Preventing the Development and Use of Chemical Weapons

The History of Chemical Weapons

Chemical weapons have been used dating back to the 12th century BCE. However, it was not until the industrial revolution and advancements in chemical studies that modern-day chemical weapons were developed[1]. These weapons have greatly changed how militaries approach war, adding heightened risks to the conflicts where they are used. During World War One, chemical weapons were used on a much larger scale. France was the first country to use a chemical weapon in the war, and soon other countries followed suit. The development of harmful chemical agents like Chlorine gas, Mustard gas, and Phosgene caused lasting effects both internally and externally. It resulted in the deaths of 91,000 people out of the 1.2 million who came into contact with poison gas.[2] Agents like mustard gas are classed as blistering agents. When in contact with skin, blistering agents create painful blisters on their target, often debilitating and lethal.[3]

The world realized the lethal nature of chemical weapons and their lasting effects on civilians and military combatants, leading officials to search for a solution before the weapons could have similar effects in World War Two. The 1925 Geneva Protocol prohibited the use of chemical weapons in war.[4] While the Geneva Protocol was an excellent first step, by World War II neither Japan nor the United States had ratified it. Even nations that signed on, such as France and Great Britain stated that the protocol would no longer apply if their enemies violated it. Some treaty members, such as Italy, continued to use chemical weapons, including in Ethiopia during the Italian invasion of 1935.[5] Although poison gas was not used on the battlefield during World War Two, chemical weapons were used in the genocide of Jewish people, resulting in the deaths of millions. This served as a wake-up call for the world, leading to a search for more effective solutions to prevent future use of chemical weapons.

Chemical Weapons in a Modern Context

Modern ideas of chemical weapons stem from their development during World War One, a time when combat was at its peak and countries had to resort to creating weapons with long-lasting effects on their enemies. Chemical weapons are defined as any weapon made with a chemical and intended

---

[1] "A Brief History of Chemical Weapons." *Science History Institute.* https://www.sciencehistory.org/stories/magazine/a-brief-history-of-chemical-war/.
[2] "The History of Chemical Weapons Use Goes Back to the Ancient World." *History.com.* https://www.history.com/news/syria-chemical-weapons-history-facts.
[3] "What is a Chemical Weapon?" *OPCW.* https://www.opcw.org/our-work/what-chemical-weapon.
[4] "Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare (Geneva Protocol)." *U.S. Department of State.* https://2009-2017.state.gov/t/isn/4784.htm.
[5] The use of chemical weapons in the 1935-1936 Italo-Ethiopian War." *SIPRI.* https://www.sipri.org/sites/default/files/Italo-Ethiopian-war.pdf.

to harm or kill.[6] They can cause various devastating effects on their targets, including choking, blistering, disruption of the nerves, and poisoning that disrupts metabolic processes, leading to a slow and painful death.[7]

To prevent the horrors of chemical weapons from recurring, the 1925 Geneva Protocol and the Chemical Weapons Convention (CWC) were created. These international agreements aim to prevent the use or creation of chemical weapons and, ultimately, eliminate them completely. The CWC has successfully eliminated vast quantities of chemical weapons and continues to work toward global disarmament. However, some countries have not signed or ratified the treaty, and chemical weapons remain a threat in various regions around the world.

The use of chemical weapons has had a profound impact on the world, not only in terms of their destructive power but also because they violate international norms and human rights. It is crucial to continue educating people about the dangers of chemical weapons and working together to ensure that they are never used again. Chemical weapon use has continued despite treaties against it.[8] For example, during the Vietnam War the United States used chemical weapons, including, most prominently, an herbicide called Agent Orange, to kill forests that the VietCong were hiding in. Agent Orange not only has short-term health impacts, including liver problems, darkening of the skin, and nerve disease, but also long-term health impacts such as causing cancer.[9]

Agent Orange also has lasting environmental impacts. Dioxin, the active ingredient in Agent Orange can last in humans for 20-years and up to 100-years in the sediments of rivers and bodies of water. The spraying of Agent Orange contributed to an estimated 150,000 birth defects within Vietnam.[10] Many Americans who were involved in the spraying of Agent Orange have seen long-term impacts to their health. When it was developed, Agent Orange had a legitimate purpose in that it was meant to protect crops by killing bugs and pests.[11] But this purpose also made it an effective chemical weapon. Chemical weapons are often developed from chemicals with legitimate purposes.

The Chemical Weapons Convention (CWC)

The Chemical Weapons Convention (CWC) is a crucial multilateral treaty with 193 member states, designed to ensure full transparency between nations in their efforts to eliminate their supply of chemical weapons.[12] The treaty was created to stop the cruel effects chemical weapons had on those it

---

[6] "Chemical Weapons: Frequently Asked Questions." *The Arms Control Association.* https://www.armscontrol.org/factsheets/Chemical-Weapons-Frequently-Asked-Questions.
[7] Ibid.
[8] "Agent Orange Wasn't the Only Deadly Chemical Used In Vietnam." *History.com.* https://tinyurl.com/5myk3xw8.
[9] "Agent Orange." *History.com.* https://www.history.com/topics/vietnam-war/agent-orange-1.
[10] "What is Agent Orange?" *The Aspen Institute.* https://tinyurl.com/3pt6z9m7.
[11] "Agent Orange." *History.com.* https://www.history.com/topics/vietnam-war/agent-orange-1.
[12] "What is the CWC?" *CWC Coalition.* https://www.cwccoalition.org/what-is-the-cwc/.

was used on. It was opened for signatures on January 13th, 1993, and within two days fostered 130 nation signatures.[13] The treaty is a significant step towards achieving peace and security across the world. Though the treaty has been successful in promoting the peaceful use of chemistry, there are still several countries that are yet to sign it. It is worth noting that Israel has signed but not yet ratified the treaty, while Egypt, North Korea, and South Sudan have not signed it.[14] This shows that there is still much work to be done in achieving full compliance with the CWC provisions. The four main provisions of the treaty are aimed at ensuring transparency, safety, and security in the chemical industry.[15] These include the destruction of stockpiles, monitoring of chemical facilities, protection from threats, and promotion of the peaceful use of chemistry.[16] The efforts of the CWC have undoubtedly contributed to the reduction of harmful chemical weapons across the globe, but there is still a long way to go. It is crucial for all nations to come together and work towards achieving the goals of the CWC to ensure a safer and more secure future for everyone.

The success of the CWC has been made due to the smooth and effective process they have put in place to verify nations' work and promote compliance. Routine checks are put in place along with each state party holding the right to conduct challenge inspections of any facility of any other state party.[17] Compliance is ensured through these verification measures and the with the powers of the CWC to restrict state parties and add sanctions on them.[18] With the success the CWC has had, many nations have reported that their entire stockpile has been eradicated. In terms of category 1 chemical weapons—considered the most dangerous—six of the eight state parties with these types of chemical weapons have reported none of them remain.[19] These state parties are Albania, India, Iraq, Libya, Russia, and South Korea.[20] While Syria has declared none of its chemical weapons remain, undeclared chemicals still exist.[21] The United States projects it will eliminate all of its category 1 chemicals by September 2023.

The Organization for the Prohibition of Chemical Weapons (OPCW)

The OPCW is the conference of state parties that have signed onto the CWC. Its goal is to ensure that each member state continues to abide by the CWC. The organization has three main bodies, the Conference of the States Parties–that oversees the implementation of the CWC and the work of the other two branches: the Executive Council and the Technical Secretariat.[22] The Executive Council promotes effective implementation and compliance of the CWC, while the Technical Secretariat

---

[13] "OPCW-History." *OPCW.* https://www.opcw.org/about-us/history.
[14] "Evolution of the Status of Participation in the Convention." *OPCW.* https://tinyurl.com/366xzn8f.
[15] "What is the CWC?" *CWC Coalition.* https://www.cwccoalition.org/what-is-the-cwc/.
[16] "Eliminating Chemical Weapons Committed to complete and verifiable destruction." *OPCW.* https://www.opcw.org/our-work/eliminating-chemical-weapons.
[17] "Chemical Weapons Convention (CWC)." *Nuclear Threat Initiative.* https://tinyurl.com/bmmhcjr8.
[18] Ibid.
[19] "The Chemical Weapons Convention (CWC) at a Glance." *The Arms Control Association.* *https://www.armscontrol.org/factsheets/cwcglance*.
[20] Ibid.
[21] Ibid.
[22] "OPCW-History." *OPCW.* https://www.opcw.org/about-us/history.

facilitates the implementation of the convention by overseeing the treaty's verification mechanisms and processes.[23] All three bodies work simultaneously to effectively eliminate chemical weapons.

However, the OPCW suffers from a lack of funding that slows down its objectives and makes it vulnerable to pressure from nations that provide more funding.[24] This creates a bias towards those nations that offer more monetary value. Although the OPCW has been effective, several issues within the organization need to be resolved. As the organization that many nations rely on for a clear picture of the chemical weapons situation, the OPCW must avoid controversies and remain strong in its role.

Recent Chemical Weapons Usages

In spite of the OPCW and CWC, there chemical weapons have been used in the past decade, most prominently in Syria during the Syrian Civil War and in a targeted attack in England in 2018.

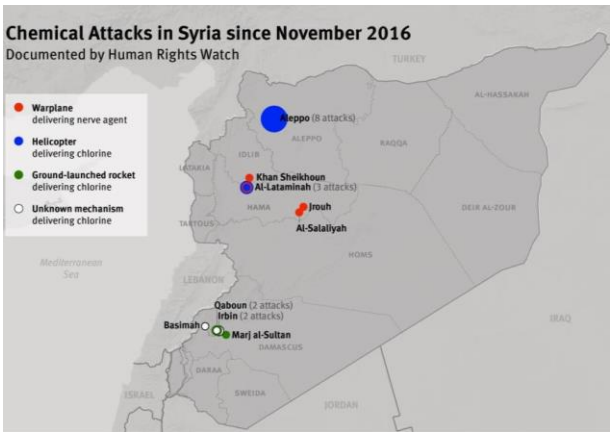
Chemical Weapons in Syria

Sparked by an uprising against the authoritarian government of Bashar al-Assad in 2011, the Syrian Civil War developed into a country wide conflict that saw Assad's regime fighting more secular rebels seeking to overthrow him; Kurdish militia groups; and a variety of extremist Islamic groups loosely or directly affiliated with other terror groups such as al-Qaeda and, later, the so-called Islamic state.[25] The conflict devolved into a bloodbath and in December 2012 Assad's forces used a chemical weapon, Agent 15, in Homs.[26] There were continued allegations of more chemical weapons attacks and in March 2013, the United Nations, World Health Organization (WHO), and OPCW decided to conduct an investigation which the Assad government permitted to enter Syria in August 2013.[27] This investigation, which was only to ascertain that a chemical weapons attack occurred—not determine who perpetrated the attack—concluded that chemical weapons, most prominently Sarin gas had been used in attacks against civilians and combatants in Syria during 2012 and 2013.[28]

After a pressure campaign in August and September of 2013, the Russian Federation proposed a plan wherein Assad would declare his chemical weapons stockpiles and return to its commitments under the CWC. This plan ultimately developed into the "Framework for Elimination of Syrian Chemical Weapons" which, "required Syria to provide a full declaration of its stockpile "within a week" and provide the OPCW and the UN access to all chemical weapons sites in Syria. The plan calls for the OPCW inspectors to complete their initial inspections by November and calls for the destruction of the stockpile of chemical weapons and chemical agents by the first half of 2014."[29] This agreement was codified through the Security Council in Resolution 2118 (2013).[30] Through 2014,

---

[23] Ibid.
[24] "Nonproliferation: Delays in Implementing the Chemical Weapons Convention Raise Concerns About Proliferation." *The U.S. General Accounting Office.* https://www.gao.gov/assets/a241969.html.
[25] "Syria's Civil War: The Descent Into Horror." *The Council on Foreign Relations.* ttps://www.cfr.org/article/syrias-civil-war
[26] "Timeline of Syrian Chemical Weapons Activity, 2012-2022." *Arms Control Association.* https://tinyurl.com/2p9yp6sn.
[27] Ibid.
[28] Ibid.
[29] "Framework for Elimination of Syrian Chemical Weapons." *U.S. Department of State.* https://tinyurl.com/bdh349sn.
[30] "Security Council Requires Scheduled Destruction of Syria's Chemical Weapons, Unanimously Adopting Resolution 2118 (2013)." *United Nations.* https://press.un.org/en/2013/sc11135.doc.htm.



chemical weapons and sites where they had been developed and maintained were destroyed with help from the international community. But chemical weapons attacks continued throughout Syria. From 2011-2015, 77% of chemical weapons attacks came after the passage of Resolution 2118 (2013).[31] Assad-aligned Syrian forces continued to use chemical weapons as late as 2018, in which they used chlorine gas in an attack in Aleppo.[32]

The international community's efforts to destroy the Assad regime's chemical weapons stockpiles was admirable, but ultimately fell short. While the Assad regime initially cooperated with investigators and the OPCW, it continued to hide some of chemical weapon stockpiles and the sites where they were manufactured. Chemical weapons can be more easily and cheaply created than other weapons of mass destruction. In Syria's case, it was able to manufacture additional chemical weapons from pesticides and chemicals used for peaceful industrial processes.[33] In a sense, even if all of the chemical weapon's stockpiles had been destroyed, Assad and his forces would have had the funding, knowledge, and resources to produce more. In March 2023, the Security Council deemed Syria's reports to the OPCW as inaccurate and sought for the country to resolve roughly 20 outstanding questions from the OPCW on its chemical weapons stockpiles and production capabilities.[34]

Novichok

Syria is not the only area that has seen chemical weapons use in the last decade, with Novichok, a nerve agent, being used in England in 2018. Novichok was developed in the Soviet Union during the Cold War and can be used as a weapon by being breathed in, ingested, or coming into contact with skin.[35] Novichok works as a chemical weapon by disrupting neurotransmitters between nerves—making it difficult for a victim to pump blood throughout their body and breathe.[36] Novichok is also difficult to detect and can be transported more easily than other chemicals used in chemical weapons because it only becomes dangerous when two non-toxic chemicals are mixed together.[37] Novichok was not specifically prohibited under the CWC until 2019.[38]

In March 2018, a Sergei Skripal a Russian accused of treason who had been imprisoned in Russia and then became a British citizen after a prisoner exchanged was poisoned by nerve agent.

---

[31] "A New Normal: Ongoing Chemical Weapons Attacks in Syria." *Syrian American Medical Society.* https://tinyurl.com/2krfv9w5.
[32] "Security Council Deems Syria's Chemical Weapon's Declaration Incomplete, Urges Nation to Close Issues, Resolve Gaps, Inconsistencies, Discrepancies." *The United Nations.* https://press.un.org/en/2023/sc15220.doc.htm.
[33] "Death by Chemicals." *Human Rights Watch.* https://tinyurl.com/265twem2.
[34] "Security Council Deems Syria's Chemical Weapon's Declaration Incomplete, Urges Nation to Close Issues, Resolve Gaps, Inconsistencies, Discrepancies." *The United Nations.* https://press.un.org/en/2023/sc15220.doc.htm.
[35] "Everything You Need to Know About Novichok." *Radio Free Europe.* https://tinyurl.com/mryu998d.
[36] Ibid.
[37] Ibid.
[38] "CWC States Update List of Banned Chemicals." *Arms Control Association.* https://tinyurl.com/2crhjmjp.

Skripal, his daughter, and some 50 others who came into contact with the chemical were hospitalized with various levels of severity.[39] An investigation determined that two operatives working for Russia had tracked Skripal to Salisbury, England with the intention to kill him in retribution for having committed treason against Russia decades earlier.[40] An investigation by the United Kingdom, with help from the OPCW, determined that the chemical weapon that was used was Novichok and the amount used was large enough to kill several thousand people. The Novichok used in the attack was so powerful that it was exceedingly difficult to clean off surfaces with which it had come into contact, allowing it to be inadvertently spread in trace amounts into people's homes.

While Skripal survived, several months later the perfume bottle that is thought to have been used to deliver the Novichok was discovered by Charlie Rowley who gave it to Dawn Sturgess, his wife. Dawn, not knowing the contents of the perfume bottle, used it and died several days later.[41] In response to this attack, many western nations, such as the United States and United Kingdom, expelled Russian diplomats from their countries. Russia has continued to deny its role in the attacks, but in 2020, Russian opposition figure Alexei Navalny fell ill and was hospitalized in Germany. An investigation concluded that he was poisoned by Novichok—which one of the perpetrators confirmed in a call with Navalny after he had recovered.[42] After much discussion, the OPCW banned Novichok in July 2020.[43]

Barriers to the Elimination of Chemical Weapons

The Dual Use Nature of Chemical Weapons

Chemical weapons are difficult to eliminate as the technologies for creating them as well as the chemical inputs have non-military purposes—a dynamic known as 'dual use'. Dual use technologies are difficult to prohibit and monitor because individuals, groups, or governments can import chemicals for use in agriculture or for manufacturing, but then turn the chemicals into chemical weapons.[44] It is not feasible for the OPCW or the international community to completely prevent chemicals and technologies with peaceful uses from falling into the hands of parties who want to make chemical weapons. For example, chlorine has a peaceful purpose as it is used in many pools as well as in many industries, but chlorine is also the main ingredient in chlorine gas, which is a chemical weapon that has been used most recently in Syria.[45] Many of the components of chemical weapons are ubiquitous across the globe or have other peaceful industrial uses, making it difficult to stop groups or countries from obtaining the chemicals under the guise of using them peacefully. In the case of Syria's chlorine gas, investigators and inspectors determined that the chlorine had

[39] "Russian spy poisoning: What we know so far." *BBC News.* https://www.bbc.com/news/uk-43315636.
[40] "Salisbury poisoning: How a lethal substance sparked an international incident in a quiet English city." *The Independent.* https://www.independent.co.uk/news/uk/crime/salisbury-poisoning-sergei-skripal-russia-b2223018.html.
[41] Ibid.
[42] "Navalny says Russian officer admits putting poison in underwear." *The Guardian.* https://tinyurl.com/35wctevy.
[43] "Explainer: What are chemical weapons and are they illegal?" *Reuters.* https://tinyurl.com/f2psdfrj.
[44] "Preventing the Re-Emergence of Chemical Weapons." *The OPCW.* https://tinyurl.com/4sub39yj.
[45] "Demystifying dual-use goods: From the chlorine in a pool to the antibiotics we take- what your business should be doing." *Lexology.* https://www.lexology.com/library/detail.aspx?g=536d0431-09fb-4039-94e6-ad8e38164f5c.

originally come from the United Kingdom and had been shipped to neighboring Lebanon for use by a private company.[46] The chlorine then found its way to Syria where it was used in the chlorine gas. But dual use chemicals can be even simpler—Thiodiglycol is an ingredient in pen ink and a precursor to mustard chemical weapons.[47] The CWC does mandate that the transfer of all scheduled chemicals be declared to the OPCW Technical Secretariat—but this is not always done.[48]

The technology that is used to create, deploy, and weaponize chemical weapons are often dual use as well. One might think that if the chemicals that go into chemical weapons cannot be effectively cut-off, then the technologies that are used to weaponize the chemicals or deliver them could be curtailed. But industrial mixers and containers can be used for peaceful uses and to make and store chemical weapons.

The Low Barriers to Entry in Chemical Weapon Creations

Unlike nuclear weapons, which take a high degree of scientific and industrial ability to design and manufacture, chemical weapons are less intensive to create. These lower barriers to entry make it easier for groups and individuals to create chemical weapons. In a sense, these lower start-up costs make chemical weapons appealing for terror groups or groups and governments actively engaged in armed conflict.[49] For example, Aum Shinrikyo, a Japanese doomsday cult, was able to procure and release sarin gas on the Tokyo subway in 1995—killing 13 people and injuring thousands.[50] Aum had attempted attacks with other chemical weapons before the 1995 attacks with VX, phosgene, sarin, and hydrogen cyanide.[51] The terror group was not particularly well funded, but was still able to make multiple chemical weapons attacks. Chemical weapons are attractive because they can inflict a large number of casualties very quickly and very cheaply. This makes is a challenge for the international community to prevent groups from obtaining the precursor chemicals under the premise of using them peacefully, only for them to be turned into a chemical weapon.

Lack of International Cooperation on Arms Control

While the international community cooperated to remove chemical weapons from Syria in the 2010s, recent international conflicts have reduced the willingness for governments to collaborate. The use of Novichok in the United Kingdom in 2018 angered many western governments and made them less interested in working with Russia on chemical weapons issues. This antagonism was furthered by the Russian invasion of Ukraine. During this conflict, both Russia and Ukraine have accused the other

---

[46] Ibid.
[47] "Preventing the Re-Emergence of Chemical Weapons." *The OPCW*. https://tinyurl.com/4sub39yj.
[48] Ibid.
[49] "Evaluating the Threat: Chemical, Biological, and Nuclear." *The Wilson Center*. https://tinyurl.com/4d5r35pd.
[50] "Aum Shinrikyo: The Japanese cult behind the Tokyo Sarin attack." *BBC News*. https://www.bbc.com/news/world-asia-35975069.
[51] "Chronology of Aum Shrinrikyo's CBW Activities." *Monterey Institute of International Studies*. https://www.nonproliferation.org/wp-content/uploads/2016/06/aum_chrn.pdf.

nation of using chemical weapons.[52] The world is currently at a nadir for international cooperation on arms control agreements. Only through working together can the use of chemical weapons be reduced and, eventually, eliminated.

Questions to Consider

- To what extent can the CWC be improved and the OPCW be empowered?
- How can terror groups be prevented from using chemical weapons?
- To what degree can existing chemical weapons stockpiles be fully eliminated?
- To what extent can the international community prevent the creation of more chemical weapons once a country's stockpile is eliminated?
- How can the dual-use chemicals be prevented from being turned into chemical weapons?
- What steps can be taken to restart dialogue and cooperation on chemical weapons arms control agreements?

[52] "Without giving evidence, Russia says it probes Ukraine use of chemical weapons." *Reuters.* https://www.reuters.com/world/europe/without-supplying-evidence-russia-says-its-investigating-alleged-ukrainian-use-2023-02-06/.