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Biological and chemical warfare

HOW MUCH DO WE KNOW?

Unlike nuclear weapons, which require rare materials and complex engineering, biological and chemical weapons can be developed at a comparatively low cost[20], placing them within the reach of most or all states as well as organized non-state actors. Chemical and biological weapons carry various levels of risk. Toxic chemicals could be aerosolized or placed into water supplies, eventually contaminating an entire region. Biological weapons possess greater catastrophic potential, as released pathogens might spread worldwide, and cause a pandemic.

Recent developments in synthetic biology and genetic engineering are of particular concern[21]. The normal evolution of most highly lethal pathogens ensures that they will fail to spread far before killing their host. Technology, however, has the potential to break this correlation, and create both highly lethal and highly infectious agents[22]. Such pathogens could be released accidentally from a lab, or intentionally released in large population centres[23]. Current trends towards more open knowledge sharing can both contribute to and mitigate such risks.

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WHAT ARE KEY FACTORS AFFECTING RISK LEVELS?

- **Global frameworks** controlling research on chemical or biological weapons including revised strategic trade controls on potentially sensitive dual-purpose goods, technology and materials, biological and chemical safety and security measures, as well as an ongoing commitment and capacity to enforce disarmament and arms control conventions[24].
- **The number of laboratories** researching potential pandemic pathogens for military or civilian purposes, and the public availability of dangerous information circulating for scientific purposes, increase the level of risk[25].
- **Further developments** in synthetic biology and genetic engineering lowering skill levels and costs to modify existing pathogens or to develop new pathogens which, in turn, may significantly increase biological risks to society[26].

CHEMICAL WEAPONS: AN UNRAVELLING CONSENSUS?

Deadly agents like sulphur mustard were used during and between the World Wars, but the horrific results of such attacks eventually led to a global consensus to ban toxic chemical weapons, the most widely-used and easily proliferated weapon of mass destruction[27].

This consensus, however, represented by the near-universal 1993 Chemical Weapons Convention (CWC) is under strain. The Syrian Civil War has resulted in well-documented and indiscriminate uses of various deadly toxic chemicals against the civilian population, most recently in Khan Sheikhoun on 4 April[28]. **The Khan Sheikhoun attack resulted in at least 85 victims – including some 20 children – dying from the deadly nerve agent Sarin (or 'sarin-like' compound).** Though the risk may always exist from easily available dual-use chemicals, and from terrorists like the Aum Shinrikyo, which perpetrated the Tokyo attack in 1995, there is a global risk that the hard-won consensus on banning state-use of toxic chemicals will be further weakened[29]. This could lead to the devastating return of more advanced toxic chemical weapons of mass destruction in any potential large-scale conflict in the future, as well as long-term changes in how states understand the development, evaluation and use of 'non-standard chemical substances' (substances other than deadly substances like sarin) for domestic riot control purposes, counter-terrorism operations, international peacekeeping operations, and as a mechanism to maintain a standby offensive chemical weapons capability.

RECENT USAGE

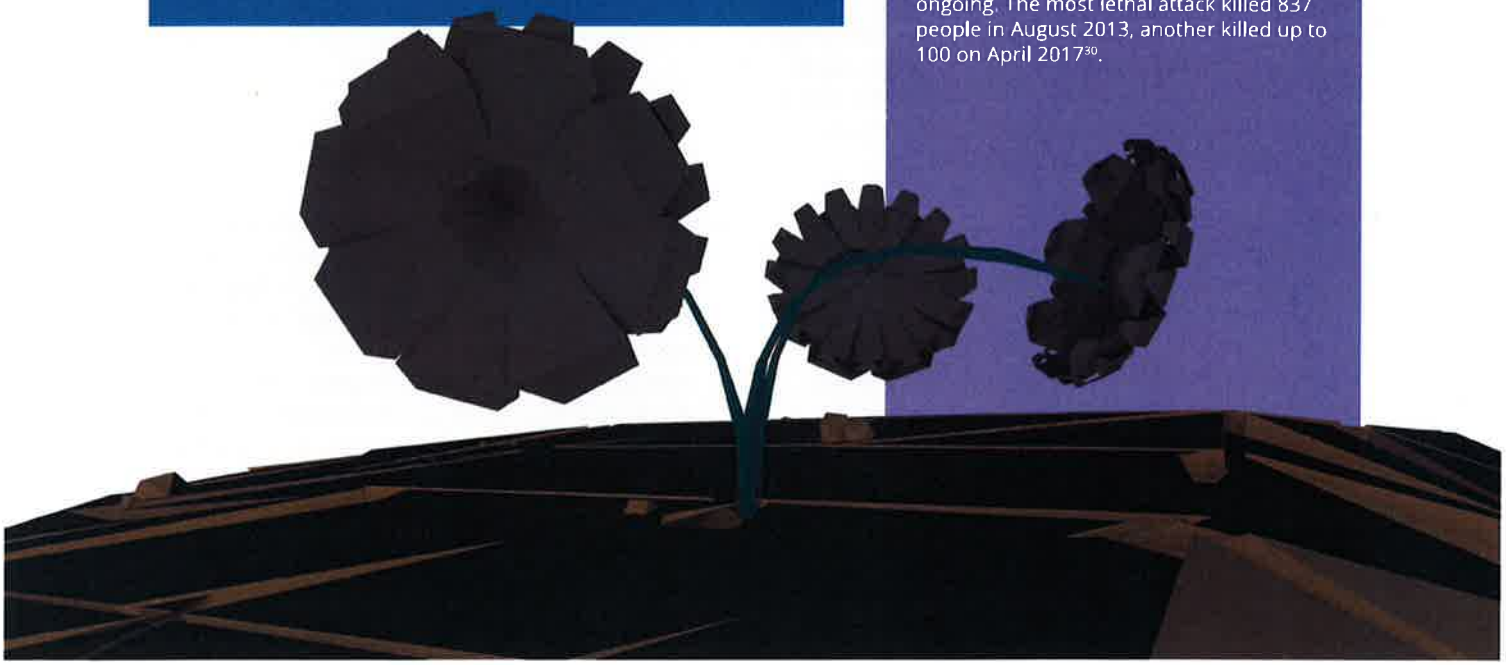
Though their production and use is banned by international conventions, biological and chemical weapons have been used at least on four occasions in the last forty years, three times in war, and once in an act of terrorism:

Rhodesia, late 1970s: cholera, anthrax, epidemic typhus and typhoid fever pathogens were released in water supplies used by guerillas.

Iraq-Iran, 1980-1988: mustard gas used in trench warfare killed 20,000 and affected 100,000. In March 1988, poison gas killed between 3,200 to 5,000 people in Halabja and injured 7,000 to 10,000 more. Thousands have since died prematurely of the after-effects. Others continue to receive medical treatment and/or remain under periodic medical observation and care.

Japan, March 1995: Sarin gas released on trains in Tokyo by the Aum Shinrikyo cult killed 12 people, and severely injured 50.

Syria, 2012 – 2017: Sarin and chlorine gas attacks have been recurring and are still ongoing. The most lethal attack killed 837 people in August 2013, another killed up to 100 on April 2017[30].



Governance of chemical and biological weapons

Biological and chemical weapons are banned by two international treaties: the Biological Weapons Convention (BWC) of 1975, with 178 State Parties, and the Chemical Weapons Convention (CWC) of 1997, with 189 State Parties. In both cases, dual-use creates a particular difficulty: the same chemicals and biological agents can be applied for beneficial purposes, or serve as the core components of deadly weapons.

The CWC, negotiated with participation of the chemical industry, defines a chemical weapon by its intended purpose, rather than lethality or quantity. It allows for stringent verification of compliance: acceding to the CWC means mandatory destruction of all declared chemical weapons as well as their production sites – to be subsequently verified by appointed inspectors.

The BWC is less prescriptive, which results in ambiguities and loopholes. Research is permitted under the Convention, but it is difficult to tell the difference between legitimate and potentially harmful biological research. States are required to "destroy or to divert to peaceful purposes" their biological weapons, but no agreed definition of a biological weapon exists. In addition, there is no secretariat to monitor and enforce implementation, except for a small support unit in Geneva, and no mechanism exists to verify destruction or diversion, despite efforts since 1991 to include legally-binding verification procedures in the BWC. Some lesser steps have been taken, including confidence-building measures on which State Parties are to report each April, and management standards on biosafety and biosecurity, but implementation is voluntary.

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Under the BWC, complaints can be lodged with the UN Security Council – which can investigate them – but no complaint has ever been made, and enforcement mechanisms do not

exist. The CWC includes a provision for "challenge inspections" in case of suspected chemical weapons use – but again, it has never been invoked, not even in the case of Syria, though doubts about a chemical weapons program are regularly debated at the Security Council. Over the last three and a half years, 28 visits by the "Declaration Assessment Team" have not been able to clarify discrepancies and determine if Syria's declaration is accurate and complete. Additionally, the security context and shifting territorial control present significant challenges in ensuring that prohibition is fully implemented within the country. In case of alleged use of chemical or biological weapons in countries not party to the conventions – like Syria in 2013 – investigations can be requested through the UN Secretary-General's Mechanism for Investigation of Alleged Use of Chemical and Biological Weapons, concluded in 1988.

Only four countries are not State Parties to the CWC (Egypt, Israel, North Korea and South Sudan). The highest concern among those is North Korea, said to possess large quantities of chemical weapons which could be sold or traded to unscrupulous non-State actors. It also needs to be mentioned that neither the United States nor Russia have destroyed their large chemical arsenal, due to the cost and environmental challenges of chemical disposal. Both countries requested extensions of the deadlines imposed by the Organisation for the Prohibition of Chemical Weapons, yet the existence of large stocks remain a risk.

In the 55 years since the BWC was negotiated, rapid advances in biotechnology have been made, which challenge our current governance models. The pharmaceutical and medical industries possess the tools and knowledge to develop biological weapons, and the Internet spreads this know-how to those who might use it for nefarious purposes. Biological threats do not respect borders and, as global travel increases, could quickly have a regional or even global impact. Terrorists could contaminate the water supply or release deadly bacteria, but it is also possible that the lack of lab safety could result in the inadvertent release of a virus or disease. The first step towards a solution would be to acknowledge the seriousness of the situation. But leadership is also needed to place this issue at the right place on the global agenda, and may come from the UN Security Council, the G7 or the G20, coalitions of government and industry bodies, civil society groups, or one or more nations acting as global champions.

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