

Armed conflict and public health: into the 21st century

S. Garry^{1,2}, F. Checchi^{1,2}

¹Faculty of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, London WC1E 7HT, UK

²Chatham House, London SW1Y 4LE, UK

Address correspondence to S. Garry, E-mail: sylvia.garry@gmail.com.

ABSTRACT

Background Many people worldwide are affected by conflict, and countries affected are less likely to meet the UN Sustainable Development Goals. This review outlines the effects of conflict on health and focuses on areas requiring more attention.

Methods We completed a search of the literature using Medline, Embase and Global Health.

Results Health effects of conflict include trauma; mental health; non-communicable diseases (NCDs); child health; sexual, reproductive and maternal health; and infectious diseases. Conflict damages health directly through fighting, and indirectly through wider socioeconomic effects. Health outcomes are influenced by pre-existing population health and demographics, and access to appropriate healthcare. Vulnerable populations (the elderly, children, neonates and women) are especially at risk.

Conclusion Several areas pose key challenges including: tactics of war as a public health problem; a lack of focus on neonatal care and NCDs; the long-term consequences of conflict across a life-course and into future generations; and the need to focus on wellbeing beyond standard health parameters. Clear decisions about prioritisation need to be made. The effects on civilians must be documented and recorded. Further research is required to understand chronic health needs and effects on future generations, to support fair and equitable resource prioritisation to best meet the needs of conflict-affected populations.

Keywords public health, social determinants, war

Background

According to the World Bank, 2 billion people currently live in areas that are fragile or affected by conflict.¹ Armed conflicts affect health: they entail violence, displacement, infrastructure damage and the disruption of public health services.² Populations seek refuge from active conflict to escape the direct danger of warfare, food insecurity and loss of livelihoods. Of the 68.5 million people currently displaced by conflict, almost 60% have not crossed international borders and remain in the country affected³ as internally displaced persons (IDPs). Conflict-affected countries are less likely to achieve the Sustainable Development Goals (SDGs).⁴

The 20th century saw over 191 million conflict-related deaths.⁵ However, whereas 1 in 7 World War 1 deaths were among civilians, civilians accounted for two thirds of World War 2 deaths, and 90% of deaths in some 1990s conflicts.^{6, 7} The review focuses on civilian populations affected by conflict; however, the distinction with combatant outcomes is not

always clear-cut, as civilians may sometimes become combatants, and vice versa.

Search strategy and selection criteria

We searched Medline, Embase and Global Health using search terms [((armed or zone) adj2 conflict\$.mp. OR (conflict adj3 (population* or person* or communit* or people)).mp. OR War exposure/] AND (Impact* or effect* or consequence* or outcome*).mp AND (disease* or health* or mortality or death* or health or morbidit* or illness*).mp. AND (population* or model or associat* or ecologic* or aggregate* or communit*).mp. We applied search criteria from January 1990 to the review date (December 2018). Only relevant

S. Garry, Public Health Registrar, Research Fellow

F. Checchi, Professor of Epidemiology & International Health

articles and citations in English were included. Second-generation searching was applied to search the references of several key articles, and further articles were added by experts in this area.

This paper reviews the effects that conflict has on the health of individuals by synthesising the available literature. It then describes factors that make people and populations especially vulnerable to these effects. The paper then discusses areas for which evidence, policy and/or programmatic emphasis are, in our view, currently insufficient and requiring of greater attention in order to transition humanitarian public health into the next decades of practice.

Effects of conflict on health

This section outlines an overview of the effects of conflict on health (see Panel 1). Direct health effects include morbidity and mortality that are usually trauma-related.^{8–10} Generally, indirect effects refer to excess morbidity and mortality attributable to the conflict (or, in other words, above and beyond a counterfactual level, had conflict not occurred), minus ‘direct’ impacts.² Estimating indirect mortality is challenging,⁵ and indirect impacts of conflict are often under-recorded and underestimated.^{11,12} The oft-quoted 9:1 ratio of indirect to direct deaths in conflict has limited evidence basis^{13,14} and probably varies considerably between conflicts. Indirect health effects are modulated by underlying population health, nutritional status, public health system resilience and access to quality healthcare. Mental health problems can be considered direct effects if they arise from exposure to traumatic events (e.g. military attacks), but anxiety, depression and other mental health disorders arising from displacement, loss of livelihoods, etc. should also be counted among conflicts’ indirect effects.

Panel 1: effects of conflict on health Trauma and injuries

Trauma-attributable mortality was especially high in the Bosnian conflict, Rwandan genocide, Kosovo and after the 2003 Iraq invasion.^{5,10} Mortality depends on the intent of violence, e.g. genocide, as well as the types of weapon used, and their destructiveness; bombing and shelling for example cause more widespread destruction and mortality than one-to-one combat.¹⁵ Weapons can inflict damage beyond trauma; chemical (e.g. chlorine, mustard gas and sarin gas) and nuclear weapons cause

immediate, and sometimes chronic, damage to health. Many injuries result in long-term disabilities, worsened by healthcare delays or limited rehabilitation services.¹⁶

Infectious diseases

Infectious disease burden depends on the risk of locally transmitted or imported endemic and epidemic-prone infections.¹⁷ Infectious diseases have accounted for the majority of mortality in some settings (e.g. 80% of deaths in Darfur).^{7,15} Their burden increases due to population movement, and exposure to disease vectors e.g. malaria.^{5,8,18} Crowded living conditions with poor sanitation increase risks of diarrhoeal illnesses, respiratory infections, measles and tuberculosis.^{15,17,19} Outbreaks are often vaccine-preventable,²⁰ e.g. measles and cholera, and malnutrition and poor vaccination coverage play key roles in incidence, severity and spread of infections.

Non-communicable diseases

The incidence and prevalence of the main non-communicable diseases (NCDs) (chronic respiratory disease, cardiovascular disease—CVD, diabetes and cancer) depend on baseline population demographics, which may be altered by conflict,²¹ i.e. from population displacement and deaths of younger people in combat. High prevalence of NCD risk factors (such as inactivity, hypertension and smoking) has been recorded in post-war Bosnia²² and Syria.^{23–25} A recent systematic review found that conflict is associated with increased CVD and the associated risk factors (smoking, hypertension, hypercholesterolaemia and alcohol consumption).¹ Conflict is also associated with increased CVD-related mortality,²⁶ likely due to reduced healthcare access.

Sexual, reproductive and maternal health

Interruption of antenatal and routine maternal services may worsen complications, e.g. pre-eclampsia/eclampsia.²⁷ Conflicts reduce access to maternal and reproductive health services, worsening maternal and neonatal health outcomes (e.g. Burundi and Northern Uganda).²⁸ The effect on maternal mortality ratio is context-dependent: it increases during and following some conflicts,^{29,30} but may improve in some areas or in neighbouring states^{29,31} possibly due to the influx of additional services in response to the emergency. Beyond access to appropriate services, health outcomes

¹ Personal communication from unpublished research: “The impact of armed conflict on cardiovascular disease risk among civilian populations in low- and middle-income countries: a systematic review,” Jawad *et al.*

are also influenced by relationships and fertility, and gender-based violence (GBV). Sexual behaviour changes and sexual health services disruptions are also associated with increased sexually transmitted infection rates.^{5,19} Wars are associated with increasing frequency of GBV, especially against women, and sometimes perpetrated as a war tactic. GBV and sexual exploitation include persecution, 'honour killings',³² human trafficking including for rape and prostitution (e.g. Iraq³²), and forced marriages, including child marriage.³³

Child health

Children are often affected by the same diseases of more stable but under-resourced settings, e.g. pneumonia, malnutrition and diarrhoea, but with higher incidence and lethality.^{5,34} Conflicts increase infant and under 5-year mortality, especially in the acute period after conflict onset,^{6,15,35–37} although some conflicts report reduced under 5-year mortality compared with pre-conflict³⁷ (possibly due to the influx of services). The negative effects generally persist into the post-conflict era.^{15,18,30} However, in post-conflict countries, child mortality improves in countries which are wealthier, more democratic, and have better education opportunities.³⁸

Mental health

There has been increased interest in recent years in conflicts' effects on mental health. Effects include post-traumatic stress disorder (PTSD), stress, insomnia, anxiety and depression.³⁹ Conflict impacts mental health due to displacement, food and water shortages, exposure to traumatic incidents and violence, loss of protective factors e.g. family and financial stability⁵ and stresses after migration including socio-economic status.⁴⁰ Those with mental health problems may be prone to exploitation and face other risks to health and wellbeing.

Nutrition

Acute malnutrition prevalence is higher in conflict-affected populations.^{15,30} Acute malnutrition presents as total nutrition deficiencies (i.e. starvation) and/or specific micronutrient deficiencies resulting in immune system depletion, cardiac failure, etc.⁷ Malnutrition is at the core of much morbidity and mortality, mainly due to its interplay with immunity to infection.⁴¹ Nutrition status is interlinked with other health outcomes, including resilience and recovery from illness (e.g. vitamin A), healing from war wounds and response to vaccines.

Armed conflict does not just directly cause population harm; it also impacts on the wider determinants of health. A public health approach considers these wider determinants,^{42–44} discussed in the next section.

Health determinants

Conflict, acute or protracted, is a shock to individuals, communities and societies. Vulnerable individuals are those less able to manage the impacts of conflict due to age, gender, health, physical and psychological resilience, and socio-economic status.

"Vulnerability is the degree to which a population or an individual is unable to anticipate, cope with, resist and recover from the impacts of disasters. It is a function of susceptibility and resilience".⁴⁵

Those vulnerable pre-war are even more vulnerable during and post-conflict. Conflict increases exposure to health risks (e.g. displacement leading to exposure to new infections/vectors, increased GBV and environmental contamination) and disrupts protective factors (e.g. community networks, safe water supply, positive health-seeking behaviours and financial stability).⁵ This section will outline some of these determinants that are interlinked; for example, loss of family members, loss of income,¹⁸ societal breakdown and lawlessness¹⁸ increase risks to health due to the loss of food security and shelter.

Pre-conflict context

Health outcomes depend on not only crisis-emergent risks to health but also the baseline characteristics of the population itself. Needs assessments start with examining these characteristics. In some areas, death rates correlate with pre-conflict population health more than conflict intensity.⁶ The pre-conflict context includes demographics and health status of the population, as well as expectations regarding health and acceptability of health interventions. For example, indirect mortality from infectious diseases has historically been high in sub-Saharan Africa due to a higher baseline burden of malnutrition, disease and weak health systems.¹⁴ This is contrasted with Syria, with high levels of NCDs and associated risk factors prior to conflict onset.²¹

Age and gender

Infants, children and pregnant women affected by conflict have some of the worst mortality indicators worldwide.⁵ Children are especially vulnerable to increased health risks

(exposure to infection, poor hygiene and environmental contamination) as they are both less aware of health risks and also less able to control their environments. Their health outcomes depend on their caregiver and their health-seeking behaviour. Mental disorders may be higher in children than in adults exposed to conflict.⁴⁶

Some health risks are specifically gender-related; during the Korean War, most abandoned children were infant girls.⁴⁷ Women are at particular risk of mental illness, with high suicide rates reported in women of child-bearing age.¹⁹ As might be expected, exposure to GBV is a risk factor for mental stress, with rape magnifying stress some 8-fold.³⁹ Negative physical health effects last into older age as older women have worse health outcomes than older men.^{17,48} Vulnerability is also not limited to children or young women; older populations suffer the psychological impact of being left behind and feel undervalued.⁴⁹

Breakdown of communities, societies and loss of livelihoods

Conflict exacerbates poverty via property damage, displacement and loss of employment,⁵⁰ contributing to a 'poverty trap'.⁵¹ Conflicts may break down social structure and social capital⁴⁴, including loss of mutual, social and financial support.^{50–52} The financial stability of widow-headed families, orphaned children and people with disabilities is especially affected.⁵¹

Conflict disrupts families and communities. The disruption of community norms impacts many aspects of life. Civil wars negatively impact education, especially for girls.⁵¹ Education quality and continuity is impacted, and children may be diverted into labour to maintain household incomes.⁵¹ Women may marry and become pregnant at a younger age due to coercion or need for psychosocial or economic stability.^{28,53} This is especially prominent in low-income country conflicts,²⁹ although in some conflicts age of marriage or first conception has been delayed, e.g. Tajikistan.^{51,53} Marriage onset may be delayed for many reasons, including lack of finances to pay for the wedding celebrations or for housing, or in areas with high mortality in young men.⁵³

Conflict disrupts infrastructure (e.g. roads and transportation), essential for populations to access work and education.¹⁵ It becomes less safe or possible to travel. There are also breakdowns of society norms and regulations aiming to protect and safeguard its citizens. Conflict damages the societal structures that reduce traffic accidents, improve street and building safety, and enforce safety regulations, resulting in increased injuries.^{17,19} The interrupted law-enforcement structures result in increased violence, e.g. homicides.^{15,17,19} There are also reports of increased domestic violence, e.g. Cambodia.³² The breakdown in civil structures in some areas

has empowered criminal organisations,⁵² with people turning to illegal trade or smuggling to maintain livelihoods.⁵⁰

Food insecurity

Conflict increases food insecurity through several mechanisms. Food needs space, time and resources to be grown and cultivated and requires finances to purchase it. Production of weapons, vehicles and equipment is resource-intensive⁵⁴ and can cause water and soil contamination⁵⁵; damaged or contaminated agricultural land reduces food production.⁵⁶ Conflict impacts inflation⁵⁰ and interrupts agriculture,⁵² trade and businesses.^{7,15} The effects on trade and economy may raise food prices and reduce its availability.

Food restrictions (both quantity and quality) impact physical and mental wellbeing. Not only women are more susceptible physiologically to vitamin and iron deficiencies,⁵⁷ but also displaced female-headed households are more vulnerable to food shortages.⁴⁷ Male children are often more protected than females from malnutrition, as was found in the Rwandan conflict for example.¹⁸ The elderly are at also risk of malnutrition, less able to access food, but also because of increased risks of chronic diseases.⁴⁹

Displacement

People escape active warfare, persecution, destruction of homes and to seek access to food and water. Some are displaced to camps, and others become dispersed within host populations. Generally in warfare, water and sanitation infrastructure are more affected in rural areas compared with urban areas; this displaces populations towards cities and towns, exacerbating shelter shortages.^{7,58} Generally, IDPs are offered less legal protection than populations that have crossed borders⁷ and IDPs have higher mortality than refugees.⁵ Displaced populations have more vulnerable people than might be expected from baseline demographics⁴⁹; half of the world's refugees are children.⁵⁹ This may in part reflect the demographics of the countries of origin, or that men are more likely to fight, reach further destinations or not be recorded in the refugee data; for example, orphans, widowed women, the elderly and those with disabilities may be unable to travel long distances.^{17,60}

The new environments, climate and temporary shelters can expose displaced populations to new health risks,¹⁵ for example disease vectors. The influx of unvaccinated people and overcrowding makes people at risk of vaccine-preventable outbreaks such as measles. Herd immunity, which normally protects populations from outbreaks against these diseases, is reduced. Overcrowding also increases the transmissibility of infections, increasing burden of both epidemic-prone and endemic diseases.

Displacement has both physical and mental health consequences (see Panel 1): travel and displacement, changes in shelter, and food access, all alter behaviours, including nutrition, sleep, sexual behaviour and physical activity. These may harm mental health by increasing the use of harmful substance, including alcohol, drugs and smoking, especially noted in displaced men.^{61,62} Women and children are at risk of sexual exploitation in camps³² due to the close proximity of living quarters, removal of protective community factors and lack of employment; these also increase the risks of transactional sex and prostitution.^{5,63}

Reduced access to quality healthcare

Effective healthcare requires access to appropriate, effective and affordable services. The pre-conflict structure influences societal expectations of healthcare structure and delivery. Conflict affects existing healthcare services, with the damage dependent on the existing system's resilience to shocks.⁷ Infrastructure, including buildings, medication stores, laboratories, electricity and water, is damaged by warfare; they may be directly targeted or looted.^{5,7,15,64,65} Fighting displaces healthcare staff,^{5,15,18,66} who may also be directly targeted.⁵ Conflict reduces access by damaging transport and communications,²⁹ and travel may become dangerous or unaffordable.⁶ Child and birth-related mortality are especially affected by lack of access.^{6,15,57}

The ability of the humanitarian health response, international and local, governmental and non-governmental, to deliver timely and functional services, determines health outcomes. Healthcare strategy requires challenging moral quandaries regarding the distribution of limited resources.² National resources are diverted to the military,^{5,15,58} with reduced public spending on education, transport, infrastructure and health^{15,55}; this diversion also occurs pre-conflict.²⁹ In health, resources at the national level are re-prioritised away from public health programmes onto more acute needs.⁵² In intercommunal conflicts, there is less public health spending on marginalised groups,³⁶ as might be expected. In some instances, access to services has improved compared with pre-conflict due to additional provision often by the international community.^{5,15} However, parallel health systems may arise as a result of the humanitarian response.¹² In addition, these additional services are likely to be temporary only, leaving a gap as the conflict situation settles.

Key challenges for the progress of humanitarian public health

The previous sections briefly outlined the effects of conflict on health, and how conflicts modulate health determinants.

This section aims to draw out some key challenges that pertain to the current state of armed conflict and health, and in the authors' opinion should be the subject of increased policy and practice emphasis.

Tactics of war are a public health issue

We cannot articulate humanitarian public health action by ignoring war tactics, war crimes and attacks against civilians. Sometimes harms are purposely caused as a political or tactical tool. For example, one in three refugees has experienced torture.^{8,67} Civilian casualties occur on the frontline but also away from where the active fighting is taking place⁵²; civilians may be mistakenly harmed, and they may fall victim to indiscriminate warfare, e.g. barrel bombs⁶⁸ or landmines^{32,69,70}, which results in high civilian casualty rates, or they may be directly targeted. Targeted attacks may be linked to gender, ethnicity and educational status (e.g. Rwanda, Cambodia and China^{50,51}), and can escalate to genocide.⁷¹ Civil wars where specific groups are targeted result in more civilian deaths.^{57,64} The targeting of civilians, and use to tactics intended to intimidate, or weaken populations is an ongoing issue across conflicts (see Panel 2).

Attacks on civilian populations have frequently been reported in recent conflicts, but civilian protection is inseparable from public health action. 'Atrocity crimes' include genocide, crimes against humanity and war crimes.⁷² Indices, e.g. Dirty War Index, seek to explicitly identify when civilians are harmed in conflict⁷³; however, these are not used in a standardised manner. Considering tactics of war as a public health problem is essential to improving the health of populations affected by conflict. They need to be recognised and treated dispassionately as such; it is a matter of good public health policy and practice to highlight the effects of these tactics. By implication, this means that humanitarian actors need to be prepared to treat these determinants as any other public health risk factor; this requires measuring their occurrence, scale, effects and reporting them.

Panel 2: tactics targeting vulnerable populations Sexual violence as a weapon of war

Rape and sexual violence, by military and non-military, have been documented as both a tactic and consequence of conflict, e.g. Sierra Leone^{5,32} Historically, finding reliable GBV as 'weapon of war' data has been difficult¹⁸ due to stigmatisation and vulnerability of survivors. Reports of conflicts involving identity-based persecu-

tion highlight sexual violence to intimidate, humiliate or impregnate women.^{32,57,63}

*“... sexual violence serves as a means of ethnic cleansing, terrorization, and humiliation, not only of the violated women, but also the men of the same ethnic group who are forcibly demonstrated their failure to protect “their” women.”*⁵⁷

GBV results in physical (trauma, infection and unplanned pregnancy) and psychological trauma.^{63,74} Trauma includes deliberate mutilation of sexual organs (breasts, genitalia), forcibly removing foetuses or deliberate HIV infection.³² Sexual torture may result in severe internal injuries.³² A Democratic Republic of the Congo (DRC) review reported:

*“... increased reports of many women and girls suffering from genital injuries, internal bleeding, fistulas and incontinence as a result of rape with limited access to appropriate care.”*⁶³

Food as a weapon of war

In some contexts, access to food and water has been deliberately restricted. This has included destruction of food (e.g. Rhodesian forces in ‘Operation Turkey’⁶⁴), water contamination (e.g. Sudan in the 1990s⁴⁷), curfews, sieges and blockades, or restricting movements (e.g. in Tubmanburg, Liberia⁷).

Child soldiers

The 250 000–300 000 child soldiers worldwide^{63,75} have often endured traumatic experiences, including being victims of, witnessing, or having engaged in violence; loss of relatives; displacement; early sexual experiences and lack of food. Most former child soldier exhibit signs of PTSD and many develop barriers to re-integrating into mainstream life due to difficulties forming relationships, loss of concentration, and feelings of revenge.⁷⁵ Child soldiers often have limited schooling, impacting long-term employment.⁵¹ These experiences have long-term impacts on physical and mental health, as well as emotional well-being and functioning in society.⁵⁹

Attacks on healthcare

In some conflicts, infrastructure including healthcare, transport, power and water are deliberately targeted.^{6,15} Bombings and attacks on hospitals have been recorded across conflicts, including Syria and Yemen recent years, prompting calls for standardised mechanisms to record these events.⁷⁶

Neonatal health

When reviewing the progress of the SDGs, progress on child mortality reduction in low- and middle-income countries (LMICs) has been slowest in reducing neonatal deaths (when compared with child deaths overall); this is also the case in conflict-affected areas. Neonatal morbidity (low birth weight—LBW, prematurity) and mortality (stillbirth and perinatal) are higher in regions affected by conflict,⁵⁹ due to impaired maternal nutrition, increased maternal stress, reduced healthcare access and reduced breastfeeding rates.⁴⁷ Rates of LBW neonates are higher in LMICs⁷⁷, increasing their vulnerability to malnutrition and infection. The health of neonates is intertwined with the health of their mothers not only in utero but also after birth, as lactating women for example have high nutritional and water requirements which may be unmet in conflicts.

However, despite 14 of the 15 countries with highest neonatal mortality worldwide being affected by conflict or being fragile,⁷⁸ neonatal health has received little attention in complex emergencies.³⁴ The reasons for this are complex, and include diversion of interest to other high-profile areas, such as infectious diseases and trauma; a shortage of accurate data on the scale of need,⁷⁹ including stillbirth rates; and a lack of clear coordinated strategy across the global community. There is a common misconception that neonatal care is complex and requires innovation to advance. However, there is a burden of morbidity and mortality that can be addressed through basic neonatal care (feeding support, parental education, kangaroo mother care, hygiene and antibiotics and thermal care); these require skilled workers to deliver, stable shelter and food sources, community support and access to healthcare, all of which are disrupted by conflict. Further attention is required to better understand how to deliver essential basic neonatal care to populations affected by conflict, and tackle a very preventable and important cause of mortality and morbidity.

NCDs

Decision-making processes around the prioritisation of humanitarian services often lack transparency, are donor-led, politically influenced and limited by the lack of cost-effectiveness evidence on interventions in humanitarian settings. There is an understandable sense of urgency to address immediate needs due to acute trauma and infection. Historically, responses have focussed on injuries and acute infectious diseases, whereas NCD health needs have received limited attention.²¹

Globally, the demographic and epidemiological transition has led NCDs to be responsible for the majority of worldwide mortality.⁸⁰ In recent years, there has been a growing awareness of chronic disease burden in conflicts. As

more middle-income countries are now conflict-affected⁸¹ and conflicts have become more protracted, NCDs account for a greater burden of disease. Non-governmental organisations have noted increasing NCD burdens in some contexts, e.g. Lebanon, Pakistan, Liberia, Sudan, Yemen, Syria and Iraq.²⁶

However, there is generally a lack of information on chronic illnesses in conflicts and displaced populations.^{26,48,82} This is due to logistic (warfare, accessing vulnerable and/or mobile populations, lack of standardised data collection and lack of verifiable sources) and political (states involved in warfare, World Health Organization—WHO bureaucracy and political will for data collection) challenges. The lack of standard NCD rapid assessment tools makes risk assessments and prioritisation challenging.²⁶ In addition, the unpredictability of war creates a challenge for planning health responses. Continuity of care is especially difficult in the face of health system disruption, as NCD health outcomes are sensitive to healthcare continuity^{18,26,83} and the elderly or disabled face multiple challenges to accessing continuity of healthcare.⁸⁴

Meeting population needs requires an understanding of the situation, as well as a transparent, accountable prioritisation decision-making framework to allocate limited resources ethically and effectively, with an appropriate balance between acute and chronic health needs. An improved understanding of the context-specific causes of morbidity and mortality, including expectations of and demand for healthcare, would help with attributing appropriate weight to these causes and, hence, prioritising limited humanitarian funds. This would allow for transparent and needs-driven (rather than donor-driven) resource allocation.

Secular and inter-generational health effects

A longer time horizon, including the decades during which populations recover from conflict, is rarely considered in public health planning and response. The health effects can last across years (see Table 1). For example, the effects on women and in pregnancy can be felt across generations. The effects of early life health and nutrition can be seen across their lives: malnutrition in pregnancy increases intra-uterine death or intra-uterine growth restriction; hypoxia at birth may result in chronic health problems; and impaired early life nutrition increases risks of NCDs in adulthood. Children in high conflict areas are more likely to become stunted due chronic malnutrition,^{18,51} with consequences on mental wellbeing and neurological development. This will impact their productiveness into society in the long term. More generally, one long-term consequence of high death rate during conflict is an increased number of single-parent

households and orphaned children, with downstream effects due to poverty, reduced educational opportunities, etc.

Conflicts, especially when protracted, have long-lasting consequences. At the economic level, civil wars delay GDP growth by on average 30 years, according to the World Bank.⁸⁵ LICs have a slower economic recovery following conflict,⁵⁰ with conflict being described as “*development in reverse*”.¹⁸ National spending patterns tend to continue post-conflict: countries with recent conflicts spend less on health and more on defence.^{5,15,18,30} There are exceptions to this: in the long term, a new political regime may also improve health if it brings with new policies and investment into public health.^{13,51} However, there are likely to be long-term consequences on healthcare systems due to the loss of healthcare workers, damaged infrastructure, disrupted leadership and financing systems as well as increased demands.

Conflict also causes long-term environmental impacts, both in preparation for and during fighting, and is linked to air, water and sound pollution.⁴⁴ Explosives and artillery have devastating impacts.⁸⁶ Chemical, biological and nuclear weapons also affect the wider environment, which can have long-term effects on individuals, ecosystems and the environment.^{54,55} Environmental damage from conflict includes the Kuwaiti oil fires (Gulf War), or the Agent Orange forest effects (Vietnam).⁵⁴ Environmental impacts directly damage health in the short and long term: radiation and chemicals are linked to birth defects and cancer; air particles and fires exacerbate respiratory disease; and deforestation creates pools of stagnant water, helping mosquitoes to breed.⁵⁵ Displacement can severely impact ecosystems, due to shelter, water and food requirements.⁵⁵ And then further to this, the long-term effects on the economics and environment may have consequences themselves on country fragility increasing the risks of conflict recurrence—economic inequality and climate change have been linked to risks of conflict onset.^{36,87}

Tackling and mitigating the long-term wider effects requires a better understanding of these impacts, including analysis on long-term impacts from a societal, economic, development, resilience, health systems and long-term health perspective. Health effects in crises last across decades and generations, and those considerations need to be counted and considered. The full cost of these effects across the years has not been quantified amongst the consequences of armed conflict, and it is challenging to do so due to their reach across health, society and economics. Although it may be reasonable to place greater value on short-term health effects that humanitarian action can more predictably expect and tackle, understanding what leads to ongoing excess mortality/mor-

Table 1 Timing of specific health effects of armed conflict, by time since conflict onset

Health threat/effect	Time elapsed since crisis onset				
	1–3 months	3–6 months	6–12 months	5 years and beyond	20 years and beyond
Worse reproductive, maternal and neonatal (RMN) outcomes	GBV perpetrated by combatants. Worse RMN outcomes due to lack of safe birth care and emergency treatment	Increased GBV—due to displacement and socio-economic disruptions, compounding RMN effect of malnutrition and lack of antenatal care	Unplanned pregnancies due to GBV.	Sequelae of GBV—sexual trauma, fistulae, infection, mental health problems, loss of livelihoods and social protection. Problems with early childhood development due to low birth weight.	GBV (e.g. rape)—increased unplanned pregnancies—causing reduced education and employment for women. Marginalisation and violence against children born due to rape. Worse health status due to poverty and low educational attainment among children born during conflict with low birth weight, orphaned and/or unable to pursue schooling.
Increased burden of endemic infectious diseases	Higher transmission of respiratory and faecal-oral infections due to overcrowding and poor hygiene; increased case-fatality due to malnutrition and insufficient health services	Increasing effects of acute malnutrition		Higher burden of neglected tropical diseases (e.g. helminths, locally important vector-borne infections) due to interruption of control	
Risk of epidemics	Outbreaks of cholera, shigellosis, measles, pertussis, meningitis, etc. due to overcrowding and poor hygiene conditions.	Increasing risk of outbreaks due to acute malnutrition.	Outbreaks due to accumulation of susceptible people (e.g. unvaccinated newborns)	Setbacks in control of vaccine-preventable diseases, requiring catch-up campaigns	
Increased HIV and TB burden	Increased TB transmission	Worse HIV and TB outcomes due to treatment interruptions	HIV transmission due to altered sexual behaviours and GBV	Higher TB and HIV burden due to earlier transmission	
Increased NCD burden	Worse type 1 diabetes outcomes due to treatment interruptions	Worse type 2 diabetes outcomes due to treatment interruptions	Worse hypertension/CVD outcomes due to treatment interruptions	Increased risk factor for NCD onset or deterioration due exposure to insecurity and displacement (e.g. smoking, poor diet, physical inactivity)	Poor nutrition, stress and illness in pregnancy causes more LBW neonates, increasing risk of developing NCDs (e.g. CVD) in adulthood
Crisis-attributable injuries	Untreated war injuries		Chronic physical disabilities due to lack of access to rehabilitation services	Worse health due to limited education and employment opportunities, stigma and chronic disabilities	Worse health due to poverty, social stigma and social exclusion due to chronic disabilities
Worse mental health	War-related trauma	Interruption of treatment for people with mental health disorders	Anxiety and depression due to displacement and other conflict exposures Addiction		Chronic displacement and unemployment across generations disrupting communities and families. Exposure to violence, ongoing stressors of life such as poverty, poor living conditions. Consequences for child soldiers including stigma, isolation and feelings of guilt.

bidity in these populations is imperative to appropriately prioritise resources.

Wellbeing, not survival, should be the ultimate goal

The WHO describes health as “*a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*”.⁸⁸ Many effects on physical and mental health are clear (see Panel 1). However, whereas there are some clear measures of mental health and physical health, social wellbeing is challenging to measure, there are no markers of overall wellbeing and there is a lack of useful measures of quality of life for these complex settings. In conflict and post-conflict situations, the emphasis is on survival. In many conflicts entire generations remain affected, either in settings of very protracted insecurity (e.g. eastern DRC, Afghanistan and Palestinian Authority) or in long-term refugee camps (e.g. South Sudanese in Kenya). During crises, humanitarian

organisations are organised into siloed clusters to ensure minimal physical and mental health needs are met. However, the ultimate ambition should be set higher than just reducing mortality: wellbeing should be the ultimate metric of success for humanitarian public health. This would require research and measurement of *living well* rather than just living; better understanding of communities, contexts and the role of spirituality; a greater integration of psychosocial support across all areas; and a better integration of the humanitarian agencies into the development sector for protracted crises.

Conclusions

The last decades have seen changes in how wars are fought, with ongoing health implications for populations affected by crises. Conflicts are increasingly protracted, more middle-income countries are affected, and the demographics and

baseline health of populations affected have changed. We have summarised the effects of conflict on health and highlighted how women and children are particularly vulnerable to the effects of conflict.

The effects of conflict on health must continue to be documented and recorded, whether these be due to direct targeted attacks or as an indirect result of warfare. This review has outlined that a better understanding population needs is essential to support fair and equitable resource prioritisation to best meet these needs. This includes not only health but also improved understanding of financial, economic and social consequences of conflict. Further research is required to understand chronic health needs and effects into future generations. There is a need for rational balancing in providing services to meet acute needs versus more chronic health needs. Better understanding population needs and re-thinking prioritisation in complex chronic conflict settings are fit into the wider conversation of providing needs-responsive rather than donor-led responses. Anthropological approaches and qualitative research can supplement quantitative data to better understand the contexts and improve acceptability of interventions.

The work for public health and the health sector is to both minimise and mitigate the health impacts of conflict and focus on preventative interventions (to minimise risk or increase protective mechanisms). Taking a public health approach to conflict can help to address the wider determinants. This could further promote the importance of broader interventions, including education, rebuilding communities and focusing on wellbeing rather than just absence of ill health.

Acknowledgements

Thank you to Rachel Thompson, Dr Brian McCloskey and Lt Gen Louis Lillywhite from the Centre for Global Health Security at Chatham House, for their support in this work.

References

- World Bank. *Helping Countries Navigate a Volatile Environment*, 2018. <https://www.worldbank.org/en/topic/fragilityconflictviolence/overview#1> (28 February 2019, date last accessed).
- Leaning J, Guha-Sapir D. Global health: natural disasters, armed conflict, and public health. *New England Journal of Medicine* 2013;**369**(19):1836–42.
- UNHCR. *Figures at a Glance*. <https://www.unhcr.org/uk/figures-at-a-glance.html> (12 December 2018, date last accessed).
- Samman E, Lucci P, Hagen-Zanker J *et al.* *SDG Progress: Fragility, Crisis and Leaving No One Behind*. London: Overseas Development Institute, 2018.
- Gordon S, Baker A, Dutan A, Garner P. *Study Exploring the Evidence Relating Health and Conflict Interventions and Outcomes*. London: UK Cross Government Group on Health and Conflict, 2010. <http://webarchive.nationalarchives.govuk/20111210182747/http://www.stabilisationunit.govuk/attachments/article/523/ExploringtheevidencerelatingHealthandConflictinterventionsandoutcomepdf> (26 October 18, date last accessed).
- Grundy J, Biggs B-A, Annear P, Mihrshahi S. A conceptual framework for public health analysis of war and defence policy. *International Journal of Peace Studies* 2008;**13**(2):87–99.
- Guha-Sapir D, Van Panhuis WG. *Armed Conflict and Public Health: A Report on Knowledge and Knowledge Gaps*. Brussels: The Rockefeller Foundation, 2002. <https://www.credbe/node/287> (24 October 2018, date last accessed).
- Mateen FJ. Neurological disorders in complex humanitarian emergencies and natural disasters. *Annals of Neurology* 2010;**68**(3):282–94.
- Coupland RM, Meddings DR. Mortality associated with use of weapons in armed conflicts, wartime atrocities, and civilian mass shootings: literature review. *Bmj* 1999;**319**(7207):407–10.
- Levy B, Sidel V. Documenting the effects of armed conflict on population health. *Annu Rev Public Health* 2016;**37**:205–18.
- Thoms ON, Ron J. Public health, conflict and human rights: toward a collaborative research agenda. *Conflict and Health* 2007;**1**:11.
- Ugalde A, Selva-Sutter E, Castillo C *et al.* The health costs of war: can they be measured? Lessons from El Salvador. *BMJ* 2000;**321**(7254):169–72.
- Murray C, King G, Lopez A *et al.* Armed conflict as a public health problem. *BMJ* 2002;**324**:46.
- Roberts A. Lives and statistics: are 90% of war victims civilians? *Survival* 2010;**52**(3):115–36.
- Gates S, Hegre H, Nygård H *et al.* *Consequences of Civil Conflict*. Washington, DC: World Bank, 2011.
- WHO. *World Report on Disability*. Geneva: WHO, 2011. https://www.who.int/disabilities/world_report/2011/report/en/ (24 October 2018, date last accessed).
- Ghobarah HA, Huth P, Russett B. The post-war public health effects of civil conflict. *Soc Sci Med* 2004;**59**(4):869–84.
- Buvinic M, Das Gupta M, Casabonne U, *et al.* *Violent Conflict and Gender Inequality: An Overview*. Washington, DC: World Bank Group, 2013.
- Ghobarah HA, Huth P, Russett B. Civil wars kill and maim people long after the shooting stops. *American Political Science Review* 2003;**97**(02):189–202.
- Culver A, Rochat R, Cookson ST. Public health implications of complex emergencies and natural disasters. *Conflict and Health* 2017;**11**:32.
- Garry S, Checchi F, Cislighi B. What influenced provision of non-communicable disease healthcare in the Syrian conflict, from policy to implementation? A qualitative study. *Conflict and Health* 2018;**12**:45.
- Poole D. Indirect health consequences of war. *International Journal of Sociology* 2012;**42**(2):90–107.

- 23 Al Ali R, Rastam S, Fouad F *et al.* Modifiable cardiovascular risk factors among adults in Aleppo, Syria. *International Journal of Public Health* 2011;**56**(6):653–62.
- 24 Ramadan H, Naja F, Fouad FM *et al.* Prevalence and correlates of metabolic syndrome in pre-crisis Syria: call for current relief efforts. *Eastern Mediterranean Health Journal* 2016;**22**(9):668–75.
- 25 Pettersson T, Wallensteen P. Armed conflicts, 1946–2014. *Journal of Peace Research* 2015;**52**(4):536–50.
- 26 Aebischer Perone S, Martinez E, du Mortier S, Rossi R. *et al.* Non-communicable diseases in humanitarian settings: ten essential questions. 2017. <https://conflictandhealth.biomedcentral.com/articles/10.1186/s13031-017-0119-8>
- 27 Small M, Magee E, Colimon I *et al.* Does armed conflict impact maternal health? A report from rural Haiti. *Journal of Neonatal-Perinatal Medicine* 2008;**1**:105–9.
- 28 Chi PC, Bulage P, Urdal H, Sundby J. Perceptions of the effects of armed conflict on maternal and reproductive health services and outcomes in Burundi and Northern Uganda: a qualitative study. *BMC International Health and Human Rights* 2015;**15**(1):7.
- 29 Urdal H, Che CP. War and gender inequalities in health: the impact of armed conflict on fertility and maternal mortality. *International Interactions* 2013;**39**(4):489–510.
- 30 O'Hare B, Southall D. First do no harm: the impact of recent armed conflict on maternal and child health in sub-Saharan Africa. *Journal of the Royal Society of Medicine* 2007;**100**(12):564–70.
- 31 Johnson S. The cost of war on public health: an exploratory method for understanding the impact of conflict on public health in Sri Lanka. *PLoS One* 2017;**12**(1):e0166674. <https://doi.org/10.1371/journal.pone.0166674>
- 32 Hynes H. On the battlefield of women's bodies: an overview of the harm of war to women. *Women's Studies International Forum* 2004;**27**(5–6):431–45.
- 33 McAlpine A, Hossain M, Zimmerman C. Sex trafficking and sexual exploitation in settings affected by armed conflicts in Africa, Asia and the Middle East: systematic review. *BMC International Health and Human Rights* 2016;**16**:34.
- 34 Moss WJ, Ramakrishnan M, Storms D, Henderson Siegle A. *et al.* Child health in complex emergencies. *Bulletin of the World Health Organization* 2006;**84**. <http://www.who.int/bulletin/volumes/84/1/019570/en/> (26 October 2018, date last accessed).
- 35 Carlton-Ford S, Boop D. Civil war and life chances: a multinational study. *International Sociology* 2010;**25**(1):75–97.
- 36 Ghobarah HA, Huth P, Russett B. Comparative public health: the political economy of human misery and well-being. *International Studies Quarterly* 2004;**48**(1):73–94.
- 37 Guha-Sapir D, Panhuis WG. Conflict-related mortality: an analysis of 37 datasets. *Disasters* 2004;**28**(4):418–28.
- 38 Joshi M. Comprehensive peace agreement implementation and reduction in neonatal, infant and under-5 mortality rates in post-armed conflict states, 1989–2012. *BMC International Health and Human Rights* 2015;**15**(1):27.
- 39 Mpembi MN, Lukeba T, Mayemba D *et al.* Stress syndrome in patients receiving outpatient treatment at the General Hospital, in Bangui, in a context of armed conflict. *The Pan African Medical Journal* 2018;**29**:26.
- 40 Bogic M, Njoku A, Priebe S. Long-term mental health of war-refugees: a systematic literature review. *BMC Int Health Hum Rights* 2015;**15**:29.
- 41 Blössner M, de Onis M. *Malnutrition: Quantifying the Health Impact at National and Local Levels*. Geneva: WHO, 2005. https://www.who.int/quantifying_chimpacts/publications/MalnutritionEBD12pdf (7 December 2018, date last accessed).
- 42 Lalonde M. *A New Perspective on the Health of Canadians: A Working Document*. Ottawa: Government of Canada, 1974. <http://www.phac-aspcgcca/ph-sp/pdf/perspect-engpdf> (7 December 2018, date last accessed).
- 43 Dahlgren G, Whitehead M. *Policies and Strategies to Promote Social Equity in Health*. Stockholm: Institute for the Futures Studies, 1991.
- 44 Rezaeian M. A review on the most important consequences of wars and armed conflicts. *Middle East J of Business* 4(1):7–9.
- 45 Wisner B, Adams J. *Environmental Health in Emergencies and Disasters: A Practical Guide*. Geneva: World Health Organization, 2002. <http://www.who.int/iris/handle/10665/42561> (13 November 2018, date last accessed).
- 46 Attanayake V, McKay R, Joffres M *et al.* Prevalence of mental disorders among children exposed to war: a systematic review of 7,920 children. *Med Confl Surviv* 2009;**25**(1):4–19.
- 47 Sapir D. Natural and man-made disasters: the vulnerability of women-headed households and children without families. *World Health Stat Q* 1993;**46**(4):227–33.
- 48 Massey E, Smith J, Roberts B. Health needs of older populations affected by humanitarian crises in low- and middle-income countries: a systematic review. *Conflict and Health* 2017;**11**:29.
- 49 Burton A, Breen C. Older refugees in humanitarian emergencies. *The Lancet* 2002;**360**:s47–8.
- 50 Rohwerder B. *The Impact of Conflict on Poverty*. London: Governance and Social Development Resource Centre, DfID, 2014. <http://gsdrc.org/publications/the-impact-of-conflict-on-poverty/> (26 October 2018, date last accessed).
- 51 Justino P. *War and Poverty: HiCN Working Paper 81. Households in Conflict Network*. The Institute of Development Studies, University of Sussex, 2010. <http://www.hicn.org/wordpress/wp-content/uploads/2012/06/wp81.pdf> (26 October 2018, date last accessed).
- 52 Meddings DR. Civilians and war: a review and historical overview of the involvement of non-combatant populations in conflict situations. *Med Confl Surviv* 2001;**17**(1):6–16.
- 53 Neal S, Stone N, Ingham R. The impact of armed conflict on adolescent transitions: a systematic review of quantitative research on age of sexual debut, first marriage and first birth in young women under the age of 20 years. *BMC Public Health* 2016;**16**(1):225.
- 54 Levy B, Sidel V. War & public health in the twenty-first century. *New England Journal of Public Policy* 2003;**19**(1):11.
- 55 Sidel VW, Levy BS, Slutzman JE. Prevention of war and its environmental consequences. In: Kassim TA, Barceló D (eds). *Environmental Consequences of War and Aftermath*. Berlin, Heidelberg: Springer Berlin Heidelberg, 2009, 22–39.

- 56 Wiist W, Barker K, Arya A. *et al.* The role of public health in the prevention of war: rationale and competencies. *American Journal of Public Health* 2014;**104**(6):e34–47.
- 57 Plümper T, Neumayer E. The unequal burden of war: the effect of armed conflict on the gender gap in life expectancy. *International Organization* 2006;**60**:723–54.
- 58 Iqbal Z. Health and human security: the public health impact of violent conflict. *International Studies Quarterly* 2006;**50**(3):631–49.
- 59 Raman S, Kadir A, Seth R. *et al.* Violence against children of the world: burden, consequences and recommendations for action. *ISPCAN* 2017. <https://www.ispcan.org/wp-content/uploads/2018/01/Violence-against-Children-of-the-World-final-statement-postedits-SR-1710-1-F29357-N.pdf> (26 October 2018, date last accessed).
- 60 Addison T, Bach K, Shepherd A, Wadugodapitiya D. Policy brief: no 24. Fragile states, conflict and chronic poverty, 2010. <http://www.chronicpoverty.org/publications/details/fragile-states-conflict-and-chronic-poverty/ss> (26 October 2018, date last accessed).
- 61 Ezard N. Substance use among populations displaced by conflict: a literature review. *Disasters* 2012;**36**(3):533–57.
- 62 Lo J, Patel P, Shultz JM *et al.* A systematic review on harmful alcohol use among civilian populations affected by armed conflict in low- and middle-income countries. *Subst Use Misuse* 2017;**52**(11):1494–510.
- 63 Mills E, Singh S, Nelson B, Nachega J. The impact of conflict on HIV/AIDS in sub-Saharan Africa. *Int J STD AIDS* 2006;**17**(11):713–7.
- 64 Zwi A, Ugalde A. Towards an epidemiology of political violence in the third world. *Soc Sci Med* 1989;**28**(7):633–42.
- 65 Levy B. Health and peace. *Croat Med J* 2002;**43**(2):114–6.
- 66 Utzinger J, Weiss MG. Editorial: armed conflict, war and public health. *Tropical Medicine & International Health: TM & IH* 2007;**12**(8):903–6.
- 67 Keller AS. Caring and advocating for victims of torture. *The Lancet* 2002;**360**:s55–6.
- 68 Guha-Sapir D, Schlüter B, Rodriguez-Llanes J *et al.* Patterns of civilian and child deaths due to war-related violence in Syria: a comparative analysis from the Violation Documentation Center dataset, 2011–16. *The Lancet Global Health*. 2018;**6**(1):PE103–10.
- 69 Landmine Monitor. *Landmine Monitor* 2017. <http://www.the-monitor.org/en-gb/reports/2017/landmine-monitor-2017.aspx> (26 October 2018, date last accessed).
- 70 Nel P. The Socio-cultural Cause and Effect of Injuries in Conflict Zones: A Review of the Literature. 2007. https://s3.amazonaws.com/academiaedudocuments/40641188/SOCIO_CULTURAL_CAUSE_EFFECT_INJURY_ANTHROPOLOGY.pdf?AWSAccessKeyId=AKIAIWOWYYGZ2Y53UL3A&Expires=1540593801&Signature=88c9GmUKd30k9a7sWehLH0jZ1Ns%3D&response-content-disposition=inline%3B%20filename%3DThe_Socio-cultural_Cause_and_Effect_of_Ipdf (24 October 2018, date last accessed).
- 71 Hoddie M, Smith JM. Forms of civil war violence and their consequences for future public health. *International Studies Quarterly* 2009;**53**(1):175–202.
- 72 United Nations. *Framework of Analysis for Atrocity Crimes: A tool for prevention*. Geneva: United Nations, 2014. http://www.un.org/en/genocideprevention/documents/atrocity-crimes/Doc.49_Frameworkof%20of%20Analysis%20for%20Atrocity%20Crimes_EN.pdf (17 September 2018, date last accessed).
- 73 Hicks MH-R, Spagat M. The dirty war index: a public health and human rights tool for examining and monitoring armed conflict outcomes. *PLoS Medicine* 2008;**5**(12):e243.
- 74 Caneco RA, Ruiz RM, Lopez HT. Sexual violence against women in armed conflict settings. Archives of Women's Mental Health Conference: 4th World Congress on Women's Mental Health Madrid Spain 2011;**14**(2):S98.
- 75 Levy BS, Sidel VW. Health effects of combat: a life-course perspective. *Annual Review of Public Health* 2009;**30**(1):123–36.
- 76 Briody C, Rubenstein L, Roberts L *et al.* Review of attacks on health care facilities in six conflicts of the past three decades. *Conflict and Health* 2018;**12**:19.
- 77 Lee AC, Katz J, Blencowe H *et al.* National and regional estimates of term and preterm babies born small for gestational age in 138 low-income and middle-income countries in 2010. *The Lancet Global Health* 2013;**1**(1):e26–36.
- 78 Wise PH, Darmstadt GL. Confronting stillbirths and newborn deaths in areas of conflict and political instability: a neglected global imperative. *Paediatrics and International Child Health* 2015;**35**(3):220–6.
- 79 Lawn JE, Cousens S, Zupan J. 4 million neonatal deaths: when? where? why? *The Lancet* 2005;**365**(9462):891–900.
- 80 NCD Countdown 2030. Worldwide trends in non-communicable disease mortality and progress towards Sustainable Development Goal target 3.4. *Lancet* 2018;**392**(10152):1072–88.
- 81 Spiegel PB, Checchi F, Colombo S, Paik E. Health-care needs of people affected by conflict: future trends and changing frameworks. *The Lancet* 2010;**375**(9711):341–5.
- 82 Owoaje ET, Uchendu OC, Ajayi TO, Cadmus EO. A review of the health problems of the internally displaced persons in Africa. *The Nigerian Postgraduate Medical Journal* 2016;**23**(4):161–71.
- 83 Isreb MA, Rifai AO, Murad LB *et al.* Care and outcomes of end-stage kidney disease patients in times of armed conflict: recommendations for action. *Clinical Nephrology* 2016;**85**(5):281–8.
- 84 HelpAge International, Handicap International. Hidden victims of the Syrian crisis: disabled, injured and older refugees, Report 2014. HelpAge International (London, UK) & Handicap International (Lyon, France). http://d3n8a8pro7vhmxcloudfrontnet/handicapinternational/pages/454/attachments/original/1397045203/Hidden_Victims_of_the_Syrian_Crisis%E2%80%9494disabled_injured_and_older_refugees.pdf?1397045203 (7 December 2018, date last accessed).
- 85 World Bank. *World Development Report 2011: Conflict, Security and Development*. Washington, DC: The International Bank for Reconstruction and Development, 2011.
- 86 Al-Shammari AM. Environmental pollutions associated to conflicts in Iraq and related health problems. *Reviews on Environmental Health* 2016;**31**(2):245–50.
- 87 Bowles DC, Butler CD, Morisetti N. Climate change, conflict and health. *J R Soc Med* 2015;**108**(10):390–5.
- 88 WHO. Constitution of WHO: principles. <https://www.who.int/about/mission/en/> (12 December 2018, date last accessed).