GLOBAL CHEMICAL, BIOLOGICAL, RADIOLOGICAL AND NUCLEAR TERRORISM AND PROLIFERATION CHALLENGES: PAKISTAN'S PERSPECTIVE

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Abstract

International security environment is becoming more complex and perilous. New challenges associated with Chemical, Biological, Radiological and Nuclear (CBRN) terrorism and proliferation warrant cooperative multilateral approaches. Evolution of these challenges necessitates augmenting existing security regimes; and negotiating new ones, where required. Therefore, states ought to cooperatively approach global challenges. Existing international security regimes have major weaknesses that merit objective consideration. Effective implementation of regimes at national level is very important, which must be comprehensive and inclusive for all stakeholders. States and international organizations need to take strategic perspective and invest in capacity building of humans and institutions. Pakistan takes its international obligations very seriously; and constructively contributes to global security framework. It has developed excellent CBRN institutions and capacity in safety, security, non-proliferation and export control. International community can immensely benefit from Pakistan's experience, capacity and positive approach to global challenges.

Keywords: *CBRN Threat, Terrorism, Non-Proliferation, CWC, BWC, Pakistan*

Introduction

Preventing and responding to chemical, biological, radiological and nuclear (CBRN) threats is an extremely complicated task. Therefore, thorough understanding, preparedness and response capabilities vis-à-vis CBRN threats and challenges are imperative. In the prevailing

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global security environment, the threat of CBRN terrorism is real and can affect any State.[1] With regard to countering these threats, the international security environment appeared optimistic after cessation of the Cold War, when measures such as the Chemical Weapons Convention (CWC)[2] entered into force (1997). This built hope that chemical weapons will be irreversibly eliminated. The Biological Weapons Convention (BWC) had already been enforced (1975) globally that banned biological weapons[3] and concerted efforts were made for concluding a strict, multilaterally negotiated and non-discriminatory verification regime for the BWC. Regarding nuclear weapons, the US and Russia were striving to reduce their numbers and salience in national strategy. Despite such positive developments in the past, the ground realities today are not encouraging. For example, chemical weapons have re-emerged and have been used extensively in the recent past by both states and non-state actors. Furthermore, CBRN materials have been used repeatedly in assassinations and attempted assassinations in different parts of the world, such as Malaysia, the UK, Syria, Middle East, Ukraine, etc.[4]

The threat of using CBRN materials for terrorism has existed for several past decades. Several agencies warned and confirmed that Al-Qaeda publicly announced and made efforts to acquire and use WMDs.[5] The Islamic State (IS) carried out Sulphur Mustard attacks in Syria. This was duly confirmed by the Joint Investigative Mechanism (JIM) of the United Nations- Organization for the Prohibition of Chemical Weapons (UN-OPCW).[6] In June 1994, Sarin gas was produced and used for terrorism in Matsumoto, Japan by Aum Shinrinkyo. Subsequently, the same cult released sarin gas in Tokyo subway in March 1995 with an aim to cause mass casualties. Anthrax attack in 2001 in the US highlighted the need for efficient national response capability and plugging the gaps in public health infrastructure. The West African Ebola outbreak in 2014

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1 Elisande Nexon, and Claude Wachtel, *EU Preparedness against CBRN Weapons*, report (Belgium, European Parliament's online database, 2019), January 2019. 2, http://www.europarl.europa.eu.

2 OPCW, "Convention on the Prohibition of the Development, Production, Stockpiling, Use of Chemical Weapons and Destruction," www.opcw.org.

3 OPCW, "Convention on the Prohibition of the Development, Production, Stockpiling of Bacteriological (Biological) and Toxin Weapons and Destruction," United Nations Treaty Series, www.opbw.org.

4 Chai PR, et al., "Toxic Chemical Weapons of Assassination and Warfare: Nerve Agents VX and Sarin," *Toxicology Communications* 1, no. 1, (2017): 21–23.

5 Lewis A Dunn, "Can Al Qaeda Be Deterred from Using Nuclear Weapons?" Center for the Study of Weapons of Mass Destruction, Occasional Paper no. 3, NDU: Washington, DC, 2015.

6 OPCW, "2nd Report of the OPCW Fact Finding Mission in Syria: Key Findings," 2014, www.opcw.org.

demonstrated the health, economic, psychological and humanitarian consequences that an act of bio-terrorism can cause. The main contributing factors to this evolving threat are the rapid advancements in science and technology, wide availability of CBRN related knowledge and dual-use materials, changing geo-political environment, and the rise of international terrorism. This growing risk of such threats underscores the need for national and international institutional infrastructure for effective prevention and response preparedness.

This paper examines the complexity of CBRN risks, threats and challenges to both international and national security and peace; the significance of national and international implementation measures; as well as regime-based international cooperation for developing and maintaining effective national prevention, preparedness and response capabilities. It explores how states ought to develop national institutional enforcement capacities inclusive of requisite cooperation amongst stakeholders for meeting the identified challenges. It identifies gaps in relevant international regimes and suggests measures to redress them. The paper delineates Pakistan's perspective; position; and associated legislative, regulatory and administrative measures regarding CBRN related challenges. It also highlights country's proactive engagement with global CBRN security architecture and concludes by suggesting certain measures to alleviate the CBRN threat.

CRBN Terrorism: Structural Challenges

Suspected State Involvement

A major worry for the international community is the suspected involvement of states in CBRN terrorism incidents. Such developments could undermine the global arms control and non-proliferation regime. In November 2006, Alexander Litvinenko, a former Russian security official, was assassinated[7] in London by ingestion of Polonium-210.[8] Some believe that in 2004 Yasser Arafat, the former Palestinian Liberation Organization (PLO) chief, was also assassinated by employing Polonium-210 –a view moderately supported by the forensic report.[9] Viktor Yushchenko, the Ukrainian ex-president, was similarly poisoned in 2004 when he was

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7 R.B. McFee and J.B. Leikin, "Death by Polonium-210: Lessons Learned from the Murder of Former Soviet Spy Alexander Litvinenko," *Seminars in Diagnostic Pathology,* 26, no. 1 (Feb. 2009):61–67.

8 Po if ingested causes inter damage to the gastrointestinal tract and then to other vital organs.

9 P. Froidevaux, et al., "^{210}Po Poisoning as Possible Cause of Death: Forensic Investigations and Toxicological Analysis of Remains of Yasser Arafat," *Forensic Science International* 259 (November 2015): 1–9.

contesting re-election.[10] In November 2017, VX Nerve Agent[11] was used at the Malaysian airport to assassinate half-brother of the present North Korean leader;[12] whereas in 2018, use of a new military grade nerve agent[13]led to assassination of former Russian intelligence agent Sergey Skripal and his daughter at Salisbury in the UK.[14] The same year Germany and France disrupted two Ricin terror plots due to excellent functioning of their intelligence and police services.[15] Such incidents cause immense fear and collateral damage, strain bilateral relations, and punitively involve states and international organizations. Resultantly, states undergo economic losses and break-down of cooperation on vital global issues.

States' involvement is suspected in above-mentioned incidents because Polonium-210 is a highly radioactive substance and it is very difficult for terrorists to manufacture or acquire it. Its annual global production is estimated to be just around 100 grams, which implies strict governmental inventory controls and security measures. In the Salisbury (UK) incident a very pure nerve agent was used to poison Sergey Skripal and his daughter. The purity level suggests its production in a very specialized state facility. Another special feature of these attacks was targeting ~~of~~ all high profile people: several were former intelligence officials, one was half-brother of North Korean leader, and some were political leaders. This trend suggests that the aim of perpetrators was not to cause mass casualties, but to assassinate high profile individuals. This trend must be arrested at priority; otherwise, it could have serious implications for bilateral and multilateral diplomacy, the global non-proliferation regime, and international peace and security on the whole.

Inadequate International Cooperation

The CBRN threats and challenges are complex in nature. Developing multilateral response mechanisms require immense resources, coordination and efforts. Therefore, based on international and regional regimes, the international community must develop mutual cooperative frameworks. At times the regional geo-political environment hampers the

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10 J. H. Saurat, et al., "The Cutaneous Lesions of Dioxin Exposure: Lessons from the Poisoning of Victor Yushchenko,"*Toxicological Sciences* 125, no. 1 (January 2012): 310–317.

11 VX is a fast reaction military grade nerve agent, which can destroy the nervous system.

12 OPCW, "Decision: Chemical Weapons Incident in Kuala Lumpur, Malaysia," report ((84th EC Session:2017) www.opcw.org

13 OPCW, Technical Secretariat, "Request for Information from State Parties on New Types of Nerve Agents," Note by DG OPCW (84th EC Session: 2018)

14 OPCW, "UK: Statement by H.E. Ambassador Peter Wilson Permanent Representative of the UK" report, (87th EC Session: 2018)

15 Elisande Nexon, and Claude Wachtel, *EU Preparedness against CBRN Weapons*.

spirit of cooperation. It is, therefore, imperative for states to set aside political differences and develop cooperative arrangements for timely delivery of requisite assistance and protection. Time will be of the essence in response operations, thereby, making regional response capability more effective. To address this dimension, the Director General of OPCW in 2016 established a Rapid Response Assistance Mechanism.[16] Moreover, we have a good example of the European Union that has developed a comprehensive mutual cooperation legal framework for handling criminal matters. It mainly encompasses joint cooperative investigations, commonly recognized arrest warrants, sharing of evidence, etc.[17] In the realm of CBRN, states share common interest i.e. preventing their misuse for terrorism, and should therefore consider this cooperation as a significant confidence building measure.

Diverse Political Interests of the States

Since 2013, both non-state actors and state have extensively used chemical weapons in Syria.[18] To respond to this perilous development and serious crime against humanity, the United Nations formed a UN-OPCW Joint Investigative Mechanism (JIM) for identifying the perpetrators; JIM did excellent work in this regard. The next logical step was to hold the perpetrators accountable since strict accountability is imperative to deter such recurrences. The process of accountability and prosecution requires singleness of purpose and cooperation amongst States. In the Syrian case, due to political differences amongst States and prevailing geo-political environment, the requisite cooperation could not be achieved at the UN Security Council.[19] Resultantly, the mandate of the JIM could not be renewed.[20]

Dual-Use Materials and Technologies

The dual-use nature of chemical and biological materials and related technologies makes them easily and widely available, since they are extensively used in industry, medicine and various other fields. For national authorities the task of overseeing all dangerous transactions and preventing sensitive materials from reaching wrong hands is a daunting task. Moreover, due to the expansive scope of global supply chains and

16 OPCW, "Field Exercise to Improve OPCW's Rapid Response and Assistance Capabilities," Romania, 14 Dec, 2017.

17 The EU, "Directive 2017/541 of the European Parliament and of the Council of 15 March 2017 on Combating Terrorism," *Official Journal of the European Union*, L88/6, 2017.

18 OPCW, "Fact-Finding Mission Confirms Use of Chemical Weapons in Khan Shaykhun on 4 April 2017," 2017.

19 OPCW, "4th Special Session of the CSP," CSP Report, 27 June 2018.

20 OPCW, "62nd Meeting of Executive Council," Report, 14 Jan 2019.

rapid scientific advancements, non-state actors can produce and deliver large quantities of sophisticated chemical and biological agents – attacks by Aum Shinrikyo cult in Japan being the cases in point. Fortunately, Aum could not succeed due to certain technical issues.

Lack of Capacity in Forensic Science

CBRN incidents leave behind a large crime scene with scattered evidence requiring scientific examination for credible investigation. Therefore, expertise in forensic science is crucially required for investigation process. Forensic experts require latest technology, such as mobile laboratories and backup of designated static laboratories for authentic analysis of samples. These laboratories must develop close cooperation with internationally designated laboratories. The investigators may need evidence from the conflict zones or from abroad for establishing the identity of the perpetrators, which would necessitate international cooperation. Moreover, states have to invest in developing accurate analysis' capacity, and a comprehensive system of investigation and attribution encompassing, *inter-alia*, an internationally certified system of sample collection, its analysis, preservation and management for a long time.[21] Relevant international organizations such as the International Atomic Energy Agency (IAEA), OPCW, World health Organization (WHO), International Police Organization (INTERPOL) and other Centers of Excellence must extend technical support to states for building national capacities.[22]

Lack of Capacity of Judicial Bodies

Judicial authorities would be required to prosecute criminal cases involving CBRN materials. Therefore, their understanding of evolving CBRN threats and related legal instruments is important. The judicial bodies have to understand the implications on national law and international peace and security, and suggest changes for national legislations and related regulations for keeping them up-to-date and effective for countering the threat. Such updated legislations would also facilitate regional and multilateral cooperation. Moreover, the CBRN investigations would be multi-dimensional in nature: first aiming at identifying the perpetrators and to hold them accountable, and second, to uncover the sources for developing or acquiring CBRN materials and technology. Investigation must provide insights on the planning and execution of the crime to help develop holistic intelligence picture for preventing future incidents by plugging gaps in national and international

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21 OPCW, "4th Special Session of CSP in the CWC Review Conference," Report of the SAB, 30 April 2018.

22 UN 1540 Committee, "Assistance Programme Offers from International, Regional and Sub-regional Organizations, and Other Arrangements."

legislative, regulatory and administrative systems. Therefore, the national authorities and international organizations must help develop capacity and understanding of judicial officials by providing them requisite multilateral exposures.

CBRN and Gaps in Arms Control Regimes

International regimes deliver and gain strength if they are effectively and comprehensively implemented at the national level. National implementation measures requires, *inter alia*, national legislations, regulations and administrative measures; domestic and export control measures; international cooperation; effective verification regimes duly updated; and capacity building of national authorities responsible for verification and implementation. Security regimes must remain up-to-date for addressing current and evolving challenges. To plug the loopholes, certain gaps in the arms control and disarmament regimes have been identified below:

a. Both BWC and CWC obligate states to enact national implementation legislations and regulations. National law enables prosecutors to investigate and prosecute the perpetrators. The state of fulfilling this international obligation is not very satisfactory. For example, in the context of CWC, globally 71 states have still not notified the OPCW regarding enacting national legislations, or 63 percent have adopted only the minimum essential national implementation measures.[23] Regarding BWC, the adoption of exhaustive national legislations and regulations globally for regime implementation is yet to be achieved.[24]
b. BWC lacks an effective verification regime,[25] vital for monitoring international compliance and for confidence-building amongst states. To address the issue of parties' compliance, the West led by the US has devised an ad-hoc system of submission of CBM (Confidence Building Measures) forms. This is not a regime based international obligation and thus, states evade sharing ~~of~~ national information due to health

[23] OPCW, "Overview of the Status of Implementation of Article VII of the Chemical Weapons Convention as at 31 July 2018," 24 August, 2018.

[24] VERTIC, "National Report on National Implementation Legislation," *National Implementation Measures Programme,* November 2016, 19, www.unog.ch, National Implementation.pdf.

[25] Ibid.

concerns and security implications. In fact, CBMs cannot be a substitute for treaty based verification regime.[26]

c. BWC lacks the support of international implementation organization as OPCW provides for the CWC implementation. To address this institutional gap, international community has established an ad-hoc BWC Implementation Support Unit (ISU) that has a staff comprising just three members. Such structural deficiencies undermine global effectiveness and credibility of BWC.

d. Both BWC and CWC were negotiated and enforced when the challenges of international terrorism were not yet pronounced. Hence, there is a dire need to supplement these regimes and national/international implementing authorities. The issue is that the OPCW is basically designed to oversee national implementation measures, and not to address the threat of chemical terrorism. Therefore, OPCW directs inadequate resources and efforts to this challenge.

e. BWC and CWC have specific provisions regarding international cooperation - legally mandatory and contributive towards member states' capacity building. However, most developed states focus on the convention's non-proliferation provisions at the expense of cooperation. At times, modern technology required for legitimate peaceful purposes is denied to the developing states on the pretext of proliferation, thus undermining the spirit of cooperation amongst states.[27]

f. BWC has 182 state parties.[28] Thus it is far away from achieving universality. Likewise, CWC has 193 States Parties but four states are not members of this regime.[29] Unless universality is achieved, the non-member States are the weak links that can be exploited by non-state actors and criminals. Therefore, concerted international effort is required for achieving universality of these regimes.

g. CWC very broadly defines Chemical Weapons. OPCW in its verification activities is mainly focused on listed schedule

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26 Masood Khan, "The 2nd Inter-sessional Process," in *Improving Implementation of the BWC The 2007- 2010 Inter-sessional Process,* UNIDIR, and UNODA (New York and Geneva, 2011), 42.

27 OPCW, CSP Session, "Proposals and Options Pursuant to Paragraph 21 of Decision C-SS-4/DEC.3 on Addressing the Threat from Chemical Weapons Use," report and note by the DG OPCW, June 2018.

28 Israel, South Sudan, Eritrea, Comoros, Micronesia, Chad, Djibouti, Kiribati, Namibia and Tuvalu have not signed the BWC.

29 Egypt, Israel, North Korea and Israel are non-member States. Israel has signed but not yet ratified.

chemicals that could be used in warfare in significant quantities. Whereas, the non-state actors may not be interested to acquire and use large quantities of such warfare agents. Rather, their purpose is better served by widely available dual-use commercial chemicals. This necessitates effective domestic controls and comprehensive national implementation of multilateral regimes.

h. Non-state actors and states are continuously using Chemical Weapons both in the battlefields and public places. This is encouraging the re-emergence of chemical weapons.[30] Though CWC is quite comprehensive security regime, yet its provisions that could be used against terrorism are less clear and specific. CWC generally obligates states to strictly enforce the treaty's controls, restrictions and prohibitions. Therefore, states should strictly regulate the peaceful use of both scheduled chemicals and all other toxic dual-use commercial chemicals, and related facilities.[31] The Syrian conflict demonstrated that both military grade chemical weapons, such as sarin, and dual-use commercial chemicals such as chlorine have been used extensively in the battlefields, thereby calling for strict domestic and export controls.

Pakistan's Measures to Strengthen CBRN Regime

The above discussion shows that international cooperation for countering CBRN terrorism essentially requires multilateral treaty based regimes. Regimes specify rights and obligations of states, e.g. in 2004 the UN Security Council adopted Resolution 1540, legally binding all states to take national measures designed to counter proliferation and prevent non-state actors from acquiring WMD and related materials, technology and equipment. Membership of states in regimes contributes to its universality, and thus denies safe havens to terrorists anywhere in the world. Since the threat of CBRN terrorism is multidimensional, the international legal instruments provide the essential legal tools and mechanisms for conducting cross-border investigations and criminal proceedings while creating space for international cooperation in this regard. The regimes and associated organizations/bodies can regularly assess and monitor the standard of national implementation measures. Therefore, a state's membership in regimes, constructive participation in multilateral efforts, and the effective national implementation measures demonstrate the seriousness with which a state takes its international

[30] OPCW, "Decision: Addressing the Threat Posed by the Use of Chemical Weapons by Non-State Actors," October 13, 2017.

[31] Ibid.

obligations, contributing in turn to its stature as a responsible actor and positive force for international peace and security.

As a responsible State Pakistan takes its international obligations very seriously, accords utmost importance to CBRN safety and security, and has established a comprehensive security regime. Pakistan is member of many international regimes, organizations, arrangements and initiatives. In the realm of arms control, international security and non-proliferation, few aspects of Pakistan's varied set of national implementation measures are discussed below.

Measures in Nuclear and Radiological Domain

Compliance with UNSCR-1540

In the post 9/11 environment, and in the aftermath of 2003 revelations of international proliferation network, the UN Security Council in 2004 adopted Resolution1540 under Chapter-VII of the UN Charter. It is a legally binding instrument that addresses the threat posed by non-state actors and compliments relevant multilateral treaties and arrangements. UNSCR-1540 includes legal, political and regulatory measures to curb proliferation of entire spectrum of WMDs. It obligates states to enforce appropriate laws, refrain from providing assistance to non-state actors, implement exports and trans-shipment controls, submit national implementation reports, etc.[32] In compliance with 1540 Pakistan has instituted robust export control regime which include national measures as well proactive role in strengthening international export control regime.

Pakistan's Export Control Measures

The standards of Pakistan's export control regime (legislations, regulations and enforcement measures) are at par with international best practices. To exercise effective and comprehensive control over export, re-export, transit, and trans-shipment of sensitive goods, technologies, materials and equipment; Pakistan enacted SECA-2004 (Strategic Export Control Act).[33] It deals with nuclear and biological goods, technologies, materials and equipment, and their delivery means. Its salient provisions include: jurisdiction over citizens visiting and working abroad, licensing and record keeping provisions that cover export, re-export, transit and trans-shipment; 'Catch All' clause covering unauthorized transfer of intangible technology; prohibits diversion of controlled goods; and its penal provisions provide up to 14 years imprisonment and Rupees 5

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32 UN Security Council Resolution 1540 (2004).

33 Pakistan, "Export Control on Goods, Technologies, Material and Equipment Related to Nuclear and Biological Weapons and their Delivery System Act, 2004,"Registered No. 302/ L-7646, 27 September 2004.

Million fine, plus confiscation of assets and property. For the effective implementation of SECA-2004, Pakistan has taken the following measures:

a. In 2007, Strategic Export Control Division (SECDIV) was established.
b. Notified an Over Sight Board (OSB) under Foreign Secretary in 2007 for monitoring implementation of this Act.
c. Published NCL (National Control Lists) in 2005 and now the lists are reviewed annually for keeping them abreast with new developments.
d. Published Export Control (Licensing and Implementation) Rules in 2009.
e. Enacted Export Control Act- 1950 that restricts, controls and prohibits the import and export of goods.

Pakistan has good standing with regard to national implementation of UNSCR-1540, yet Pakistan's ranking can be further improved if BWC National Implementation Law is enacted and the national measures are appropriately show-cased at multilateral forums.

Engagement with International Export Control Regime

Pakistan is actively and constructively engaged with International Export Control Regime. In 1975 the Nuclear Suppliers Group (NSG) was created, which is implemented through its Guidelines and thus contribute to non-proliferation of nuclear weapons. NSG along with Zangger Committee[34] governs nearly all the world trade in nuclear material, equipment and technology. In May 2016, Pakistan formally declared adherence to NSG Guidelines and submitted application for membership.[35] Pakistan's NCL comprehensively incorporates NSG Guidelines and EU integrated lists, and is annually reviewed. Pakistan has highly trained and qualified human resource, requisite expertise, facilities, institutions and overall capacity to produce and globally supply goods, technologies, material and services for wide variety of peaceful nuclear uses.

Pakistan follows Missile Technology Control Regime (MTCR) Guidelines, fulfils membership criteria and maintains engagement through MTCR outreach activities. MTCR was established in 1987 for addressing missile proliferation.[36] It has 34 members and restricts the proliferation of missiles, Unmanned Aerial Vehicles (UAVs), complete rocket systems and

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34 Zangeer Committee was originated in 1971 and its mandate remain restricted to Art III.2 of NPT. NSG was formed on the premise of Art III-2 in establishing other criteria that recipient states must take for importing nuclear goods from supplier states. NSG is constantly evolving as per global challenges.

35 "Pakistan Applies for Accession to NSG," *The Express Tribune,* May 2, 2016.

36 MTCR was established by the US, UK, France, Japan, Germany, Canada and Italy.

related technology for delivering payload i.e. 500 kg to 300 km range and beyond.

Pakistan is member state of the CWC and BWC, which is the criteria for Australia Group (AG) membership. Pakistan maintains engagement through AG outreach activities. AG reduces risks of Biological and Chemical Weapons proliferation by regulating the export and trans-shipment of related goods, technology and materials.

Pakistan maintains engagement with Wassenar Arrangement (WA) through its outreach activities. In 1996, WA was established, it has 41 members, and maintains national export control on conventional arms and related dual-use goods and technologies through national laws and notifying the transfer and denials of such items. Pakistan's decision and efforts to seek membership for participation in the global regime for export control demonstrates Pakistan's serious and positive approach to contribute to global efforts for preventing the spread of WMD related goods, technologies, materials and equipment.

Measures in Safety and Security Domain

Effective implementation of Convention on Nuclear Safety (CNS)

Pakistan is effectively and comprehensively implementing CNS. The CNS entered into force in 1999 for achieving higher safety levels. It has 83 signatory states and 65 ratifying states. Pakistan signed CNS in 1994 and ratified in 1997. CNS obligates states to implement international safety standards at all facilities related to nuclear energy during designing, site selection, construction, safety verifications, emergency preparedness, operations and quality assurance. Pakistan submits annual reports on national implementation of CNS to the IAEA, is implementing the Fukushima Response Action Plan (FRAP), has established Pakistan Nuclear Regulatory Authority (PNRA) in 2001 for implementing its obligations under CNS, and has enacted PNRA Act as an implementing legislation. PNRA is an independent implementing and regulatory body that ensures that all responsibilities are defined, and legislations and regulations are effectively implemented.

Pakistan has established accounting and control systems for sensitive materials, based upon US National Laboratories Procedures, and has a strict inspection and verification regime. Moreover, special theft proof vehicles have been introduced, PNRA has established border controls, screening procedures, and implemented national Nuclear Security Action Plan (NSAP). The NSAP manages all radioactive sources and related activities. In this regard, PNRA carries out systematic verifications comprising *inter-alia*, both routine and surprise inspections.

For securing borders against illicit traffic and orphan radioactive sources, Pakistan has established Nuclear Emergency Management Centres. In this regard, PNRA provides education and training to personnel

of Frontier Corps, Coast Guards, National Disaster Management Agency (NDMA), Customs, law enforcement agencies, intelligence services, Emergency and Rescue Services, Pakistan Rangers, and all strategic organizations. Nuclear security, emergency preparedness, detection equipment, border monitoring, physical protection, and recovery operations are ~~a~~ part of training. This Centre serves as a focal point for coordinating the efforts of all relevant governmental agencies and other nuclear emergency offices established in major cities - the main responsibility is to track and effectively respond to the threats of illicit nuclear or radioactive source or a dirty bomb (Radiological Dispersal Device).

A comprehensive Nuclear Detection Architecture has been established at major entry-exit points for preventing, detecting and deterring illicit traffic of radioactive or nuclear materials. In addition, Pakistan has established sophisticated Nuclear Emergency Management System (NEMS), which is linked with National Disaster Management Authority. NEMS has been designed to effectively respond and manage any type of radiological or nuclear incident. This system is supported by highly trained human resource, latest technology and technical support provided by Pakistan Atomic Energy Commission (PAEC) and PNRA.

Establishing Security Training and Education Institutions

Pakistan has established specialized security, intelligence and education training institutions for ensuring security and safety of radiological and nuclear facilities and materials. In 2012 representatives from 30 member states established an International Nuclear Security and Support Centre, with a vision to create excellence in nuclear security worldwide, promote cooperation, facilitate provision of assistance, and develop sustainable national, regional, and global nuclear security training and support centres. As a responsible member, Pakistan has established specialized security and intelligence capabilities that include a Special Response Force with dedicated air-lift capability. To develop depth in defense, Pakistan has instituted an Integrated Intelligence System, which is the foundation of its nuclear security architecture. Pakistan has established a Centre of Excellence (CoE) in the field of nuclear safety and security,[37]comprising three institutions working in synergy and providing formal education, training and technical support to all national stakeholders and even foreign participants. These include:

a. *Pakistan Centre of Excellence for Nuclear Security (PCENS),* conducting specialized courses regarding physical protection, response, nuclear control and accounting, security and

[37] Noreen Iftikhar and Sitara Noor, "Nuclear Security Education and Training in Pakistan," *International Journal of Nuclear Security* 3, no.1 (25 July 2017), 5, idsa.in/system/files/OP-PakistanNuclearSecurity.pdf.

intelligence, as per international standards and best practices.[38]

b. *National Institute of Safety and Security (NISAS),* working under PNRA, and providing nuclear safety and security training to professional technicians and managers from the regulator perspective.[39]
c. *Pakistan Institute of Engineering and Applied Sciences (PIEAS),* which conducts formal nuclear safety and security degree courses including specialization in MS Nuclear Engineering and other academic programmes.[40]

Effective Implementation of Convention on the Physical Protection of Nuclear Material (CPPNM)

Pakistan ratified the CPPNM Amended in March 2016, and has taken legislative, regulatory and administrative measures to ensure its implementation. It is the sole multilateral legal binding treaty regarding physical protection of civilian nuclear material in international nuclear transport, which entered into force in 1987. Pakistan acceded to CPPNM in 2000. After the disintegration of Soviet Union, international concerns heightened about the possibility of nuclear material falling into terrorists' hand. This treaty was inadequate for addressing the growing and complex threat of nuclear terrorism. In 1999, IAEA member states started working on the need to revise CPPNM and finally signed the amended convention in 2005. The amendment expanded the scope of CPPNM to cover protection of nuclear materials for peaceful purposes in domestic facilities, storage, use and transport.

Convention on Early Notification of a Nuclear Accident

Pakistan as a member of this Convention has developed effective, world-class response capabilities.[41] This Convention aims to provide correct and timely information regarding nuclear accidents, and thus contribute to global security through international cooperation. Member states are legally obligated to develop response capability and provide timely information on the type of accident to the affected states and IAEA, enabling both to respond expediently.

Convention on Assistance in Case of Nuclear Accident or Radiological Emergency

Pakistan is a member of this Convention and has developed

38 Ibid.

39 Ibid.

40 Ibid.

41 IAEA, Convention on Early Notification of Nuclear Accident, Latest Status, https://www.iaea.org, accessed on November 10, 2019.

international standards of response capacity. It has also pledged assistance to IAEA in case of any nuclear or radiological emergency. This Convention sets *inter alia*, the procedures, rights and obligations for state-parties regarding cooperation for assisting the affected States. IAEA is mandated to perform the central role, and to coordinate the entire operation in the event of radiological or nuclear emergency.

Active Participation in Global Counter Proliferation Initiatives

Pakistan is actively involved in global counter-proliferation initiatives which follow as:

Global Initiative to Combat Nuclear Terrorism (GICNT)

Pakistan considers that GICNT complements the IAEA nuclear security architecture, and shares its best practices in the field of non-proliferation, export controls and nuclear security.[42] US and Russia jointly launched GICNT in 2006, a voluntary international partnership of 85 partner states and organizations to prevent nuclear terrorism through sharing of best practices. Pakistan partnered with GICNT in 2007 and has made valuable contribution to its Working Groups, by helping develop capacities of partner states in the field of response and mitigations. This positive approach has been widely acknowledged by partner states.

Container Security Initiative (CSI)

Pakistan is a partner in CSI since March 2006 and Port Qasim is CSI compliant;[43] it is installed with Integrated Cargo Container Control facility. The aim of this initiative is to inspect and scan all US bound containers. The US launched CSI in 2002, and is functioning in Asia, Latin and Central America, North America, Europe and Middle East at 58 sea ports.

Proliferation Security Initiative (PSI)

The US launched PSI in 2003 for preventing and countering WMD shipments, their delivery systems and related materials worldwide.[44]102 states have voluntarily endorsed the 'interdiction principles'. Pakistan supports the objective and purpose of PSI but has reservations regarding

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42 Statement by Husham Ahmed, Director General Arms Control & Disarmament-I, Ministry of Foreign Affairs, GICNT Plenary Meeting, Buenos Aires, 5- 7 June 2019.

43 Abdullah Yousaf, former Chairman Central Board of Revenue, Seminar on "Dry Ports of Tomorrow," *Port Security Pak*, Karachi, July 20, 2006, https://portsecuritypak.wordpress.com.

44 Charles Wolf Jr, Brian G. Chow, and Gregory S. Jones, *Enhancement by Enlargement: Proliferation Security Initiative,* (California: RAND Corporation, 2008), 14.

its implementation and its conflict with international law especially the *UN Convention on the Laws of Seas and the International Civil Aviation Agency Protocols*. Pakistan has not endorsed the interdiction principle, yet sometimes participates in the PSI exercises as an observer.

IAEA Incident and Trafficking Database

Pakistan are participants in ITDB programme along with 138 states.[45] This IAEA information management system is voluntary in nature and supports IAEA, relevant international organizations, and participating states in enhancing security. ITDB also contributes to improving IAEA's Nuclear Security Plans.

Measures in Biological Domain

Pakistan ratified Biological Weapons Convention (BWC) in September 1974 and is comprehensively and effectively implementing the regime in Pakistan. Pakistan never pursued Biological Weapons, therefore, it joined the regime as a non-possessor State. Pakistan encourages a cooperative, multilateral, and non-discriminatory verification regime for BWC that contributes to the capacity building of member states, since the country considers ad-hoc arrangements for monitoring national compliance as a short-term approach. Pakistan shares international concerns of bio-terrorism and suggests strict national oversight and regulations on all sensitive bio-facilities. The country itself implements strict bio-security and bio-safety initiatives in light of the BWC and International Health Regulations (IHR) 2005. For addressing risks associated with biological sciences and materials, Pakistan has instituted the following legislative, regulatory and administrative measures:

National Legislative and Controlling Context comprises of national bio-related laws, and rules and guidelines for bio-safety.[46] The national legislations includes, inter-alia, Pakistan Export Control Act- 2004 (elaborated above),[47] Animal Quarantine Act- 1979[48] and Rules, Plant Quarantine Act- 1976 and Rules,[49] Drugs Act-1976 and Rules,[50] Anti-

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45 IAEA, Fact Sheet, Incident and Trafficking Data Base, 2019, www.iaea.org/facts sheet-2019.

46 Pakistan, Bio-Safety Rules, 2005, S.R.O. (1) 336 (1) 2005, Islamabad, 26 April 2005.

47 Pakistan, Export Control on Goods, Technologies, Material and Equipment Related to Nuclear and Biological Weapons and their Delivery System Act, *2004,* Registered No. 302/ L-7646, 27 September 2004.

48 Pakistan, Animal Quarantine (Import and Export of Animal and Animal Products) Ordinance, 1979, September 17, 1979.

49 Pakistan*,* Plant Quarantine Act, 1976 and Plant Quarantine Rules, 1976.

50 Pakistan, The Drugs Act, 1976*,* No. XXXI, May 11, 1976.

Terrorism Act-1997,[51] and Pakistan Penal Code.[52] Moreover, Pakistan's Bio-safety Rules 2005, Bio-safety Guidelines 2005,[53] The safety of bio-related facilities and materials is dealt with Animal Quarantine Act 1979 and Plant Quarantine Act 1976.

Administrative Measures

Pakistan has taken following measures:

i) Established national point of contact for BWC at Ministry of Foreign Affairs.
ii) Conducts seminars and conferences for raising awareness regarding bio-risk management, dual-use issues of biological materials, etc.
iii) Ensures strict institutional oversight on biological research. The implementation of National Bio- Safety Guidelines is based on three levels i.e. National Bio-safety Committee, Technical Advisory Committee and Institutional Bio-safety Committees.[54]

a. **Regulation of GMOs** – Pakistan has developed comprehensive implementation system for regulating Genetically Modified Organisms (GMOs). This is a national obligation under Cartagena Protocol on Bio-Safety, which is signed by Pakistan. In this context, Pakistan has instituted Bio-Safety Rules-2005 and National Bio-Safety Guidelines 2005.[55]
b. **Bioethics Committee** is an advisory body under the *Pakistan Medical Research Council* (PMRC) dealing with bioethics.[56] All relevant research projects prior to their commencement are reviewed by Research Ethics Committee (REC).
c. **Code of Conduct for Life-Scientists** is a set of guidelines issued in 2010 for implementation. Stakeholders are encouraged to customize their codes according to their respective roles, within the broad theme of "Science for Humanity" as their fundamental objective.[57]
d. **Network of Public Health Labs Network** was launched in

51 Pakistan, The Anti-Terrorism Act 1997, Act No. XXVII, 20 August 1997.

52 Pakistan, Penal Code Act, (Act XLV of 1860), 6 October 1860.

53 Pakistan, Biosafety Rules 2005, Notification Document SRO (I) 336(I)/2005, 21 April 2005; and Pakistan, Environmental Protection Agency, National Biosafety Guidelines, May 2005.

54 Pakistan, Pakistan Environmental Protection Agency, National Bio-Safety Centre Directorate.

55 Ibid.

56 *Pakistan Bio-Ethics Committee,* nbcpakistan.org.pk.

57 Pakistan, Zameer Akram, Statement to the 7th BWC Review Conference, Geneva, 6 December 2011.

2007.[58] The response from this network fulfills international obligations under IHR 2005. It keep studying various trends for establishing disease patterns, and thus also identify at-risk population. Moreover, this system is quite useful in identifying specific needs and health priorities of different areas.

All these measures are designed to strengthen biological safety and security frameworks at national and international.

Efforts in Chemical Domain

Pakistan's has also undertaken significant national measures in the chemical domain that follows as:

a. **National Authority:** Pakistan has established a dedicated National Authority for implementation of CWC at the Ministry of Foreign Affairs (MFA). It is headed by the Secretary MFA.
b. **Implementation Legislation:** Pakistan promulgated *CWC Implementation Ordinance* in 2000 that gives effect to Pakistan's rights and obligations under CWC. This is a comprehensive and dedicated legislation that covers all aspects of CWC prohibitions, including declaration obligations, extraterritorial applications, export control regime for scheduled (listed) chemicals, penal provisions, etc.
c. **Implementation Regulations:** Pakistan has instituted regulatory and administrative measures to prevent both individuals and entities from any proscribed activities. For this purpose, Pakistan has promulgated *CWC Implementation Rules-2010* which is a dedicated instrument in light of the CWC Implementation Ordinance. It effectively prevents and redresses any breach of the CWC.
d. **Outreach and Capacity Building** is also ensured through an active outreach programme for raising stakeholder-awareness regarding CWC obligations. Keeping in view the threat of proliferation and terrorism, the OPCW and World Customs Organization organize capacity building courses for national authorities and customs services, which are fully availed by Pakistan.[59] Pakistan also trains and equips border security personnel and all relevant agencies to prevent, deter and investigate transfer of CBRN related material and technology.[60]

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58 *National Institute of Health,* Islamabad, Public Health Laboratories, www.nih.org.pk.

59 OPCW News, "Customs and National Authorities Team up to Bolster Training in Chemical Weapons Convention Transfer Regime," The OPCW Headquarters, The Hague, 6 July 2017.

60 Zafar Nawaz Jaspal, "Pakistan Nuclear Weapons Safety and Security," *Global Village Space,* 27 February 2019.

e. **Regional Assistance and Protection Centre:** Pakistan has established this Centre at Islamabad in November 2015, which was inaugurated by the DG OPCW. It is adequately staffed and equipped for providing assistance.[61] Moreover, advanced international courses on assistance and protection are conducted here for enhancing capacities of CWC member states. Pakistan has also pledged support to the OPCW in case of any chemical accident/ incident.

f. **Support for Negotiation to Construct New Non-discriminatory Regimes:** Pakistan realizes that CWC and BWC lack provisions that specifically deal with the issues of terrorism. Therefore, it supports new and non-discriminatory regimes that address such challenges. At the Conference on Disarmament (CD) Geneva, Pakistan supports Russian proposal of negotiating *Convention on Suppression of Acts of Chemical and Biological Terrorism*.[62]

Conclusion

The challenges of CBRN terrorism and proliferation are significant for international peace and security. The regimes for addressing CBRN related challenges needs to be strengthened, new regimes may be concluded, and must be effectively implemented nationally and internationally. States have to work closely and cooperatively in building requisite capacities for prevention and response preparedness. As per non-proliferation regime, it is mandatory for states to encourage and promote international cooperation. CBRN threats are expansive in scope, and involves numerous stakeholders at national level. On CBRN national authorities, have to adopt an inclusive approach in both planning and implementing response contingencies. Pakistan like other developing states is constructively engaged in contributing to multilateral non-proliferation regimes and initiatives.

Pakistan takes its international non-proliferation obligations very seriously. Pakistan is constantly building its national institutions, facilities and human resource, which are continually shared with international community for capacity building. Both States and international organizations duly acknowledge Pakistan's contributions, constructive approach, standards and capacity. Pakistan's safety and security of sensitive CBRN materials, technologies and facilities is world-class that are legally and institutionally based. The international community and security system can immensely benefit from Pakistan's experience and

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61 OPCW News, "OPCW Director General Visits Pakistan," 19 November 2015.

62 "Pakistan Committed to Chemical Weapons Convention, UN Told," *Pakistan Today,* October 25, 2018, https://www.pakistantoday.com.pk/2018/10/25/pakistan-committed-to-chemical-weapons-convention-un-told/.

capacity. Pakistan is a valuable partner in the global peace, security and non-proliferation regime. Being a member and partner in many international regimes and arrangements, Pakistan is constructively contributing to global CBRN security framework.