The impacts of armed conflict on human development: a review of the literature

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Abstract

The detrimental impacts of wars on human development are well documented across research domains, from public health to micro-economics. However, the compartmentalized study of conflict impacts has led to incongruities whereby macro-level assessments of war damages largely exceed the sum of costs identified by micro studies. A possible explanation for this puzzle lies in the linkages among conflict impacts: as several dimensions of development are inter-dependent, the combined effect of conflicts on societies and individuals may be much greater than the sum of their domain-specific impacts. Macro-economic growth depends on political institutions and trust, which in turn affect the provision of public health services; the spread of diseases depends on access to clean water and is affected by economic performance; migration impacts the distribution of resources, the risk of infections, and the job market – all of which are affected by conflicts. Studying conflict impacts in silos may thus severely under-estimate the total damage of war, hinder a comprehensive understanding of the consequences of conflicts, and limit our ability to effectively sustain human development. A more holistic approach is needed to understand how various impacts mutually interact. This article takes a first step in filling this gap by providing a comprehensive review of the literature on the impacts of armed conflicts on development, and discussing how these impacts intertwine and reinforce each other. An inter-disciplinary team reviews the impacts of conflicts across 9 dimensions of human development: health, schooling, livelihood and income, macro-economic conditions, water access, food security, political institutions, migration and displacement, and socio-psychological processes. Attention is paid to both direct and indirect impacts of violence, and to the spatial and temporal extent of the damages caused by conflict. As these impacts likely differ by conflict intensity and type, as well as according to individual and group-level characteristics of the exposed populations, the review also discusses how the effects of wars vary across contexts and conditions, and how different age, gender or societal groups are unequally vulnerable to wars. We conclude by outlining implications for future research. By systematically reviewing conflict impacts across different domains, the present review contributes to a deeper understanding of how war reverberates across society. In turn, this multi-disciplinary understanding of conflict impacts may help reconcile divergent estimates, encourage cross-disciplinary analyses, and enable forward-looking policies that minimize the costs of war.

1 Introduction

Not only do civil wars 'kill and maim people long after the shooting stops' (Ghobarah et al., 2003); they force entire populations to relocate, disrupt livelihoods and economic growth, undermine social capital and political institutions, and impair access to water, food, and infrastructure: War is 'development in reverse' (Collier et al., 2003).

The impact of armed conflict is well studied: research has investigated the micro-economic impacts of armed conflict on individuals, households and groups (Verwimp et al., 2019), as well as the detrimental impacts of violence on public health and the spread of diseases (Garry & Checchi, 2019), political institutions (e.g. Sánchez de la Sierra, 2020), social capital (Bauer et al., 2016), food security (Brück & d'Errico, 2019), and displacement (e.g. Fearon & Shaver, 2020).

Estimates of conflict impacts across domains can be hard to reconcile, however. For instance, estimates of the macro-level effect of conflict range from 1 to 4% of GDP per year of conflict (e.g., Collier, 1999; de Groot et al., 2022; Gates et al., 2012; Moyer, 2023; Mueller & Tobias, 2016). Such a strong economic impact seems to exceed the sum of micro-level effects identified in studies at the household level (e.g. Justino et al., 2013).

One possible explanation for this puzzle lies in cross-sectoral impacts of conflicts: the combined effect of conflict is likely to be much greater than the sum of its individual impacts. Public health provision depends on macro-economic performance, epidemics are strongly connected to water availability, and the implementation of public policies depends on political institutions and social capital, all of which are affected by conflict. Studying conflict impacts in isolation may therefore severely under-estimate the total damage of war. Yet, research on how the various impacts affect and reinforce each other remains limited (Verwimp et al., 2019).

This article fills this gap by crossing disciplinary boundaries to provide a comprehensive review of the empirical, quantitative literature on conflict impacts across 9 dimensions of human development: health, schooling, livelihood and income, macro-economic conditions, water access and use, food security, political institutions, migration and displacement, and

socio-psychological wellbeing. The focus is on organised political violence, defined according to the Uppsala Conflict Data Program as an incompatibility over the territory or the government of a state where the use of armed force leads to at least 25 battle-related deaths in a country-year (Pettersson et al., 2021).[1] We limit the scope of this review to state-based armed conflict, where the use of violence involves at least one government of a state. Attention is paid to both the direct and indirect impacts of conflict, as well as to the spatial and temporal extent of the damages. As the impacts are likely to vary by conflict intensity and type, as well as individual and group-level characteristics of the exposed populations, the review also discusses how the effects of conflicts vary across contexts.

By systematically reviewing the impacts of armed conflict across different disciplinary domains, the study contributes a deeper understanding of how impacts relate, interact and mutually reinforce. A broader comprehension of how conflict impacts vary across contexts and conditions helps reconcile divergent estimates, lays the ground for cross-sectoral examinations, and supports the formulation of forward-looking policies to minimise the costs and damages of war.

1.1 Theoretical framework

Armed conflicts affect human development both directly and indirectly, and are felt at the individual/household and societal levels alike. It is no coincidence that countries that were exposed to conflicts tend to have higher infant mortality rates (IMR) – a commonly used proxy for human development. As shown in Figure 1, IMR is particularly high in Central African

[1]To ease the reading, the terms 'conflict', 'armed conflict', 'violence', 'political violence', and 'war' are here used interchangeably.

Republic and Somalia, and to a lesser extent in Mali, Sudan, the Democratic Republic of the Congo and Mozambique – all countries with a grim legacy of violence. Despite the generalized improvement in IMR observed in Africa and Middle East over the past two decades, the right map of Figure 1 shows that countries that were heavily exposed to violence in 2000-2019, such as Sudan, Syria, Nigeria and Chad, have had null or very limited decrease in infant mortality in the past decade relative to peaceful or less violent countries.

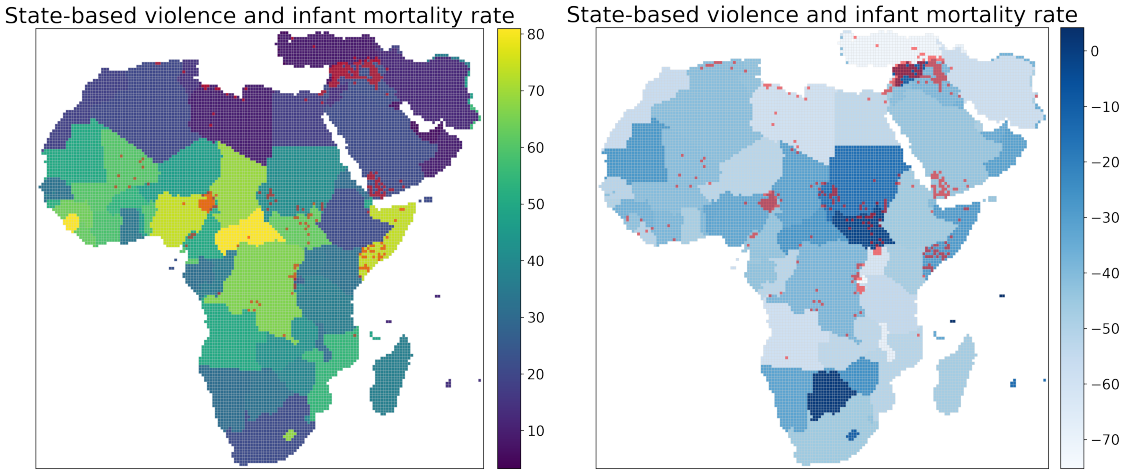

Figure 1. *Left map*: dark blue (low) up to yellow (high) shades indicate different levels of IMR in 2020 (source: World Bank, 2022), defined as the number of infants dying before reaching one year of age per 1000 live births. Red dots indicate locations that experienced more than 100 battle-related deaths from state-based violence in the previous 5 years (Pettersson et al., 2021). *Right map*: blue shades indicate the percent change in IMR in 2020 relative to 2000 for each country. Darker shades represent lower improvements in IMR in two decades, lighter shades indicate larger improvements. Red dots signal locations that have experienced more than 100 cumulative deaths related to state-based violence in period 2000-2019.

We classify the impacts of conflicts in direct and indirect, at the individual (red) and societal (green, blue, purple) level, and of environmental (green), economic (blue) and socio-political (purple) type (Figure 2).

Individual-level impacts are the 'end' consequences of armed conflicts on the wellbeing of people affected by them. Here, they encompass the three main dimensions of the Human Development Index (UNDP, 1990) – health, schooling/education, and livelihood/income. The destruction and deterioration of resources induced by war directly affects the health,

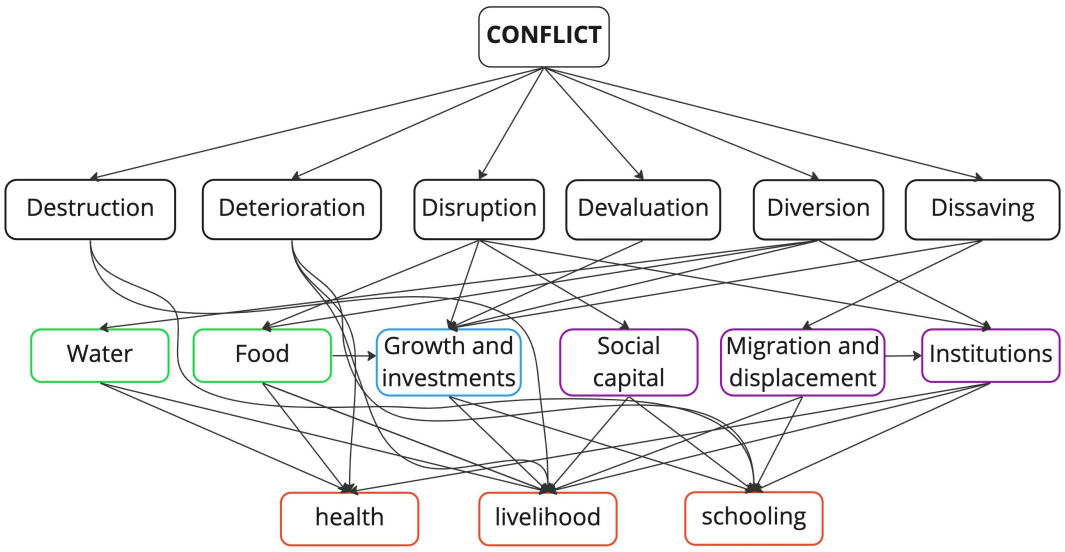

Figure 2. Impacts of armed conflicts on human development. Red boxes indicate 'end impacts' on individuals. Intermediate, societal-level impacts are distinguished in environmental (green), economic (blue), and socio-political (purple).

livelihood and schooling of individuals (Section 2.2). Soldiers and civilians are killed and maimed (Section 2.1); individuals' property, agricultural production and livestock are stolen and destroyed (Section 2.3), and people are forced to flee (Section 3.3.2). Violence restricts movement, deteriorating and reducing access to clean water (Section 3.2.1), food (Section 3.2.2), jobs, markets, and schooling (Section 2.2).

Armed conflicts also have indirect consequences at the societal level, working through macro-effects, such as reducing foreign investments into the country, disrupting exports of goods and services, and lowering quality of governance. Building on Ghobarah et al. (2003) and Collier (1999), we distinguish two types of direct impacts – destruction and deterioration – and four types of indirect impacts – disruption and reduced efficiency, diversion, devaluation, and dissaving.

Beyond the material destruction and deterioration of human lives, livestock, resources, and capital, the dangers posed by fighting and the imposition of curfews disrupt resources and services (Collier, 1999), as goods cannot be transported or preserved, people cannot go

to work, and infrastructure cannot be accessed. The disruption caused by conflict decreases resource efficiency, as war increases the costs while reducing the outcome of ordinary activities (Ghobarah et al., 2003). Conflicts disrupt economic output and growth (Section 3.1), decreases the production of food (Section 3.2.2), limits the access to schools and education (Section 2.2), and impairs social capital and cooperation (Section 3.3.3). The erosion of trust hinders people's movement, affecting access to water, health care, and market places.

Wars affect human development indirectly through diversion (Collier, 1999), as government's budget for growth-promoting activities is reallocated to military and intelligence services. As conflicts divert resources away from the provision of public goods (Ghobarah et al., 2003), the availability, quality, and access to water declines (Section 3.2.1), agricultural production shrinks (Section 3.2.2), and health services and education are curtailed (Section 2.1). The shift of public spending to military activities compromise societal trust (Section 3.3.3) and political institutions and may promote authoritarian drifts (Section 3.3.1).

The widespread fear that accompanies violence leads to a devaluation of capital and assets (Sections 2.3, 3.1). Devaluation lowers the prices of goods and assets even in locations that are not exposed to direct violence, but are perceived as being at risk of conflict: it is the expectation of violence rather than the onset of conflict that drives devaluation (Guidolin & Ferrara, 2010). For example, news about the war in Ukraine contributed to the depreciation of the ruble both before and after the invasion (Warburton, 2022).

The uncertainty and fear that characterize wars induce dissaving, encouraging mobile capital – financial or human – to leave the country, slowing or halting economic growth and deteriorating livelihoods (Sections 2.3, 3.1). As people move from conflict-exposed locations to refugee camps (Section 3.3.2), the impacts of conflict diffuse through space, exposing

refugees and host populations to diseases (Section 2.1), altering collective dynamics of trust and cooperation (Section 3.3.3), destabilizing political institutions (Section 3.3.1) and demanding adjustments in the economic structure of receiving communities (Sections 2.3, 3.1).

Building on this framework, the next sections review the direct and indirect impacts of conflicts on health, livelihood, schooling, macro-economic conditions, water, food, political institutions, migration, and socio-psychological wellbeing.

2 End impacts at the individual level

2.1 Health

Wars 'raise the exposure of the civilian population to conditions that increase the risk of disease, injury, and death' (Ghobarah et al., 2003, p. 192). Violence and attacks have a direct detrimental effect on people's health and lives, resulting in deaths, injuries, and disabilities.

Conflicts tend to be particularly associated with an increase of chronic or non-communicable diseases in exposed locations, although the information available in conflict settings is, at best, sparse (Aebischer Perone et al., 2017). Non-communicable diseases, such as cardiovascular diseases, diabetes and cancers, are the leading cause of death and disability worldwide. Disrupted treatment and delay of diagnosis aggravate cancer diseases, diabetes and other chronic diseases (Caglevic et al., 2022). Studies show an increase of systolic blood pressure in areas exposed to violence (Jawad et al., 2019), as well as heightened mortality from chronic ischemic heart and other heart diseases (Aebischer Perone et al., 2017; Jawad et al., 2019).

Crowded living conditions with poor sanitation common in conflict settings lead to an

increase of diarrhoeal incidence, respiratory infections, measles and tuberculosis (Bendavid et al., 2021). The disruption of routine vaccination services is an additional risk factor (Garry & Checchi, 2019): the incidence and prevalence of active tuberculosis is doubled in crisis-affected populations relative to the reference population (Kimbrough et al., 2012).

Violence increases exposure to health risks indirectly, due to poorer and more crowded living conditions, higher exposure to new infections among displaced communities, as well as increases in risk factors such as alcohol and tobacco use. Disruption of protecting factors is common in conflict settings, such as poorer access to safe water supplies, electricity, and financial stability (Garry & Checchi, 2019).

Conflicts disrupt the availability, accessibility, and use of health care services not only through the destruction of infrastructure, but also due to the services disruption caused by security constraints. In turn, the disruption of health care services and impaired access to them are important causes of morbidity and mortality (Garry & Checchi, 2019; Kadir et al., 2019), and make outbreaks increasingly difficult to stop, as demonstrated by the cholera outbreaks in Yemen, the Democratic Republic of the Congo (DRC), and Somalia (Bendavid et al., 2021; Blackburn et al., 2020; Rohan & McKay, 2020; Wells et al., 2019).

The diversion of public funds away from health further affects the provision of health services. For example, health care provision in Tigray has decreased to a minimum, leaving large parts of the population without access to health care (Gesesew et al., 2021). Utilisation of health services is shown to decrease in correlation with the number and intensity of conflict events (Ekzayez et al., 2021; Price & Bohara, 2013). Armed conflict is strongly associated with greater risk of severe and moderate underweight among children under-5 (Bendavid et al., 2021; Dahab et al., 2020). Rape and sexual exploitation of children and women also

increase in conflict settings (Kadir et al., 2019; Nordås & Cohen, 2021). Lack of access to health services, including interruption of antenatal and maternal services, increase the risk for adverse outcome during pregnancy, including the risk of death for mother and child (Garry & Checchi, 2020). On the other hand, where poor health services predate the conflict, violence can improve antenatal care service, plausibly due to international health interventions (Price & Bohara, 2013).

Dissaving, in the form of expatriation of economic resources and increased migration of individuals negatively impact public health. Medical staff often move away from conflict-affected locations, reducing the provision of services. The displacement of exposed populations, living in conditions of aggravated poverty, higher exposure to disease outbreaks, and lower access to food and clean health, is likely to lead to malnutrition, diarrhoeal diseases, acute respiratory infections, as well as psychological problems (anxiety, depression, and post-traumatic stress disorder).

How health is impacted by conflict depends not only on the intensity of the violence, but also on the pre-conflict context. A low- or middle-income country with a growing population above 65 years of age is likely to suffer heavily from health impact related to chronic diseases, such as diabetes and cardiovascular diseases, compared to a low-income country where negative impacts on child health will dominate. As a rule, individuals that were vulnerable pre-conflict are even more vulnerable during and after conflicts (Garry & Checchi, 2019; Wagner et al., 2019). Increased vulnerability and exposure especially affect children, and pregnant and lactating women, amplifying their health risks both directly and indirectly.

Overall, studies suggest that armed conflict is positively associated with maternal, child, and all-cause mortality, and that the intensity of conflict, rather than the actors involved,

is the most important determinant of the level of mortality (Jawad et al., 2020; Wagner et al., 2018). Distance to conflict events is also a decisive factor: A study of Africa finds that neighboring armed conflicts significantly increase the probability of dying before reaching age 1 (Wagner et al., 2018) and that women of childbearing age are at an increased risk of death from nearby high-intensity armed conflicts (Wagner et al., 2018).

To obtain crisis-wide estimation of population mortality remains a challenge, however, especially since armed conflicts disrupt health-information systems that report morbidity and mortality. Populations affected by armed conflict are poorly covered by demographic surveillance (Dahab et al., 2020). However, national health surveys can give important information of trends over time (Boerma et al., 2019), and initiatives such as the early warning system for disease outbreaks (EWARN) established in the late 1990s can fill the surveillance gap at least partially (Asghar et al., 2022).

2.2 Schooling and education

Conflict has devastating impacts on human capital generally, and on a range of education outcomes specifically. Leveraging the increasing availability of micro-level data in post-conflict countries, studies find that violent conflict reduces school enrollment (Bertoni et al., 2019), literacy and attendance (Bharati, 2022), as well as high school grades (Brück et al., 2019a). The impacts of violence on education differ by gender, ability, school level, and age of the child at the time of conflict (Guariso & Verpoorten, 2019).

Violence not only reduces education outcomes directly by destructing school facilities and impairing children's ability to attend school, but also indirectly, via increased stress levels of the exposed pupils (Michaelsen & Salardi, 2020), a generalized environment of insecurity

that hinders attendance, and by raising opportunity costs of studying relative to working. Populations not exposed to direct violence may also experience declines in educational performance (Padilla-Romo & Peluffo, 2023). However, the incidence or expectation of violence may also have a positive effect on education: studies find that the risk of conflict may rise the supply of education, especially in democracies (Aghion et al., 2019), and the end of hostilities can yield an educational peace dividend (Prem et al., 2021).

2.3 Income and livelihood

Violent conflict destructs, displaces and devalues capital stock and livelihood, as businesses are destroyed or looted during fighting, and entrepreneurs move capital and businesses out of conflict areas (Naudé & Brück, 2023). In turn, destruction, deterioration, and dissaving negatively affect output and productivity, whereby firms lack access to the financial, economic, and material resources that are necessary for production, and investments cease or shrink. The impacts of conflict on productivity are long-lasting: A study from Cambodia shows that the exposure to conflict in early childhood leads to lower labour productivity at a later stage (Islam et al., 2016).

Conflict also impacts income by disrupting labour market dynamics and displacing or re-allocating the labour force. Total labour force participation decreases, and the structure of the labour force changes as female employment grows relatively to male labour in response to violence. Evidence from Colombia shows that exposure to conflict causes long-term disruptions to the labour markets that continue after the fighting stops: violence restricts the transitioning of labour to more productive sectors (Fergusson et al., 2020), while promoting a gendered reallocation of informal workers from rural and conflict affected areas – where

men are largely employed in farming – to safer urban areas, where women work in domestic services (Bozzoli et al., 2013). A key factor explaining these long-term labour market effects is lower educational attainment, which is strongly shaped by conflict exposure (Shemyakina, 2015). The impacts of conflicts on livelihood, output, and labour markets are particularly pronounced in rural settings which rely heavily on farming labour and agricultural inputs, as violence lowers agricultural production (Adelaja & George, 2019; George et al., 2021) (see Section 3.2.2).

Although most aspects of life do continue in conflict settings (Verwimp et al., 2019), violence affects livelihood and income by shifting individual risk preferences and triggering behavioural changes (Section 3.3.3). Callen et al. (2014) and Jakiela and Ozier (2019) find that conflict increases risk aversion, even though the effect is not permanent (Moya, 2018). Conflicts increase discount rates Voors et al. (2012), as households exposed to violence are more likely to engage in risk-averse behaviors (Brück et al., 2016), such as saving more, diversifying income sources, conducting informal activities or subsistence farming (Brück et al., 2019b). Violence-induced risk aversion depresses investments, with long-term consequences on economic output and productivity (Arias et al., 2019a). In protracted and desperate conflict situations, households can adopt harmful and risky livelihood strategies to cope, including borrowing or buying food on credit, selling their assets, accepting risky jobs, or enforcing child labour (Churchill et al., 2022). Exposure to violent conflict changes household consumption patterns – the share of income spent on food increases dramatically, while spending on other basic needs such as education decreases (Büttner et al., 2022). In turn, conflict exposure and economic hardships can foster other violent behaviours, including intimate partner violence (Brück & Stojetz, 2023) and forced child marriage (Bartels et al.,

2018), and precipitate vulnerable households into a conflict-driven poverty trap which can have inter-generational and long-lasting impacts (Efendic et al., 2022; Mercier et al., 2020; Moya & Carter, 2019).

Overall, the literature on the micro-economic impact of violent conflict has grown rapidly in the past ten years, driven by the increasing availability of survey data from conflict areas, an improved measurement of conflict exposure at the micro-level in these surveys (Brück et al., 2016), and an increase in impact evaluations of peacebuilding, development and humanitarian interventions in conflict settings (Puri et al., 2017) that provide new insights on how people operate in the shadow of war. However, the ability to rigorously identify the causal impacts of conflict on micro-level economic behavior and welfare remains a challenge.

3 Indirect impacts at the societal level

3.1 Macro-economic impacts

Conflict destroys human and physical capital, reducing the current and future growth potential of countries and regions. One way of measuring economic damages at macro-economic level is by looking at the gross domestic product (GDP). GDP captures the market price of all goods and services produced within a country in a given year: although it does not encompass all dimensions relevant for prosperity, it provides comparability across space and time with a relatively high objectivity. Growth in GDP, in turn, is a good proxy for reduction in poverty levels (Moyer, 2023).

Looking at GDP per capita growth, estimates based on panel data suggest that the

damage caused by conflict ranges from 1.5 (Costalli et al., 2017; Petrova et al., 2023) to 4.4% per year (Mueller, 2016). One possible reason for this variation comes from the use of different battle-related deaths thresholds to define conflict, and the spatial unit of analysis. Further, these estimates are attributed to experiencing one year of conflict; however, conflict duration can vary substantially, such that damages can accumulate over longer time horizons. Considering duration as well, Bove et al. (2017) find that the direct effects of civil war lead to an average drop in GDP levels by 9.1%, whereas Gates et al. (2012) and Mueller (2012) find average contractions of 15–18% compared to the benchmark.

These largely inconsistent macro-economic contractions are a puzzle. The reasons behind the dramatic decline in GDP per capita induced by political violence are wide-ranging. A main driver of GDP collapse is the destruction of physical infrastructure and means of production caused by conflicts. However, the destruction of infrastructure does not seem to have long-lasting effects (see for instance Miguel & Roland, 2011, 's study of US bombings in Vietnam).

The mechanism linking conflict to a decline in economic growth is therefore likely to be more subtle. In their review, Rohner and Thoenig (2021) discuss three channels: the impact of war on institutions and the social fabric, the destruction of human capital, and the impact on health and behavior. Here, we focus on alternative mechanisms which could explain the magnitude of conflict-related macro-economic effects: disruption of production networks and asset prices, diversion induced by the expectation of violence, and uncertainty-driven dissaving.

Studies find that disruption in production networks play a key role in the macro-economic impacts of conflicts. Amodio and Di Maio (2018) show that 70% of the fall in output value

of Palestinian firms in high conflict districts during the Second Intifada can be accounted for by import substitution. Export markets suffer from the decline in production and loss of workers, as shown in the case of post-electoral violence in Kenya (Ksoll et al., 2021). Supply networks lead to a diffusion of conflicts' effects to areas outside the conflict zone: the Maoist insurgency resulted in an average aggregate output loss of 1.9%, of which 73% is explained by the disruption of production network and its propagation (Couttenier et al., 2022).

Armed conflicts also disrupt markets by destabilizing asset prices. Studies find that asset and house prices react to critical junctures like battles or ceasefires, but also to changes in expectations beyond violence itself (Besley & Mueller, 2012; Willard et al., 1995; Zussman & Zussman, 2006). Recent work on macro forecasting by Diakonova et al. (2022) suggests that violence expectations and the disruption caused to asset prices are useful when predicting GDP. This implies that the disruption caused by the expectations of violence on asset prices and GDP may linger long after the war is over: the economy will fully recover only when peace is regarded as stable.

The expectation of violence further amplifies the macro-economic costs of conflict by deterring and diverting investments. For example, de Roux and Martinez (2021) document that the supply of credit to farmers in Colombia was suppressed even before the government and the FARC rebels entered the peace agreement.

The negative effects of violence expectations are amplified by the dissaving effect induced by uncertainty and fear. A large literature in economics stresses the role of uncertainty for decision-making of economic actors (Bloom, 2014; Collier, 1999): armed violence is strongly associated with uncertainty, leading actors to postpone investment decisions which can harm economic activity. In turn, uncertainty and instability further exacerbate macro-economic

contractions (Baker et al., 2016). Uncertainty regarding the potential locations and timing of violence is expected to make very unpredictable types of violence, such as terror attacks, particularly harmful for the economy. Research linking variability in the temporal and spatial location of violent events to the macro-economic cost of conflict is scarce, but some evidence exists at the micro scale. Uncertainty in the location of attacks leads to a diffusion of armed conflict impacts, as the fear of violence spreads to neighboring areas. In a study of child health in Ivory Coast and Uganda, Tapsoba (2022) shows that the effect of fear is so powerful that cohorts of children exposed to high risk of violence suffer major health setbacks even when this risk does not materialize in violent events around them.

These mechanisms all contribute to the notable macro-economic declines associated with violence. However, not all macro-economic costs might be observable by standard econometric tools. The existence of conflict traps is now well-established, yet the repercussions for macro-economic cost estimates are still not well understood (Mueller and Rauh 2022, Rohner and Thoenig 2021).

3.2 Environmental impacts

3.2.1 Water

Water provision is among the most vital elements of humanitarian responses during war, as water is essential both for daily needs (nutrition, hygiene) as well as for various economic sectors, primarily agriculture. War impacts water access and provision both directly and indirectly (Schillinger et al., 2020a; Zeitoun & Talhami, 2016). Here, we focus on impacts from direct use of violence in state-based conflict, although we acknowledge indirect actions

such as targeting of water infrastructure through cyberwarfare (Stoddart, 2022) as well as impact of non-state conflict (Döring, 2020).

Direct impacts entail warfare's immediate effects on water quality, quantity, access, and provision. Water infrastructure continues to be deliberately destroyed during armed conflict (Francis, 2011; Schillinger et al., 2022; Sowers & Weinthal, 2021; Tabor et al., 2023; Talhami & Zeitoun, 2020; Weinthal & Sowers, 2019). For example, early in the war in Ukraine the most targeted water infrastructures were dams and reservoirs, urban water supplies and wastewater treatment facilities (Shumilova et al., 2023). This occurs despite multiple international declarations, including the International Humanitarian Law, establishing water as a basic human right and prohibiting states to disrupt access to water services or destroy infrastructure (Grech-Madin, 2021; Tignino, 2023; Tignino & Irmakkesen, 2020). Wars similarly deteriorate water quality. This occurs via destruction of infrastructure such as water pipes, pumping, and treatment systems, but also from contamination of surface and groundwater bodies by explosives or military equipment. Even outside of combat zones, damaged water pipes or dysfunctional waste-water treatments pose critical dangers (Zeitoun & Talhami, 2016). In turn, contamination and pollution contribute to poor water access in war settings affecting drinking water systems. Deterioration in the quality and quantity of water affect the agricultural sector, and can damage entire ecosystems with potential ripple-down effects on many other economic and societal sectors. Responses to the resulting water scarcity often occur first through individual coping strategies, followed by groups- or state-led adaption initiatives in the medium to long term.

War also directly affects the management of transboundary river basins. Such state-based tensions are more commonly solved in a cooperative way, including river claims that

more often lead to conflict management (Owsiak & Mitchell, 2017). At the national level, government-initiated water-cooperation is found to be more likely following violent armed conflict (Döring, 2020). This is in line with research showing that transboundary water issues, even in war times, are more institutionalized and thus more likely to foster cooperation than conflict (Bernauer & Böhmelt, 2020).

Indirect effects of conflict on water include the deterioration or failure of water treatment plants due to disruption and maintenance issues, diversion of funds away from water provision, dissaving and impacts on personnel.[2] Wars disrupt access to water resources and services by their impacts on the grid supply: for instance, in Southern Syria, access to piped water supply decreased from more than 90% to about 15% within one year (Sikder et al., 2018). Power outages can lead to siltation and increased contamination from industrial facilities or treatment structures (Sowers & Weinthal, 2021), which in turn undermine water quantity and quality.

Conflicts also increase water scarcity through disrupting infrastructure maintenance or by reducing efficiency in resource management, increasing salination and pollution. Especially in protracted conflicts, the destruction and disruption can take decades to be restored. For instance, 65% of the population in conflict-ridden Sudan and Somalia remain without access to safe water and sanitation (ESCWA, 2021). In Syria, the ICRC estimates a decline of up to 40% in drinking water a decade after the war started (ICRC, 2021).

Warfare disrupts water supply systems through dissaving, by impacting the personnel who maintain services, reducing the availability of consumables such as fuel for pumping, and deteriorating water infrastructure (Zeitoun & Talhami, 2016). Dissaving can manifest

[2] An extensive theoretical overview is provided by Schillinger et al.

in the form of a deregulation of water use, and disinvestment in water infrastructure and maintenance. The decline in water supplies induced by war leaves a vacuum likely to be filled by unregulated, informal water provision businesses, which can lead to over-exploitation of available water resources and potentially increase water pollution. In Yemen and Syria, informal tanker markets have been linked to falling groundwater tables (Abu-Lohom et al., 2018; Aw-Hassan et al., 2014).

In long-lasting conflicts, military construction projects often neglect guidelines on environmental protection, with long-lasting impacts on water-catchment areas (Chan et al., 2019; Francis, 2011). While lakes or rivers can be directly polluted, groundwater is mostly affected through contaminated soil (Rawtani et al., 2022). Such pollution can have lingering impacts on aquifers and can severely endanger ecosystems, as observed in the Iraqi peatlands (Lawler, 2005). An increased amount of toxins and other pollutants was also found in Ukrainian freshwater reservoirs (Rawtani et al., 2022). In turn, water insecurity can have direct and indirect impacts on health and wellbeing (Kangmennaang & Elliott, 2021; White et al., 2022). Direct consequences from lack of water are particularly evident in the water, sanitation, and hygiene sector (WASH). Deficient access to WASH increases the risk of several diseases and preventable infections (Chirgwin et al., 2021; Connolly et al., 2004; Cooper et al., 2021; Tabor et al., 2023): for example, handwashing with soap has been shown to decrease diarrhoea episodes by 27% (Connolly et al., 2004). . Some health studies provide estimates of water quality in conflict settings, including measuring the levels of coliform bacteria as proxies for various outcomes (Blanchet et al., 2017). Displaced persons in protracted conflicts particularly suffer from water-related illness, parasites, and respiratory problems as a result of water scarcity (Behnke et al., 2020). A recent study on the impact of the war in the Ethiopian

Tigray region found armed conflict to diminish access to water for washing by 24% in rural areas (Abay et al., 2022). Reviews for refugees camps find that the available water quantities can range from 1 to 40 liters/person/day (lpd), far below the minimum needs of about 2 lpd as water alone or 40–60 lpd for hygiene (Behnke et al., 2020; Cooper et al., 2021). Falling below these thresholds for prolonged periods is defined as extreme water scarcity.

Warfare can also deprive households from access to safe water sources or significantly increase the distance to fetch water. Having longer water-collection times alone is shown to increase mental-health burdens (Slekiene & Mosler, 2019).

Women and girls face a disproportionate burden from water scarcity (Blanchet et al., 2017; Kadir et al., 2019). Globally, 80% of households without water supply rely on women and girls to fetch their water (UNICEF-WHO, 2017). In some regions especially, societal taboos make women reluctant to bring attention to issues related to sanitation access (Mafuta et al., 2021). In areas affected by armed conflict, women with long distances to obtain water may also be subject to gender-based violence (Mafuta et al., 2021; Pommells et al., 2018). Extended time to fetch water can also increase disputes both within households and between communities (Mott MacDonald, 2005).

Work within humanitarian actions highlights the importance of safeguarding water access in war zones, but there is still little systematic research on the impact of war on water resources, especially on longer-term societal outcomes (Schillinger et al., 2020a). Even the magnitude of impacts on water remains largely unknown. Remote sensing data can be one valuable tool for analysing land cover changes (Eklund et al., 2022; Mohamed et al., 2020): for example, the normalized difference water index (NDWI) has been used to identify conflict-induced surface water change (Hasan et al., 2018). Particularly for the study of WASH

outcomes, surveys have been widely used, including in-situ sampling for water quality. Yet, inconsistencies in survey design and data reporting often hamper cross-study comparison (Ricau et al., 2021).

3.2.2 Agricultural production and food security

Armed conflict is a central driver of food insecurity, constituting a major obstacle to reaching the Zero Hunger SDG (FAO, 2022).[3] The relationship between armed conflict and food insecurity has been widely studied, and previous research suggests a positive correlation between the two (Brück & d'Errico, 2019). Here, we review the quantitative literature on the effects of armed conflict focusing on direct impacts on agricultural production, and indirect impacts on food consumption and nutritional status, particularly of children, through disruption of food markets, diversion, and dissaving.[4]

Violence undermines food production and accessibility directly through loss of livestock, crops and access to land, shortage of labour, as well as theft and destruction of land properties (see e.g. Arias et al., 2019b; Brück et al., 2016; Verpoorten, 2009). For example, Adelaja and George (2019) find that Boko Haram attacks in Nigeria significantly reduced agricultural productivity, primarily by reducing output of staple crops, wages and the availability of farm labour. In an article on conflict risk and agricultural portfolios in Northern Uganda, Rockmore (2020) finds that holdings of cattle and sheep fell by roughly 80 percent when

[3] We follow the commonly used definition of food security by the Food and Agricultural Organization (FAO) as a situation 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, 2008). Although broad, the definition encompasses the classes of indicators that are most commonly used in the literature: Calorie deprivation indicators, monetary indicators, dietary diversity indicators, and subjective indicators (Headey & Ecker, 2013).

[4] For comprehensive reviews on armed conflict and food insecurity, see Martin-Shields and Stojetz (2019), Shemyakina (2022), Sassi and Thakare (2022) and Rudolfsen (2020).

comparing those with highest risk and lowest risk of violence. Appau et al. (2021) find that a 10% increase in bombing in Vietnam decreased agricultural productivity by 3%. Households closer to violence are also less likely to grow most of the crops, observing relative to the sample mean a reduction of crops like cassava (-21%) and sorghum (-28%).

Wars affect food production and consumption indirectly, including through diversion of resources to non-agricultural or less agriculturally intense activities. Investigating agricultural activity in IS-seized areas since 2014 in Iraq and Syria, Eklund et al. (2017) identify multiple trajectories of changes in cropland cultivation, including expansion of cropland to formerly uncultivated areas, cropland abandonment, and a reduction of high-intensity cropland. This points to diverse and context-specific changes of land systems induced by armed conflict.

Farming production, livelihood, and income are constrained by violence-induced disruptions to the supply of inputs, such as seeds, fertilizers, and tools (Baliki et al., 2022). The inability to access land and other natural resources can additionally impact agricultural production (Jaafar et al., 2015). Conflicts further decrease food consumption by disrupting access to food markets, which in turn increases food prices. Event data show that households neighboring violence experienced reduced consumption levels. For example, examining the effect of armed conflict on food insecurity in Afghanistan, D´Souza and Jolliffe (2013) find that households in provinces with higher levels of war exposure experience food insecurity via increasing food prices, likely due to reduced access to food markets. Comparing pre-war and post-war household data in Cote d'Ivoire, Dabalen and Paul (2014) find that households in the most war exposed areas and individuals who were direct victims of violence had lower dietary diversity. Gates et al. (2012) find that battle deaths increases the share of people

below the level of minimum recommended dietary consumption, and a conflict with 2500 battle deaths is estimated to increase undernourishment by an additional 3.3%.

Food security is indirectly impacted via dissaving – the movement of capital and labour out of the country. Studies suggest that food insecurity increases due to forced displacement, reducing both the quantity and quality of the food consumed (see e.g. Kondylis, 2010; Marchesi & Rockmore, 2022). For instance, Verwimp and Muñoz-Mora (2018) find that internally displaced persons who returned home after the Burundian civil war had 5% less calorie intake and 6% less food expenses than the average Burundian.

In turn, reduced food consumption and poor dietary variation have a detrimental effect on the nutritional status of the population, and especially among vulnerable groups such as children. Studies of the effect of conflict exposure on child nutritional status often apply anthropometric indicators, including wasting (low weight for height), stunting (low height for age) and underweight (low weight for age), and largely find an association between conflict exposure and malnutrition (see e.g. Acharya et al., 2020; Akresh et al., 2012; Arcand et al., 2015; Dunn, 2018; Kinyoki et al., 2017; Minoiu & Shemyakina, 2014; Tranchant et al., 2020). Brown et al. (2021) find shocks due to variations in climate conditions and violent conflict to be the most consistent predictors of child malnutrition across studies. In a cross-sectional study of Sudan, Dahab et al. (2020) find that armed conflict is associated with a higher risk of underweight among children under the age of 5. Also, Akresh et al. (2022) investigate the link between war exposure and child health in Ethiopia and Eritrea, and suggest that conflict-exposed children (measured in distance to conflict sites) have significantly lower height-for-age. They find that children that live nearest to conflict bear the brunt of the impact, experiencing a decrease in the height-for-age ratio that vary from 0.72 standard deviation in

Ethiopia, up to 1.37 standard deviation in Eritrea. In a study of 56 developing countries, Le and Nguyen (2022) find that children exposed to armed conflicts are on average 6.6% shorter for their age, 11% thinner for their height, and 9% thinner for their age compared to unexposed children.

Over the past years, quantitative research on food and conflict has expanded rapidly across disciplines. Overall, the literature suggests that conflict has a negative effect on nutritional status in both the short and long term. However, there is much theoretical and empirical room for a better understanding of the multiple underlying and context-specific mechanisms linking conflict exposure to food insecurity.

3.3 Socio-political impacts

3.3.1 Political institutions

A well-established literature shows how democratic institutions influence the risk of intra- and inter-state conflict (for reviews, see Fjelde et al., 2020; Hegre, 2014), but research on the effect of armed conflict on political institutions, democratic transition, and consolidation is relatively scattered and surprisingly thin. We review the existing studies here, focusing on the impacts of conflicts on two main aspects of political institutions: state building, and political regimes and changes thereof.

A key impact of wars on state formation and strength operates through the disruption of tax revenues and fiscal capacity. Prominent in the literature is the so-called bellicist argument that explains state formation. The classical exposition is Tilly (1990), which argues that prospects of interstate war in Europe have encouraged the creation of systems for tax revenue

collection, and sustained the design of effective militaries and administrative apparatuses.

While interstate wars, under certain conditions, may incentivize state building (Goenaga & von Hagen-Jamar, n.d.; Queralt, 2019; Tilly, 1990), there are theoretical reasons to expect that armed civil conflict has different effects (e.g., Besley & Persson, 2010). In fact, studies find a strong negative correlation between civil war and state capacity (see, e.g., Sobek, 2010; Thies, 2010), mostly associated with a diminished fiscal capacity due to poor tax revenues. Studying Latin American countries, Thies (2005) identifies a negative effect, especially in South America during the 20th century, of civil war on fiscal capacity. Babajide et al. (2021) study 49 sub-Saharan African countries from 2000-2015, and finds indications that while external conflict may increase military capacity, civil war has a clear negative relationship with fiscal capacity. However, based on cases from Southeast Asia, Slater (2010) argue that when violent internal contention takes particularly threatening and challenging forms, it forges broad elite coalitions around the tightening of centralized control and it enhances state power, thus underpinning increases in state infrastructural power (and durable authoritarian rule).

Wars impact political regimes through the diversion of public resources into military activities, which may lead to a centralization of power. Prominent arguments suggest that wars are, generally, harmful to democracy. Thompson (1996), for example, contends that participation in wars promotes centralized approaches for quick and efficient decision-making as well as large-scale resource mobilization for the war effort. These mechanisms may make populations facing prospects of war more willing to defer to autocrats and accept curtailment of civil and political rights. Colaresi and Thompson (2003) and Gibler (2012) present evidence that especially interstate rivalries and wars over territory hurt democracy. Territorial

conflicts increase demands for larger armies and political centralization, pulling regimes in an authoritarian direction. Studying a panel of 96 countries from 1970–2004, Armey and McNab (2015) find indications that civil wars, in general, mitigate subsequent democratization.

Several other mechanisms may drive the detrimental effect of war on democracy. Civil war and violence exposure may deteriorate peoples' support for democracy (von Borzyskowski et al., 2022), strengthen authoritarian values (Dyrstad, 2013), and disrupt political trust (e.g. De Juan & Pierskalla, 2014; Hutchison & Johnson, 2011). Garcia-Ponce and Wantchekon (2022) consistently show that independence struggles in the form of violent rural insurgencies, in contrast to urban protest, are negatively associated with present-day democracy levels in Africa.

Yet, there are also much theorizing and some evidence suggesting that inter-state war can enhance democracy. Wars, and especially losses in wars, increase the probability of leader change (e.g., Bueno de Mesquita et al., 2003; Chiozza & Goemans, 2003), but also regime change. Insofar as democracies are less likely to lose the wars they engage in (de Mesquita et al., 1992), war participation might more frequently induce the collapse of autocratic than democratic regimes, and could thus, on average, enhance democracy.

Participation in inter-state war might also relate differently to different aspects of democracy (Krebs, 2009). Knutsen et al. (2019) study the relationships between ongoing war or past war participation and changes in democracy in a global sample for 1817-2006. They find that war participation matters, but that the direction of the relationship hinges on democracy measurement. Electoral aspects of democracy – especially related to free and fair elections but also suffrage extensions – are positively related to having experienced war in the past five years. This echoes findings from the literature on the violent origins of voting rights.

Suffrage expansions have been linked to violent revolutions abroad and related domestic revolutionary threats (Aidt & Jensen, 2014; Przeworski, 2009; Rasmussen & Knutsen, 2022; Scheve & Stasavage, 2010), but also to participation in interstate wars.

Specific effects of civil war on democratization are likely contingent on conflict characteristics, such as conflict size, duration and type of termination. Findings are again mixed, and depend, according to Fortna and Huang (2012), on when initial levels of democracy are measured, the democracy indicator itself, and the time period under study. Studying 128 civil wars from 1945–1999, Fortna and Huang (2012) find limited evidence that conflict characteristics systematically influence democratization. Even so, these authors corroborate the finding from previous studies (e.g., Gurses & Mason, 2008) that settled solutions to civil war enhance democratization, albeit in the short term.

The diversion of economic and political resources away from public goods and towards military activities may also influence institutions beyond placement on the democracy-autocracy dimension, encouraging the strengthening of security apparatuses that support the leader. Recent contributions find that violent conflict may shape what type of autocratic regime is in power. For instance, Eibl et al. (2021) find evidence that regional rebellions increase the likelihood of military rule, and such military regimes are, in turn, less likely to democratize than other autocracies. Lachapelle et al. (2020), studying all autocracies across 1900-2015, propose that autocracies emerging from violent social revolutions are more likely to form strong and cohesive regime parties (and loyal security apparatuses), which contributes to making these autocracies more durable (see also Slater, 2010). Likewise, civil wars may influence different power-sharing arrangements in post-war democracies, for instance pertaining to federalist state structures, the electoral system or legislative checks on the executive (Cederman et al.,

2022).

3.3.2 Migration and displacement

Conflict severely impacts the mobility patterns of individuals and households. Focusing on the coercive aspect of conflict induced-migration,[5] the impacts of violence are most commonly quantified in terms of refugees, asylum seekers and internally displaced people (IDPs).[6]

War exposure directly affects individuals' decisions to migrate or relocate. A recent study by Fearon and Shaver (2020), looking at refugees and asylum seeker out-flows between 1990 and 2017, estimates an average of 30 refugees per battle-related death, although the estimates vary widely within and across conflicts, ranging between 9 and 41. The number of displaced persons depends on conflict dynamics, and on individual differences in the propensity to leave when exposed to violence or the threat thereof (see for example Davenport et al. (2003b) and Shellman (2006) for early large-N quantitative studies).

The impacts of conflict also depends on the intensity of violence and its diffusion over space. Schutte et al. (2021) find that the influence of armed conflict on the number of asylum seekers is dependent on the number of fatalities, and increases substantially after crossing a threshold of 500 deaths. Melander and Öberg (2007) estimate 9 times more forced migrants when ethnic conflicts spread from 10 to more than 50% of the country area (see also Schon, 2015). The geography of violence can influence decisions to move internally or cross-border: The spread of government violence increases the number of refugees, while the relationship between rebel violence and IDPs resembles a 'reversed U-shape' (Turkoglu, 2022).

[5]For a discussion about the challenges of focusing solely on the coercive aspect of 'forced' migration, see for example (Erdal & Oeppen, 2018).

[6]Refugees and asylum seekers include people who cross country borders, unlike internally displaced people who do not (UNHCR, 2022).

Individual decisions to move internally or cross-border can also depend on the perpetrators: in the context of the Lebanese civil war, experiencing indirect violence such as shelling increases the likelihood of relocating within Lebanon, while direct violence such as torture and sexual violence push victims to flee the country (Braithwaite et al., 2021). The type of actors who engage in violence similarly affect the number of refugees, although findings are mixed. Turkoglu (2022) find that one standard deviation increase in government violence is associated with shy of 40,000 additional refugees, while a similar increase in rebel violence leads to over 25,000 refugees. By contrast, Davenport et al. (2003a) find rebel violence to be associated with a larger number of refugees than government violence.

Decisions to migrate may also be affected by war indirectly, and conditionally on a number of 'pull' factors in potential host countries, such as the economic opportunities and the protection of human rights that the receving countries offer. Turkoglu and Chadefaux (2019) find that increases in economic opportunities and democratisation account on average for an additional 130,000 and 156,000 refugees per conflict year. While macro-level findings on the effect of income on refugees and asylum seekers are mixed (Ruhe et al., 2020), micro-level studies propose that economic capital and opportunities influence the decision-making process of conflict-exposed individuals and households in multiple ways. Economic and social capital can change the costs of leaving (Adhikari, 2013; Bohra-mishra & Massey, 2011; Engel & Ibáñez, 2007), and make it easier to translate motivations to leave into opportunities to do so (Schon, 2019).

The disruption and uncertainty induced by conflicts may contribute to drive migration even without direct violence exposure. For example, in the context of low-level violence during the 2017 presidential elections in Kenya, Ruhe (2021) finds that migration 'aspirations' are

partly formed as anticipatory responses to potential future risks of violence.

Research on the relationship between conflict and migration has advanced by relying on better data and a broader understanding of the complexity of migration decisions in the context of conflict. However, this complexity, as well as differences in the conceptualisation and operationalisation of displacement, make comparison and interpretation of substantive effects of conflict impacts challenging.

3.3.3 Socio-psychological outcomes

Not only have armed conflicts detrimental impacts on physical health, they also have a number of negative effects on individuals' support for cooperative or competitive behaviours, social capital, and pro-sociality more broadly.

The experience of war activates our coalitional psychology and leads to the emergence of an 'ethos of conflict' or 'conflict ideology' that revolves around the concern for security and exalts the ingroup while denigrating the adversarial outgroup (Bar-Tal, 1998; Bar-Tal et al., 2012). This conflict-supporting system of beliefs helps meet individuals' psychological needs for sense-making and self-esteem in the midst of armed conflict, but also cements the prejudices and grievances that lie at the conflict's root (Bar-Tal & Avrahamzon, 2017). Those that experience greater violence tend to express greater endorsement of the ethos of conflict, which in turn can reduce support for peaceful compromise (Canetti et al., 2017). After the war ends, those more exposed to violence also express greater support for retribution, especially if they remain ethnically segregated (Hall et al., 2018). War exposure is found to reduce political tolerance in Sri Lanka (Kijewski & Rapp, 2019) and increase negative bias towards ethnic outgroups in Kosovo (Mironova & Whitt, 2018). Such attitudes can be

passed down through generations lengthtening the shadow cast by war (Bar-Tal et al., 2017; Medjedovic & Petrovic, 2021; Štambuk et al., 2020).

Research conducted in Darfur suggests that war exposure can also reduce demands for retaliation (Hazlett, 2020). In postwar Burundi, those victimized by violence were more forgiving when they held the expectation that their ethnic group would make political gains as a result of the post-conflict transition (Samii, 2013). In former Yugoslavia, a high degree of violence against a particular ethnic group was associated with lower support of reconciliation, whereas more symmetric violence had the opposite effect (Penić et al., 2021).

War may profoundly shape 'social capital' — the trust, social norms, networks, and interpersonal relations that facilitate coordinated action (Putnam et al., 1994). Early research suggested that armed conflict undermines social capital (Collier et al., 2003), yet the empirical evidence accumulated in recent years demonstrates the opposite (see Bauer et al., 2016). War-related prosociality appears to occur mainly within rather than between social groups (e.g., Bauer et al., 2014; Cecchi et al., 2016; Mironova & Whitt, 2016; Whitt et al., 2021), but not all outgroup members may be treated the same. A recent study of Syrians living in Turkey find that war exposure decreased empathy and altruism towards rival out-groups, but not non-rival outgroups (Hall & Kahn, 2020).

An alternative strand of literature contends that war exposure can increase outgroup prosociality due to 'altruism born of suffering' (Staub & Vollhardt, 2008; Vollhardt & Staub, 2011). Liberians exposed to greater war violence were more likely to host Ivorian refugees belonging to ethnic outgroups (Hartman & Morse, 2020), and Syrians with greater war exposure were more willing to host internally displaced persons belonging to the Kurdish minority (Hartman et al., 2021). For willingness to host minority Christians the opposite

was true, however, presumably due to their association with the Assad regime. In both studies, outgroup members were portrayed as especially vulnerable and non-threatening and thus may have been met with greater empathy as a result. In a sample of Syrian and Iraqi refugees in Turkey, Hall et al. (2021) found that elderly people, women and ingroup members were perceived as less threatening and shown more altruism than young people, men and members of a rival outgroup, and these relationships were stronger for those exposed to greater war violence. Outgroup membership may thus be one of several threat cues to which war exposure enhances sensitivity.

War further undermines mental health, as war-exposed populations suffer from disproportionately high rates of depression, anxiety, stress-related mental illness, and severe psychiatric disorders such as schizophrenia (Charlson et al., 2019; Hoppen & Morina, 2019; Priebe et al., 2013). The negative impact of ill mental health on psychosocial functioning in the general population is well documented, with typical symptoms including social withdrawal, apathy, anhedonia, mistrust, and irritability (Clayborne et al., 2019; Maercker et al., 2022; Yang et al., 2022). However, only a limited number of studies have investigated mental illness as a mechanism linking war exposure to social outcomes in conflict settings.

In turn, PTSD was associated with less desire for reconciliation and interdependence in Rwanda (Pham et al., 2004), and with more feelings of revenge and lower support for reconciliation among former Congolese and Ugandan child soldiers (Bayer et al., 2007). More recently, research conducted among Burundian refugees in Tanzania by Haer et al. (2021) shows that war-related mental health problems were associated with a decline in social capital and community participation. Among refugees from Syria and Iraq residing in Turkey, posttraumatic stress was found to reduce altruism and increase ingroup bias (Canevello et

al., 2022), and to decrease trust in political institutions (Hall & Werner, 2022). However, traumatic experiences can sometimes promote 'posttraumatic growth' (Tedeschi & Calhoun, 2004) which is associated with positive personal development and improved relations to others. Research conducted in Sri Lanka suggests that the relational component of posttraumatic growth is associated with increased political tolerance (Rapp et al., 2019). Refugees from Iraq and Syria reporting higher levels of posttraumatic growth displayed more empathy and altruism, but this was directed mainly at their ingroup (Canevello et al., 2022). Overall, however, the available evidence points to the potential risk of societies entering 'loss spirals' (Heath et al., 2012) in which mental health problems, loss of social capital and intergroup conflict feed and magnify each other.

4 Discussion: cross-cutting impacts

Not only do armed conflicts impact specific dimensions of human development and wellbeing individually; the impacts of violence on each societal sector can be aggravated by the havoc wreaked in others. Violence amplifies and perpetuates existing vulnerabilities and risks, decreases the coping capacity of individuals and communities, and exacerbates the magnitude of ongoing crises and disasters (Muzamil et al., 2021; Peters, 2021).

Examples abound: the recent cholera outbreaks in conflict-ridden Yemen and South Sudan have been the worst such epidemics in modern history, aggravated by population displacement and poor access to water and sanitation induced by the war (Camacho et al., 2018; Jones et al., 2020; Ng et al., 2020). The upsurge of the coronavirus pandemic in Ethiopia, hitting a population made increasingly vulnerable by the impacts of conflict and drought, have

contributed to fuel a complex humanitarian emergency. 3 million people lack access to water and basic services, and wasting and malnutrition are severely widespread, especially among displaced communities (USAID, 2022).

Table 1 summarizes the cross-cutting impacts of armed conflicts across different domains. The impacts of conflicts on the various societal dimensions reviewed in this paper can interact and propagate in a self-reinforcing loop, where the adverse effects of violence in one sector lower collective capacity to respond to other conflict-induced shocks.

[TABLE 1 HERE]

For example, conflict has significant negative effect on mental and physical health; in turn, health has long-term impacts on income growth and status in adult populations (Mayer, 2001), and the prevalence of AIDS, often worsened by wars, increases poverty and depresses local socio-economic development (Ardington et al., 2014).

Concomitantly, reduced access to clean water impact mental health and social integration (Devoto et al., 2012; White et al., 2022). The impacts of conflict on economic conditions and growth may further deteriorate populations' health by depressing income, worsening individuals' social position, and lowering educational attainment – among the major determinants of health (Braveman & Gottlieb, 2014). For instance, people in Southern Syria spent at least 20% of their income on water alone (Sikder et al., 2018).

Destabilized labour markets and limited job opportunities, common consequences of conflicts, may contribute to internal migration decisions (Morrison & Clark, 2011). The detrimental impacts of conflict on water provision and food production contribute to fuel internal displacement, as the lack of fuel for groundwater pumping, damaged water pipes, or dys-

functional waste-water treatment pose serious challenges for local populations (ICRC, 2015). Temporary shelters hosting conflict refugees and internally displaced people can expose communities to new disease vectors (especially if vaccination coverage is lacking), increase the likelihood of sexual exploitation, and limit access to healthcare (Garry & Checchi, 2019). The inflow of displaced people in receiving communities can also destabilize the existing ethnic composition, decrease social cohesion, and exacerbate economic competition (Baloch et al., 2017; Salehyan & Gleditsch, 2006).

Conflict-driven structural changes in the national economy, including lower per-capita income, decreased openness to trade, and widespread uncertainty that depresses growth (Collier, 1999; Magee & Massoud, 2011), can all contribute to changes in political institutions, lower social capital, and adversely affect stability and security, thereby increasing the risk of conflict in the future (Acemoglu et al., 2008; Boix, 2008; Gat, 2005).

Social cohesion, stability, and trust are in turn paramount determinants of socio-economic development (Foa, 2011), institutional quality, and political regimes (Easterly et al., 2006; Heller, 2009). Changes in political regime, which may arise from violence, have repercussions on economic growth (Hausmann et al., 2005), with particularly sharp and long-lasting effect after the death of a political leader (Jones & Olken, 2005). Social cohesion also affects mental health (Browne & Leckey, 2022), and deprived and socially excluded individuals exhibit lower level of mental and material wellbeing (Bellani & D'Ambrosio, 2011; Foa, 2011).

Overall, conflicts act as a disaster multiplier, increasing both the risk that a shock would precipitate into a disaster, and the magnitude of its impact (Peters, 2021). The total impacts of conflict on human wellbeing and development are hence potentially much larger than the sum of the sectoral impacts. This might explain why micro- and macro-level estimates of

conflict costs are hard to reconcile.

Yet, there is still limited knowledge on how the macro-level indirect processes feed into or amplify the individual-level impacts across different contexts. Existing empirical studies, as those reviewed in this paper, focus on the impacts of violence on a specific societal dimension, while few studies have investigated how these impacts interact and mutually reinforce. More inter-disciplinary research is needed to model how impacts travel through domains, other than through space and time. Complex system approaches can be used to understand how the impacts spread across societal dimensions and scales. Agent based and integrated assessment modelling may be employed to investigate how the impacts of a shock in one sector propagate to other sectors and back, and simulate how individuals or groups respond to amplified risks. Finally, structural equation and reduced form regression models may help identify causal links between conflicts and multiple societal dimensions.

Another important research avenue is to improve understanding of what individual and group-level characteristics exacerbate or moderate conflict impacts, and what policies and interventions may mitigate them. An increased understanding of the factors and conditions that worsen or moderate the impacts of violence may help inform anticipatory actions and prevention strategies to minimise human suffering, and preempt conflicts from escalating into a humanitarian disaster.

5 Conclusions

We have reviewed the impacts of armed conflict on different dimensions of human development: health, schooling, livelihood and income, macro-economic conditions, water access,

food security, political institutions, migration and displacement, and socio-psychological processes. The review paid attention to both direct and indirect impacts of violence, and to how these impacts interact across sectors.

We find that armed conflicts have long-lasting impacts via material mechanisms – affecting the availability and access to resources, diverting public investments, and devaluating and destructing capital – but also by immaterial ones – by propagating fear and uncertainty, deteriorating individuals' mental health and wellbeing, and altering group-level dynamics of cooperation and trust. These impacts are observed even in communities that are not directly exposed to violence, and last long after the fighting stops.

Conflict impacts affect all dimensions of human wellbeing and development, making societies increasingly vulnerable to shocks. In turn, the exacerbated vulnerability induced by conflicts leads to rippling effects where the impacts on one outcome propagates on a multitude of societal dimensions, worsening the total consequences of violence. Further research is needed to understand how the impacts of war interact at various levels and scales, how they travel and mutually reinforce across different societal domains, and what conditions make individuals and groups more or less vulnerable to those impacts.

	Impacts of armed conflict								
On → Through ↓	**Health**	**Income & Livelihood**	**Schooling & Education**	**Water**	**Food**	**Growth & Investments**	**Social capital**	**Migration**	**Institutions**
Health	war increases risk of disease, injury, death; lowers health services availability/access	ill health leads to impoverishment	disease outbreaks hinder school enrollment and learning		outbreak of infectious diseases increases malnutrition	poor health decreases economic output	mental illness reduces social capital	epidemics trigger migration as coping strategy	outbreaks weaken socio-political stability
Income & Livelihood	lower income linked to poorer health	conflict destructs, displaces and devalues capital and livelihood	income shocks increase risk of school droupouts	income shocks decrease water access	income decline impairs food consumption	income deterioration results in lower aggregate output	income decline reduces trust	income shocks increase propensity to migrate	lower income associated with less democratic regimes
Schooling & Education	loss of support systems due to school closures impair children's mental health	school absence lowers employment prospects	wars reduce school enrollment, attendance and literacy; destruct school facilities	educational attainments linked to water consumption	lower education associated with lower agricultural productivity	decrease in education expenditure impairs growth	lower education attainments reduce social capital	lower education levels may reduce aspirations to migrate	worse education linked to lower democratic stability and higher support for authoritarian regimes
Water	disruption of safe water supplies increases risk of disease outbreaks; water scarcity worsens mental health	water stress threatens livelihoods	reduced water increases school absenteeism	conflicts impair water access, quality and provision	groundwater depletion, water pollution/degradation threaten food security	changes in water runoff hinder economic growth	water scarcity increases risk of social conflict	lower access to water encourages migration	water scarcity may destabilize democracies
Food	malnutrition increases risk of underweight in children	decline in food production deteriorates farming income	malnutrition hinders children's academic performance	lower food production may decrease pressure on water	wars lead to loss of livestock, crops and access to land, shortage of farming labour, theft and destruction of land properties	agricultural shocks decrease economic growth	food scarcity deteriorates trust	food scarcity encourages migration	
Growth & Investments	disruption of financial stability, diversion of public funds away from health, and expatriation of economic resources disrupt health services	macro-economic shocks lower household income	diversion of public expenditures lower investments in education	economic decline reduces resources available to maintain water facilities	economic shocks hinder agricultural production	war destroys human and physical capital; reduces current and future growth and investments	negative economic shocks decrease prosociality	economic crises promote outmigration	economic decline decreases trust in political institutions

On → Through ↓	Impacts of armed conflict								
	Health	**Income & Livelihood**	**Schooling & Education**	**Water**	**Food**	**Growth & Investments**	**Social capital**	**Migration**	**Institutions**
Social capital	less inter-group support may increase morbidity and PTSD, deteriorate wellbeing and promote health-risky behaviours	lower social capital may increase the impacts of income shocks	reduction in social capital increases likelihood of school dropout	loss of social networks decreases efficiency of water projects	social capital disruption worsens food security	social capital deterioration contributes to poverty	war exposure induces ingroup cooperation and outgroup competition	social capital loss deteriorates migrants' quality of life	loss of social connections decreases governmental accountability
Migration	migration of medical staff impairs healthcare; increased exposure to diseases among displaced communities	migration increases income (unequally)	migrants' remittances increase school enrollment	rural-urban migration may increase access to tap water; migration can trigger competition for resources	migrants are at higher risk of food insecurity	migration can raise GDP by raising productivity	migration can alter ethnic and socio-economic dynamics that disrupt social networks in host communities	conflict is a major determinant of migration	migrants can boost institutional transformations; migrants' remittances can weaken state capacity
Institutions	decline in democracy is deleterious for public health	democratic decline may increase income inequality	decline in state capacity deteriorates educational attainment	poorer rule of law contributes to deregulation of water use, disinvestment in water infrastructure and maintenance	authoritarian regimes decrease returns to farmers and can exploit food insecurity as a repression strategy	deterioration of state capacity lowers social capital	democratic decline lowers openness to trade and discourages investments	political instability triggers migration	civil war deteriorates state capacity and harms democracy

Table 1. Cross-cutting impacts of armed conflict on various development dimensions. The direction of causality reads from left to right: conflict impacts on the dimensions of development in each column affect the development dimension reported in each row. Diagonal cells summarize direct impacts.

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