Wirkus, 2022). The ongoing emergency in Gaza, where 677,000 people are experiencing catastrophic (IPC level 5) food insecurity due to the conflict, has been exacerbated by very poor humanitarian access to the Gaza Strip, which inhibits the delivery of goods as well as basic services (Integrated Food Security Phase Classification (IPC), 2024).

Conflicts may also decrease food production indirectly by forcing people to relocate to less high-intensity croplands, or to change tactics and type of seeds in cultivated areas to low-risk subsistence

crops that ensure food provision for their household (Justino, 2012). (Baumann et al., 2014) reported high farmland abandonment in the Nagorno-Karabakh conflict in 1991–1994. Similarly, Serneels and Verpoorten (2015) find that population loss during the Rwandan genocide lowered returns to land, leading to increased land availability. Using data on land use, violent events and displacement, (Alix-Garcia, Bartlett, and Saah, 2013) find that civil conflict in Darfur led to changes in the spatial distribution of agricultural production, lowering households' income and welfare. In Burkina Faso,violent attacks decreased households' production of staples such as maize, millet, sorghum, and cowpeas (Kafando and Sakurai, 2024).

In areas controlled by the Islamic State in Syria and Iraq between 2005 and 2010, households abandoned previously cultivated areas in favour of new, previously uncultivated, lands, and increased farming of low-intensity crops as a coping response to violence (Eklund et al., 2017). Resort to low-intensity and low-risk subsistence farming is commonly adopted by households in conflict settings, not only because they represent an easier source of food, but also because they are less appealing to armed groups and thus less exposed to violent attacks. Broadly, households in conflict-exposed areas tend to shift towards lower-risk activities that can easily feed their members (such as seasonal crops or cattle ranching) and can be promptly abandoned in case of emergencies that would require them to flee (Arias, Ibáñez, and Zambrano, 2019).

Although resorting to subsistence farming and low-risk activities is a rational choice in the short-term to mitigate the impacts of conflict on food security and ensure the health and livelihood of the family, these coping strategies also limit trade exchanges, impair households' abilities to re-enter the exchange market once violence de-escalates (Nillesen, 2007; Verpoorten, 2009; Blattman and Annan, 2010) and can overall project households into a lower-income trajectory in the long term (Arias, Ibáñez, and Zambrano, 2019). Focusing on agricultural activity in post-conflict Cambodia, for example, Lin (2022) finds that unexploded bombs on fertile land leads to short-term adjustments in agricultural methods, contributing to long-term underdevelopment and poverty.

Consumption patterns

Several studies have investigated how armed conflict impacts food consumption patterns, nutrition and resilience (for reviews see e.g. Corley, 2021; Brück and d'Errico, 2019). In general, studies find that households in closer proximity to war experience a reduction in food consumption levels (Dabalen and Paul, 2014; Serneels and Verpoorten, 2015; D´Souza and Jolliffe, 2013). For example, a recent study of Sub-Saharan Africa investigates the impact of conflicts and other shocks on food security, measured in line with the IPC scale (Anderson et al., 2021). The study finds that the worsening trends in food insecurity observed after 2014 in the region, and especially in South Sudan and Nigeria, are largely attributable to violent conflict.

Using farm household data collected between May and June 2019 in Nigeria, Nnaji et al. (2022) studies the impact of both the incidence and the severity of farmer-herder conflicts on the HFIAS and CSI food consumption scores. They find that a one-unit increase in the incidence of farmer-herder conflicts increases food insecurity by 0.07 HFIAS units and 1.97 CSI units, and that a unitary increase in conflict severity increases food insecurity by 2.04 HFIAS and 5.41 CSI units. Using panel data for 14 ECOWAS states in 2005–2015, Ujunwa, Okoyeuzu, and Kalu (2019) investigates the effect of conflict intensity on an experience-based measure of food security, proxied by the (logged) weighted

average of crop, forestry and livestock production. The study finds a significant effect of armed conflict intensity on food security, with a 1% increase in fatalities being associated to an expected 0.13–0.82% decrease in food security. Joining panel data on Boko Haram violent incident data between 2000 and 2016, George, Adelaja, and Weatherspoon (2019) find that an additional conflict fatality decreases the food consumption score (FCS) by 0.025–0.037 units, pushing households to adapt their diet and limit the size of meals to cope with limited food availability and access. A recent study of Burkina Faso combines granular data on violent incidents with survey data on food security to study how the number of fatalities from violent attacks affects food consumption and purchase patterns. The study finds that a 100% increase in the number of fatalities from violent attacks leads to a 0.8% decrease in food consumption at the household level, corresponding to a 2% decrease in the food consumption score relative to the sample mean (Kafando and Sakurai, 2024). Comparing pre and post-war household data in Côte d'Ivoire, Dabalen and Paul (2014) find that households in the worst-hit conflict areas have lower dietary diversity. Also, Gates et al. (2012) find that a medium-sized conflict with 2500 battle deaths is expected to lead to an increase in undernourishment by an additional 3.3%.

Child nutritional status and health

The effect of armed conflict on children's nutritional status is largely consistent between studies (see e.g. Le and Nguyen (2022) for a review), supporting a negative impact of war exposure on food security in a wide range of settings (Minoiu and Shemyakina, 2014; Akresh et al., 2012; Akresh, Lucchetti, and Thirumurthy, 2012; Shemyakina, 2021). Conflict-ridden Yemen, for example, has a high prevalence of general acute malnutrition, with a weight-for-age score of 13.3% in the Ibb and Sana'a governorates (Dureab et al., 2019). Exposure to violence in Nigeria has been linked with an increase in child wasting from 18 to 23% (Dunn, 2018), and a higher likelihood of stunting and undernourishment among children, which is worsened by more frequent and intense episodes of violence (Makinde et al., 2023). Mass violence in South Darfur in 2004 was similarly associated with high prevalence of childhood malnutrition – ranging between 10.7% and 23.6% (Grandesso et al., 2005). Exploiting the exogenous variation in the geographic extent and timing of the conflicts in Ethiopia and Eritrea, Akresh, Caruso, and Thirumurthy (2022) find that conflict-exposed children have significantly lower height-for-age scores, with children closest to conflict areas facing the largest negative effects. A recent survey of the Tigray region in Ethiopia in 2021 Gebretsadik et al. (2023) studies the impact of conflict on children's global acute and severe malnutrition, proxied by mid upper arm circumference (MUAC) measurements, and finds a significant increase in children malnutrition (0.26 standard deviation increase in the intercept model). Bundervoet, Verwimp, and Akresh (2009) show that an additional month of war exposure in the Burundian civil war decreases children's height for age z-scores by 0.047 standard deviations compared to non-exposed children. Studying the effect of war on weight-for-age Z-score among children under five in Sudan, Dahab, Bécares, and Brown (2020) find that armed conflict is associated with a higher risk of underweight. Also, Acharya et al. (2020) find that 2-5 year old children exposed to the conflict in Iraq are more likely to experience chronic malnutrition, measured by the height-for-age z-scores.

The effects of armed conflict on nutritional status travel across space and may persist over time, casting a long shadow of war on directly and indirectly exposed populations. In a study of Northern Uganda, Adong et al. (2021) find that not only conflict-exposed households, but also their neighbors are likely to experience lower food security. Children exposed to a conflict *in utero* and early life have

significantly lower heights than non-exposed children, which in turn leads to long-lasting impacts on both physical and cognitive development. For example, exposure to war in early childhood is associated to shorter stature later in life and a higher mortality risk in Burundi (Verwimp, 2012). Other studies similarly find lower birth weight for children exposed to conflict in utero (e.g. Brown, 2018; Mansour and Rees, 2012). A pioneering study by Akresh, Caruso, and Thirumurthy (2022) on children's growth in Nigeria examines whether the impacts of conflict are transmitted over generations. During the 1967–1970 Biafran conflict in Nigeria, mass starvation of the population was used as a war weapon. The study finds that children of women who grew up during the Biafran war were more likely to die in early childhood: 18% died before reaching 5 years of age, and if they survived, they were more likely to be stunted (38%) or underweight (28%) and had lower educational attainment. The effects were larger for women who were adolescents during the war and who themselves experienced health shocks. The authors suggest that the impacts of war transmitted across generations via poor maternal health, especially lower height and obesity, and health care utilization behaviors (Akresh, Caruso, and Thirumurthy, 2022). Camacho (2008) similarly finds maternal stress and health to be a main pathway linking armed conflict to negative health impacts on children that were exposed in utero or in early childhood. Other mechanisms through which violence affects children nutritional status, and their subsequent health and development, include limited or no access to healthcare (Minoiu and Shemyakina, 2014), decreased dietary diversity (Dabalen and Paul, 2014), poor coping capacity of exposed households (Bundervoet, Verwimp, and Akresh, 2009; Tranchant, Justino, and Müller, 2020), as well as economic losses (Minoiu and Shemyakina, 2014).

3.1 Mechanisms linking conflict to food insecurity

Not only does conflict hamper food security directly; it also affects it indirectly, through a range of micro and macro-level consequences on major determinants of food security: violence disrupts transports and networks, increases food prices, and deteriorates households' income due to higher unemployment and lower wages, which in turn reduce the availability of and access to food. However, surprisingly, there are limited studies that systematically test how and under what conditions conflict affects food insecurity. This section reviews the scholarship focusing on the mechanisms linking armed conflict on food security.

Limited mobility and access to markets (logistical challenges)

One suggested mechanism linking war exposure to reduced food security is that conflict influences the ability to acquire food by undermining and limiting essential movement within the community. During and after conflict, insurgent or government roadblocks, market closures, safety concerns, or movement restrictions preempt households and producers' travels to food markets (Collier et al., 2003; Calì and Miaari, 2018; Dunn, 2018; Jakiela and Ozier, 2019). As security risks increase, food consumption is likely to decrease to avoid exposure, also without direct realization of violence – perception of insecurity and threats are sufficient to limit individuals' mobility and thus inhibit their food consumption (Tapsoba, 2022; Rockmore, 2016). Perceived danger may hinder people to leave their houses to buy groceries, leading to reduced utilization of local markets and increased consumption closer to home which may have lower quality and quality (Bar-Nahum et al., 2020).

Conflicts disrupt road and transport networks, impair trade routes and markets, and largely lead

to logistical obstacles to preserving, storing, transporting and selling food, thus further hampering the availability of and access to food. Previous research suggests that households that are closer to conflict locations have poorer access to markets and pay higher prices for goods (e.g., (Adong et al., 2021; Tranchant, Justino, and Müller, 2020). A study of the Israeli-Palestinian conflict in 2007–2011 finds that violence escalation in Hebron, a focal point of the conflict, reduced the size of apple markets by 14.5%, while demand for apples increased if any fatalities were observed in the previous three days (Bar-Nahum et al., 2020). Overall, promoting stable environments where food markets are both accessible and secure can mitigate the effects of shocks such as those linked to climate change impacts and conflict feedbacks (Raleigh, Choi, and Kniveton, 2015).

Deterioration of livelihood and erosion of income

Armed conflict can deteriorate food security indirectly by harming households' ability to access and buy food, and weakening sources of livelihood and economic assets. Wars kill, injure, and recruit fighters, which in turn may undermine households' income and ability to acquire food (Justino, 2012). Although some people might not personally experience violence, conflict may lead to the loss of family member, community networks, and the death of providers/caregivers, which deteriorate income and purchasing capacity, and destabilize households' support network (Adong et al., 2021).

A study of the indirect pathways linking terrorist attacks in Burkina Faso to food security finds that a 100% increase in fatalities from terrorist attacks leads to a 9% decrease in household income, thereby limiting household food purchases (Kafando and Sakurai, 2024). A survey conducted in the Tigray region of North Ethiopia in 2021 finds that the intensity of the conflict and the resulting disruption of off-farm income in affected communities led to a significant decrease in food access (43.3%), food insecurity experience (41,9%), and hunger scales (32,5%) relative to the prewar period (Weldegiargis et al., 2023). Income and livelihood may be further deteriorated by increased unemployment rates during and after conflicts, also in connection with forced displacement and refugee outflows (Kondylis, 2010; Bozzoli, Brück, and Muhumuza, 2016; Fiala, 2015). For example, in a study of the conflict in Gaza in 2014, Brück and d'Errico (2019) finds that exposure to conflict increases households' unemployment while decreasing opportunities for income generation.

Changes in food prices, which are likely to peak during conflict episodes, contribute to further erode income and hamper food consumption. For example, in a study of Syria and Iraq, Eklund et al. (2017) find that the impacts of conflict on food security was driven by a combination of higher food prices and poor resource access, rather than by direct changes in land-use patterns. Two studies of Burundi and Rwanda show evidence of increases in prices of staple food during armed conflicts due to the scarcity and destruction of land, seeds and crops, as well as the risks associated with market exchanges during violent episodes (Bundervoet, Verwimp, and Akresh, 2009; Verpoorten, 2009). The war in Ukraine led to a peak in agricultural prices that inhibited trades and may lead to severe food insecurity especially for countries that are heavily dependent on food imports from Ukraine and Russia, such as Egypt and Turkey (Feng, Jia, and Lin, 2023). Similarly, the instability of food prices in Sub-Saharan Africa, peaking during and after the driest time of the year, worsened local livelihood conditions and exacerbated the ongoing food crisis driven by a combination of violence and drought impacts (Anderson et al., 2021).

Adong et al. (2021) investigate the repercussions of conflict in Northern Uganda on households'

expenditure and food consumption, as well as the lingering effects of conflict shocks two and six years post-conflict. Surprisingly, household consumption expenditure decreased following the cessation of conflict, which the authors attribute to elevated prices during the conflict period. Also, Tranchant, Justino, and Müller (2020) study the effects of food assistance on households in Mali, revealing reduced household consumption and escalated food prices in areas closer to conflict zones and rebels' presence. Studying the effect of conflict on food insecurity in Afghanistan, (D´Souza and Jolliffe, 2013) shows that households that are exposed to higher intensity of conflict experience food insecurity via increasing food prices, probably driven by obstacles to accessing food markets.

Migration and displacement

The impacts of conflicts on food security are worsened by forced displacement and migration: conflicts force people to flee their homes in search for safer living conditions and improved economic opportunities. The United Nations High Commission for Refugees (UNHCR) estimates that almost 110 million people were displaced in at the end of 2022. Broadly, refugees from conflict areas and internally displaced populations (IDPs) are some of the most excluded, vulnerable and deprived population groups in the world. (UNHCR, 2023).

Refugees and migrants may suffer from heightened risk of food insecurity, due to the poor living conditions characterising displacement settlements and temporary shelters. Existing research suggests that food insecurity increases as a response to forced displacement, which reduces food consumption (Marchesi and Rockmore, 2022). A study of South Darfur in 2004 finds that food insecurity among IDPs was exacerbated by low to no access to food markets or arable land around the settlement areas, as well as by violent attacks targeting individuals who move to the neighboring areas to farm or collect fire wood. Poor access to food, freshwater and sanitation in settlement camps in turn led to higher prevalence of diseases such as diarrhea, and a higher level of morbidity and mortality especially among young children (Grandesso et al., 2005).

IDPs and refugees are also more likely to be excluded from the job market (Engel and Ibáñez, 2007; Ibáñez and Moya, 2010) and display lower income levels than those who stayed behind (Sanch-Maritan and Verdine, 2019). These impacts can persist long after the conflict: studies find that refugees and IDPs struggle to find formal employment even in the conflict aftermath, and populations that remain displaced are worse off economically than those who manage to return to their home Kondylis (2010). These effects are worsened by the breakdown of families and communities, and the rising hostility towards displaced populations which denies them access to the usual social protection mechanisms and networks (Justino, 2009) and limits adaptation strategies. For example, displaced households in Bosnia and Herzegovina are 10% less likely to adopt fertilizers – a common coping strategy to mitigate food shocks – and thus have much lower food output per hectare and lower income than non-displaced households (Sanch-Maritan and Verdine, 2019).

The inflow of IDPs can in turn contribute to deteriorate food insecurity in the host community: a study of displaced and non-displaced households in Chad finds that food security among resident households worsened as a result of the inflow of IDPs (mostly from conflict-ridden Sudan), which further aggravated the disruption of trades and the increase in food prices driven by insecurity and rainfall shocks (Guerrier et al., 2009).

4 Compound hazards

The impacts of conflict on food insecurity can compound with and be reinforced by exogenous shocks, such as extreme weather events. Violence and climate extremes represent the biggest threat to food security (Brown et al., 2020). By increasing the frequency, duration, and intensity of dry spells and extreme events, climate change will increasingly impact the availability, utilization, stability of and access to food, particularly in vulnerable areas (Wheeler and Von Braun, 2013). In 2019, for every 1°of temperature anomaly, severe global food insecurity increased by 1.64%, and these impacts are worsening over time (Dasgupta and Robinson, 2022). Households that experienced a climate shock in Latin America, Africa or South Asia, are 1.73 times more likely to be food insecure (Niles and Salerno, 2018). In Jordan, for examples, drought is associated to a 0.68 standard-deviation decrease in food availability, 7 standard-deviation decrease in food access and over 14 standard-deviation lower food consumption (Qtaishat et al., 2022). Droughts hitting Tanzania, Ethiopia, Kenya and Somalia in 2017 contributed to critical food insecurity levels (Funk et al., 2019).

The compound impact of extreme climate conditions and violent conflict can be even more detrimental to food security than the isolated effect of conflict or climate extremes: some of the most acute food crises in recent years are in fact found in areas exposed to the impact of both violence and climate related shocks, such as Yemen or Ethiopia. Disasters and conflict happening concurrently amplify risks of future emergencies, reduce populations' coping capacities, and raise their poverty levels (United Nations Development Programme, 2011). In most cases, households that are exposed to conflict had been previously exposed to other drivers of food insecurity, such as droughts or poverty, which increase their vulnerability to the devastating impacts of war (George, Adelaja, and Weatherspoon, 2019). Although the compound impact of violence and weather extremes varies across countries and contexts, the existing literature broadly points to a lower coping capacity of populations living in fragile and conflict-exposed areas: individuals and communities that live in conflict zones tend to be more vulnerable to the impacts of weather extremes, as conflicts harm access to healthcare and basic service provision, deteriorates livelihood, destabilizes social cohesion and overall impairs health and well-being (Christoplos, Longley, and Slaymaker, 2004; Eriksen and Lind, 2009; Jaspars and O'Callaghan, 2010; United Nations Development Programme, 2011). Recently, the peaks in food and energy prices triggered by Russian invasion of Ukraine have been exacerbated by climate extremes: India, hit by a severe heatwave, has banned wheat exports, while concerns around food productions in France and China followed extreme weather events (Hendriks et al., 2022).

A study of food security and livelihood in Sub-Saharan Africa in 2009–2018 (Anderson et al., 2021) finds that, while severe food insecurity levels largely coincide with preceding dry spells or more frequent conflicts, the few episode of famine-level food insecurity– in Somalia in 2011 and South Sudan in 2017 – are driven by the *combination* of conflict and droughts. The severe food insecurity affecting Sudan and South Sudan in the past few years is preponderantly driven by the escalation of violence which exacerbated the impacts of variable rainfall patterns in 2017–2019 (Anderson et al., 2021). This is largely due to long-lasting violence making affected population more vulnerable to the impacts of droughts, and thereby increasing the likelihood of food crises. In their study of exposure to violence in Andhra Pradesh, India, Tranchant, Justino, and Müller (2020) find that drought only has adverse effects on child height-for-age z-scores in violence-affected areas, likely due to limited economic coping strategies and access to public goods and services. The protracted conflict and the threat of violent attacks from Al-Shabaab obstructed humanitarian responses to reach drought-

affected areas in Somalia in 2011, thus aggravating the crisis (Majid and McDowell, 2012; Maxwell et al., 2016). Ansah, Gardebroek, and Ihle (2021) uses survey data for Ghana in 2013–2014 to study the impact of droughts on households, and find that the effect of drought on households coping strategies and consumption patterns is significantly worse when combined with health, pests, or price related shocks. A study of Yemen similarly finds that the protracted conflict has exacerbated the impacts of climate change and environmental deterioration, leading to increased competition over dwindling resources, forced displacement, and increased food insecurity (Poornima and Ramesh, 2023). In Northern Mali, the impacts of droughts, which force herders to travel further away from their homes in search for food, have compounded with the instability caused by the presence of armed groups since 2012 (Augsten, Gagné, and Su, 2022). However, the role of conflict in exacerbating droughts impacts is highly heterogeneous across contexts, and especially dependent on the duration of conflict as well as the role of local institutions (Anderson et al., 2021). We review the main determinants of households' vulnerability to food insecurity driven by conflict or climate hazards in the next section.

5 Vulnerability of exposed populations

The impact of conflict and climate hazards on food insecurity depends not only on the intensity, type, and duration of the fighting, but also on the vulnerability of the exposed population. In line with the widely acknowledged definition provided by the Intergovernmental Panel on Climate Change (Intergovernmental Panel On Climate Change (IPCC), 2023), vulnerability is here understood as the propensity to be adversely affected by exogenous or endogenous shocks. The impacts of conflict or climate hazards on food security are higher in vulnerable populations, who lack the resources to prepare for and mitigate the negative effects of the shocks. For instance, the effects of flooding on food security are mediated or exacerbated by localized dynamics, including changes in subsistence crops, destruction of infrastructure, livelihood deterioration, or impaired access to water and an increased incidence of water-borne diseases (Reed et al., 2022).

In this section, we review the most important determinants of vulnerability to food insecurity according to the existing literature. Drivers of vulnerability are here understood as factors and preconditions that decrease the capacity of individuals, households, and communities to prepare for, mitigate, and recover from the impacts of conflict and climate hazards on food insecurity.

5.1 Poor governance and institutions

The vulnerability of individuals and households that are exposed to conflicts is shaped fundamentally by the institutional capacity in the aftermath of the conflict. Inadequate political institutions and a lack of support from the state significantly amplify the burdens arising from the intersection of climate-related risks and armed conflicts (Augsten, Gagné, and Su, 2022).

Local and national governance and political institutions can either moderate or exacerbate the impacts of conflict and weather extremes on food security, as they can influence the availability of and access to resources, markets, and social and political opportunities. Justino (2012) argues that resilience in maintaining food security in contexts of enduring violent conflict is dependent on two key institutional factors: (i) how people are targeted by violence; and (ii) how the organisation of local

institutions shapes people's access to food markets and livelihood opportunities. Relations between individuals and political or customary institutions are formed in response to drought and conflict as a survival mechanism, aimed at at preserving or reinforcing power structures. In turn, political structures and processes shape local resilience through the allocation of resources, development policies, and competition for positions of power, among others (**Eriksen2009**).

Institutional factors are arguably more important than individual characteristics in shaping how households cope with food shocks: Insecure land property rights among displaced households in Bosnia and Herzegovina, for example, reduces incentives for IDP households to engage in coping strategies, such as using fertilizers, which may increase their resilience to food insecurity (Sanch-Maritan and Verdine, 2019). Land tenure security mitigated the impact of drought shocks on food security in rural Malawi (Ajefu and Abiona, 2020), and institutional mechanisms that ensure farmers' access to credit had a beneficial effect on food security and consumption in Ethiopia, not only because they helped meet households' basic and nutritional needs, but also because they supported farmers' access to inputs such as fertilizers and seeds (Negera, Bekele, and Wondimagegnehu, 2019). Policies that enforce local communities' right to food and agricultural markets have positive impacts on food sovereignty and nutrition (Sampson et al., 2021).

Broadly, accountable and effective institutions characterized by high rule of law and good governance are associated with better food and nutrition security. Using panel data for 15 Sub-Saharan African countries for 1996–2015, (Ogunniyi et al., 2020) finds that quality of governance, government effectiveness, rule of law, political stability and especially control of corruption have significant positive effects on food security, measured by the average value of food production and the average dietary energy supply adequacy. By contrast, governments' corruption fosters inequality, alters or slows down development, and impairs international or regional institutions' attempts to fight hunger and enhance food security (Uchendu and Abolarin, 2015). Rent-seeking activities have fostered competition for limited resources, increased land scarcity and fragmentation, and contributed to food insecurity in Uganda (Ogwang, Vanclay, and Van Den Assem, 2019). In turn, food insecurity and deprivation make individuals increasingly intolerant to governments' malpractices and corruption, fostering frustration and resentment against institutions which are perceived as responsible for food scarcity (Riley and Chilanga, 2018).

5.2 Lack of cohesion, inequality and discrimination

Highly unequal or divided societies are generally more vulnerable, as marginalized individuals and communities may lack access to resources that can mitigate the impacts of conflict and weather extremes on food insecurity. Social relations and a large personal network are key to resilience during conflict (d'Hôtel et al., 2023). However, conflicts negatively affect community cohesion, as support structures are hindered by military conscription which reduces the local labor force needed to cultivate the land. Individuals who lose their social ties with family and friends, and especially those who depend on community support, such as children and pregnant women, are left in a precarious situation (Corley, 2021) with lower opportunities to provide for food. Using longitudinal data before and after the post-election crisis in Kenya in 2008, (Jakiela and Ozier, 2019) find that post-conflict societies are characterized by lower generalized trust and community engagement, which in turn may lead to negative impacts on trade, market development, and total factor productivity, and ultimately reduce food production. In contrast, enhanced social capital and

bonding are associated with positive changes in food security in marginalized communities, as interpersonal networks provides a safety net that mitigates the impacts of discrimination, by encouraging political representation and educational opportunities (Paul, Paul, and Anderson, 2019).

Inequality and discrimination based on age, gender, ethnicity, and disability are other major drivers of food insecurity, making marginalized groups more vulnerable to the impacts of shocks. Reduced food output and access combined with increasingly lower diet diversity have especially exposed Indigenous Peoples, ethnic minorities, small-scale food producers, and low-income, female-led households to malnutrition, with children, elderly people and pregnant women particularly vulnerable, as poverty and exclusion exacerbate impacts (Vinyeta, Lake, and Norgaard, 2016; Clay et al., 2018; Intergovernmental Panel On Climate Change (IPCC), 2023).

A survey of 200 households in Malawi finds that female-headed households are disproportionately vulnerable to food insecurity as women have lower access to food provision and farming inputs (Kakota et al., 2015). As men migrate in search of new income sources or opportunities, women and youth are subject to increased workloads, reduced access to resources and information, and lower investment opportunities, which further increase their vulnerability (Sugden et al., 2014; O'Neil, Fleury, and Foresti, 2017). Women, especially in rural contexts, are particularly vulnerable to the impacts of violence and climate related shocks, as they are excluded from land tenure and financial resources (Chandra et al., 2017). A study of Nigeria finds that 37% of households with a disabled adult experience severe food insecurity, a 12% difference compared to households with no disabled members (Lamidi, 2019). Similarly, finds that female-led households and households with a disabled member exhibit higher risk of food insecurity in the aftermath of Hurricane Katrina (Clay et al., 2018).

5.3 Poverty and economic shocks

Poverty is a key determinants of societal vulnerability: poor households lack the financial and material resources to invest in disaster preparedness and response, and are more vulnerable to the negative effects of conflicts and weather extremes. Iqbal et al. (2018) finds that income loss is a major determinant of vulnerability for Afghan farmers. Combining survey data with satellite observations a study of Ghana finds that 74% of the total effect of heat stress on household food consumption is explained by the indirect effect that the shock has on households' resilience capacity, enhanced by households' assets, income, and cash savings, among others (Ansah et al., 2023). Kakota et al. (2015) finds that income is a major driver of vulnerability to food insecurity in Malawi. Lower income levels are similarly associated with higher vulnerability to food insecurity in households impacted by Hurricane Katrina in Louisiana and Mississippi (Clay et al., 2018).

Households' income level and consumption patterns interact with and are shaped by global dynamics which affect the prices of food and basic provisions. The global instability triggered by the Russian invasion of Ukraine has exposed the inter-dependencies threatening food security at the global level, and highlighted the vulnerabilities arising from a high reliance on imports of staples, livestock forage, fertilizers, and fuels (Hendriks et al., 2022). The COVID-19 pandemic has further contributed to a decrease in food production and a depletion in food reserves that worsened food insecurity through 2020 and 2021, especially in combination with other shocks such as extreme weather events, financial or economic crises, trade war, and conflict/insecurity (Udmale et al., 2020). In Gaza, for example, the

pandemic shaped individuals food consumption, induced panic buying, reduced food affordability due to the spikes in food prices, and overall threatened food security (Ben Hassen et al., 2022). These impacts were moderated by age, education, and income level that shaped coping strategies (Ben Hassen et al., 2022).

5.4 Intensity and type of food production (rural/urban area)

Vulnerability to food shocks also varies according to the type of inhabited area and the degree of dependency on agricultural production. Households and communities that are heavily dependent on agriculture may be more vulnerable to food shocks, as their livelihood and income source primarily rely on farming. Conflicts may lead rural households to lose their primary sources of income, not only because the collapse of food markets, the destruction of roads and transport systems, and the overall security risks in conflict settings hamper trade (Dunn, 2018), but also because households may switch to subsistence farming as a coping strategy (Justino, 2012). Agriculturally dependent households are also more vulnerable to the impacts of weather extremes. A survey of Ethiopia using data for 2005–2015 finds that rural households are highly vulnerable to climatic extremes due to their dependence on rain-fed agriculture (Tofu, Mekuria, and Ogato, 2023). Droughts and conflicts in Sub-Saharan Africa are particularly detrimental for pastoral communities, which face more prevalent and long-lasting impacts in the aftermath of a drought (Anderson et al., 2021). Employing 5-year household data for Burkina Faso, Kafando and Sakurai (2024) find that the decline in food consumption induced by conflict mostly affects rural households that are highly dependent on agricultural production, as farm income and food expenditures are the primary determinants of changes in food security in conflict affected areas. In turn, locations that rely on rainfed croplands are more likely to experience civil conflict following drought (von Uexkull, 2014) leading to a potential vicious cycle of climate impacts, heightened risk of violence and increased vulnerability and insecurity (Buhaug and Uexkull, 2021).

On the other hand, urban areas may be also highly vulnerable to food-related shocks, as they lack access to land and subsistence agriculture, are less likely than rural areas to benefit from family support systems and safety nets, and are highly dependent on markets for food. In conflict-ridden Yemen, for example, 84.7% of surveyed families depend on purchasing food from the market, while agriculture is the second source of food (Dureab et al., 2019). In turn, higher unemployment rates, obstacles to food imports, and lower wages – driven by the general environment of uncertainty that characterises conflict locations – harm consumers' purchasing power and may exacerbate food insecurity further. Using data on about 90,000 households in the Punjab region in Pakistan, Azeem et al. (2016) finds that urban households are more vulnerable to food insecurity (measured as variations in caloric intake) than rural ones. The higher vulnerability of urban dwellers in Punjab may be explained by rapid patterns of urbanization that increase population pressures in urban centers, as well as by a predominantly cash-based economy where large parts of households' income is spent on food provisions (Azeem et al., 2016).

5.5 Research gaps and future research avenues

The existing literature predominantly focuses on the impacts of armed conflict on food production, childhood nutritional status and health, and households consumption patterns. Studies that use broader frameworks to operationalize food security, such as the IPC, are very limited. This is partly due to the difficulty in validating the IPC scales, as well as the inherent endogeneity of the food security variable in the IPC assessment, which already includes information about the exposure to hazards such as conflicts and droughts. The endogeneity of the IPC outcome to conflict and climate shocks calls for caution in interpreting the results of studies that employ the IPC assessments as their main dependent variable.

Second, most studies to date have focused on the effects of armed conflict incidence, whereas much less is known on how the intensity, duration, or onset of conflict affects food security.

As far as the research design is concerned, many empirical studies employ a survey design to investigate the impacts of armed conflict on food security in a specific country. Although case studies are paramount to provide a nuanced understanding of the relationship between violence and food, their generalisability is limited.

The lack of sufficiently granular and yet longitudinal and cross-national data on food security further limits the opportunities to conduct large-N studies whose results are easier to generalize. Although satellite and observational data on vegetation and weather patterns may partly supplement information on food production, they do not directly translate into a measure of food security. Efforts towards comparable, time-variant data on food security should therefore be a priority.

Lastly, limited research has so far studied the indirect mechanisms leading from armed conflict to food insecurity, and even less has systematically tested the compound impact of armed conflict and climate hazards on food security. Most of the reviewed studies investigate how vulnerability to food insecurity respond to climate hazards, whereas there is still limited knowledge on drivers of vulnerability in conflict settings. Further research is needed to shed light on what mechanisms link armed conflict, alone or in combination with other shocks, to food insecurity, how these different shocks interact and compound, as well as how and under what conditions exposed households are particularly vulnerable to these shocks.

6 Conclusion

The substantial body of knowledge reviewed here agrees on the negative impacts of armed conflict, especially in combination with droughts or other shocks, on food security. Violence destroys livestock and croplands, impairs access to markets, raises unemployment, destabilizes food prices, hinders healthcare and sanitation, disrupts livelihood and income, and forces people to migrate. All these impacts in turn hinder food production and consumption, and increase food insecurity in affected areas. Women, children, and people who are discriminated against or marginalized are particularly vulnerable to these shocks. Capable political institutions, societal cohesion, trust, rule of law, and investments into poverty eradication and control of corruption may in turn mitigate the negative impacts of armed conflict and make households more resilient to violence or climate-related shocks.

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