

ADDRESSING CHEMICAL AND BIOLOGICAL WEAPONS CHALLENGES THROUGH THE MIDDLE EAST WEAPONS OF MASS DESTRUCTION-FREE ZONE WORKSHOP REPORT

By Sarah Ruth Opatowski



MIDDLE EAST WEAPONS OF MASS DESTRUCTION FREE ZONE SERIES



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A United Nations Special Commission inspector is measuring the volume of the nerve agent in a container, UN Photo, Iraq, 1991.

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LIST OF ACRONYMS

AHG	Ad Hoc Group
BW	Biological weapons
BWC	Biological Weapons Convention
CBM	Confidence-building measure
CBRN	Chemical, Biological, Radiological and Nuclear
CW	Chemical weapons
CWC	Chemical Weapons Convention
DIYbio	Do-it-yourself biology
IAEA	International Atomic Energy Agency
ISU	Implementation Support Unit
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
NWFZ	Nuclear weapon-free zone
OPCW	Organisation for the Prohibition of Chemical Weapons
S&T	Science and technology
UNODA	United Nations Office for Disarmament Affairs
UNSGM	United Nations Secretary-General's Mechanism
VEREX	Ad Hoc Group of Governmental Experts to Identify and Examine Potential Verification Measures from a Scientific and Technical Standpoint
WMD	Weapons of mass destruction
WHO	World Health Organization
ME WMDfZ	Middle East Weapons of Mass Destruction-Free Zone



1 INTRODUCTION

First Responders from CWC Middle East and North Africa Member States at a Regional Advanced Course and Field Exercise on Assistance held at Qatar Army CBRN Regional Training Centre in Doha, OPCW, Qatar, 2017.



The 1995 Review and Extension Conference of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) mandated the establishment of an “effectively verifiable Middle East zone free of weapons of mass destruction, nuclear, chemical and biological, and their delivery systems”.¹ In 2018, the United Nations General Assembly adopted a decision, based on a draft by the Arab Group, to convene an annual Conference on the Establishment of a Middle East Zone Free of Nuclear Weapons and Other Weapons of Mass Destruction.² The conference has so far held three sessions, with intercessional Working Committee meetings. Although the discussions at the conference are in their preliminary stages, the second session agreed on several proposed obligations and prohibitions related to chemical and biological weapons and a preliminary definition of “non-prohibited purposes”.³ The second session also noted that verification under a future treaty on a Middle East Weapons of Mass Destruction-Free Zone (ME WMDFZ) should avoid duplicating other international arrangements and could rely on existing instruments, including the verification regime of the Organisation for the Prohibition of Chemical Weapons (OPCW).⁴

On 17–18 May 2022, UNIDIR held a workshop exploring issues pertaining to chemical and biological weapons in the Middle East in the context of a ME WMDFZ. Twenty-five international and regional experts, diplomats, officials and representatives from relevant international organisations participated in the workshop. The workshop took place under the Chatham House Rule.

The workshop spanned over two days, each focusing on a specific topic: one on chemical weapons (CW) and the other on biological weapons (BW).

1 1995 Review and Extension Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, “Resolution on the Middle East,” NPT/CONF.1995/32 (Part I), annex, para. 5, May 1995, <https://unidir.org/node/5643>.

2 United Nations General Assembly, “Convening a conference on the establishment of a Middle East zone free of nuclear weapons and other weapons of mass destruction,” Decision A/73/546 (22 December 2018), 23, [https://undocs.org/en/A/73/49\(Vol.II\)](https://undocs.org/en/A/73/49(Vol.II)).

3 United Nations General Assembly, Report of the Conference on the Establishment of a Middle East Zone Free of Nuclear Weapons and Other Weapons of Mass Destruction on the work of its second session, A/CONF.236/2021/4 (3 December 2021), 5, <https://unidir.org/node/6581>.

4 Ibid.

5 For more on regional perspectives on chemical and biological weapons, see Benjamin Bonin, Amir Mohagheghi and Michael Yaffe, "Implementing a WMD-Free Zone in the Middle East," *Nonproliferation Review* 20, no. 1 (February 2013), <https://doi.org/10.1080/10736700.2012.76178>; David Friedman, *Towards WMDFZ in the Middle East: Biological Confidence-Building Measures* (Brussels: Second EU Non-Proliferation Consortium Seminar to Promote Confidence Building and in Support of a Process Aimed at Establishing a Zone Free of WMD and Means of Delivery in the Middle East, November 2012), <https://www.nonproliferation.eu/wp-content/uploads/2018/10/friedman.pdf>; Jean Pascal Zanders, "Chemical and Biological Weapons in Regional Disarmament in the Middle East and North Africa," *Journal for Peace and Nuclear Disarmament* 5, no. 1 (June 2023), <https://doi.org/10.1080/25751654.2022.2092368>, and Ali Asghar Soltanieh, "Risks stemming from the politicization of the activities of the Organization for the Prohibition of Chemical Weapons," presented at the Security Council Arria-Formula event, 24 March 2023, <https://media.un.org/en/asset/k1p/k1p3rz8a4w>.

Each day featured presentations by experts on the relevant international regimes, existing verification measures, and developments in science and technology (S&T) related to these weapons. Following the presentations, the participants discussed the potential implications, challenges and opportunities for the Middle East in general, focusing on a ME WMDFZ.⁶

This report summarises the discussions, key findings and insights on the less examined and less explored chemical and biological weapons dimensions of a ME WMDFZ.

2

KEY TAKEAWAYS

OPCW Inspectors walking in the desert in Libya, OPCW, Libya, 2010.

Key takeaways from the workshop discussions on CW include:

- The conclusion of a ME WMDFZ treaty will have implications for existing international treaties and organisations related to weapons of mass destruction (WMD). Negotiators of the Zone should be mindful of ensuring early collaboration with these entities while negotiations take place and should establish consistent information exchange and harmonisation between the regional and international arrangements. Clear delineation of responsibility and authority between organisations is essential for maintaining an effective and sustainable treaty that leverages existing mechanisms.
- The mandate and scope of a ME WMDFZ are still under discussion. Three topics related to the scope of the future treaty were mentioned:
 - A mandate that includes disarmament provisions and relies on existing non-proliferation regimes and mechanisms would be easier to conclude than a broader mandate that includes provisions beyond the three existing treaties but may not address all CW regional threats.
 - Throughout the discussion, there were diverging views on whether biological and chemical safety and security should be incorporated into the scope of a Zone. Some consider WMD

security and safety to be an inherent part of the current regime and should be incorporated in any ME WMDfz treaty, while others consider them to be a separate issue. Concerns were expressed that too broad a scope may undermine the ability to conclude a treaty, while others held that a broad scope would be required to truly address all the WMD-related concerns and threat perceptions of Middle Eastern states.

- Concerns were raised regarding non-state actors and their possible development or acquisition of CW. While the OPCW and the 1540 Committee of the United Nations Security Council have several mechanisms available to address these threats. It was suggested that collaboration between the OPCW, the 1540 Committee and the existing organisations located in the region (e.g., the European Union Chemical, Biological, Radiological and Nuclear (CBRN) Centre of Excellence) could be one practical way of addressing non-state actor issues. This would be achieved through the development of national legislation, practices and procedures to enhance CW security and safety. The states of the Middle East must decide whether these mechanisms are sufficient or should be supplemented by regional arrangements.
- The Chemical Weapons Convention (CWC) establishes several types of CW verification, which are implemented by the OPCW: verification of the destruction of chemical weapons; industry verification of the non-production of chemical weapons; challenge inspections; and investigations of alleged use of chemical weapons. Only a state party can trigger non-compliance inspections under the CWC. The United Nations Secretary-General's Mechanism (UNSGM) offers another route, independent of the CWC, for United Nations member states to report and investigate allegations of CW use.
- Notably, to date, no challenge inspection or investigation into alleged CW use has yet been triggered through the OPCW's established mechanisms.
- An unused provision of the CWC of potential interest to Middle Eastern states in addressing non-compliance concerns is the option of establishing a tailored bilateral or multilateral CW verification arrangement.⁶ If implemented, these arrangements would be expected to go further in their scope and intrusiveness than those implemented to date by the OPCW. This could be deemed advantageous to states of the region, given the cases of non-compliance, the current political challenges within the OPCW, and the prevalent mistrust among Middle Eastern states.

⁶ Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction (CWC), Article IV (13–15) and V (16–18).

Key takeaways from the BW segment of the workshop include:

- S&T developments have changed the nature of biological threats and states' threat perceptions. It is important to keep in mind that BW can be used not only as a WMD but also in a localised attack, economic sabotage and incapacitation. The possibility of development and use of BW by non-state actors adds further complexity.
- Participants mentioned that governance of dual-use biological materials – materials with both civilian and military applications – is complex, with more than one treaty (e.g., the Biological Weapons Convention (BWC) and the CWC) covering some of the same materials and technologies. This makes it unclear for governments to determine the appropriate regulations and obligations under each mechanism.
- Participants lamented that many governments in the Middle East do not prioritise non-proliferation and disarmament, and officials' attempts to promote national biosafety and biosecurity often lack appropriate mechanisms and necessary funding to implement even simple measures. While funding can be streamlined through external assistance mechanisms (e.g., the European Union CBRN Centres of Excellence), national governments need to see the value in providing national funds for biosafety and biosecurity. This is particularly challenging in countries where dual-use biological agents are found in the natural environment.
- In ongoing negotiations in New York around a ME WMDFZ, some participants have noted that, of the three WMD categories, BW poses the biggest verification challenge. The BWC notably does not include a verification regime. Recently within the BWC, states have declared their intentions to keep discussing the question of how verification of BW should be carried out.
- In 1986, BWC states parties adopted an annual data-exchange mechanism through a set of confidence-building measures (CBMs). The CBMs were modified and expanded in 1991 and streamlined in 2011. Because CBMs are not explicitly mentioned in the Convention, some states do not consider them a legally binding requirement. Yet, because CBMs stemmed from a decision of a BWC Review Conference and has been reiterated in subsequent Review Conferences as well as United Nations General Assembly resolutions, CBMs are generally considered as politically binding.
- CBMs do not constitute a substitute for verification, and they suffer from ambiguity and completeness. There is also disparity in states' capacity to provide the requested information. Yet, participants

noted CBMs are valuable mechanisms to be considered in the context of a ME WMDFZ as a tool to clarify concerns and to reduce suspicions, ambiguities and tensions among states of the region. CBMs could also serve as a pilot for actual verification measures to help states understand internally what capabilities exist, which are the national authorities relevant to implementing BW-related obligations, and what is needed for verification. In fact, the negotiation in the 1990s on a potential verification protocol for the BWC and the negotiation of the CWC involved – and were partly based upon – practice inspections between often like-minded states. These exercises assisted in the negotiation process, built trust, and addressed concerns between the states. CBMs do not constitute a substitute for verification, and they suffer from problems with ambiguity, quality and completeness and the disparity in states' capacity to provide the requested information.

- Middle Eastern states will have to agree on the level of verification needed to address their threat perceptions. Additional tools and supplemental verification mechanisms – such as state-level inspections, transparency visits and peer review initiatives – could contribute to ensuring confidence in compliance.
- A Middle East WMD-Free Zone could benefit the exchange of expertise between member states. A Zone could also contribute to stronger biosafety and biosecurity mechanisms and strengthen national readiness to respond to a biological event.

3 CHEMICAL WEAPONS

Middle Eastern and North African First Responders Take Part of an Advanced and Exercise Training Course on Assistance and Protection Against Chemical Weapons, OPCW, Jordan, 2019.

The Middle East has experienced CW use by states and non-state actors in interstate and intrastate conflicts. From the 1960s until today, CW have played a prominent role in the threat perceptions of many states of the region. While the CWC, with 193 states parties,⁷ is the most widely adhered disarmament treaty in the world, two of the four states outside the Convention are in the region: Egypt and Israel. In addition, in April 2021, the states parties voted in the OPCW to suspend certain rights and privileges of the Syrian Arab Republic due to non-compliance allegations linked to outstanding questions about the completeness of its declaration to the OPCW.⁸

This chapter begins by outlining the current international CW regime, followed by a description of the different OPCW verification mechanisms and relevant S&T developments. It then summarises the workshop discussion on their implications for a Middle East WMD-Free Zone.

Chemical weapons and the non-proliferation regime

Throughout history, the use of CW was considered abhorrent. The first large-scale use of chemical weapons occurred in Ypres, Belgium, during the First World War.⁹ The devastating effects of CW renewed interest in banning them and led to the adoption of the 1925 Geneva Protocol for the Prohibition of the use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare.¹⁰ While the 1925 Geneva Protocol prohibits the use of CW, it is not comprehensive as it does not prohibit the development and stockpiling of CW and only prohibits their use in war. Consequently, states continued to research, produce, and even use more lethal forms of CW.¹¹ Several states in the Middle East, including the Islamic Republic of Iran, Morocco and Yemen, have suffered from CW use.¹²

⁷ CWC, 3 September 1992, no. 33757, <https://www.opcw.org/chemical-weapons-convention>.

⁸ Organisation for the Prohibition of Chemical Weapons (OPCW) Conference of the States Parties, "Decision Addressing the Possession and Use of Chemical Weapons by the Syrian Arab Republic," no. C-25/DEC.9 (21 April 2021), 4, <https://www.opcw.org/sites/default/files/documents/2021/04/c25dec09%28e%29.pdf>.

⁹ Julian Perry Robinson, "The Problem of Chemical and Biological Warfare, Volume 1: The Rise of CB Weapons," (Stockholm: SIPRI, 1971), 30–31, <https://www.sipri.org/publications/2000/problem-chemical-and-biological-warfare>.

¹⁰ "Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare," 17 June 1925, <https://ihl-databases.icrc.org/en/ihl-treaties/geneva-gas-prot-1925>.

¹¹ Marie Isabelle Chevrier and Jessica Eve Stern, "Chemical and Biological Weapons in the Third World," Boston College Third World Law Journal 11, no. 1 (1991): 56–58, <https://lira.bc.edu/collection/34e2b21b-b919-404c-b22e-e1524dd9e768?volume=11&issue=1>.

¹² World Health Organization, Public Health Response to Biological and Chemical Weapons: WHO Guidance, Second Edition (Geneva: WHO, 2004), 13, 35, [https://www.who.int/publications/item/public-health-response-to-biological-and-chemical-weapons-who-guidance-\(2004\)](https://www.who.int/publications/item/public-health-response-to-biological-and-chemical-weapons-who-guidance-(2004)).

The CWC was concluded in August 1992, opened for signature in 1993 and entered into force in 1997.¹³ CW are defined under the CWC as “all toxic chemicals and their precursors, except when used for purposes permitted by the Convention – in quantities consistent with such a purpose”.¹⁴ In addition, the Convention states that any chemical which, through its chemical action, causes death or harm is a toxic chemical, and therefore any toxic chemical can be a chemical weapon. The definition of CW is intent-based and draws upon the general-purpose criterion – thus, any toxic material or precursor is defined as a chemical weapon unless it has been developed, produced, stockpiled or used for purposes not prohibited by the CWC. The general-purpose criterion was designed as a safety net to ensure that chemical materials are used for legitimate purposes only, regardless of any future S&T developments and whether they are specifically listed in the Convention or its Annexes.

The implementing body of the CWC is the OPCW, which facilitates states parties fulfilling their obligations under the Convention. The core functions of the OPCW, and in particular its Technical Secretariat, include (a) to undertake inspections to verify the destruction of CW by states parties and inspections to verify the non-production of CW in the chemical industry; (b) to promote and facilitate the peaceful application of chemistry; and (c) to support national implementation of the CWC.

The first function of the OPCW is to undertake inspections related to CW destruction and non-production of CW. Over the past 25 years, the OPCW has supervised the complete elimination of approximately 72,000 metric tons of declared CW stocks. As of 7 July 2023, the United States, serving as the final possessor state, successfully concluded the verification of destruction for the remaining declared stockpiles.¹⁵ Additionally, among the 97 CW production facilities that were declared, 74 have undergone destruction, while the remaining 23 have been repurposed for peaceful activities.¹⁶ The OPCW continuously affirms compliance with the CWC through routine inspections, leading to trust in adherence. The OPCW can also conduct challenge inspections and investigations into the alleged use of CW (as detailed in the following section).

13 OPCW, “Evolution of the Status of Participation in the Convention,” 16 June 2018, <https://www.opcw.org/evolution-status-participation-convention>.

14 OPCW, “What is a Chemical Weapon?,” <https://www.opcw.org/our-work/what-chemical-weapon>.

15 OPCW, “OPCW Confirms: All Declared Chemical Weapons Stockpiles Verified as Irreversibly Destroyed,” 7 July 2023, <https://www.opcw.org/media-centre/news/2023/07/opcw-confirms-all-declared-chemical-weapons-stockpiles-verified>.

16 OPCW, “OPCW by the Numbers,” <https://www.opcw.org/media-centre/opcw-numbers>.

17 OPCW, “Promoting Chemistry for Peace,” <https://www.opcw.org/our-work/promoting-chemistry-peace>.

The second function of the OPCW is to facilitate states parties in maximising the economic and technological benefits of chemistry for peaceful uses insofar as they do not conflict with their obligations in the Convention. The OPCW has a range of international cooperation and assistance programmes and activities, including chemical management, enhancement of analytical skills to analyse Convention-related substances, and the promotion of knowledge exchange in the field of chemistry.¹⁷ The OPCW has organised several regional and subregional workshops in the Middle East, hosting around 250 participants between 2017–2022 to facilitate the peaceful benefits of chemistry.

The third core function of the OPCW is to support states parties in implementing the CWC at the national level. States parties are required under the Convention to establish a national authority to oversee national implementation and to act as a focal point with the OPCW and other states parties.¹⁸ National authorities are essential for the treaty's implementation. The CWC includes complex provisions that affect and require coordination by multiple national entities such as law enforcement agencies, the justice system, customs authorities, the chemicals industry, and other commercial and educational entities. The national authority is also responsible for submitting national declarations to the OPCW as part of state party obligations under the verification regime. The OPCW also offers several mechanisms to assist states parties in developing tools and assessing which industrial facilities should be declared. This includes the possibility for a state party to invite the OPCW to conduct a technical assistance mission to confirm that it has submitted complete and accurate declarations. The OPCW additionally organises courses for states parties on declarations and inspections, which around 45 representatives from the Middle East attended between 2017 and 2022. The OPCW has also established international cooperation and assistance programmes for tailored assistance and capacity-building. These programmes support states parties to draft national legislation and adopt the necessary measures to implement the Convention, among other things.¹⁹ These programmes have included training for Iraqi and Syrian officials.²⁰

The OPCW has also arranged general courses on the Convention, attended by at least 17 Middle Eastern representatives between 2017 and 2022. Additionally, since 2015, the OPCW has conducted numerous capacity-building programmes for states parties in the Middle East to improve regional capacities to respond to incidents involving CW agents and toxic chemicals. For example, more than 200 first responders and experts from national institutions involved in chemical emergency response activities have participated in special training courses.

In May 2023, the OPCW inaugurated the new Centre for Chemistry and Technology (the ChemTech Centre).²¹ The new centre aims to ensure that the organisation remains up-to-date with the rapid developments in S&T. It will also enhance the OPCW's capacity-building activities, such as international and regional training; tabletop exercises; specialised training on live chemical agents, chemical sampling and analysis, laboratory skills, and medical and pre-hospital treatment; and courses to prepare first responders for chemical emergencies. The new centre will supplement the OPCW's verification and analytical capacities and preserve and enhance knowledge and skills to address chemical terrorism.²²

The OPCW supports the implementation of the CWC in the Middle East through training and education programmes. These programmes assist states in developing national legislation and regulations, submitting declarations, and training inspectors. Additionally, the OPCW helps in developing an effective national response to chemical incidents.

18 CWC, Article VII; OPCW, "National Implementation Framework," <https://www.opcw.org/resources/national-implementation/national-implementation-framework>, and OPCW Technical Secretariat, "Chemical Weapons Convention National Implementation Framework" (The Hague: OPCW, February 2019), 6, 11, <https://www.opcw.org/sites/default/files/documents/2019/10/English%20National%20Implementation%20Framework%20February%202019.pdf>

19 OPCW, "Supporting National Implementation of the Convention," <https://www.opcw.org/our-work/supporting-national-implementation-convention>.

20 OPCW, "Iraqi Officials Review Laws and Set Roadmap to Implement Chemical Weapons Convention," 10 April 2018, <https://www.opcw.org/media-centre/news/2018/04/iraqi-officials-review-laws-and-set-roadmap-implement-chemical-weapons>, and OPCW, "Legal Workshop Organised to Support National Implementation of Chemical Weapons Convention," 20 November 2019, <https://www.opcw.org/media-centre/news/2019/11/legal-workshop-organised-support-national-implementation-chemical-weapons>.

21 OPCW, "OPCW Centre for Chemistry and Technology officially inaugurated," 12 May 2023, <https://www.opcw.org/media-centre/news/2023/05/opcw-centre-chemistry-and-technology-officially-inaugurated>.

22 Ibid.



An advance OPCW-UN team arrives in Damascus to oversee the destruction of the Syria's chemical weapons programme, UN Photo/Hend Abdel Ghany, Syria, 2013.

Verification of the Chemical Weapons Convention

The CWC provides one of the most extensive, complex and robust verification regimes ever devised for a disarmament treaty. The verification system (a) seeks to ensure that states parties have submitted correct and complete declarations as a baseline for compliance with core CWC provisions; (b) confirms that all declared CW and their production facilities have been destroyed and that nothing has been omitted from the national declarations; (c) assures that no new CW have been acquired by states parties; and (d) provides a mechanism to resolve non-compliance concerns and allegation of CW use by establishing technical facts upon which political decisions can then be taken.²³

The CWC provides for several types of inspection: verification of chemical weapons destruction; verification of the non-production of chemical weapons; short-notice challenge inspections; and investigations of alleged use of chemical weapons.

²³ CWC Verification Annex, <https://www.opcw.org/chemical-weapons-convention/annexes/verification-annex/part-i-definitions>, and Ralf Trapp, Compliance Management under the Chemical Weapons Convention (Geneva: UNIDIR, 2019), 3, <https://doi.org/10.37559/WMD/19/WMDCE3>.

²⁴ CWC, Articles IV and V; OPCW, "Three Types of Inspections," Fact Sheet no. 5 (October 2014), <https://www.acs.org/content/dam/acsorg/events/program-in-a-box/documents/2016-global-security/cw-inspections.pdf>, and OPCW, "Verification," <https://www.opcw.org/about/technical-secretariat/divisions/verification>.

Verification of chemical weapons destruction

Verification of destruction of declared CW stockpiles includes technical assessments and clarifications of chemical weapon-related declarations. These include states parties' declarations on destruction plans, destruction facilities, old and abandoned CW, and CW storage facilities. The OPCW oversees all technical and verification-related aspects of CW destruction, including planning, oversight, support and process finalisation.²⁴

Verification of the non-production of chemical weapons

Verification of compliance with the non-production of chemical weapons involves determining that chemicals listed in the Schedules of the CWC as well as unscheduled discrete organic chemicals at facilities and plant sites declared by states parties are for purposes not prohibited under the Convention. The OPCW conducts missions to inspect the CW inventory and production facilities. Routine inspections also cover and monitor states parties' dual-use chemicals and related facilities.²⁵

Due to the abundance of chemicals scheduled in the CWC it is impossible to cover all facilities annually, the OPCW uses an algorithm to select which industry facilities to inspect each year. The frequency of routine inspections is based on the potential of the chemicals to be used for developing chemical weapons and their potential severity and harm.²⁶ For that purpose, the Convention includes an Annex of Chemicals, divided into three Schedules (see table 1).²⁷ Schedule 1 covers known CW agents and their immediate precursors, including such chemicals as Sarin and VX.²⁸ These have very limited industrial and medical applications and are under a very rigid inspection regime to confirm that they are not produced for weapon purposes or stockpiled. Schedule 2 covers chemicals and precursors that have some industrial uses.²⁹ Schedule 3 covers chemicals and precursors with broader commercial applications. These chemicals are produced in large amounts within the chemical industry but can also be used as a precursor for chemical warfare agents, such as toxic industrial chemicals.³⁰ Compared to the inspection regime outlined for Schedule 1 chemicals, Schedule 2 and 3 chemicals are under a less frequent and intrusive system. The last category is Other Chemical Production Facilities, which cover two categories of organic chemicals: Discrete Organic Chemicals and phosphorus, sulfur or fluorine chemicals. An Other Chemical Production Facility may be subject to declarations and verification requirements based on the amount of material it produces annually and whether it produces more than a specific amount of phosphorus, sulfur or fluorine chemicals. As with Schedule 3 facilities, facility agreements are not concluded for Other Chemical Production Facilities unless requested by the state party.³¹

The CWC also includes a Verification Annex outlining provisions to ensure that all toxic chemicals and their precursors are only used for non-prohibited activities. The states parties are obligated to submit declarations to the OPCW detailing the production of dual-use chemicals and the facilities that produce them. Based on the declared information, the OPCW inspectors visit facilities where these chemicals are produced, processed or consumed. As of March 2022, over 4,200 industrial facilities had been declared to the organisation and were subject to inspections.³² The OPCW conducts around 241 industry inspections annually.³³

25 OPCW, "Three Types of Inspections," and OPCW, "The Verification Regime of the Chemical Weapons Convention: An Overview," 28 November 2008, <https://www.opcw.org/media-centre/news/2008/11/verification-regime-chemical-weapons-convention-overview>.

26 OPCW, Verification: Report of the Scientific Advisory Board's Temporary Working Group (The Hague: OPCW, 2015), 13, 31–32, 38, https://www.opcw.org/sites/default/files/documents/SAB/en/Final_Report_of_SAB_TWG_on_Verification_-_as_presented_to_SAB.pdf; Oliver Thränert and Jonathan B. Tucker, Freeing the World of Chemical Weapons, SWP Research Paper (Berlin: Stiftung Wissenschaft und Politik, 2007), 22, <https://www.swp-berlin.org/en/publication/freeing-the-world-of-chemical-weapons>, and Irish Health and Safety Authority, "The Chemical Weapons Convention," https://www.hsa.ie/eng/your_industry/chemicals/legislation_enforcement/chemical_weapons/.

27 CWC Annex on Chemicals, <https://www.opcw.org/chemical-weapons-convention/annexes/annex-chemicals/annex-chemicals>. Updating the Annex of Chemicals remains a complex and contested issue. The Annex has been updated only once, to include novichok-class nerve agents.

28 CWC Annex on Chemicals, Schedule 1, <https://www.opcw.org/chemical-weapons-convention/annexes/annex-chemicals/schedule-1>.

29 CWC Annex on Chemicals, Schedule 2, <https://www.opcw.org/chemical-weapons-convention/annexes/annex-chemicals/schedule-2>.

30 CWC Annex on Chemicals, Schedule 3, <https://www.opcw.org/chemical-weapons-convention/annexes/annex-chemicals/schedule-3>.

31 OPCW, "Three Types of Inspections".

32 OPCW, "OPCW Member States enhance knowledge of CWC declarations and inspections obligations," 11 May 2022, <https://www.opcw.org/media-centre/news/2022/05/opcw-member-states-enhance-knowledge-cwc-declarations-and-inspections>.

33 OPCW, "Our Partners," <https://www.opcw.org/about/our-partners>, and OPCW Conference of the States Parties, "Report of the OPCW on the Implementation of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction in 2021," no. C-27/4 (30 November 2022), 11, [https://www.opcw.org/sites/default/files/documents/2022/12/c2704\(e\).pdf](https://www.opcw.org/sites/default/files/documents/2022/12/c2704(e).pdf).

Table 1: OPCW routine inspection of chemical production facilities³⁴

	Schedule 1 Facilities	Schedule 2 Facilities	Schedule 3 Facilities	Other Chemical Production Facilities
Annual Inspection Rate	Single Small-Scale Facility: twice per year on average; Other Facilities: on average once a year	Based on risk assessment after initial inspection and facility agreement; not more than two per year per site	Based on random selection, equitable geographical distribution and information available to the Secretariat; no more than two per year at any one site	Based on random selection, equitable geographical distribution, information available to the Secretariat and proposals by states parties; no more than two per year at any one site
			Combined number of Schedule 3 and other chemical production facility inspections in any state party per year not to exceed three plus five per cent of total number of declared Schedule 3 and other chemical production sites in the State Party, or 20, whichever is lower	
Notification Prior to Inspection	At least 24 hours	At least 48 hours	At least 120 hours	At least 120 hours
Duration of Inspection	Determined by the Secretariat	6 hours (extension possible)	24 hours (extension possible)	24 hours (extension possible)
Inspector Access	Unimpeded to plant and unit but no access to wider site	Unimpeded to plant and within plant site; access to other plant areas guided by clarification and facility agreement rules or, if no facility agreement, managed access rules	Unimpeded to plant and within plant site; access to other plant areas guided by clarification rule	Unimpeded to plant and within plant site; inspected state party can apply managed access to protect confidential information; for other plant areas, request for access based on ambiguity rule or granted by inspected state party

Challenge inspections

A challenge inspection of a state party can only be initiated by another party based on non-compliance concerns. If a state party initiates a challenge inspection, its request must specify the type of violation or non-compliance suspected, share supporting evidence, and provide the location or facility where the violation occurred. These procedures were put in place to reduce the risks of political abuse of the process. A challenge inspection is a technical process initiated through a political decision overseen by the OPCW's Executive Council. The Executive Council may block a request

³⁴ CWC, Articles IV and V, and OPCW, "Three Types of Inspections."

for a challenge inspection under the “red-light procedure” (three-quarter majority vote against) if it deems the request to be lacking or inappropriate.³⁵ The reason for providing the red-light procedure for a challenge inspection is to allow the OPCW to respond swiftly and decisively to non-compliance concerns without being blocked by one or a few states while allowing unsubstantiated requests to be blocked. It is then the role of the Technical Secretariat to implement the decisions of the policymaking organs.

The state party requesting a challenge inspection can ask for its own observer to join the inspector team. A representative of the requesting state party could provide additional information not included in the request submitted to the Executive Council. In such a scenario, a delicate balance must be struck between the role of the inspection team and the requesting state party, where the former is responsible for the investigation and integrity of the process. While the inspected state party cannot refuse a challenge inspection of a requested site, it does have the right to manage the access to information it deems secret or confidential (e.g., of a military or industrial nature) as long as it is unrelated to CW.

Notably, a challenge inspection has never been requested by any state party, and the mechanism has not been implemented.

Investigation of alleged chemical weapon use

In a situation where a state party is alleged to have used chemical weapons, any state party can request an investigation. Like challenge inspections, only a state party can trigger such inspection.³⁶

In a situation where chemical weapons are alleged to have been used against the requesting state, it can additionally request assistance from the OPCW Director-General.³⁷ In this scenario, the investigation takes place to find facts on whether CW have been used and, if so, to establish the CW agents and means of distribution so as to use this information to assist victims (it should be noted that attribution, namely who carried out the attack, is not currently part of the OPCW mandate, other than in the case of Syria). The established facts then provide the Executive Council with a basis on which to decide whether the Technical Secretariat should take further action to support the affected state party.

The OPCW should cooperate with the UNSGM³⁸ on investigations into the alleged use of CW by or in a state that is not a party to the CWC, as was the case in 2013 in Syria, which was not a CWC state party at the time.

The Director-General of the OPCW can exercise emergency assistance measures where proven that there are victims of CW use and that immediate action is essential.

One of the tools provided by the CWC to address suspicions of non-compliance is challenge inspection. No state party has initiated such an inspection yet, leaving it untested.

³⁵ CWC, Article IX, para. 17, and OPCW Conference of the States Parties, “Rules of Procedure of the Executive Council,” no. C-1/DEC.72 (23 May 1997), 9, Rule 38, <https://www.opcw.org/about-us/executive-council>.

³⁶ OPCW, “Use of Chemical Weapons,” <https://www.opcw.org/our-work/responding-use-chemical-weapons>.

³⁷ CWC, Articles IX–XI.

³⁸ The UNSGM was mandated by the General Assembly and the Security Council to carry out prompt investigations in response to allegations of the possible use of chemical and bacteriological (biological) and toxin weapons that may constitute a violation of the 1925 Geneva Protocol or other relevant rules of customary international law. Such an investigation can be initiated if a United Nations Member State provides the Secretary-General with a report of such allegations. The Secretary-General is authorized then to launch an investigation to ascertain in an objective and scientific manner the facts, including dispatching a fact-finding team to the site(s) of the alleged incident(s), and to report the results of the investigation to all Member States. The UNSGM is not a standing investigative body. Instead, Member States nominate expert consultants, qualified experts and analytical laboratories which are then listed in a roster and may be called upon to support a UNSGM investigation and in accordance with the Guidelines and Procedures endorsed by the General Assembly in resolution 45/57C (1990). For additional information see UNODA, “Secretary-General’s Mechanism for Investigation of Alleged Use of Chemical and Biological Weapons (UNSGM),” <https://disarmament.unoda.org/wmd/secretary-general-mechanism/>.

The limitations of the Chemical Weapons Convention verification system

It is important to highlight that although the CWC offers a comprehensive verification mechanism, the Convention still faces several challenges.

First, while the OPCW has developed an elaborate mechanism to verify CW disarmament, verifying legitimate industry activities and resolving trade discrepancies based on transfer declarations is challenging. Industrial facilities are often very large and complex, and they may use a wide variety of chemicals including dual-use ones. There are many legitimate uses for chemicals that are also used in the production of chemical weapons. For example, chlorine has been used widely in industry and has been used as a CW.

Second, as noted, no challenge inspection has yet been requested by a state party, and similarly, no investigation of alleged CW use has been triggered through the OPCW's established mechanisms. Regarding CW use in Syria, the OPCW–United Nations Joint Mission was established according to recommendations made in close consultations between the United Nations Secretary-General and the OPCW Director-General. The OPCW–United Nations Joint Investigative Mechanism was then created by the United Nations Security Council. There are currently three ongoing OPCW missions related to Syria: the Declaration Assessment Team; the OPCW Fact-Finding Mission; and the Investigation and Identification Team.³⁹ These three missions were established through ad hoc agreements between the OPCW Director-General and the Syrian Government, as no OPCW state party triggered a challenge inspection or investigation of the alleged use of CW. Some states have accused the OPCW and other member states of politicising the organisation and its decision-making process, particularly regarding attribution, and have raised concerns about their legality and legitimacy.

Third, the OPCW does not make decisions about non-compliance with the CWC. States parties can make political decisions about whether a state party is in non-compliance based on their interpretation of technical data. If a breach of the CWC is confirmed, the OPCW should encourage the inspected state to verifiably re-establish full compliance as early as possible. Where there is suspected non-compliance, the Executive Council can, in cases "of particular gravity and urgency", bring the issue, including relevant information and conclusions, directly to the attention of the United Nations General Assembly and Security Council.

Scientific and technological developments

While most chemical agents used today are similar to those used 100 years ago (e.g., chlorine-based weapons), to maintain and strengthen confidence in the competence and integrity of the CWC and its verification system, the OPCW have been and continues to adapt its system to keep pace with developments in S&T, manufacturing and trade. Such adaptations

³⁹ OPCW, "Syria and the OPCW," <https://www.opcw.org/media-centre/featured-topics/opcw-and-syria>.



A view of a dual-use chlorine production plant that was monitored by the United Nations Special Commission, UN Photo/Henry Arvidsson, Iraq, 1995.

could include enhancing investigative and forensic capabilities to ensure inspections can address the evolving CW threat landscape. Moreover, the OPCW should regularly consider which chemicals should be added under the verification regime. Advancements in the chemical industry make it increasingly difficult to monitor all activities of dual-use CW agents.

The implications for a Middle East WMD-Free Zone

1. The mandate and scope of a Middle East WMD-Free Zone

Several points were made during the workshop discussion regarding incorporating CW elements into a future Middle East WMD-Free Zone. First, participants noted that establishing a ME WMDFZ is an ambitious objective as it would be the first of its kind: existing regional arrangements elsewhere cover only nuclear weapons. Creation of a Zone is further complicated when considering diverging views on its mandate and scope. A treaty that relies on existing non-proliferation regimes and mechanisms – the NPT, the CWC and the BWC – would present a more achievable goal than a broader mandate that includes provisions beyond the three treaties. However, participants expressed diverging opinions on what should be included in the scope, especially when addressing non-compliance cases and in preventing proliferation.

Second, some participants noted an outstanding question of whether biological, chemical and nuclear safety and security should be incorporated into the scope of the Zone. Some participants viewed WMD security and safety as issues beyond the scope of the ME WMDFZ treaty. They also expressed concerns that adding them to the mandate and scope of a ME WMDFZ would overload the process to the extent that

no concrete progress could ever be accomplished, which would only increase frustrations and disillusionment. In contrast, other participants saw non-proliferation, safety and security as inherently part of a future ME WMDFZ. They noted that security and safety are incorporated in implementing the existing regimes and should not be separated. For example, Article VII of the CWC notes that states parties should “adopt the necessary measures to implement its obligations under this Convention”,⁴⁰ which is understood today by many – but not by all – as incorporating chemical security. These participants noted that while covering safety and security within a Zone may initially seem too large an undertaking, it might be necessary in order to address all Middle Eastern states’ threat perceptions regarding WMD and concerns over these by the international community.

Third, some participants held that although at the practical level, it may be difficult to have one system that covers all three types of WMD at the institutional, organisational and political levels, an overarching mechanism could offer a more comprehensive approach. South Africa and Qatar were mentioned as examples that have established a national authority that covers biological, chemical and nuclear issues.⁴¹

A fourth issue, that was repeatedly brought up, was how to address threats posed by the development and use of CW by non-state actors, which remains a significant concern in the Middle East. International experts highlighted that the OPCW has sought to address CW threats stemming from non-state actors through several mechanisms:

- The OPCW has established international counter-terrorism cooperation with other relevant organisations. It signed the United Nations Global Counter-Terrorism Coordination Compact in 2018 and now works alongside many United Nations and other international agencies to enhance inter-agency interoperability and public communications in the event of a chemical or biological attack.⁴² The OPCW works through this framework with the United Nations Office for Disarmament Affairs (UNODA) and the World Health Organization (WHO). Additionally, the OPCW cooperates with the 1540 Committee on effectively implementing the requirements of Security Council resolution 1540 to adopt and enforce national laws to prevent non-state actors from developing, acquiring, manufacturing, possessing or transporting WMD and related materials.⁴³
- The OPCW established an Open-Ended Working Group on Terrorism in 2001. This has offered a platform for states parties and experts to interact, examine and exchange information on the threat of, and measures against, chemical terrorism.⁴⁴

40 CWC, Article VII.

41 Helen E. Purkitt and Stephen Burgess, “South Africa’s Chemical and Biological Warfare Programme: A Historical and International Perspective,” *Journal of Southern African Studies* 28, no. 2 (June 2002), <https://www.jstor.org/stable/823383>, and CBRNE Central, “OPCW Director Visits Doha Regional Centre For CBRN Training,” 25 October 2016, <https://cbrnecentral.com/opcw-director-visits-doha-regional-centre-cbrn-training/10066/>.

42 United Nations Security Council, S/RES/1540, 28 April 2004, <https://digitallibrary.un.org/record/520326>, and OPCW, “Note by the Director-General Status of the OPCW’s Contribution to Global Anti-Terrorism Efforts,” Executive Council, no. EC-102/DG.12, para. 7 (16 February 2023), 2, <https://www.opcw.org/sites/default/files/documents/2023/02/ec102dg12%2B%28e%29.pdf>.

43 Note by the Director-General Status of the OPCW’s Contribution to Global Anti-Terrorism Efforts, para. 6.

44 *Ibid.*, para. 7.

- The OPCW Technical Secretariat provides an option of a Rapid Response and Assistance Mission, whereby a state party can request assistance from the OPCW where there has been an emergency chemical incident involving a non-state actor.⁴⁵ The OPCW has an expert team ready to be rapidly deployed to advise on areas such as decontamination, emergency medical assistance and chemical analysis.

Promoting collaboration between the OPCW and existing regional European Union CBRN Centres of Excellence was suggested as one practical way of addressing challenges related to non-state actors. Several participants mentioned, for example, that these centres can assist with creating information channels to detect and intercept the movement of chemical materials and equipment. This assistance could involve strengthening legislation and promoting legal cooperation between states, subnational authorities and law enforcement agencies. More generally, linking the OPCW and CBRN Centres of Excellence can support states of the Middle East in developing legislation and procedures that enhance CW security and safety. Furthermore, such collaboration could foster relations between the states of the region.

2. Addressing mistrust: Utilising the Convention's unused disarmament verification provisions

Beyond the mandate and scope of a Zone, participants discussed the issue of mistrust. When considering the CWC, some participants noted mistrust in other states' commitment to compliance. Those participants noted that international WMD organisations are perceived as limited in what they can do on the ground. For them, this meant that accession to the CWC is unlikely on its own to provide sufficient confidence of compliance with CW prohibitions for Middle Eastern states, especially following the recent use of CW in the region. A future Middle East WMD-Free Zone will need to create a regime in which members feel assured that commitments will be respected, verified and enforced. Therefore, some participants noted that the states of the region should consider what can be done on the regional level to build upon the CWC and the OPCW to increase trust between parties and provide adequate confidence in national commitments. A few participants expressed concerns about the politicisation of the OPCW itself, how decisions were made and the integrity of its investigations.

Some participants highlighted that the CWC encompasses several mechanisms that could provide parties in the Middle East with collaborative tools to increase confidence in each other's compliance with the treaty obligations. These measures were not intended to replace the work of the OPCW but complement it by establishing a collaborative mechanism among a subset of member states interested in implementing them. Given the history, the geopolitical circumstance,

⁴⁵ CWC, Article X, and OPCW, "Responding to the Use of Chemical Weapons," <https://www.opcw.org/our-work/responding-use-chemical-weapons>.

Mistrust has been a pervasive issue in the region, encompassing suspicions regarding compliance by other states, concerns about the politicisation of the OPCW, its decision-making process, and the integrity of its investigations.

Utilising the CWC's unused bilateral and multilateral chemical weapons verification provisions could prove useful in the context of a Middle East WMD-Free Zone as they could tailor the verification mechanisms to address their specific threat perceptions.

and the ongoing mistrust in the region, the CWC is open to accommodating stronger arrangements if Middle Eastern states choose to adopt them. For example, the states could utilise existing verification arrangements within the CWC on CW disarmament.⁴⁶

The idea behind these CWC provisions was to avoid duplication of verification between a bilateral arrangement and the CWC and for the OPCW to serve as a complementary verification measure where it audits the effectiveness of the external arrangement and assures the international community about the arrangement's effectiveness and implementation. While the bilateral and multilaterals verification arrangements have never been put into force, the option remains in the Convention and can be utilised in a future Middle East WMD-Free Zone. It is worth noting that the CWC's unused bilateral and multilateral verification provisions cover only verification and elimination of CW and do not cover the OPCW's routine verification of chemicals in industry or of any other usage, which states would also need to adhere to regardless as CWC states parties. Nonetheless, some participants noted that the Convention and the OPCW can be flexible in meeting evolving and specific needs. For example, Libya requested that a former CW production facility be converted rather than destroyed, an option that technically was no longer possible under the CWC. The OPCW Executive Council accepted that the conversion would benefit Libya, and thus the modification was allowed.⁴⁷

In the Zone context, operationalising these unused bilateral and multilateral provisions could prove advantageous in creating either a complementary process or one that would supersede what the OPCW is doing to address specific concerns. Workshop participants noted that to implement such measures on a regional basis, technical and organisational capacity will have to be established, and all verification arrangements would have to be approved by the OPCW policymaking organs to ensure that regional verification principles and methods are equally effective as those of the organisation. The OPCW could provide technical assistance to ensure the region has the competence and expertise to comply with the requirements.

3. The international chemical weapons regime and a Middle East WMD-Free Zone

A Middle East WMD-Free Zone treaty, if and when concluded, will impact and interplay with existing international WMD-related treaties and organisations, primarily related to verification, compliance decisions and enforcement. To harmonise the regional and international arrangements, negotiators of a ME WMD-FZ should engage with these entities while negotiations take place to exchange information and

⁴⁶ CWC, Articles IV (13–15) and V (16–18).

⁴⁷ OPCW, "OPCW Executive Council Approves Recommendation to Allow Conversion of Former Chemical Weapons Production Facilities for Peaceful Purposes," 18 October 2004, <https://www.opcw.org/media-centre/news/2004/10/opcwexecutive-council-approves-recommendationallow-conversion-former>.

coordinate efforts. It needs to be clear where one organisation's responsibility and authority start and another's end to avoid creating parallel, competing obligations or gaps that allow states to exploit differences unintentionally or deliberately. While this will add another layer of complexity to negotiating a Zone, it increases the likelihood of maintaining an effective and sustainable treaty that builds upon existing mechanisms.

There are many issues regarding CW verification, compliance and enforcement provisions within a Zone that the negotiators of a ME WMD-FZ treaty would need to discuss and agree upon. These include (a) whether states alone can raise violation concerns through formal treaty channels; (b) who makes the decision that non-compliance has been detected; (c) what happens if non-compliance is verified; and (d) the appropriate procedure to address enforcement (e.g., whether the non-compliance case can be addressed regionally or should be referred to the United Nations Security Council). Of course, the CWC offers provisions and mechanisms for what can be done in various scenarios. Nonetheless, Middle Eastern states must decide whether these provisions are sufficient and whether there are specific aspects that need to be supplemented. The CWC and the OPCW have been proven to be flexible and have support mechanisms to address some of the region's specific needs if the states of the region choose to utilize them.

Middle Eastern states will have to determine whether the available international mechanisms under the CWC as implemented by the OPCW are sufficient for an effective and verifiable CW regime in a future Middle East WMD-Free Zone, or whether regional supplements are required.



4 BIOLOGICAL WEAPONS

Negotiating the Biological and Toxin Weapons Convention, UNODA, Geneva, Switzerland, 1972.

48 United Kingdom of Great Britain and Northern Ireland for submission to the UN, “Confidence Building Measure Return for 2011 (Covering Data for 2010) for the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and Their Destruction, 10 April 1972,” 31 March 2011, https://bwc-ecbm.unog.ch/system/files/form-pdf/bwc_cbm_2011_united_kingdom.pdf, and Seth Carus, *A Short History of Biological Warfare*, 38.

49 *Ibid.*

50 *Ibid.*, 37, and John-Thor Dahlburg, “Russia Admits it Violated Pact on Biological Warfare,” *Los Angeles Times*, 15 September 1992, <https://www.latimes.com/archives/la-xpm-1992-09-15-mn-859-story.html>.

51 United Nations Office for Disarmament Affairs (UNODA), *Membership and Regional Groups*, <https://www.un.org/disarmament/biological-weapons/about/membership-and-regional-groups/>.

52 *Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction (Biological Weapons Convention or BWC)*, 10 April 1972, Article I, <https://ihl-databases.icrc.org/en/ihl-treaties/bwc-1972?activeTab=default>.

Biological weapons have long been a topic of significant concern and international attention. Several countries (e.g., the United Kingdom,⁴⁸ the United States⁴⁹ and the Soviet Union⁵⁰) are known to have pursued biological warfare programmes in the past, but they subsequently took measures to halt or destroy their capabilities. In the Middle East, Iraq developed biological warfare research programmes under Saddam Hussein. At the same time, several other states are subject to speculation regarding their past or current BW programme and their compliance with the BWC. There are currently 185 states party to the BWC. Most states in the Middle East are members, except Egypt and Syria, which have signed but not ratified, and Israel, which has neither signed nor acceded to the treaty.⁵¹

This chapter begins with an overview of the current international BW regime, the limitations it experiences with verification and S&T developments. The chapter then outlines the workshop discussions on the implications of BW for a Middle East WMD-Free Zone.

Biological weapons and the non-proliferation regime

The BWC defines BW as “microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes”.⁵² As is the case for CW, the definition of BW is intent-based – in other words, the definition is underpinned by a general-purpose criterion, which prohibits the use of biological and toxin agents for

offensive military purposes while permitting their peaceful uses. This approach is intended to future-proof the Convention by making it broad enough to capture future technological innovations with regard to new types of biological or toxin agents.

Historically, BW were considered a relatively low-cost weapon with high-level impact, and they were usually used against non-human targets such as livestock (anthrax), crops (wheat stem rust) and horses (glanders).⁵³ However, a closer look reveals that BW are expensive to develop and are relatively unpredictable weapons. Although a small amount of infective material could cause widespread disease, states have rarely used BW, primarily because of the distribution challenge. A miscalculation could lead to the BW being dispersed and equally affecting the two sides in a conflict, and there is a risk of retaliation by an enemy that anticipates the planned attack. Moreover, a natural human instinctive fear of disease and reluctance to take operational and reputational risks due to a long-standing international taboo against using BW have dissuaded states from developing and using these weapons.⁵⁴

Biological weapons are prohibited under the 1925 Geneva Protocol⁵⁵ (albeit only in war) and under the BWC since it entered into force in 1975. The BWC prohibits the development, production, stockpiling, acquisition, retention or transfer of BW. The Convention, like the CWC, is non-discriminatory, meaning all its states parties must adhere to the same prohibitions. Similar to the other WMD treaties, a BWC Review Conference takes place every five years, with intercessional work being undertaken between these meetings. The BWC provides an unequivocal norm against BW; heightens BW awareness; seeks to facilitate peaceful cooperation in the life sciences; provides a mechanism for consultation and cooperation to resolve treaty-related issues; and offers a platform for concrete proposals to strengthen the BWC's mechanisms.

Verification of the Biological Weapons Convention

Assessment of the existence of biological weapon programmes has always been complex, owing to their dual-use nature, the widespread availability of the equipment and materials used to produce them, and the lethality of even small quantities of some forms of biological weapons, which can cause devastating consequences. Several countries have had or have been suspected of possessing BW.

In the 1950s and 1960s, it was easier to speculate about and conclude which countries had a BW programme. Some states publicly acknowledged having a research programme without revealing its details. Even if a programme was not explicitly announced, details could often be collated, to some extent, from research papers published

⁵³ "Biological Weapons," Reaching Critical Will, <https://www.reachingcriticalwill.org/resources/factsheets/critical-issues/4579-biological-weapons>, and David P. Clark and Nanette J. Pazdernik, "Biological Warfare: Infectious Disease and Bioterrorism," in *Biotechnology*, eds. David P. Clark and Nanette J. Pazdernik (Pune: Academic Cell, 2015), 695, <https://doi.org/10.1016/C2009-0-64257-4>.

⁵⁴ Jozef Goldblat, "The Biological Weapons Convention – An Overview," *International Review of the Red Cross*, no. 318 (June 1997), <https://www.icrc.org/en/doc/resources/documents/article/other/57jnpa.htm>.

⁵⁵ Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare.

The absence of a verification mechanism in the BWC creates uncertainty and reduces the level of confidence of states regarding in the compliance of other parties to the Convention.

by researchers involved directly or indirectly in the programme.

Unlike the other WMD treaties and conventions, the BWC has no international verification regime, despite attempts to establish one in the 1990s. Furthermore, the BWC does not have an implementation agency, thus the states parties must translate the Convention's commitments into effective national action. The BWC Implementation Support Unit (ISU) within UNODA is tasked with several key objectives, including providing administrative support to the BWC-related meetings and Review Conferences, assisting states parties

with the national implementation of the BWC, and supporting the facilitation of CBMs.⁵⁶ The ISU has very small staff and a low level of funding compared to other international organisations, such as the IAEA and the OPCW. The ISU neither has a verification role comparable to these two organisations.

Discussions on incorporating verification measures into the BWC can be traced back to the 1991 Third Review Conference. An Ad Hoc Group of Governmental Experts to Identify and Examine Potential Verification Measures from a Scientific and Technical Standpoint (VEREX) was established. The VEREX group identified 21 measures, evaluated them, and drafted a report highlighting the importance of combining measures to strengthen the BWC. A Special Conference was convened in 1994 based on the VEREX report, but different interpretations emerged regarding the possibility of verification. As a follow-up, an Ad Hoc Group (AHG) was formed to consider measures to strengthen the Convention, including verification. The AHG faced challenges in reaching a consensus on issues like international cooperation and non-transfer verification.⁵⁷ Between 1997 and 2001, negotiations and drafting of a text took place, resulting in limited progress and unresolved conceptual differences. The composite text of March 2001 aimed to address key challenges and find areas of compromise. Some states supported it as a basis for further negotiations, while others opposed it. Numerous requests for changes to the text led to strong divisions, with over 1,200 pairs of square brackets indicating many areas of disagreement. The United States concluded that the proposed verification protocol could not achieve its mandate to strengthen confidence in compliance with the BWC, and the process ended.⁵⁸

Strengthening reporting requirements under the BWC

Historically, several states parties (e.g., Kuwait⁵⁹) stated that they never had or no longer have a BW programme through voluntarily submitted statements or a declaration referencing Article II of the BWC.⁶⁰ Many of these statements were made in the negotiations before the formal

56 UNODA, "Implementation Support Unit," <https://www.un.org/disarmament/biological-weapons/implementation-support-unit/>.

57 James Reville, John Borrie and Richard Lennan, "Back to the Future for Verification in the Biological Disarmament Regime," WMD Compliance Enforcement Series 14 (Geneva: UNIDIR, 2022), 4.

58 BWC, Ad Hoc Group of States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, Procedural Report, BWC/AD HOC GROUP/56-1, 18 May 2001, [https://docs-library.unoda.org/Biological_Weapons_Convention_-_Ad_Hoc_Group_Twenty-Third_session_\(2001\)/BWC_AHG_56_Part.I.pdf](https://docs-library.unoda.org/Biological_Weapons_Convention_-_Ad_Hoc_Group_Twenty-Third_session_(2001)/BWC_AHG_56_Part.I.pdf), and Donald Mahley, "Statement of the United States to the Ad Hoc Group of Biological Weapons Convention States Parties," US Department of States (Archived), 25 July 2001, <https://2001-2009.state.gov/t/ac/rls/rm/2001/5497.htm>.

59 Review Conference of the Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, Procedural Report, Background paper relating to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, Procedural Report, Note by the Secretariat, BWC/CONF.I/4, 20 February 1980, para. 42, 22, [https://docs-library.unoda.org/Biological_Weapons_Convention_-_First_Review_Conference_\(1980\)/BWC_CONF.I.04.pdf](https://docs-library.unoda.org/Biological_Weapons_Convention_-_First_Review_Conference_(1980)/BWC_CONF.I.04.pdf), and Review Conference of the Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, Committee of the Whole, Summary Record of the Second Meeting, BWC/CONF.I/C/SR.2, 12 March 1980, 5, [https://unoda-documents-library.s3.amazonaws.com/Biological_Weapons_Convention_-_First_Review_Conference_\(1980\)/BWC_CONF.I.C_SR.02.pdf](https://unoda-documents-library.s3.amazonaws.com/Biological_Weapons_Convention_-_First_Review_Conference_(1980)/BWC_CONF.I.C_SR.02.pdf).

60 BWC, Article II.

adoption of the BWC text or later on as part of the information exchange of CBMs. However, some of the statements were characterised by ambiguity, while others only reflected the knowledge of the state's Ministry of Foreign Affairs, which may have been unaware of the state's national BW capabilities when the treaty was signed. While mistakes in the statements of several states parties have been remedied, this illustrates the limitations of voluntary decelerations in the absence of verification mechanisms.

At the Second Review Conference in 1986, the states parties adopted an annual data-exchange mechanism through a set of CBMs. The CBMs were modified and expanded in 1991 and streamlined in 2011. Information exchanged under the CBMs includes details on (a) facilities such as research centres and laboratories and national biological defence research and development programmes; (b) outbreaks of infectious diseases and similar occurrences caused by toxins; (c) publications; (d) legislation, regulations and other measures adopted; (e) past activities in offensive or defensive biological research and development programmes, and (f) vaccine production facilities.⁶¹

CBMs are a beneficial mechanism within the BWC, they enhance transparency and reduce tension. However, they do not replace the need for systematic and comprehensive monitoring and verification of implementation, formal declarations, or a compliance mechanism. CBMs were intended as an interim solution, not a permanent solution to the lack of verification in the BWC. While the ISU supports the exchange and collection of CBMs, it has neither the mandate nor the capacity to assess, evaluate or translate them. Additionally, it should be noted that CBMs are not explicitly referenced in the Convention itself. Consequently, several states do not view CBMs as legally binding obligations. As such, some (but not all) states parties consider CBMs to be a politically binding mechanism, given that they stemmed from a decision of a BWC Review Conference, have been reiterated in subsequent Review Conferences and mentioned in United Nations General Assembly resolutions.⁶²

Between 2013 and 2023, of the 18 states from the prospective ME WMDfz that are members of the BWC, 14 submitted a total of 93 CBMs to the BWC (see table 2). Some of these states submitted only once or twice throughout this period, while others have not submitted any CBM during this time frame. Notably, public access to 92 of the 93 submissions was restricted to only states parties: the exception that was available to the general public was the 2021 submission of Saudi Arabia.

In addition to the limitations of CBMs as a transparency measure, there are also significant disparities in the quality and completeness of CBMs submission, mainly due to varying national capacities to complete them. The process of completing CBMs requires complex

⁶¹ UNODA, "Confidence-Building Measures," <https://disarmament.unoda.org/biological-weapons/confidence-building-measures/>; Final Document of the Second Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, BWC/CONF. II/13, 30 September 1986, <https://digitallibrary.un.org/record/679482>, and Kavita M. Berger and Neil Davison, "Bringing Science to Security: Soft Implementation of the BTWC," in *Beyond the BTWC RevCon*, ed. Kerstin Vignard, (Geneva: UNIDIR, 2011), 14, <https://www.unidir.org/publication/disarmament-forum-beyond-btwc-revcon>.

⁶² Eighth Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, BWC/CONF.VIII/4, (7–25 November 2019), <https://digitallibrary.un.org/record/3856224>, and Ninth Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction (28 November – 16 December 2022), <https://meetings.unoda.org/bwc-revcon/biological-weapons-convention-ninth-review-conference-2022>.

Table 2. CBMs submissions by the prospective ME WMDfZ states that are members of the BWC, 2013–2023

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023 ⁶³	Total submissions	Publicly available submissions
Algeria	X	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	9	0
Bahrain	X	X	X	X	X	X	X	X	X	X	X	0	N/A
Iran	X	X	X	✓	X	X	X	X	✓	X	X	2	0
Iraq	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	10	0
Jordan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11	0
Kuwait	X	X	X	X	X	X	X	X	X	X	X	0	N/A
Lebanon	X	✓	X	✓	X	✓	✓	X	X	✓	X	5	0
Libya	✓	✓	X	X	X	X	✓	✓	✓	✓	✓	7	0
Mauritania ⁶⁴	N/A	N/A	X	X	X	X	X	X	X	X	X	0	N/A
Morocco	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11	0
Oman	X	X	X	✓	X	✓	✓	✓	✓	✓	X	6	0
Palestine ⁶⁵	N/A	N/A	N/A	N/A	N/A	X	X	X	X	✓	✓	2	0
Qatar	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11	0
Saudi Arabia	X	X	X	✓	✓	✓	✓	✓	✓	✓	✓	8	1 (2021)
Sudan	X	X	X	X	X	X	X	X	X	X	X	0	N/A
Tunisia	X	X	X	X	X	X	✓	X	✓	✓	X	3	0
Yemen	✓	X	X	X	X	X	X	X	X	X	X	1	0
UAE	X	X	X	✓	✓	✓	✓	✓	✓	✓	X	7	0
Total	6	7	5	10	6	9	11	9	11	12	7	93	1

⁶³ As of June 2023.

⁶⁴ Mauritania ratified the BWC in January 2015.

⁶⁵ Palestine ratified the BWC in January 2018.

inter-agency coordination across different ministries, including foreign affairs, health, education, industry and S&T. Throughout the workshop discussion, it was noted that since the BWC may not be a priority for many of its states parties and CBM submission is not a legal requirement, officials may face challenges in advocating for such extensive national coordination. National-level information sharing has been particularly challenging when it involves sharing sensitive information between different ministries. Thus, it is vital to have thorough inter-agency discussions within a country to assess national capabilities before issuing any declarations. One workshop participant noted that delivering statements to the national parliament is an effective approach for a given country to identify gaps or disparities in knowledge among its national entities and to increase decision makers' interest and awareness on the issue. Statements made in international forums overseas may not capture the attention or engagement of all the relevant stakeholders within a government, whereas internal statements can address, and mitigate, such issues more directly.

Moreover, challenges remain when assessing allegations of BW development and production. An outstanding challenge is what to do in the case of non-compliance, that is, when a BW programme has been detected. As it currently stands, the BWC does not have a clear enforcement process or mechanism to address non-compliance. Instead, the treaty only notes that "Any State Party . . . which finds that any other State Party is acting in breach of obligations deriving from the provisions of the Convention may lodge a complaint with the Security Council of the United Nations".⁶⁶ While the UNSGM can be utilised in case of suspected use, it is challenging to make a credible case for BW use and the mechanism lacks enforcement powers.

Scientific and technological developments

The BWC faces numerous challenges in managing S&T developments with regards to dual-use materials.

First, S&T advances could potentially lower technical barriers to using BW. There has been significant technological progress in life sciences and converging technologies in the past two decades. While these S&T developments could benefit human, animal and environmental health, they could also outpace the political mechanisms to address them. To foster greater compliance and confidence, new tools like bioforensics and open-source tools have been developed that can be – once fully developed and proven – incorporated in a future BW international verification regime, as well as a regional one as part of a ME WMDfZ.

Bio-based products, materials and processes have also gained increasing importance in the energy, health, agriculture and food, transportation,

CBMs serve as valuable tools to increase confidence and transparency among BWC state parties. However, they are not a substitute to a verification regime.

⁶⁶ BWC, Article VI.



United Nations Special Commission Biological Weapons Inspectors are taking samples from fermenters at a Single Cell Protein Facility at Al Hakam, UN Photo/Henry Arvidsson, Iraq, 1991.

and textiles sectors.⁶⁷ The bioeconomy has attracted significant investments, with continued growth in breakthrough technologies such as genetics (e.g., gene therapy, CRISPR/Cas9 diagnostics and germline editing), neurobiology (e.g., language processing), and agriculture and ecology (e.g., gene drives and biobatteries). However, these scientific developments come with the risk of misuse for BW, as they can overcome problems associated with old-generation biological agents and create new generations of agents with potentially novel effects.

Second, technological advances have given rise to a new category of BW threats. For example, technologies for reading, editing and writing DNA allow for a deeper understanding of genetic codes, which enables precise edits to viruses or bacteria, potentially enhancing their characteristics.⁶⁸ For example, this technology could be misused by entering the sequence of a smallpox virus.⁶⁹ Convergence of technology allows to order, share and print new DNA sequences. Technological developments and advances in microscopy (e.g., cryogenic electron microscopy) have further augmented the risks associated with reading, editing and writing DNA. These advances improve the prediction and understanding of proteins,⁷⁰ enabling targeted and intentional modifications. Single-cell omics technologies (e.g., lineage tracking, cellular maps, functional analysis and pathogenesis tracking techniques) facilitate the observation of protein reactions within individual cell, thereby aiding in monitoring pathogen behaviour in infected individuals. Additionally, other technological breakthroughs have enhanced the understanding, recognition, storage, transfer, access and security of big data and bioinformatics.

67 UNODA, "Science and Technology under the Biological Weapons Convention," <https://www.un.org/disarmament/biological-weapons/science-and-technology/>, and OECD, "Recommendation of the Council on Assessing the Sustainability of Bio-Based Products," OECD/LEGAL/0395, 2022, (Paris: OECD, 2022), 3, <https://legalinstruments.oecd.org/public/doc/283/283.en.pdf>.

68 Kelsey Lane Warmbrod, James Revill, and Nancy Connell, Advances in Science and Technology in the Life Sciences and their Implications for Biosecurity and Arms Control (Geneva: UNIDIR, 2020), 2 and 7, <https://doi.org/10.37559/SecTec/20/01>.

69 *Ibid.*, 16.

70 John Jumper et al., "Highly Accurate Protein Structure Prediction with AlphaFold," *Nature* 596 (2021), 583–589. <https://doi.org/10.1038/s41586-021-03819-2>, and Meghna Gupta et al., "CryoEM and AI reveal a structure of SARS-CoV-2 Nsp2, a multifunctional protein Involved in Key Host Processes," *bioRxiv* (May 2021), 588, <https://doi.org/10.1101/2021.05.10.443524>.

Third, one of the significant challenges in governing dual-use technologies is that many industries are using biological techniques and producing biological material in bulk, which can contain potentially harmful biological substances. For instance, the Scotch whisky industry and laundry detergent manufacturers use enzymes that could have dual-use potential. Moreover, it is challenging to predict the results of life science research and control pathogens outside the laboratory environment, and nearly any material can have dual-use potential. There are ongoing discussions within various organisations, such as WHO and through the BWC meetings, on how to best mitigate and prevent biorisks and govern dual-use research.⁷¹

Fourth, another major challenge mentioned by workshop participants in implementing national-level controls to govern dual-use technologies is that multiple entities and bodies cover them. This makes it difficult for national governments to determine their obligations and the appropriate regulations across various agencies and industries.⁷²

Fifth, the potential use of biological weapons by non-state actors who operate outside the framework of academia, regulated industries and governments but can develop and use BW agents further complicates the governance of dual-use materials. The growing trend for do-it-yourself biology (DIYbio) allows individuals with no formal training in life sciences to use advanced tools, such as CRISPR products, or to produce engineered microbes.⁷³ In addition, there is a biohacking community which could, for example, supply orders of materials needed to experiment in the privacy of one's home, potentially leading to misuse. The DIYbio community has recognised the risks and attempted to mitigate them by adopting norms and codes of conduct and teaching biosecurity. Although these are non-legally binding tools, they are stronger than those implemented by many universities worldwide.

The implications for a Middle East WMD-Free Zone

1. The limited international biological weapons verification regime and a Middle East WMD-Free Zone

Given concerns regarding participation in and compliance with WMD treaties in the Middle East, some challenges that a ME WMDFZ will face stem from the same challenges characterising the nature of BW and the implementation of the BWC. In light of the limitations of the current international BW verification architecture, experts who participated in the workshop noted that, given the deep mistrust in the region and the history of WMD-related non-compliance, it is very unlikely that the BWC would be sufficient to build confidence with compliance with the BW-related prohibitions in a future Zone treaty. Even if a ME WMDFZ

71 World Health Organization (WHO), Global Guidance Framework for the Responsible Use of the Life Sciences: Mitigating Biorisks and Governing Dual-Use Research, (Geneva: WHO, 2022) <https://www.who.int/publications/i/item/9789240056107>.

72 Warmbrod, Revill and Connell, *Advances in Science and Technology in the Life Sciences and their Implications for Biosecurity and Arms Control*, 17.

73 *Ibid.*, 7 and 14.

were to incorporate elements from the 2001 composite text, states of the region would need to be mindful that the AHG's work appears to have primarily focused on addressing BW threats from a strategic level (e.g., fully fledged national programmes and use). Since the early 2000s, states' threat perceptions related to BW have altered because BW can be used to generate a range of effects. These risks are not limited to large-scale national programmes but also include small-scale and localised biological attacks, tactical terrorism, and economic sabotage.⁷⁴ These developments may shape Middle Eastern states' consideration of the additional components required for an effective BW verification arrangement.

As there is no BWC verification regime that can support verification on a national, regional or international level, the discussion throughout the workshop considered the question of whether a ME WMDFZ should wait until current limitations are addressed at the international level or whether the Zone negotiators should create their own, regional-based arrangements. In the former scenario of relying on the current regime, it was highlighted that even if the BWC were to have a global verification system in place, a ME WMDFZ should not immediately adopt it "as is". Some workshop participants noted that it might not necessarily fit the security context of the region and may thus prove insufficient. It may even be counterproductive, providing a false notion of compliance. The responsibility for agreeing on the appropriate verification level to address regional threat perceptions and determining whether additional verification mechanisms are necessary for the region lies with the region's states. During the discussion on what additional measures a ME WMDFZ could adopt, one example mentioned was a state-to-state exchange of inspectors. Although the 1991 Mendoza Agreement between Argentina, Brazil and Chile was never enforced, it set a precedent whereby these three states intended to establish inspection mechanisms in their respective states to ensure that CW were not developed, produced or acquired (before the CWC entry into force).⁷⁵ Moreover, states in the Middle East would need to decide whether the mechanisms for addressing suspected non-compliance under the BWC – which currently only refers to appealing to the Security Council or the UNSGM – are sufficient in a ME WMDFZ context.

For the other option – adopting a regional-based verification mechanism – some experts emphasised that unresolved challenges on the international level should not hinder progress on the regional level. For instance, the nuclear-weapon-free zone (NWFZ) in Latin America and the Caribbean under the Treaty of Tlatelolco provides an example where an agreement was reached with the nuclear weapon states to provide negative security assurances to the Zone members

⁷⁴ Revill, Borrie and Lennan, "Back to the Future for Verification in the Biological Disarmament Regime," 4.

⁷⁵ Nuclear Threat Initiative (NTI), "Mendoza Agreement," 26 October 2011, <https://www.nti.org/education-center/treaties-and-regimes/mendoza-agreement/>.

In the absence of a BWC verification regime, Middle Eastern states need to decide whether to wait until verification regime is adopted at the international level through the BWC or whether there is a need to adopt regional arrangements to ensure compliance with the BW obligations under a Zone treaty.

before the NPT itself was concluded.⁷⁶ Thus, some NWFZs have gone beyond existing international arrangements. With ongoing negotiations on a ME WMDFZ in New York, there is an opportunity for discussion and potentially faster progress on the parameters of a BW verification system on a regional basis than at the international level. Indeed, during the sessions of the Conference on the Establishment of a Middle East Zone Free of Nuclear Weapons and Other Weapons of Mass Destruction, states of the region have acknowledged the current lack of a BW verification system and any international legal structure.⁷⁷ They have thus discussed whether a ME WMDFZ could explore regional mechanisms to supplement existing multilateral regimes and include a requirement to submit CBM reports to be shared with the Zone members. Whether such a regional arrangement could be adopted and what it could look like is still under discussion.

Another issue under discussion at the workshop was verifying the destruction of BW stockpiles. Under Article II of the BWC, states parties are obligated to destroy all their stockpiles before joining the Convention.⁷⁸ As the BWC has no verification provisions and there are no set criteria to check whether obligations have been fulfilled, the disarmament of BW has never been verified. Nonetheless, the lack of a verification mechanism on the international level has not hindered initiatives for voluntary verification. If a state intended to disarm its BW programme, other states could verify this removal and destruction through their own national technical means and resources.⁷⁹ For example, in 1954, in line with a protocol to the 1948 Brussels Treaty, the Western European Union was given the power to inspect and verify disarmament within West Germany.⁸⁰ In 1992, the United States and the United Kingdom concluded a Trilateral Agreement with Russia to inspect the latter's military biological sites.⁸¹ Though the Trilateral Agreement was difficult and there were some questions regarding its transparency, there are perhaps some relevant lessons learned for Middle Eastern states to consider.

In the context of a ME WMDFZ, in addition to addressing the issue of verification of disarmament, states of the region would have to consider how to ensure that biological weapons are not developed. Experts noted that even if there was a mechanism to supervise the destruction of a state's BW stockpile, negotiators would also have to consider how to address dual-use biological materials in public health laboratories and other industries to prevent the development, distribution and use of BW.

In addition to considering verification measures, some participants indicated that Middle Eastern states could adopt all or a subset of the BWC CBMs as interim and pre-verification steps. The CBMs have been the only formal tool under the BWC for promoting transparency, building confidence and clarifying concerns among states. These aspects may be

76 NTI, "Negative Security Assurances (NSAs)," 5 January 2023, <https://www.nti.org/education-center/treaties-and-regimes/proposed-internationally-legally-binding-negative-security-assurances/>.

77 United Nations General Assembly, Report of the Conference on the Establishment of a Middle East Zone Free of Nuclear Weapons and Other Weapons of Mass Destruction on the work of its second session, A/CONF.236/2021/4 (3 December 2021), 51, <https://undir.org/node/6581>.

78 BWC, Article II.

79 Trevor Findlay, "Looking Back: The UN Monitoring, Verification and Inspection Commission," *Arms Control Today* 35, no. 7 (September 2005), <https://www.armscontrol.org/act/2005-09/looking-back-un-monitoring-verification-inspection-commission>, and Gregory Koblenz, "Pathogens as Weapons: The International Security Implications of Biological Warfare," *International Security* 28, no. 3 (Winter 2003): 113, 122, <http://www.jstor.org/stable/4137478>.

80 NATO, "Memorandum for the Secretary of the Standing Group: Western European Union Armaments Control Agency, Visits, Inspections and Spot Checks as per Protocols Annexed to the Brussels Treaty," Item LOM 057/57, 30 July 1957, <https://archives.nato.int/western-european-union-armaments-control-agency-visits-inspections-and-spot-checks-as-per-protocols-annexed-to-brussels-treaty>.

81 David C. Kelly, "The Trilateral Agreement: Lessons for Biological Weapons Verification," in *Verification Yearbook*, eds. Trevor Findlay and Oliver Meier (London: VERTIC, 2002), 93, <https://www.vertic.org/publications/yearbook/>.

82 "Pilot Peer Review Exercise on National Implementation of the BWC in Morocco," BWC Newsletter 4/2017 (May-June 2017), 1–2, <https://geneva-s3.unoda.org/static-unoda-site/pages/templates/the-biological-weapons-convention/topics/BWC%2BNewsletter%2B4%2B2017%2B-%2Bfinal.pdf>.

83 Thomas S. Lough, "The Military Liaison Missions in Germany," *Journal of Conflict Resolution* 11, no. 2 (June 1967): 258, <http://www.jstor.org/stable/172924>, and Igor Scherbak, "Confidence-building Measures and International Security – The Political and Military Aspects: A Soviet Approach" (New York: UNIDIR, 1991), xiv, 18, <https://www.unidir.org/sites/default/files/publication/pdfs/confidence-building-measures-and-international-security-the-political-and-military-aspect-8212-a-soviet-approach-en-88.pdf>.

84 Limor Samimian-Darash, "Practicing Uncertainty: Scenario-Based Preparedness Exercises in Israel," *Cultural Anthropology* 31, no. 3 (August 2016): 359–386, <https://journal.culanth.org/index.php/ca/article/view/ca31.3.06/377>.

85 BWC, Article X, Assistance and Cooperation Database, <https://bwc-articlex.unog.ch/>.

relevant for a ME WMDFZ to consider as a tool to reduce suspicions, ambiguities and tensions among states of the region. In addition, the CBMs could serve as a pilot for actual verification measures to help states understand internally what capabilities exist, which are the national authorities relevant to implementing BW-related obligations, and what is needed for verification. In fact, the negotiation phase of the BWC's composite text in the 1990s and the negotiations for the CWC involved – and were partly based upon – practice inspections between often like-minded states. These exercises assisted in the negotiation process, built trust and addressed concerns between the states involved.

Finally, although the BWC itself does not have any form of review process for CBMs, states of the Middle East could create a collective process for review of the information provided in the CBMs. Some states may prefer not to make their CBMs public, and such a collective review process may be a valuable forum to exchange information on a regional basis. It could start with a subset of countries to help them gain additional experience and understanding of the CBMs, as well as increase trust and transparency between them. Within the BWC, states parties are divided on the topic of peer review, but some regions have conducted these exercises. For example, Morocco hosted in 2017 a peer review exercise in which experts from other states were invited.⁸² During the exercise, the Moroccan experts presented and explained their biosecurity framework, after which participants visited several facilities. An additional interim step mentioned to reduce regional tension, based on the East–West experience during the Cold War, is to have exchange programmes whereby different countries' militaries or other agencies interact and visit each other's exercises and activities.⁸³ For example, Israel's Turning Point 3, a bio-emergency preparedness exercise in 2009 that 70 international military and diplomatic observers attended, could serve as another model for regional information and personnel exchange.⁸⁴

CBMs, as an information-exchange mechanism, could reduce suspicions regarding BW-related capabilities and non-compliance. The process of preparing CBMs can also help a state internally assess its own capabilities and identify the relevant national authorities responsible for implementing the BWC.

Although the ISU has a small team and a limited mandate, international experts noted that it could play an important role in the Middle East in implementing the BWC and adopting region-specific measures as part of a ME WMDFZ. For example, the ISU collects, collates and disseminates the national CBM reports and supports states, particularly developing states, with implementing the BWC. Additionally, the ISU runs an Article X assistance database, serving as a clearinghouse and a matchmaker between states that need assistance and states able to provide it.⁸⁵ The ISU can also facilitate bilateral arrangements, which benefit states with particular vulnerabilities that prefer to discuss issues informally. For example, within the Middle East, the ISU



Pilot Peer Review Exercise on national implementation of the BWC in Morocco, UNODA, Morocco, 2017.

has provided training on CBM submissions for Iraqi experts⁸⁶ and has trained and held capacity-building events on implementing legislation for the BWC in Lebanon and Palestine.

2. Strengthening inter-Arab and regional cooperation

Throughout the workshop discussion, several participants from the region noted a need for greater inter-Arab and intra-regional cooperation and coordination on both the technical and political levels. Some noted that, given the lack of a BWC verification system, the region as a whole and the Arab states as a group have the opportunity to discuss and envisage verification as a new concept for the Middle East. Additionally, within the BWC itself, Arab states can follow the example of other regions or groups of states and issue a statement to the Review Conference on behalf of the Arab Group. Coordination on such a statement could serve as a valuable starting point for broader cooperation since, so far, the Arab Group's position has been encompassed in that of the Non-Aligned Movement.

On the regional side, there is no regional coordination on WMD issues; experts from the region expressed interest in and the need for more regional workshops on these issues. These could provide a mechanism and forum for all the states of the region to share their perspectives on these issues.

3. The state of biosafety and biosecurity in the Middle East

Following the discussion on the BWC, verification and CBMs, workshop participants discussed biosafety and biosecurity. There is little consensus on the definitions of the two concepts, and some languages use the same term for both. WHO defines biosafety as

86 Report on Cooperation and Assistance under Article X of the Convention, BWC/MSP/2013/INF.5, 11 December 2013, <https://digitalibrary.un.org/record/769749>, and Mahdi F. H. Al Jewari and Gregory D. Koblenz, "Strengthening Biosecurity in Iraq: Development of a National Biorisk Management System," in *Frontiers in Public Health* 4 (February 2016): 2, <https://doi.org/10.3389/fpubh.2016.00025>.

Several Middle Eastern states face funding challenges to implementing biosafety and biosecurity measures. These states can utilise the ISU's Article X assistance database to identify states capable of providing assistance in implementation of the BWC, enhancing biosafety and biosecurity protocols, emergency response, and peaceful use of biological and toxin agents.

"principles, technologies, measures and practices that are implemented to prevent unintentional exposure to biological agents or their inadvertent release". It defines biosecurity as "Principles, technologies, measures and practices that are implemented for the protection, control and accountability of biological agents, data or equipment, biotechnologies, skills and information related to their handling. Biosecurity aims to prevent their unauthorised access, loss, theft, misuse, diversion or release."⁸⁷

Several experts from the region lamented that biosafety and biosecurity are not seen as a priority for many governments in the Middle East. The first reason mentioned by several experts is the lack of funding. Many participants from the region called for greater international assistance in improving national biosafety and biosecurity measures. While the United Nations and developed countries support strengthening biosafety and biosecurity efforts and programmes in the region, regional experts who participated in the workshop suggested that Middle Eastern states struggle with implementing such measures due to a lack of financial and technical means. Decision-makers perceive these issues as less urgent, especially in poorer economies, where decision-makers prioritise other issues. While funding for biosafety and biosecurity can be augmented by bilateral assistance schemes or projects funded by the European Union or other donors – either directly through the BWC or through the European Union CBRN Centres of Excellence⁸⁸ – reserving funds within a state's budget has remained a complicated issue. Biosafety and biosecurity are often perceived as security issues and are assessed against how much they will increase a state's security. The direct national security benefits from strengthening biosafety and biosecurity measures seem small compared to other security measures where funding is deemed better spent. However, participants emphasised that it is crucial to strengthen decision-makers' understanding of biosafety and biosecurity norms. For example, this can be done by promoting better awareness that improving the biosafety and biosecurity of a facility will make it more attractive for foreign direct investment.⁸⁹ One of the primary inhibitors for foreign direct investment is the risk of accidents and their repercussions, and robust safety and security arrangements could reduce these concerns.

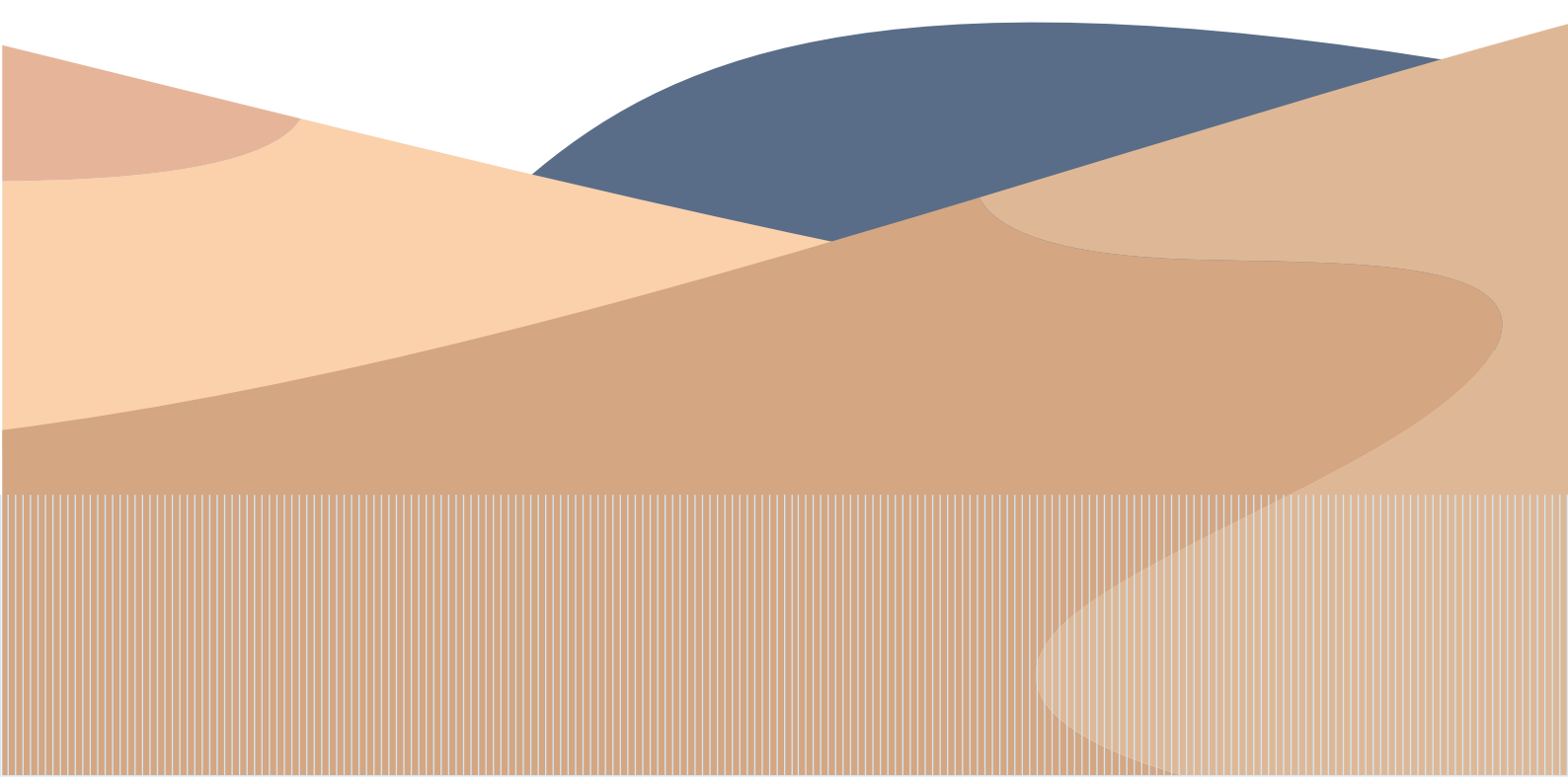
There was also a call among experts from the region for greater collaboration within states and regionally across domains – among industry, scientists, and biosafety and biosecurity experts. On the national level, it was noted that greater coordination is needed between biosecurity and biosafety experts on the one hand and the military and political decision-makers on the other. A ME WMDFZ could be an

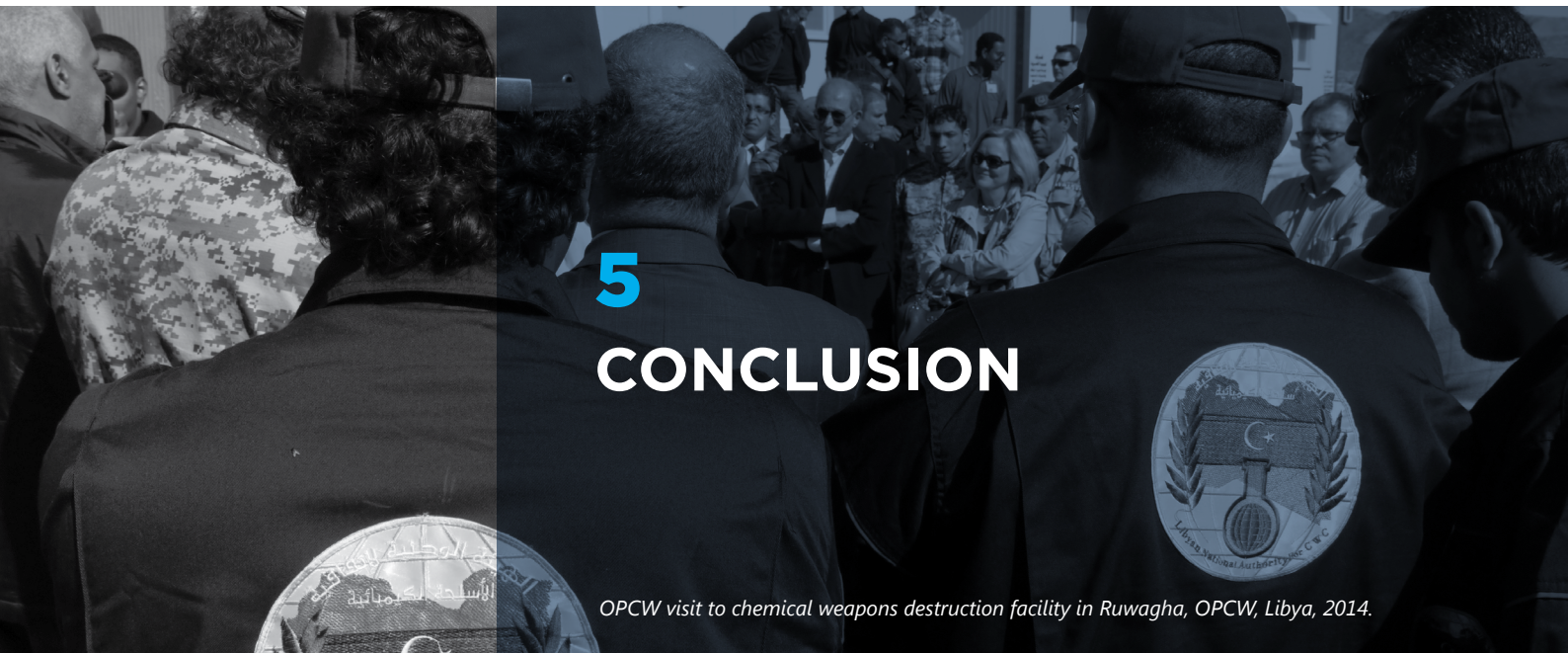
⁸⁷ WHO, Global Guidance Framework for the Responsible use of the Life Sciences: Mitigating Biorisks and Governing Dual-use Research (Geneva: WHO, 2022), XIX, <https://www.who.int/publications/i/item/9789240056107>.

⁸⁸ Ralf Trapp, "The EU's CBRN Centres of Excellence Initiative after Six Years," Non-Proliferation Papers 55 (February 2017), <https://www.sipri.org/publications/2017/eu-non-proliferation-and-disarmament-papers/eus-cbrn-centres-excellence-initiative-after-six-years>.

⁸⁹ WHO, Global Guidance Framework for the Responsible Use of the Life Sciences, 21 and 27.

opportunity to bridge these groups. A Zone could also improve, ensure and solidify national readiness and preparedness related to biosafety and biosecurity threats. Hence, once a ME WMDFZ is established and such measures implemented, it could further improve and secure the peaceful and safe use of biological materials throughout the region. On a regional basis, a ME WMDFZ could serve as a platform where states with more experience and capacity in biosafety and biosecurity could share their expertise. To achieve this objective, it would be essential to utilise capacity-building and support programmes and workshops, whether under the United Nations or in a regional, subregional, intra-Arab or national format.





5 CONCLUSION

OPCW visit to chemical weapons destruction facility in Ruwagha, OPCW, Libya, 2014.

The discussions held during the workshop on chemical and biological weapons in the Middle East shed light on important considerations for the establishment of a ME WMDfZ. Key takeaways from the workshop emphasised the importance of clarifying the Zone's scope and mandate, establishing compliance with the CW and BW obligations under a Zone treaty, and effective verification mechanisms and regional cooperation.

Regarding CW, the workshop highlighted the verification capabilities of the OPCW and the importance of addressing concerns about treaty participation and non-compliance. A tailored bilateral or multilateral CW verification arrangement was suggested as a potential complementary measure for the Middle East. Concerns were also raised about the acquisition and use of CW by non-state actors, and it was recommended that collaboration between the OPCW, the 1540 Committee and regional CBRN Centres of Excellence could enhance CW security and safety measures on the regional level.

In the context of BW, it was recognised that advances in science and technology, the complexity of governance of dual-use biological materials and the involvement of non-state actors added further challenges. Participants emphasised the need for governments to prioritise non-proliferation and provide necessary funding for biosafety and biosecurity measures. The exchange of information through CBMs was seen as a valuable mechanism to enhance transparency and reduce tensions, although CBMs alone could not substitute for verification,

ensure compliance or significantly reduce mistrust. The participants acknowledged that a Middle East WMDFZ would require agreement on the level of verification necessary to address threat perceptions. Additional tools and supplemental verification mechanisms, such as state-on-state inspections, and peer review exercises could be considered to reduce concerns related to non-compliance.

Establishing a WMD-Free Zone in the Middle East was viewed as an opportunity for knowledge sharing, stronger chemical and biological safety and security mechanisms, and strengthening national readiness. However, the scope and mandate of the Zone remained a topic of debate. Some participants suggested reliance on existing non-proliferation regimes. In contrast, others argued for a broader scope encompassing non-proliferation, security and safety. Balancing these perspectives will be crucial to ensure the feasibility and effectiveness of any ME WMDFZ treaty.



ADDRESSING CHEMICAL AND BIOLOGICAL WEAPONS CHALLENGES THROUGH THE MIDDLE EAST WEAPONS OF MASS DESTRUCTION- FREE ZONE

WORKSHOP REPORT

A workshop organised by UNIDIR provided a platform for in-depth discussions on the often-overlooked regional threats associated with chemical and biological weapons and explored ways to address them within the framework of a Middle East Weapons of Mass Destruction-Free Zone (ME WMDFZ). The report examines the limitations associated with existing international regimes and explores the opportunities these regimes and the ME WMDFZ offer Middle Eastern states to consider in addressing and preventing proliferation in the region, enhancing regional security and promoting the realisation of the Zone.