

The International Arms Trade and Global Health (forthcoming in Global Health and Ethics, Cambridge University Press)

Jonathan Kennedy, David McCoy, Joseph Gafton

Abstract

War, armed conflict and other forms of collective violence are incompatible with health, especially when we use World Health Organization's conceptualisation of health as a state of complete physical, mental and social wellbeing, a fundamental human right, and the responsibility of the state. It is for good reason then that the World Health Assembly affirmed in 1981 that "the role of physicians and other health professionals in the preservation and promotion of peace is the most significant factor for the attainment of health for all". This chapter analyses nature of contemporary armed conflict, the role of the arms trade in fueling collective violence, and the devastating impact they have on health through both direct and indirect mechanisms. It begins with an analysis of recent historical trends in the prevalence and nature of armed conflict. The next section investigates the nature of international arms industry, including patterns of military expenditure and trade in weapons. The third section discusses the threat posed by weapons of mass destruction, particularly nuclear weapons. The fourth section focuses on efforts to prevent war and armed conflict. The final section considers how artificial intelligence (AI) might shape future armed conflict and considers the implications for health.

Key words: global health, international arms trade, war, armed conflict, violence, nuclear weapons, artificial intelligence, international law,

Introduction

War, armed conflict and other forms of collective violence are incompatible with health, especially when we use World Health Organization's (2006) conceptualisation of health as a state of complete physical, mental and social wellbeing, a fundamental human right, and the responsibility of the state. In addition to their obvious direct physical and psychological effects, wars, conflict and collective violence damage health through a variety of indirect channels, including the destruction of healthcare and undermining of the broader determinants of health by, for example, disrupting food, water and sanitation systems, displacing large numbers of people, polluting and degrading the environment, and damaging the economy (Weinberg and Simmonds 1995). There is an enormous opportunity cost. The Institute for Economics and Peace (2018) estimates that violence cost the global economy US\$14.76 trillion in 2017 (12.4% of world GDP). This is more than the amount of money spent on healthcare – 10% of world GDP in 2016 (World Bank undated) – and a hundred times the total official development assistance given by OECD (undated) countries.

There are social costs associated with "militarism" and the incorporation into civilian life of ideas, behaviours and language aimed at legitimising the use of force to address political problems, expanding the power of military actors in society, and creating support for military spending (Williams and McCleary 2009, Wiist et al. 2014). The use of military power to undermine democracy is one concern. It may be conspicuous in countries like Myanmar and North Korea, where military oppression is overt, or more subtle, such as in the US where the military-industrial complex spends

vast amounts of money to buy political influence (Centre for Responsive Politics 2013). In low income countries, militarisation is associated with greater inequity in access to healthcare and education, as well as higher levels of corruption (Institute for Economics and Peace 2015). Other data show that militarism is positively correlated with authoritarianism, and negatively correlated with respect for human rights, tolerance of dissent, and sympathy for the poor (Williams and McCleary 2009). By contrast, the constitutional demilitarisation of Japan after the Second World War, was accompanied by significant and rapid social and economic benefits in the ensuing years (ibid.).

It is for good reason then that the World Health Assembly affirmed in 1981 that “the role of physicians and other health professionals in the preservation and promotion of peace is the most significant factor for the attainment of health for all” (quoted in Wiist et al. 2014). Over the past century, health professionals have played an impressive role in preventing armed conflict and mitigating its effects. This is apparent from the number of health organisations that have received the Nobel Peace Prize: International Committee of the Red Cross (ICRC) on three occasions (1917, 1944 and 1963); International Physicians for the Prevention of Nuclear War (IPPNW) in 1985 for spreading information about the catastrophic consequences of atomic warfare; Médecins Sans Frontières in 1999 providing medical care in humanitarian crises and raising awareness of potential humanitarian disasters; and International Campaign to Abolish Nuclear Weapons (ICAN) in 2017 for its work on nuclear disarmament. If health professionals are to continue to work to prevent, resolve and mitigate the effects of armed conflict, it is necessary to understand the nature of contemporary armed conflict, the role of the arms trade in fuelling collective violence, and the devastating impact they have on health.

This chapter begins with a brief description of recent historical trends in the prevalence and nature of armed conflict. The next section describes the international arms industry, including patterns of military expenditure and trade in weapons. The third section discusses the threat posed by weapons of mass destruction, particularly nuclear weapons. The fourth section focuses on efforts to prevent war and armed conflict. The final section considers how artificial intelligence (AI) might shape future armed conflict and considers the implications for health.

Armed conflict and violence: recent trends

The numbers of people killed by armed conflict are staggering. The Uppsala Conflict Data Programme (UCDP) estimates that since 1989 there have been 1.4 million battle-related deaths – i.e., people killed by guns, bombs and other weapons (UCDP 2018a). In 2014, the number of fatalities (104,769) was higher than at any point since the end of the Cold War. The annual total has fallen steadily since then, standing at 68,969 in 2017. It should be noted UCDP figures are believed to underestimate the true number of battles-related deaths by a factor of at least three because they are compiled from news reports and journalists are not always present in conflict zones (Obermeyer et al. 2008). Moreover, such figures do not include the far larger number of people that die as a result of the indirect impact of war, such as conflict-exacerbated disease and malnutrition. UCDP estimate that there were 68,027 battle-related deaths in Iraq between 2004 and 2017, while a retrospective mortality survey estimates that there 654,965 excess deaths between 2003 and 2006 (Burnham et al. 2006). Even more remarkably, UCDP estimate 18,360 battle-related deaths in

Democratic Republic of Congo between 1996 and 2017, whereas a retrospective mortality survey estimated there was a total of 5.4 million direct and indirect deaths between 1998 and 2007 (International Rescue Committee 2007).

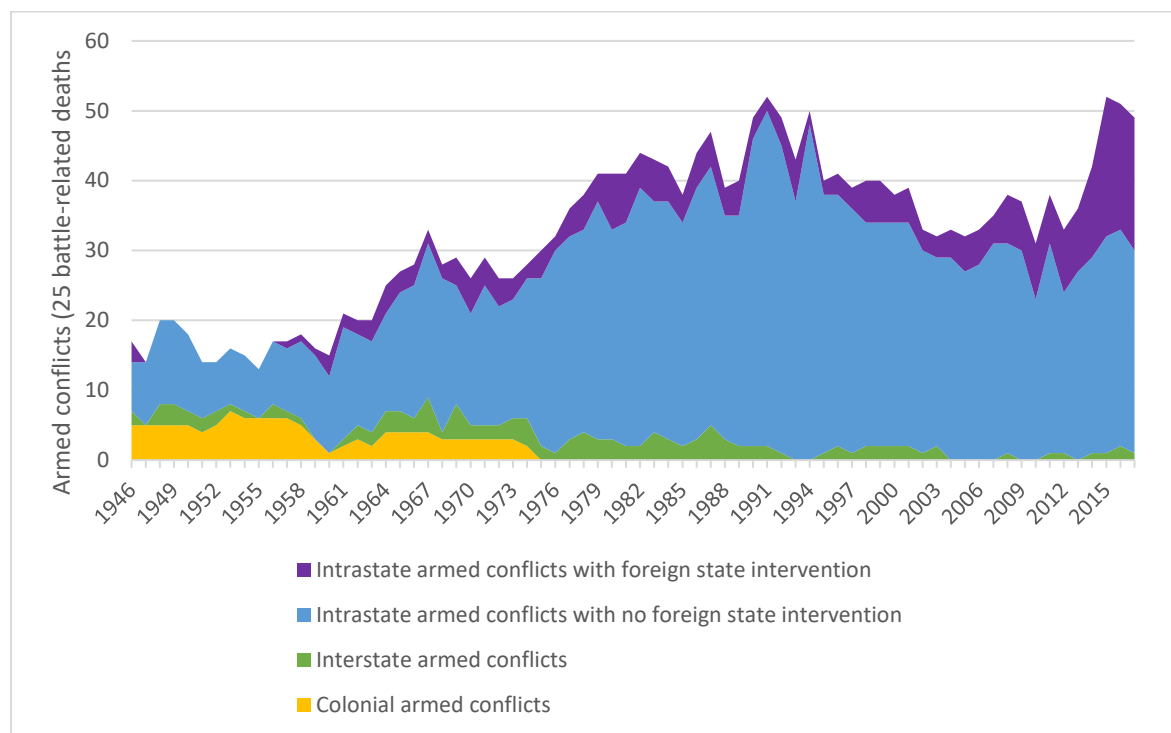


Figure 1: Number of armed conflicts by type, 1946-2017 (25 battle-related deaths per year)

Data source: UCDP Armed Conflict Dataset

The UCDP defines an armed conflict as having 25 battle-related deaths in at least one calendar year. Using this definition there have been a greater number of armed conflicts in the last few years than at any point since the Second World War, with the exception of the period immediately after the collapse of the Soviet Union – see figure 1 (UCDP 2018b). When a threshold of 1,000 battle-related deaths is used, the current number of armed conflicts is at its highest for two decades. It is also important to note how the nature of armed conflict has changed. The majority of conflict-related deaths in the first half of the 20th century were caused by a handful of catastrophic inter-state wars, in particular the First and Second World Wars. Now, the vast majority of armed conflicts are between states and one or more non-state actors. UCDP data shows that intra-state conflicts accounted for 90.2% of battle-related deaths during 1989-2017 and 99.9% since 2010. One interesting feature is that the number of intra-state armed conflicts involving foreign state intervention increased over the last few years: they accounted for 34.2% of fatalities between 1989 and 2017, but the proportion has increased in recent years and in 2017 the figure was 88.8%. This includes Syria, Iraq, Afghanistan and Yemen, which together account for 77.1% of global battle-related deaths in 2017.

Intra-state conflicts pose specific challenges for global health. To understand how, it is useful to consider the distinction between “old wars” and “new wars” (Kaldor 1999). Old wars are fought

between states represented by uniformed armies on the battlefield, whereas new wars are fought between the state and non-state actors. As non-state actors are militarily weaker they tend to avoid direct engagement, instead using a strategy of guerrilla warfare to control territory and build base areas (ibid; Kalyvas 2006). In such situations, the non-state actors' prospects are determined by the support of the local population, and both the state and non-state actors use a combination of sanctions and incentives to win civilian support. As such, intra-state conflicts are fought "through the people", often resulting in high levels of civilian casualties and violations of international law (ibid). Kaldor (1999) estimates that at the start of the 20th century the ratio of combatants killed in armed conflict to non-combatants was roughly 8:1, by mid-century it was 1:1 and was 1:8 in the 1990s. Several recent conflicts have had a catastrophic impact on civilians. The Syrian civil war is notable for violence against civilians and the displacement of half the population (Human Rights Watch 2018). In Yemen, the bombardment and blockade of rebel-controlled areas by a Saudi-led military alliance left 22 million people in need of humanitarian assistance and resulted in outbreaks of cholera and diphtheria (Kennedy, Harmer and McCoy 2017).

Since 1945, few conflicts have occurred in Europe and the Americas, whereas most have been in Africa, Asia and the Middle East. The increase in the armed conflicts and battle-related deaths in the past few years is largely driven by war in the Middle East, with the region accounting for 63.7% of all battle-related deaths in the 2010s (UCDP 2018a). Historically, the vast majority of armed conflicts were in poor countries but this is changing. In the 1990s, 75% of battle-related deaths occurred in low income countries, according to the World Bank's classification, but in the 2010s 77% of battle-related deaths occurred in middle income countries (Kennedy et al. 2019).

Notwithstanding the focus on armed conflicts in this chapter, it should be noted that most violent deaths occur outside of war zones. According to the Small Arms Survey, interpersonal and collective violence claimed the lives of 560,000 people around the world in 2016 (McEvoy and Hideg 2017). This works out at about 1% of all the people who died in the world that year (WHO 2018). "Only" 18% (99,000) of these were casualties of war, whereas 78% (385,000) were homicides. About 38% of all these violent deaths (210,000) were caused by firearms, including about a third of those who died in armed conflicts. Six countries account for over half the gun deaths a year in the world – the US, Brazil, Mexico, Colombia, Venezuela and Guatemala (Global Burden of Disease 2018). With the exception of Colombia, none of these have been affected by significant armed conflicts in recent times, but Latin America has the highest murder rates of any region in the world due, to a large extent, to organised crime (Muggah and Tobón 2018).

The International Arms Industry

By far the biggest purchasers of weapons and military equipment are governments. World military expenditure was estimated at \$1,739 billion in 2017, making up 2.2% of global GDP (SIPRI 2018). Levels of military expenditure have plateaued over the last decade, following a rise in spending since 1999. Global military expenditure is highly concentrated. The USA accounts for 35% of worldwide military spending. The second biggest spender is China (12%) and the next eight countries account for a further quarter of global military spending – see figure 2.

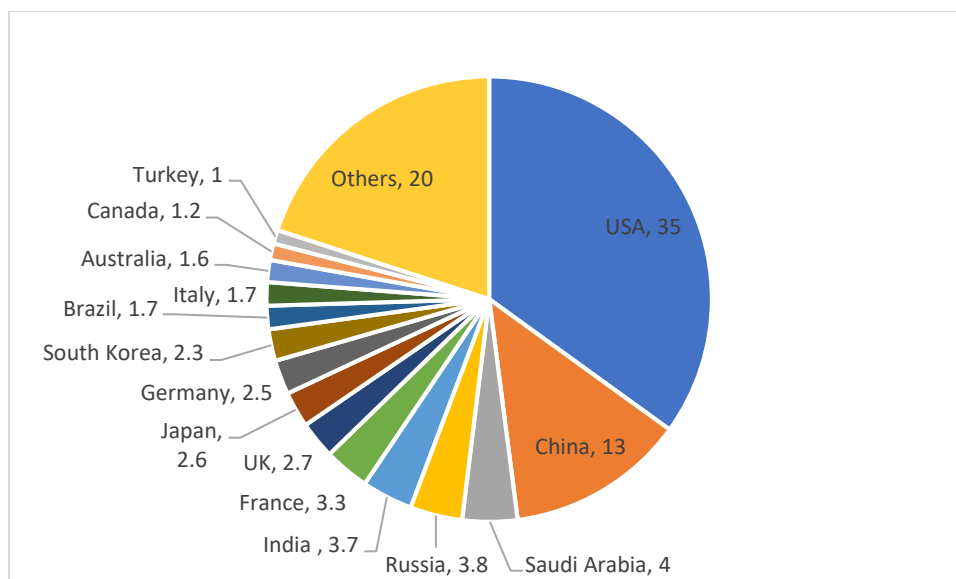


Figure 2: Global military expenditure in 2017, by country
SIPRI 2018

It is impossible to get complete and accurate description of the international arms trade. Large segments of the trade in weapons are illicit and hidden, while data on many official transactions are not adequately captured by information systems, particularly in relation to small arms and light weapons (SALWs). The UN's Register of Conventional Arms (UNROCA) was designed to record all conventional arms transfers involving member states. It was established as a voluntary reporting system, but is mandatory for the 100 states that have ratified and adopted the international Arms Trade Treaty (UN 2019). However, the UNROCA database suffers from considerable incompleteness – three of the four biggest arms producers, the US, Russia and China, do not participate – and inaccuracy- there are cases of recipient states denying arms imports declared by exporting states (Wezeman et al. 2011).

It is, nonetheless, possible to paint a reasonably detailed picture of the licit trade in “major weapons” – a category that includes aircraft, armoured vehicles, ships and missiles, but not SALWs. Stockholm International Peace Research Institute (SIPRI) uses government documents, industry publications and media reports to collate data on the production and transfers of major weapons. According to SIPRI, the sector is dominated by a relatively small number of companies based in the USA and western Europe, with 66 of SIPRI's list of top 100 companies (measured by monetary value in sales, including to their own states) in 2017 coming from these two regions (Fleurant et al. 2018). Of the top 10 companies, which accounted for 50% of total arms sales, all came from the US or western Europe, except for one Russian company – the first from outside these two regions to make the top 10. This marks the growing role of Russia as an arms-producing nation. Among the top 100 arms companies, the total sales of British companies were second only to those of US companies from 2002 to 2016. In 2017, Russia displaced the UK as the second largest in 2017, mainly due to Russia's increased procurement of arms for its own military. SIPRI's Top 100 list does not include Chinese companies due to lack of access to reliable and comparable data. However, the limited available information suggests that three Chinese arms companies would probably be listed in the top 10 (Fleurant et al. 2018).

The volume of *international transfers* of major weapons grew by about 10% between 2008-12 and 2013-17 (Wezeman et al. 2018), with about 80% of such transfers since 2008 being directed to countries in the Global South (Theohary 2016). The five largest importers between 2013 and 2017 were India, Saudi Arabia, Egypt, UAE and China, with most of the supply of major arms coming from the US, Russia, China, France and the UK – the five-member permanent members of the UN Security Council – as well as Germany (Wezeman et al. 2018). With 42% of global imports from 2013-17, Asia and Oceania is the largest importing region, followed by the Middle East, which accounts for 32% of global imports. From 2008-12 to 2013-17, while arms imports into Asia and Oceania increased by 1.8%, imports to the Middle East increased by 103% (ibid.). This reflects the fact that over the last decade the Middle East accounted for a large and increasing proportion of armed conflicts and battle-related deaths.

The Oxford Research Group's Sustainable Security Index analyses the proportion of arms exported to "internally repressive" states or states with a history of "illegal annexation/occupation, militarisation of territorial disputes and foreign military interventions not authorised by the UN" (Larsson 2018). Russia scored worst overall, but five western democracies (UK, France, Netherlands, US and Switzerland) were also listed in the worst 10 due to "their willingness to sell to repressive regimes". For example, from 2016-17, 75% of arms exported by the UK went to the internally repressive states of Saudi Arabia and Oman and 46% of US exports went to the internally repressive states of Egypt, UAE, China, Saudi Arabia and Uzbekistan. Israel is conspicuous by its absence from this list, despite being a major market for US arms exports (Wezeman et al. 2018). The exclusion is due to Oxford Research Group's use of Freedom House's classification, which codes Israel as "free" – a claim that would surely be contested by the Palestinians inhabitants of Gaza and the West Bank. The repressive and genocidal regime in Myanmar acquires 68% of its arms from China and 15% from Russia (Wezeman 2018).

The Small Arms Survey attempts to document the international trade in SALWs, which encompasses sporting shotguns and rifles, as well as their parts, accessories and ammunition. The trade is estimated to be worth at least US\$5.7 billion in 2015 – roughly 1.5% of the total spent on major weapons sales. As with major weapons, a relatively small number of countries dominate this trade, with 21 countries known to have exported at least US\$ 100 million worth of SALWs in a single year between 2001 and 2015 (Small Arms Survey undated a). The import and purchase of SALWs is also unevenly spread across the world. For the period 2001 to 2014, seven countries (Australia, Canada, France, Germany, Saudi Arabia, the UK and the USA) routinely imported SALWs worth US\$100 million or more per year (Small Arms Survey undated b). A significant amount of trade in SALWs is illicit, mainly occurring in areas affected by conflict, violence and organized crime. Illicit arms trafficking fuels civil wars – which account for almost all contemporary armed conflict – and contributes to violent crime (Small Arms Survey undated c). Large and well organized inter-continental shipments of SALWs account for only a small fraction of illicit transfers. Instead, the most important form of illicit trafficking is the so-called "ant trade", consisting of numerous shipments of small numbers of weapons that, over time, result in the accumulation of large numbers of illicit weapons by unauthorized end users. For example, many of the firearms in Mexico were purchased in small numbers in the USA and smuggled over the border.

The design, manufacture and supply of weapons is shaped by many factors, including the way that the arms industry is structured. The arms industry involves a symbiotic relationship between private companies and the state. Many arms negotiations and deals occur through inter-governmental fora, brokered by politicians, diplomats and civil servants, as well as by corporate agents (Feinstein 2011). A “revolving door” operates between the arms industry and government. For example, a 2010 investigation found that between 2004 and 2008, 80% of retiring US generals went on to work in the arms industry as consultants or executives (Bender 2010). An interesting feature of the major weapons industry is the relative heterogeneity of arms companies. Most companies are either partly or, in the cases of Chinese firms, mainly state-owned. At the same time, some companies are clearly multi-national and have connections to more than one country. BAE Systems (undated), for example, is a corporation with 85,800 employees in over 40 countries and major operations in the UK, USA, Saudi Arabia and Australia. BAE Systems is primarily an arms company with 98% of its total sales consisting of arms sales, but some of the biggest arms companies are conglomerations that manufacture other items. For example, General Electric was the 22nd biggest company in SIPRI’s top 100 in 2017, but its arms sales only represented 3% of its total sales. Similarly, arms only make up 29% and 15% of all sales made by Boeing and Airbus respectively (Fleurant et al. 2018).

Geopolitical factors also shape the arms trade. A key aspect of the Cold War was both Russia and the US arming favourable regimes or rebel groups. Such behaviours have continued, as illustrated by the conflict in Syria where the Assad regime receives military aid from Russia and Iran, while the US and Saudi Arabia supply Syrian rebel groups (Schanzer 2012, Mazzetti and Apuzzo 2016). Arms transfers can also be used to gain access to natural resources: China increasingly supplies African states with manufactured products, including arms, in exchange for access to natural resources (Conteh-Morgan 2017). Similarly, the US supplies Saudi Arabia and other Gulf states with weapons in exchange for secure access to oil (Bove et al. 2018). In some instances, arms transfers appear to proceed indiscriminately with single suppliers selling arms to both sides of a conflict, such as during the Iran-Iraq War, or US exports to both India and Pakistan or Russia and Ukraine supplying both sides in the Sudanese conflict (CAAT 2003; SIPRI 2009; Wezeman et al. 2011). This underlines the point that arms transfers are strongly influenced by commercial motives, including the military industrial-complex’s imperative to generate a demand for weapons and military technologies by fostering armed conflict. Certain governments also contribute to the illicit trade by deliberately arming proxy groups involved in insurgencies against rival governments or non-state armed groups. In recent years, governments have covertly delivered tens of thousands of small arms and light weapons to various armed groups in Somalia despite a long-standing UN arms embargo (Small Arms Survey 2012). Similarly, between 2006 and 2010, the UN embargo on moving military equipment into Darfur was repeatedly broken by Sudan using weapons supplied by Belarus, China, Russia and Ukraine (Wezeman 2011).

A key characteristic of the arms industry is that it is beset with systematic corruption. One particularly notorious example is the Al-Yamamah arms deal between BAE Systems and Saudi Arabia, which was worth around £40 billion and allegedly included around £6 billion of “unauthorised commissions” – effectively bribes – to members of the Saudi royal family (Feinstein 2011, Wearing 2018). A criminal investigation launched by the UK’s Serious Fraud Office was shut down following pressure from erstwhile UK Prime Minister Tony Blair under the guise that it could jeopardise UK-Saudi relations and undermine cooperation on national security. Another example is a \$5 billion

arms deal between BAE and South Africa in the early 2000s, which was reported to have involved \$300 million of “commissions” to South African officials to secure the deal ahead of other suppliers (Feinstein 2011). This case draws stark attention to the opportunity cost involved in such arms deals, as South Africa’s President Thabo Mbeki claimed simultaneously that the state could not afford antiretrovirals for the 5 million citizens suffering from HIV (Gilby 2014). Feinstein (2011) argues that illicit activity in the arms industry has become the norm as it can be readily concealed through appeals to national security, and because it is extraordinarily profitable for the relatively limited number of individuals involved.

Nuclear weapons and other weapons of mass destruction

Nuclear weapons are perhaps the ultimate weapon of mass destruction. When a nuclear bomb is detonated, buildings are flattened and temperatures reach several million degrees centigrade, vaporising human tissue and producing a conflagration that consumes all oxygen and kills even those sheltering underground. Many initial survivors of the blast die from burns, internal bleeding and injuries. The destruction of roads, buildings and electricity supplies make any immediate humanitarian response mostly futile (ICRC 2013a). Those exposed to high radioactive doses will suffer from acute radiation syndrome and die in the ensuing days and weeks. Longer-term survivors will be at heightened risk of cancer in the future (ICRC 2013b). There are also long-term psychological effects: many survivors of Hiroshima and Nagasaki experienced significant post-traumatic distress disorders for the rest of their lives, and some also suffered from the effects of forced migration and stigmatisation (due to unfounded fears of contamination).

Multiple nuclear detonations would produce even more catastrophic effects (Helfand 2013). Nuclear war between India and Pakistan involving only 1.5% of the world’s total stockpile would throw enough dust and soot up into the atmosphere to dim the sunlight for months or years, producing what has been termed a “nuclear winter”. Food production would decline to such an extent that up to two billion people could die of starvation (IPPNW undated, Robock and Toon 2010, Helfand 2013). A full-scale nuclear war between the USA and Russia may result in a new ice age, imperilling the future of humanity (ICRC 2013a).

The majority of the world’s stockpile of 9,000 nuclear bombs is held by Russia and the USA. Seven other nations also possess nuclear weapons (France, China, Britain, Israel, Pakistan, India and North Korea) and a further 32 countries incorporate nuclear weapons into their national defence policies (e.g. the NATO countries, Australia, New Zealand and South Korea). Nearly 1,800 warheads are on alert and ready for use at short notice, and China, France, Russia, Britain and the US are actively upgrading their weapons systems as part of a continuing nuclear arms race (Blair 2011). The US and Russia also have a large number of retired nuclear warheads awaiting dismantling, which pose a risk in terms of their radioactivity and the potential for plutonium to be stolen to build a “dirty bomb” (a bomb packed with radioactive material that is detonated conventionally and which then spreads highly toxic radioactive material) (Helfand et al. 2002).

Some people argue that the fear of “mutually assured destruction” restrains the nuclear powers from full-scale armed conflict with each other. Such an approach to maintaining world peace is, however, a high-risk gamble. Safety measures designed to prevent the accidental or mistaken launch

of nuclear weapons are not completely failsafe, and it cannot be taken for granted that trained and disciplined personnel will be in charge of nuclear weapons. There have been several occasions when the world has come close to catastrophe due to accidents and mistakes (Schlosser 2013, Lewis et al. 2014). The possibility of an unintended nuclear weapon launch will only increase with further nuclear proliferation and increasing international tension, combined with risks posed by cyber-warfare (Abaimov and Ingram 2017). In recent years, there has been a strong push to challenge this conventional wisdom and to make the case that disarmament is absolutely necessary given the existential threat posed by nuclear weapons. In early 2019, the Bulletin of Atomic Scientists (2019) noted “the global nuclear order has been deteriorating for many years” and warning the risk of a nuclear catastrophe was as great as it has ever been. There are several potential nuclear flashpoints in the world, notably in Eastern Europe, the Indian sub-continent and around the South and East China Seas, as well as worries about a new Cold War emerging between the West and Russia.

There are other forms of weapons of mass destruction, including chemical and biological weapons. Following the use of poisonous gas in the First World War, the 1925 Geneva Protocol banned asphyxiating, poisonous or other gases and bacteriological methods of warfare. The fact that neither chemical or biological weapons were used by the main belligerents in the Second World War indicates that the protocol established a clear norm (ICRC 2013c). This was reinforced by further bans in 1972 and 1993 on the development, production, stockpiling and transfer of chemical or biological weapons. There have been a handful of high-profile violations with chemical weapons – for example, in 1988, Iraqi warplanes dropped chemical agents on the Kurdish town of Halabja and in the 2013 the Syrian Army used Sarin against opposition controlled Ghouta. However, these cases resulted in widespread international criticism. Similarly, the use of biological weapons has been limited, with the most recent notable incident being in 2001, when an unidentified attacker in the USA sent anthrax-contaminated letters that killed five people. However, there are concerns that technological advancements are increasing the risk posed by biological weapons, particularly from non-state actors. For example, CRISPR gene editing could be used to create lethal infectious microbes using unregulated technology ordered online for less than \$200 (Thompson 2018).

Arms control and the prevention of war

The UN was established after the Second World War, with two of its prime functions being to prevent international conflict and mitigate their humanitarian consequences. The Security Council is the UN's most powerful body. In theory, it has the tools to prevent and resolve armed conflict or reduce its humanitarian impact, as it can issue legally binding resolutions supported by sanctions, peacekeepers, or military force. It is interesting to consider why it has failed to do this in many recent conflicts. The permanent members of the UN Security Council are the victors of the Second World War: USA, UK, France, Russia and China, which are also some of the world's major arms exporters. There is no permanent representative from South Asia, Africa, and Middle East, the regions most affected by armed conflict. Permanent members of the UN Security Council have the power of veto. This makes it difficult to pass resolutions, particularly as foreign states are increasingly interfering in intra-state conflicts. Russia has used its veto twelve times since the beginning of the Syrian civil war – sometimes on issues as uncontroversial as condemning chemical weapon attacks and expressing concern about human rights violations (BBC 2018a) – while the US

has consistently vetoed resolutions that would have ameliorated the suffering of Palestinians at the hands of the Israeli state (Campos 2018).

Intra-state conflicts are particularly problematic for an international organization like the UN. This is, in part, because new wars tend to result in greater violence against civilians because they are fought *through* civilian populations (Kaldor 1999). But civil wars also create governance problems. As the non-state actor exerts control over territory, it undermines the state's exclusivity of jurisdiction, creating a situation of dual or multiple sovereignty (Kalyvas 2006). This is problematic for the UN, which is responsible for leading and coordinating the response to conflict-related humanitarian emergencies, but is also mandated to respect its member state's sovereignty (Kennedy and Michailidou 2016). For example, in the Syrian conflict, the internationally-recognised government and its allies have been largely responsible for creating and sustaining the humanitarian emergency by attacking civilians in rebel-controlled areas and restricting their access to aid, but UN agencies were obliged to work closely with the state to address the crisis (*ibid.*).

The Geneva Conventions and Hague Conventions define the obligations of nation states engaged in armed conflict (ICRC undated). For example, the Fourth Geneva Convention requires warring parties to refrain from targeting civilian populations and protects for health and humanitarian workers. This legal regime was codified in the nineteenth and twentieth centuries when the main concern was so-called old wars that were fought between states represented by armies on battlefields (Kaldor 1999). New wars create a different set of problems. Unlike in old wars, the civilian population are crucial to the outcome of the conflict. Consequently, the civilian population are much more likely to be targeted in contravention of international law. In addition, non-state actors play an important role in new wars but they are not signatories to the inter-governmental treaties and conventions. However, as noted above, even when international law is broken by a state actor – in Syria or Yemen, for example – the accused is not brought to account if they are protected by at least one Security Council permanent member.

The UN (and its predecessor, the League of Nations) is the main platform for the establishment of international laws designed to limit the impact and control the proliferation of weapons and prevent the use of weapons of mass destruction. There are a number of international treaties and conventions aimed at inhibiting the development, distribution and use of weapons that cannot discriminate between civilians and enemy combatants (see Appendix 1). However, the adoption of these treaties is not universal, and even among those states which have ratified them, compliance is patchy. Moreover, non-state actors are not party to these agreements. Mechanisms for disciplining states and enforcing adherence are often weak or even absent. For example, the use of such chemical weapons in Syria in 2013 illustrated the many difficulties in preventing chemical weapons proliferation. In addition to Russia vetoing Security Council efforts to condemn the attacks, leaked US government cables and other sources show that Syrian procurement agents may have targeted firms in countries including China, Greece, India, Italy, South Korea and Switzerland (Martin et al. 2013).

New Technologies and the future of war

About one-third of the \$600 billion that the USA spends on defence each a year is assigned to

research, development, and procurement of new weapons systems (Clark 2018). In an environment of rapid technological development, it is difficult to predict the future by extrapolating from past trends. Notwithstanding, it seems likely that armed conflict will be heavily influenced by AI. Indeed, it has been argued that the impact of AI might rival that of nuclear weapons (Allen and Chan 2017). The Pentagon is investing billions of dollars in what it calls “algorithmic warfare” (Tarnoff 2018). In new wars, in which frontlines are blurred and the enemy is not wearing a uniform, a major issue is deciding who to kill. Target identification becomes much more labour-intensive because the enemy could be anywhere but AI can help to overcome this issue. For example, the first phase of US military’s Project Maven uses machine learning to scan drone video footage and identify people, vehicles and buildings to attack. Ultimately, AI has the potential to transform the nature of warfare into ‘battlefield robots waging constant war, algorithms that determine who to kill, face-recognition fighting machines that can ID a target and take it out before you have time to say “Geneva conventions”’ (Chan 2019).

Military planners argue that the application of AI to armed conflict will reduce civilian casualties enabling more precise identification of targets. We should, however, approach such claims with scepticism. First, with the development of autonomous ground and aerial robots, fewer or no ground troops will be needed to fight wars (Allen and Chan 2017). This will lower the political costs of war for militarily stronger countries, which may lead to an increase in the number of armed conflicts. Drones have already achieved this to some extent: for example, over the last decade and a half the USA has fought as an undeclared war with drones in the Federally Administered Tribal Areas of Pakistan (Kennedy 2017). Second, algorithms are created by humans working for institutions, they reflect their masters and mistresses’ prejudices. For example, algorithms have been shown to reinforce racial bias in policing and criminal sentencing (Angwin 2016). It is worrying that similarly faulty algorithms could be used to decide who to kill. An insight into what might happen is the US military’s use of so-called “signature strikes” in Pakistan, where drone attacks targeted individuals whose identities are unknown, but who displayed “signatures” as imprecise as being military-aged male in a particular area (Heller 2013). Third, it will expand the number of powerful businesses that make money from armed conflict. We have noted above that arms companies play an important role in driving armed conflict, but “algorithmic warfare will bring big tech deeper into the military-industrial complex”, giving it incentives for finding enemies and waging war (Tarnoff 2018). This is particularly concerning when we consider tech firms’ ability to control and manipulate information of various kinds.

Profound concerns have been expressed about the potential impact of AI on armed conflict. Google pulled out of Project Maven after thousands of its employees objected to the company’s involvement (BBC 2018b). More than 250 research and academic institutions and 3,000 prominent people have called for a ban on the use of autonomous robots in war (Chan 2019). Similarly, the Campaign to Stop Killer Robots advocates the global prohibition of any kind of autonomous weaponry, arguing that the best method to achieve this is an international treaty. Nevertheless, AI creates specific challenges for those who want to restrain its use in military operations. Unlike with nuclear weapons, development of AI is in large part driven by the commercial sector, making the use of AI in the military sphere more difficult to control (Cummings 2017). Moreover, while nuclear weapons require input of large amounts of money, resources and scientific knowledge, code and digital data tend to be cheap or even freely available (Allen and Chan 2017). Consequently, it is

plausible that weaker non-state combatants will be able to develop this technology, making it much harder to control.

In China, the state uses algorithms to monitor and control minority groups such as the Uighers in Xinjiang province in what it terms a “people’s war on terror”. (Byler 2019). It scans digital communications in order to identify suspicious patterns of behaviour, which can be religious speech or even “lack of fervour in using Mandarin”. Suspects can be apprehended using facial recognition software and sent to detention centres.

Conclusion

As noted earlier, the promotion of peace and the avoidance of armed conflict are vital and legitimate public health pursuits. Such a public health agenda would include providing humanitarian care and protection to civilians on the frontline of war and conflict in a manner that is impartial and in accordance with international law; taking active measures to monitor, document and publicise breaches of international law; and describing the full impacts of war and armed conflict, including all long-term inter-generational effects. Away from the frontline, it should also include advocating for reform of international law, not only to bring it up to date in an era when the majority of armed conflicts occur within states and have a devastating impact on civilian populations, but also to preempt the increasing role that will be played by AI, advocating for stronger legal and democratic controls over the military-industrial complex, and ending the excessive profiteering of the arms trade, which creates enormous incentives and power to encourage violence and conflict. It can also be argued that the health community also has a professional duty to examine and challenge militaristic approaches to defence and national security that fail to emphasise international diplomacy, tolerance, and other determinants of peace such as social and economic justice within and between countries. This is all the more so given the impotence of military might in the face of new threats to national security such as cyber-attacks, which have become increasingly alarming due to our reliance on globalised systems of information and communication (Sanger 2018). Health professionals can use their social mandate and public health expertise to promote a more holistic conception of human security that highlights health, social security and environmental protection, whilst countering cultural practices that celebrate and legitimise violence and aggression.

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WEB APPENDIX

Summary of Treaties relating to nuclear, chemical and biological weapons (Source: Arms Control Association)

1925 – Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or other Gases, and of Bacteriological Methods of Warfare: prohibits the *use* of asphyxiating, poisonous or other gases and of bacteriological methods of warfare. Did not cover production, development and stockpiling. Compliance was voluntary, with no verification mechanism.

1963 – Limited Test Ban Treaty: prohibits nuclear weapons tests in the atmosphere, outer space and underwater

1968 – Nuclear non-proliferation Treaty: creates a binding commitment to disarmament and preventing the spread of nuclear weapons. Divides states into nuclear, who must pursue disarmament, and non-nuclear states who must not develop nuclear weapons. Almost universal membership, except for: South Sudan, Israel, India and Pakistan. For Israel, India or Pakistan to join, they would now have to dismantle their nuclear weapons; a step taken by South Africa in 1991 to join this treaty.

1972 – Biological Weapons Convention: bans the development, production and stockpiling of biological weapons of mass destruction. Subject to review conference every five years: 1986 conference required annual reports on reportable activities such as laboratories, vaccine production, disease outbreaks and defence research. 2006 review conference established the implementation support unit. Notably, Israel has not signed; and Egypt and Syria have not ratified the convention.

1996 – Comprehensive Test Ban Treaty: bans all nuclear test explosions. Currently pending entry into force; waiting for China, North Korea, Egypt, India, Iran, Israel, Pakistan and USA.

1997- Chemical Weapons Convention: prohibits development, production, acquisition and stockpiling of chemical weapons. States are required to destroy all chemical weapons and weapons production facilities under their control. The convention prohibits direct or indirect transfer of chemical weapons and requires states to declare chemical weapons stockpiles and production facilities to Organization for the Prohibition of Chemical Weapons (OPCW). Limits also extend to the production and transfer of certain chemicals, precursors and manufacturing technologies which could be used to develop chemical weapons. Not signed by Egypt, North Korea or South Sudan; and signed but not ratified by Israel.

1999 - Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction: commit countries to not using, developing, producing, acquiring, retaining, stockpiling, or transferring anti-personnel landmines "designed to be exploded by the presence, proximity or contact of a person and that will incapacitate, injure or kill one or

more persons."

2010 - Convention on cluster munitions: bans all use production, transfer and stockpiling of cluster munitions.

2014 - Arms Trade Treaty: requires states-parties to adopt basic regulations and approval processes for the flow of weapons across international borders, establishes common international standards that must be met before arms exports are authorized, and requires annual reporting of imports and exports to a treaty secretariat. Also requires states to assess the potential for arms exports to "contribute to or undermine peace and security" or be used to commit or facilitate serious violations of international humanitarian or human rights law, acts of terrorism, or transnational organized crime

2017 - Treaty on the Prohibition of Nuclear Weapons: prohibits states from "developing, testing, producing, manufacturing, acquiring, possessing, stockpiling, transferring, deploying, stationing, using or threatening to use nuclear weapons, under any circumstances" and make it illegal to 'assist, encourage or induce, in any way, anyone to engage in any activity prohibited to a state party under this treaty'). The treaty also establishes obligations on victim assistance and environmental remediation related to nuclear weapons testing, and recognises the disproportionate harm caused to indigenous peoples.