Global Challenges Foundation

Weapons of Mass Destruction

BY WILFRED WAN*

Mounting geopolitical tensions and rapid technological advances are eroding long-standing safeguards against weapons of mass destruction. As global regimes falter and enforcement weakens, the world faces growing risks of proliferation, misuse, and strategic instability. Understanding these shifts is essential for strengthening governance and preventing catastrophic escalation in an increasingly volatile security landscape.

What is the risk?

Hostile geopolitical relations and the deteriorated strategic context are eroding the structures that govern the world's most destructive capabilities. The decades-old regimes that are meant to curb the spread of weapons of mass destruction (WMD) — mainly, the Nuclear Non-Proliferation Treaty (NPT), the Biological Weapons Convention and the Chemical Weapons Convention — face myriad challenges. Tensions among key players are hindering compliance and enforcement efforts and undermining institutional structures. All of this is being exacerbated by rapid technological developments that can lower barriers to WMD access, delivery and use. Global governance of WMD is at a crossroads.

What is at stake?

While chemical and biological weapons are prohibited under international law, the normative barrier against their use shows signs of strain. Widespread and repeated chemical weapon use was seen in the Syrian Civil War by both government and opposition forces, despite global condemnation. Governance of chemical and biological weapons has been further undermined by years of deadlock between permanent members of the UN Security Council and the inability of the Organisation for the Prohibition of Chemical Weapons (OPCW) and the UN Security Council to investigate, attribute or hold guilty parties accountable in a timely manner. In a separate case, the OPCW has found evidence of repeated use of riot control agents in the war in Ukraine[1]. Dutch and German intelligence agencies also claim that Russia is increasingly using a wide spectrum of chemical weapons in that context.

A particular challenge in the chemical and biological space is the changing nature of threat. Scientific research in these fields is critical to global health and sustainable development, as seen in the response to the COVID-19 outbreak. Yet the pace of technological advances and the wider availability of dual-use tools, materials and expertise increase the risk of mistakes and deliberate misuse. Governance frameworks that rely on national implementation and slow diplomatic negotiation are poorly matched to fast, decentralised innovation cycles. Without updated risk management tools, today's treaty regimes will complicate detection and continue to fall behind the

The *Global Catastrophic Risks Report* by the Global Challenges Foundation is a publication that analyses the greatest threats to humanity's future. The purpose of the report is to raise awareness of these dangers and to encourage international cooperation to prevent them. It also highlights the need for stronger global institutions and innovative governance models to effectively address these complex challenges.

Read the full report here.

* Director of the Stockholm International Peace Research Institute (SIPRI) Weapons of Mass Destruction Programme

technologies they aim to govern. It remains to be seen whether common interest in tackling the shifting threat landscape can overcome geopolitical hurdles.

What is being done to govern this risk and where are there gaps?

There is unfortunately little indication that states can disentangle nuclear issues from the broader strategic context. Russia justified its suspension of the bilateral New Strategic Arms Reduction Treaty (New START) by referring to the United States' desire to inflict strategic defeat on Russia; it has consistently used nuclear coercion to shape the conflict in Ukraine.[2] China cited US arms sales to Taiwan in breaking off arms control dialogue.[3] Experts believe that the global nuclear stockpile — an estimated 12,241 nuclear weapons with Russia and the US holding over 90 per cent of them — is on the verge of rising.[4] Barring an extension of New START before February 2026, there will soon be no limits on the world's two largest nuclear arsenals. Extensive nuclear modernisation programmes being undertaken by nearly all of the nine nuclear-armed states underscores the potential for uninhibited arms racing.

Adherence to non-proliferation principles also appears under threat. Recent developments suggest a growing willingness among states to sidestep established norms and mechanisms of restraint, as military action, new defence alignments and shifting security doctrines take precedence over diplomatic engagement. Israeli and US attacks against Iranian nuclear facilities were condemned by UN procedures experts as a violation of international legal and normative frameworks.[5] Saudi Arabia signed a mutual defence pact with Pakistan, also a non-NPT nuclear-armed state, that in their view "encompasses all military means".[6] In response to the war in Ukraine, some states are not only calling for the expansion of extended deterrence arrangements, but even revisiting the question of acquiring independent nuclear capabilities. Prospects for a constructive 2026 NPT Review Conference appear bleak as nuclear-armed and nuclear-allied states continue to shun the 2017 Treaty on the Prohibition of Nuclear Weapons.

Recognition of these trends has driven multilateral attention on practical action to reduce the risk of nuclear weapon use. Existing efforts have focused on bolstering the crisis prevention and management toolkit as means to reestablish minimal levels of predictability and stability. These are essential steps. But the nuclear risk landscape itself is fundamentally changing because of the impact of emerging technologies and developments across domains and capabilities — both nuclear and conventional. Indeed it is because of these changes that some states have established a wider scope for nuclear use in their doctrines and security strategies. Only by navigating these developments can nuclear-armed states and other key actors properly reduce risk and begin to reinvigorate arms control and disarmament.

[1] Dutch Ministry of Defence, Russia further intensifies its use of chemical weapons in Ukraine, 4 July 2025. https://english.defensie.nl/latest/news/2025/07/04/russia-further-intensifies-its-use-of-chemical-weapons-in-ukraine

[2] Ministry of Foreign Affairs of the Russian Federation, Foreign Ministry statement, 21 February 2023. https://mid.ru/en/foreign_policy/news/1855184/

[3] Reuters, China says it has halted arms-control talks with US over Taiwan, 17 July 2024. https://www.reuters.com/world/china/china-says-it-has-halted-arms-control-talks-with-us-over-taiwan-2024-07-17/

[4] SIPRI Yearbook 2025

[5] UN experts condemn United States attack on Iran and demand permanent end to hostilities, OHCHR, 26 June 2025 https://www.ohchr.org/en/press-releases/2025/06/un-experts-condemn-united-states-attack-iran-and-demand-permanent-end

[6] Shah, S., and M. El Dahan, Saudi pact puts Pakistan's nuclear umbrella into Middle East security picture, 19 September 2025, Reuters. https://www.reuters.com/business/aerospace-defense/saudi-pact-puts-pakistans-nuclear-umbrella-into-middle-east-security-picture-2025-09-19/