AN ANALYSIS OF BIOLOGICAL THREATS: APPREHENSIONS AND COUNTER STRATEGIES IN PAKISTAN

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DEDICATION

I dedicate all my efforts and success to

My

Parents

The most valuable asset of my Life

DECLARATION

I, Rubin Ali, do solemnly declare that the research dissertation title "An Analysis of Biological Threats: Apprehensions and Counter Strategies in Pakistan" is hereby submitted for the Degree of Doctor of Philosophy. I also declare that this dissertation is original and has never presented in any other institution. Moreover, I declare that any secondary information used in this dissertation has adequately acknowledged. I also state that it has not been previously or concurrently submitted as a whole or in part for any other degree at IIUI or any other institutions.

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FINAL APPROVAL

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List of Abbreviations

ACA	Arms Control Association
AHG	Ad Hoc Group
BWC	Biological Weapons Convention
CDC	Centers for Disease Control and Prevention
DHS	Department of Homeland Security
DOD	Department of Defense
EPA	Environmental Protection Agency
FBI	Federal Bureau of Investigation
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
ISU	Implementation Support Unit
LRN	Laboratory Response Network
NBACC	National Biodefense Analysis and Countermeasures Center
NBIS	National Biosurveillance Integration System
NDMS	National Disaster Medical System
NIAID	National Institute of Allergy and Infectious Diseases
OPCW	Organization for the Prohibition of Chemical Weapons
RRL	Roodeplaat Research Laboratories
SIPRI	Stockholm International Peace Research Institute
UNSCOM	United Nations Special Commission
WHO	World Health Organisation

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ABSTRACT

This thesis addresses the issue of proliferation of biological weapons threats in the contemporary era. Biological threats posture significant risks to national and international security. The risk of a deliberate release of biological agents, whether by the terrorist groups or individual perpetrators, poses an immediate threat to the life and health of the population. Anthrax outbreaks in September 2001 crystallized the perception that terrorists were willing to victimize the lives of citizens. Deliberate dissemination of germs and the natural outbreaks produce death rates high between animals, plants or people. This research explores biological terrorism is relatively rare and has not been devoted to more attention. But the notion changed after the case of an anthrax letter, and people suddenly began to realise biological agents vulnerabilities. Therefore, anthrax attack brought a shift in the thinking and focused that the hostile states and numerous violent non-state actors can utilize biological agents in warfare or terrorist attack. Furthermore, the issues of proliferation of biological threat assess from multiple angles as primarily focus on the effectiveness of the legal parameter on the prohibition, development, production, accumulation, use and subsequent destruction of biological weapons. The study also investigates the capacity and capability of the Pakistan infrastructure to manage the new and emerging biological agents' threats. The study aims to assess the possible ways for the strengthening of the Biological Weapons Convention (BWC) regime. The study based on how existing institutional mechanism responded to biological threats on the global and the state level. Despite this, the regime theory in this study provides a suitable analytical framework for answering the question of the establishment, the efficiency and the stability of arms control regimes. The basic purpose of the study is filling gaps by focusing on the control and readiness against the proliferation of biological weapons. Throughout history,

the states have been developed and use biological agents as a weapon. This thesis highlighted the countermeasure strategies at global levels, such as suppress the threat of bioterrorism or natural outbreak and the readiness of the states against the threat of biological weapons at the global level. More importantly, this part also explained how the international regime contributed to constraining the use of biological weapons. Regime theory profoundly used to analyse the effectiveness of the emerging regimes and evaluating how well implementation of the regime carried out and what reform might be in future to countering biological weapons and how various states have dangerous weaknesses in existing preparedness capabilities. The thesis presents Pakistan as a responsible state party of BWC and has a firm adherence to strengthening the BWC regime. Additionally, the study concludes trust or distrust in the BWC regime can influence the further development of the convention. The study posits that more intense effort needed in particular in the pursuit of effective biological defense and countering for futuristic biological outbreaks.

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CHAPTER-1

INTRODUCTION

1.1 Introduction

The risk of biological weapons proliferation has become one of the greatest non-traditional security threats. The matter of biological terrorism or proliferation of biological agents as weapons is relatively contemporary, although there has been no severe biological attack in the last few years. Yet, there is the possibility of misuse of biological weapons by terrorists, so this work determines whether the threat of biological terrorism or biological agents natural outbreak is underestimated in the contemporary era. Eventually, this is an unfortunate fact that the danger of terrorist groups, individual perpetrators or deliberate release of biological warfare agents poses an immediate threat to the life and health of the population. This unusual, potential threat from biological terrorism or natural outbreaks of biological agents raises the question of how a state can adequately protect the life and health of its citizens from this new threat. Furthermore, the issues of proliferation of biological threat assess from multiple angles as primarily focus on the effectiveness of the legal regulation of the ban development, production, accumulation, use and subsequent destruction of biological weapons.

Biological threats come from bacteria, viruses, toxins, or other biological substance that cause infectious diseases which can kill or affect animals, plants, and humans (Alexander, 2006). Biological warfare agents are pathogens or toxins that can cause infectious diseases or spread poison in animals, plants, and humans. Accordingly, the perception of biological warfare is the use of biological warfare agents or germs for killing opponents. The dangerous property of biological warfare agents is their silent, invisible and undetectable spread. On the other hand, as

compared to conventional weapons, biological agents can be transported easily and inconspicuously. Biological weapons can be produced with less technical and financial expense as compared to chemical weapons or nuclear weapons; therefore, they are known as the "atomic bomb of the poor man" (Horowitz & Narang, 2014).

Biological weapons are not an invention of the high-tech age. The use of biological weapons runs through history and goes back to the earliest days of humanity (Martin, Christopher, & Eitzen, 2007). Biological research has revolutionized through advances in biotechnology along with genetic engineering and molecular biology. These technologies can decode the instruments of disease-causing processes of biological agents in a more besieged and precise manner and thus serve peaceful research. On the other hand, the same technologies can be misused for the production and enlargement of biological weapons. The use of technologies can be dangerous; because it may develop completely new biological agents that are even more suitable for warfare. It also means that these technologies are dual-use.

Table 1: Categories of Biological Agents

Category A	Category B	Category C
✓ *Bacillus anthracis* (anthrax) ✓ *Clostridium botulinum* toxin (botulism) ✓ *Yersinia pestis* (plague) ✓ Variola major (smallpox) and other related pox viruses ✓ *Francisella tularensis* (tularemia) ✓ Viral hemorrhagic fevers ✓ Arenaviruses ✓ LCM, Junin virus, Machupo virus, Guanarito virus ✓ Lassa fever ✓ Bunyaviruses ✓ Hantaviruses ✓ Rift Valley Fever ✓ Flaviruses ✓ Dengue ✓ Filoviruses ✓ Ebola ✓ Marburg	✓ *Burkholderia pseudomallei* *Coxiella burnetii* (Q fever) ✓ *Brucella* species (brucellosis) ✓ *Burkholderia mallei* (glanders) ✓ *Chlamydia psittaci* (Psittacosis) ✓ Ricin toxin (Ricinus communis) ✓ Epsilon toxin (Clostridium perfringens) ✓ Staphylococcus enterotoxin B ✓ Typhus fever (*Rickettsia prowazekii*) ✓ Food- and waterborne pathogens ✓ Bacteria ✓ Diarrheagenic *E.coli* ✓ Pathogenic Vibrios ✓ *Shigella* species ✓ Salmonella ✓ *Listeria monocytogenes* ✓ *Campylobacter jejuni* ✓ *Yersinia enterocolitica* ✓ Viruses (Caliciviruses, Hepatitis A) ✓ Protozoa ✓ *Cryptosporidium parvum* ✓ *Cyclospora cayatanensis* ✓ *Giardia lamblia* ✓ *Entamoeba histolytica* ✓ *Toxoplasma gondii* ✓ *Naegleria fowleri* ✓ Microsporidia ✓ Additional viral encephalitides ✓ West Nile virus ✓ LaCrosse ✓ California encephalitis ✓ VEE ✓ EEE ✓ WEE ✓ Japanese encephalitis virus ✓ Kyasanur Forest virus	Emerging Infectious Disease threats such as Nipah virus and additional hantaviruses *NIAID priority areas:* ✓ Tickborne hemorrhagic fever viruses ✓ Crimean-Congo hemorrhagic Fever virus ✓ Tickborne encephalitis viruses ✓ Yellow fever virus ✓ Mluti-drug resistant TB ✓ Influenza virus ✓ Other Rickettsias ✓ Rabies virus ✓ Prions ✓ Chikungunya virus ✓ Severe acute respiratory syndrome associated coronavirus (SARS-CoV)

Source: National Institute of Allergy and Infectious Diseases
(Available at
http://www.niaid.nih.gov/topics/biodefenserelated/biodefense/pages/cata.aspx)

Biological Agents have been used since antiquity. The potential impact of biological agents in war is highlighted in all through history as early in 400 B.C. In the earlier period, biological weapons were utilized by the armies to defeat their enemies. It was common practice to dip swords and tips of arrows into faeces or corpses before attacking an enemy army. Therefore, "Infectious diseases were acquainted with their prospective influence on people and troops early in the 600 BC" (S. Riedel, 2004). Consequently, Bioweapons have its roots in ancient times, when the uses of biologically active agents on the battlefield were recognized. In the 15th Century for the period of Pizarro's occupation of South America, they enhanced their possibility of conquest by presenting to the inhabitants, the same as gifts, garments loaded with the variola (Fenner, 1988).

Thoughtout, human history infectious disease like smallpox or others has created the highest threat to human lives and activities as well as increases the number of deaths and troubles. Practically in the 18th century, British commander deliberately utilised smallpox on Native Americans to reduce or remove tribes which were antagonistic to them. In 1763 Captain Ecuyer, beneath the disguise of companionship, presented handkerchiefs and blankets to the Native Americans which polluted with smallpox. According to the observation in the Indian and French wars, it is supposed British armies distribute smallpox-loaded blankets among in the Indians American Natives.

In World War II Germans utilised anthrax on United States armed forces horses. In the Cold War, the United States and the Soviet Union achieved biological weapons; so these two stares were capable of destroying human life. The extensive use of weapons of mass destructions (WMDs) during the First World War led the

Geneva Protocol in 1925. Geneva Protocol prevents the use of suffocating, poisonous or bacteriological agents and other gases that also forbidden.

Anthrax attacks after 9/11 in the United States have highlighted the actual amount of the threat. The event of 9/11 shows the crushing attacks of a terrorist cause the fearful situation, and there was once again a question of what would happen if biological warfare agents were used in the future. Biological agent's threats can cause mass casualties. Unfortunately, after the end of the Cold War and mainly after 9/11, another growing biological threat is the acquisition of biological agents by hostile countries and non-state actors.

The hostile states and numerous violent non-state actors can utilise biological agents in warfare as well as in terrorist attack. Therefore a conceivable possibility is to develop policies that counter and control the non-state actors for using biological agents at the international level and national level. The legislation, international agreements and programmes related to biological weapons are undoubted of great importance concerning relations between states and global security. However, in the case of biological terrorism, in which a non-state actor plays a significant role because the terrorists do not regard international treaties and laws. One of the objectives of international conventions on biological weapons is the suppression of biological terrorism. Still, there is a great need for reduction of terrorists and the prevention of state-sponsored terrorism.

More important in this respect are programmes and strategies that focus on the crisis management and preparedness of States to protects to its inhabitants while during the biological weapons attack. Since it contains the efforts of States to overcome the threat of bioterrorism, this work attempts to explain the detail of the

biological weapons threat, the phenomenon of bioterrorism as well as international and national efforts to counter it.

In particular, bioterrorism relevant bacterial pathogens, viral pathogens and toxins as well as the diseases caused by them, including treatment options, diagnosis, and prophylaxis and safety measures, were presented and evaluated. There is a massive problem of the detection of biological attacks; hence the scientific interest is in the management of "biological hazard situations".

The term "Biological hazards" was chosen here because it is common in the specialist literature. The "biological hazard" means the hazard that is associated with the release of biological warfare agents. The focus was on the presentation of the unique role and tasks of the public health service. Subsequently, the management presented in an attack with smallpox viruses as part of the so-called "federal-state framework concept. Smallpox can be used in two scenarios; so there is a need for technical preparations and measures to combat epidemics after bio-terrorist attacks or natural outbreaks.

At the national level in Pakistan, there have been legislative efforts to improve and counter the biological threat, through the Export Control Act, Environmental Protection Act, National Biosafety Guidelines, and National Biosafety Center (NBC). Biological threats countermeasures demand legislation regarding the safe, secure and responsible conduct of science. The capacity building to raise awareness and train researchers which can also support by teamwork among international governments, clinicians, veterinarians, agriculturists, ecologists, and scientists.

1.2 Statement of the problem

This study aims to explain the various aspects of biological threats. The aggressive non-state or states actors who may change the power dynamics can utilize biological agents in warfare or terrorist attack. This study contributes towards how to overcome the risk of biological threat and how to improve the national defense preparedness? Furthermore, this study also evaluates the capacity and capability of the Pakistan infrastructure to manage the new and emerging biological agents' threats. This study also assesses the other crucial aspects of countering biological threats such as how possible to strengthen the regime of BWC. Moreover, BWC regime is providing an inclusive platform to members states and also providing opportunities for the disarmament of biological weapons.

1.3 Objective of the study

- To analysis the level of Pakistan's preparedness against biological threat
- To explore different pathogens, i.e. virus, bacteria, microorganisms, which have the highest possibilities to be used as biological agents
- To understand the current and foreseeable weaknesses of the BWC regime
- To evaluate countermeasures which are available in Pakistan pre and post-biological outbreaks
- To analyse various possible defensive measures for strengthening of the BWC regime
- To explore Pakistan's biological defense preparedness and the institutional arrangements to deal with biological threat

1.4 Research Questions

- Why biological agents' outbreaks are proficient in causing harm to the state in warfare or terrorist attack?
- What are the current and predictable weaknesses of the biological weapons convention regime?
- How can the BWC regime be strengthened? Which factors will become effective within the BWC, and what are the weaknesses of the BWC regime?
- How can the experience gain from natural biological outbreak be utilized for the management of any similar case of biological emergency in future?
- Which agencies are involved in the monitoring of biological outbreaks in Pakistan?
- In what way are present countering strategies appropriate to prevent and reduce future biological agents' threats at global and national?

1.5 Significance of the study

This study will provide a better understanding of possible ways of strengthening the BWC regime. The opportunities are identified for strengthening regime, assessing their likelihood of implementation. Based on the individual investigation results, a forecast can be made as to whether the BWC will remain a "weak" regime, whether the regime can be strengthened in individual areas of the provisions and the implementation of the convention. This study can be utilized to help military defense, and hospitals recognize how their daily work fits within emergency preparedness, as well as identify the gaps and areas for improvement. The study also highlights the current conflict and risk situation in the international area under the aspect of new biotechnological developments.

1.6 Delimitations of the study

There is umber of biological agents which are spreading infectious disease; however, the focus of this study would be on the countermeasures of biological agents that posture the highest risk to the global security and national security. This study would be not focused on wide-ranging categories of biological agent's countermeasures, but agents that produce viral fever would be taken as a case study.

1.7 Research Methodology

The study is based on explanatory and analytical methodology. The research is a qualitative study of primary and secondary sources. Countering of biological weapons has been a significant issue in world politics as its birth. The study based on how prevailing institutions countered sudden biological threats at global and state level. This study is qualitative by nature which chains a social-legal approach. The socio-legal approach has used in this study because of its multidisciplinary nature, mingling history, security studies, and law. Subsequently, the social science methods of analysis as content analysis and textual have been used.

So to fulfil the objective of the work, it was essential to analyses international agreements such as the text of the Biological Weapons Convention (BWC) in detail, which annexed to this work. The whole work is systematic research analysis and comparison of biological weapons programs. First, the texts of BWC analysed and obtained the necessary overview of the overall structure, scope and also analysed consensus on the effectiveness of Convention. After analysing the BWC text, it was made possible a systematic comparison of the individual measures contained in the Convention that could affect the actual implementation.

This work also relied on BWC text and the reports of review conferences which also include the comments from the member states. Furthermore, the

statements of the VEREX negotiations, the Ad Hoc Group (AHG), CBM Reports, Implementation Support Unit (ISU), Non-Aligned Movement's (NAM) and the special conference serve as primary literature. The negotiations on the BWC prosperously documented until the second review conference in 1986. The special conference in 1994 also recorded in detail. Expert interviews were carried out to determine the indicators for the possible use of biological weapons during the 21st century.

Furthermore, the criteria set out below for international regimes and international organizations are determined, which are suitable as indicators for describing international regime effectiveness. A SWOT analysis (strengths, weaknesses, opportunities and threats) applied to the BWC serves to identify intra-regime strengths, weaknesses, areas for optimization and possible dangers. However, performing a SWOT analysis provide a prospect to discuss what we have done so far, and it also explains our successes and shortcomings. For this purpose BWC and its detailed provisions analysis furthermore; it also includes the reservations and comments of the individual member states were carried out focuses explicitly on Pakistan. For the following theory based work, it determined in which category the BWC can be categorized within the framework of international relations.

The theoretical framework identifies the individual component of the regime and its interpretation, which prevailed in the literature. Ultimately, factors outside the regime are analysed, which have proven to be factors to be taken into account since the convention was created. I considered these areas to conclude whether biological weapons still posture a threat to the world or not—the question of whether the prohibition of biological weapons belongs to disarmament or the law of armed conflict. At the same time at the theoretical level, the thesis aims to determine

whether the prohibition on the use of biological weapons is considered, for example, a legal custom or not.

In addressing the research questions outlined above, I focused not only on the ban on the use of biological weapons while in the armed conflicts but also ban on the development, production and accumulation of these weapons, because these two areas together closely related. The possession of biological weapons is not only dangerous because of their possible use in armed and other conflicts, but also for political and deterrent reasons.

To achieve the research goals; thus, I chose professional publications in the field of international law, political science, military, medicine, etc. Relevant information provides UN resolutions, individual conventions governing prohibited funds; and ways of armed conflict management, especially those prohibiting production, development, the accumulation and use of biological and chemical weapons and, last but not least, reports international organizations dealing with this area, such as 'the Organization for the Prohibition of Chemical Weapons' (OPCW) and the 'Arms Control Association' (ACA). The work itself is divided into a theoretical part and a practical part, where the practical examples I deal with the issue of compliance with prohibiting contracts biological and chemical weapons. The first part consists of four chapters which aim to acquaint the reader with the basic theoretical definition of the topic.

In my opinion, biological weapons are not given enough attention both in academic, so public debate. Considerably more space is devoted to the potential threat of abuse in nuclear weapons, which is less due to the technological demands of production feasible. Moreover, the issue of biological weapons is increasing importance in the contemporary world. Therefore, the ability of local governments to

govern their citizens in combination with relatively unassuming procurement of biological and chemical weapons and supply funding for non-state actors and terrorist organizations is a threat to sustain security and peace. I focused only on current valid mostly disarmament conventions related to biological weapons, and it's not deal with other weapons of mass destruction. I had monitor only individual States as to whether the conventions on the prohibition of production, development, accumulation and the use of biological weapons.

1.7.1 Sources of research

The literature on weapons of mass destruction, in general, is challenging to survey. The issue of nuclear weapons occupies the most significant part of the literature before chemical weapons. The literature on biological weapons contains some fundamental works from the mid-20th century. During this period, an abundance of publications which were based on scientific considerations, history and the major focus was on the development of biological weapons and some were based on protective measures against biological agents. Due to the emerging problems of verification, developments in biotechnology, the risk of the rapid spread of weapons of mass destructions (WMDs) is growing in the 21st century. Moreover, the growing possibility of biological weapons may use by terrorists groups has increased intension of the political scientist and international relations arena.

Biological weapons mostly remain overshadowed by nuclear and chemical weapons. The study also emphases on the preparedness of Pakistan to counter any attacks of biological agents. The study is based on face to face and telephonic interviews.

Primary sources include Ministry of Defense, Defense Science & Technology Organization (DESTO) Rawalpindi, Military Vehicles Research and

Development Establishment (MVRDE) Rawalpindi, Center for Non-Communicable Diseases (CNCD), Pakistan Health Research Council (PHRC) Islamabad, National Institute of Health (NIH) Islamabad, Institute of Strategic Studies (ISSI) Islamabad, Center for International Strategic Studies (CISS), Biological Safety Association of Pakistan (BSAP), Armament Research & Development Establishment (ARDE) Rawalpindi, National Development Complex (NDC) Islamabad, Institute of Optronics (IOP) Chaklala-Rawalpindi, Ordnance Factories (POF) Wahh Cantonment, National Disaster Management Authority (NDMA) Islamabad.

Besides the primary sources, the secondary source of data help me extensively to answer the research question. The secondary sources include newspaper articles, books, Jstor journals, conference proceedings and periodicals. Thematic analysis monitored through by the assessment of people awareness on the biological outbreaks in Pakistan. Furthermore, it may define as "a procedure for encoding qualitative information" (Boyatzis, 1998).

1.8 Theoretical framework

The regime theory in this study provides a suitable analytical framework for answering the question of the establishment, the efficiency and the stability of arms control regimes. The international regimes are an appropriate theoretical framework for examining biological weapons threats. Neither an approach to implementing a verification mechanism nor an establishment of confidence-building measures contradicts the intention of regime theory, since both promote interdependency. In the BWC, essential elements are anchored in scientific cooperation and the mutual assistance required. The four elements - principles, standards, rules and procedures - can be optimized both by implementing verification mechanisms and by expanding confidence-building measures. The establishment of an international organization,

which would also have actor quality, would be useful for strengthening the BWC and could achieve security for all member states. Specifically, regime theory, international regimes and international organizations are powerful structural features, the aim of which is the pursuit of international peace and cooperation. The more interstate relations are institutionalized within the BWC, the greater the likelihood of peace and collaboration. The work aims to summarize the aspects of a possible regime strengthening of the BWC and to evaluate it based on the selected theories of international politics. Furthermore, the regime theory provides a suitable analytical framework for the establishment, the efficiency and the stability of arms control regimes.

1.9 Literature review

In the contemporary era, the biological threat is a new dimension of greatest security concern. This study is a brief overview of the literature that imitates the issues of biological warfare, biological weapons regimes and bioterrorism. Furthermore, the review of literature is more focused on disarmament of biological weapons and how international regimes control the proliferation of biological weapons. The basic purpose of the study is filling gaps by focusing on the control and readiness against the proliferation of the biological weapons, although, recognizing proper literature for such a study is challenging. However, there are an enormous amount of books being published on biological warfare and biological weapons such as Jeanne Guillemin's "Biological Weapon: From the Invention of State-Sponsored Programs to Contemporary Bioterrorism" or Judith Miller's Germs.

Furthermore, the literature also seeks to analyze academic series of SIPRI on "chemical and biological warfare studies", this include the work of Julian Perry Robinson on "Chemical and Biological Warfare Development: 1985", Erhard

Geissler's "Biological and Toxin Weapons Research, Development and Use from the Middle Ages to 1945", Nicholas A. Sims's "The Evolution of Biological Disarmament", Erhard Geissler's "Strengthening the Biological Weapons Convention by Confidence-Building Measures" and this also include the work of S. J. Lundin's that is on "Views on Possible Verification Measures for the Biological Weapons Convention". The purpose of analyzing academic series of SIPRI is to builds a historical framework against the use of biological weapons.

This analysis of literature indicates numerous issues related to biological weapons in a detailed manner. The focus will be on programmes and procedures as well as on the preparedness against the event of a biological weapons attack and crisis management policies at the national level. Furthermore, a substantial body of work exists on subsequent reviews or the information such as articles related to the text of biological convention regime. In particular, literature is diverse and includes the development of legal instruments as theories and practices. The literature under the rubric of regime theory applies the key concepts which involve an assessment of the regime.

In the book *'Biohazard'*, Ken Alibek (2008) explains in detail the functioning of the Soviet BW apparatus. The writer suggested that this program included employing thousands of scientists, development of bioengineered pathogens and producing tons of anthrax, plague and smallpox on an annual basis despite USSR enjoying the status of a member state of BWC. This book highlights the weakness of BWC.

Joshua Lederberg (1997) views in his book *"Biological Weapons-Limiting the threat"* the problem of biological weapons described in detail. The writer thinks that many issues like historical analysis of biological weapon, management of

patients who have faced biological warfare and clinical recognition should be analyzed in detail to develop an efficient precautionary program.

Laurie Gerrett (2001) in an article *'The Nightmare of Bio-terrorism'* gives a general and brief overview of a bioterrorism threat. Garrett looks in detail on response side like vaccine stockpiles to surveillance to anti-terrorism programs of different governments. However, this article does not discuss the motivation or objectives of agents or groups responsible for bioterrorism.

In another book *'Bio-Terrorism and Bio-Defense'*, P.R Chari and Suba Chandran (2005) highlight the embedded problems of bio-defence in countering bio-terrorism. The writers discuss various non-state and state actors who pose a severe challenge to humans, environment and living species. Furthermore, *'Bio-Terrorism and Bio-Defense'* address the problems in the field of biodefense to cope with this threat. The writers investigate various national and international endeavours to cope with bio-terrorism, identification of many hostile non-state and state actors to security of India.

Christopher F Chyba (2001) in an article *'Biological Terrorism and Public Health'* suggests that biological terror attacks can take various forms like an overt or covert attack, economic damage, social panic through announcements of credible threats. He argues that public health response to respond to the threat of bioterrorism is a low probability event that is without attendant hype. The writer is of the view that it is very difficult to differentiate between natural and manmade outbreaks and suggests that especially low levels of inspection on imported food and other stuff can be a major source of spread of bioterrorism. However, this article does not include the number of groups that may seek biological weapons, nor it discusses their motivation, goals or tactics.

Judith Miller (2012) discusses the tests conducted by the US government and Army regarding biological terrorism in her book '*Germs: biological weapons and America's secret war'*. The problem of emigration of Russian biologists has been highlighted in the book, and the writer has conducted a number of interviews with many field relevant researchers.

Another book '*The Soviet Biological Weapons Program: a history'* investigates in detail the scientific resources invested by the Soviets to develop the biological program. This book suggests that Biopreparat was an organization to manage the top-secret Soviet program with codename Ferment, whose aim was to use genetic engineering for the development of unnatural pathogenic agents. This book also deals with the question of whether biological warfare is present in today Russia?

In another book '*Living Weapons: Biological Warfare and International Security*', Gregory D Koblentz (2009) deals with the challenge posed by biological terrorism to international security. The writer is of the view that unless international measures to deal with inhibition of biological weapons are stringently followed biological terrorism is very difficult to be controlled as poor states have meagre resources and training to cope with biological weapons. The writer presents cases of security challenges posed by Russian, Iraq and South African weapons programs.

The biological weapons regimes are suitably studied as this aspect has relevance with structures, policies, and technical properties. Nevertheless, regimes have been largely overlooked as taking the argument that analysis whether a regime can function or more importantly succeed. Bernard Brodie's argue that "the volume of literature on arms control contrasts sharply with the dearth of results in actual armaments limitation or control"(Brodie, 1976). Brodie, also believes on "pragmatic

approach" as he further said that "we want our objectives to be mutually consistent, to be worth achieving and to be in some degree achievable – and that in turn entails a properly empirical utilization of our experience"(Brodie, 1976). Barrry Buzan and Ole Weaver (1998) in a book *'Security: A New Framework of Analysis'* set two competing schools in international relations: the traditional whose primary focus in on military and political issues and the 'wideners' who are of the view of incorporating societal, economic and environmental sectors in security related debates. The writers stand with the broader approach in security studies.

Another report title *'National strategy for countering biological threats'* outlines the possible threats of misuse of life sciences that may occur in the killing of people, plants and animals. This report is divided into three main sections: prevention, global cooperation and connection between security and health.

Jeanne Guillemin (2005) in his book '*Biological Weapon: From the Invention of State Sponsored Programs to Contemporary Bioterrorism*' narrates the disturbing story of experimentation of biological weapons in World War 1 and World War 2 to Cold War. This book outlines personal, political and military factors which gave birth to national biological weapons programs in the 1920s.

Jeanne Guillemin (2009) focusing on the criminal investigation, she also touches on US policy towards biothreats, especially the prevalent idea of foreign bioterrorism. "*American Anthrax - Fear, Crime, and the Investigation of the Nation's Deadliest Bioterror Attack*" is a thoughtful examination of America's fight against biological warfare and a chain of events, which never forgets the five innocent people who died from the anthrax spores floating in post offices, news media mailrooms, and the Senate offices on Capitol Hill.

The Biological Threat Reduction Program of the Department of Defense: From Foreign Assistance to Sustainable Partnerships is Cooperative Threat Reduction (CTR) program which run by the Department of Defense, the basic purpose of this program is the prevention and the control of the proliferation of biological weapons. The CTR program main objective is to identify approaches for incapacitating the obstacles to cooperation and moreover to increases the long-term influence of the program.

Amy E Smithson and Leslie-Anne Levy in "*Ataxia: The Chemical and Biological Threat and the US Response*" analyze in detail the biological and chemical threats to the US government in context of changing nature of terrorism in 1990s. The writers also investigate the motivations behind terror attacks to inflict causalities and injuries at such a level. Smithson and Levy provide a detailed account of 1995 Tokyo subway attack and response to the attack by presenting the case as an example for the US higher authorities that how can they save the US from such attacks.

Richard K. Betts in 'Israel, the '*Peace Process' and Nuclear Terrorism-Recognizing the Linkages*' discusses the change in threat and thinking about weapons since the end of the Cold War. Betts points out that nuclear weapons were the most vicious challenge in past, but now the fear of biological weapons have supplanted the nuclear weapons. Betts thinks that the US has been target to some state and sub state actors which are not happy because of policies of the US, therefore, the writer suggests that such thinking is a grave challenge to the security of the US.

Gavin Cameron and Jason Pate (2001) in '*Covert Biological Weapons Attacks Against Agricultural Targets: Assessing the Impact Against US Agriculture*'

present the agriculture related threats to the US and how US is responding to the problem. The writers present definition of agricultural terrorism and suggest that how agricultural terrorism is different than natural calamities and that how US can save itself from the potential threats of agricultural terrorism.

Bruce Hoffman in '*Change and Continuity in Terrorism*' presents a detailed discussions regarding dissemination of chemical weapons and argues that biological weapons can shake the basis of the nation within the US.

Cordesman Anthonty H in '*Defending America: Asymmetric and Terrorist Attacks with Biological Weapons*' concentrates on biological weapons threats from state as well as sub-state level. The writer focuses on two countries: Iraq and Russia and thinks that biological threats and methods are almost inexhaustible. Therefore, there is much vulnerability in the US in the field of bio-defence.

Seth Carus, Jonathan Tucker and Jeffrey Simons opine that bioterrorism has become a potential threat however cataclysmic events are not expected to be perpetrated by non-state actors. The writers are of the view that there is a widespread tendency to confuse state led bioterrorism to non-state bioterrorism.

Zafar Nawaz Jaspal opines in his article, titled '*Biosecurity and Pakistan*', that natural and man created pathogens both are primary causes of biological threats. Huge number of people is transferring from rural to urban areas in Pakistan which pose severe problems for transmission of pathogens from person to other person or rodent, vector or other to person.

Ali Talha Khalil argues in '*Pakistan's Bio-Preparedness With Regard to Biosecurity, Biodefense Strategies and Policy Measures*' that Pakistan, which has been a terrorism ridden country, is also facing serious problems of bio-terrorism in the near future. The writer that the policymakers should understand the severity of

the problem of bio-terrorism and should adopt efficient techniques of bio-defense to cope with the threats of bio-weapons in addition with developing strong bio-response procedures, bio-defense relevant research and development and policy measure and capacity building.

Amer Ikram is of the view in '*Biosafety & Biosecurity in Pakistan*' that potential of biosecurity can be divided in the selection of agents, legalized transportation, utilization of appropriate equipment, optimization of risk management, regular view and rigorous oversight. Precaution revolves around control lists, safe practices, personal surveillance, access control, proper maintenance of record and authorized transportation.

Ali Talha Khalil and Zabtra Khan Shinwari suggest in '*Threats of Agricultural Bioterrorism to an Agro Dependent Economy; What Should be Done?*' that agricultural sector is the backbone of Pakistan economy. The writers are of the view that agriculture of Pakistan is highly vulnerable to potential germ warfare which can play havoc with overall cash crops in Pakistan resulting in disastrous downfall in GDP in Pakistan. Therefore, the government of Pakistan should increase its preparedness and security risk management.

Amir Ullah Khan opines in '*Health Security Governance and Zoonotic Diseases in Pakistan: The International Health Regulation (2005) Angle*' that International Health Regulations (IHRs 2005) should be an ideal initiative in controlling zoonotic diseases. This regulation suggests that all the member states should make and execute laws to ensure the health safety of their citizens. Pakistan is a member of this regulation and has framed laws for protection of its citizens but unfortunately, Pakistan has not been able to implement and execute these laws properly. The writer suggests that Khyber Pakhtunkhwa is especially vulnerable than

other provinces of Pakistan in controlling the spread of dangerous and infectious diseases. Ajay Lele in '*Bio-Weapons: The Genie in the Bottle*' endeavours to study various problems regarding the scourge of bioterrorism in a historical context. This book addresses the requirement of rash assessment and realistic assessment and endeavours to develop in the context of India centric model of threat. This book discusses many international instruments for disarmaments that have been developed internationally to deal with the problem of bioterrorism, especially in the context of the geopolitical context. The main feature of this book is the case studies of actual bioterrorism in the development of hypothetical situations which the world may have to face in future. In other words, this book is a great effort to predict the future of bioterrorism; therefore, it offers a good insight into the policymakers at the global level to decrease the chances of bioterrorism.

The notion of an international regime for the prohibition of biological weapons is not commonly mentioned in the literature. In this thesis it is used to emphasize the interconnection of international relations with the sphere of natural sciences. It basically combines the conceptual apparatus of the theory of international regimes with the area of the prohibition of biological weapons. The International Biological Weapons Regime in this field, the most commonly used terms are such as Biological arms control regime (Beard, 2007) (Becker-Jakob, 2011), the biological weapons prohibition regime (Kelle, 2007), the biological and chemical weapon regimes (Enia & Fields, 2014), BWC regime (Zanders & Smithson, 2011) and BTWC regime (McLeish & Nightingale, 2005).

1.10 Organization of the Work

Chapter one discusses the biological threats and explains the categories of biological agents. This chapter introduces the research area, explains the problem

and also explains the methodological approach chosen. This chapter will also give an overview of literature. The historical use of biological agents that provide the understanding of the early years use of biological weapons. The countermeasure strategies at the global level, such as suppress the threat of bioterrorism and the readiness of the States against the threat of biological weapons. Final section particularly focused on countermeasure strategies of individual state such as Pakistan.

Chapter two explores the overall idea of the usage of biological weapons in ancient times and also briefly describes the history of biological warfare. **Chapter three** the chapter focuses on the biological agents challenges while the first part is mostly focused on the list of the most common biological agents in the relevant period, together with a description of the most striking moments of their use. This chapter focuses on the use of biological weapons by the State and programmes for the development of biological weapons of selected States, which in fact constitutes a violation of these agreements.

Chapter Four: This chapter is an assessment of the theoretical perspective of regime theory, and the basis for the formulation which shed light on salient aspects of regimes. The aim of this chapter is to take a closer look at the theoretical footing of regime theory. In addition, this study will analyse the behaviour of states; specifically, it pursues the insight of regimes reflects the growth in the area of international institutions that are firmly rooted in substantial interests of states. How international institutions, for example, regimes affect the behaviour of non-state actors and the states? How the effectiveness of the international regime on the prohibition of biological weapons? Which aspects located within the institution for determining the stability and the success of international regimes? Generally, while

joining the international regimes occasionally states sacrifice its national interests so as to protect long span cooperation among states.

Chapter Five: This chapter pursues to explain how the international regime contributed to constraining the use biological weapons. This study basically combines the conceptual tools of the regime theory specifically with the area of the prohibition of biological weapons. This deals with the analysis of the two basic pillars underpinning the international regime for the prohibition of biological weapons, the Geneva Protocol and the Convention. Substantially this is an assessment of effectiveness of regime theory that explains whether a regime increases cooperation among states and success of the regime in terms of fulfilling the purpose for which it arose. This chapter will also examine regime theory as a theoretical framework which profoundly analyzes the effectiveness of the emerging regimes and evaluating how well implementation of the regime is carried out and what reform might be in future to countering biological weapons. The focus of the analysis is on the insights gained from this on the need to strengthen the regime how conferences and negotiations following the in the convention.

Chapter Six: The possibility of natural and deliberate outbreaks of biological agents is worldwide enormous threat. Since Non-state actors are utilize biological agents like viruses, bacteria and germs intentionally to produce fear or grounds sickness or cause mass casualties with the intention of to attain their purpose. This chapter discusses how the deterrence strategy applied for the countering of the biological weapons threat what part deterrence plays for discouraging and deeming the possibility of successful attack of biological weapons from non-states terrorist groups. Furthermore, it looks at how to reduce the threat of natural outbreaks of biological agents and raise awareness of biological security.

Chapter Seven: BWC play a major role in the controlling of biological arms and the first legally multilateral biological disarmament negotiation treaty. This chapter focuses primarily on the BWC role in the implementation of national legislation and the proper implementation of the convention provisions by its member states. It discusses how states parties during the past decades are connected through BTWC to address the substantial obstacle for the implementation of the Convention's provisions. Furthermore, it shows how Pakistan as a responsible state party of BTWC and has strong adherence to strengthen the BWC regime. It discusses how Pakistan remains to adhere to and implementing Convention's provisions entirely. The foremost objective of this chapter is to encapsulate the dangerous weaknesses in existing preparedness capabilities. Furthermore, this chapter attempts to give an overview of current policy tools which tracks and also regulate the deficiencies along with the implementation challenges that lie in future. Also, it explores the capabilities and policies of Pakistan to tackle and curb the rising biological threats. Particularly highlight the significance of existing policy tools and critical gaps in policy tools for countering biological threats, especially in Pakistan.

CHAPTER-2

HISTORICAL OVERVIEW AND BIOLOGICAL WEAPONS THREAT CHALLENGES

2. Introduction

The chapter gives an overall idea of the usage of biological weapons in ancient times and also briefly describes the history of biological warfare. The purpose of this discussion is to define how biological warfare was unique about its variety in comparison with other weapons. Use of microorganisms and toxins as biological agents used to attack the enemy is the idea of almost like humanity itself. The use of primitive forms of biological weapons has been known since ancient times and the middle ages and has common roots with chemical weapons. The use of biological weapons for war and terrorism is not a new idea; this type of weapon has been used for centuries (Barras & Greub, 2014). This is due to the fact that toxins of plant or animal origin were most frequently used in hunting or fighting.

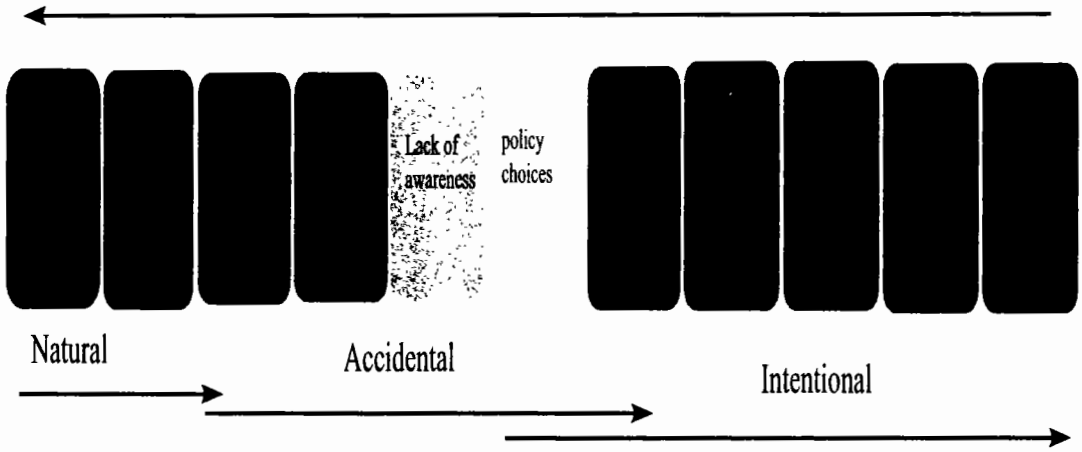
Biological warfare carried out while using biological weapons, the consumption of microorganisms, and toxins as biological agents used to attack the enemy (Arora, Gautam, & Arora, 2002). The biological weapons consist of substances obtained from living, pathogenic microorganisms or products thereof. The basic persistence of bio-warfare can be sense as Clark stated that biological warfare is an extremely aggressive activity that allows the one state against another, commonly by a military, using biological agents to disable, kill, and disorganize people to attain a large military goal (Clark, 2008).

The target of biological warfare is both the living environment (animals, humans and plants), as well as the inanimate environment (soil, water, air and human structures). Similarly, bio-warfare or germ warfare is the use of disease that taken

from toxin or organism which exist in the nature that can also use as a war weapon (Ryan & Glarum, 2008). They were used to smear the tips and blades of conventional weapons or to digest water sources. Biological weapons use in the old times is mostly reflected in the contamination of resources such as drinking water, whether contamination through carcasses of animals or humans. Moreover, in biological warfare, one of the most common and the oldest method was used sweeping corpses through the walls to the besieged cities.

Although, the use of biological weapons in the old times are problematic to differentiate whether the outbreak is naturally occurring of epidemics or the hostile attacker utilizes biological weapons against enemies. The whole time in human history, infectious disease like smallpox or others has created the highest threat to human lives and activities as well as increases the number of deaths and troubles. Approximately a dozen microorganisms deliberately convert into agent by utilizing bacteria, viruses or toxins that cause mass casualties. This problem has continued importance throughout history because it's difficult to assess whether disease outbreaks are an accidental release, natural occurrence or deliberate release of biological agents.

Figure 1: The spectrum of Biological risk



Source: The Global Threats from Naturally Occurring Infectious Diseases

These weapons can be engaged in numerous ways to gain strategic or technical benefits over an adversary, both as actual use and as a threat. Conversely, a historical review of different sources shows that the interest of ancient nations has persisted in the development of biological weapons. Furthermore, Guillemin (2005) argues that the history of the use biological weapons classifies in the three major phases. Accordingly, the first phase called offensive phase because in this phase production and development were considered legitimate, the second phase stressed on the treaties and bans.

Currently, defensive phase characterized by tensions among national interests and the international security objectives concerning people's trust in their governments and the control of scientific activities. However, the history of biological warfare must be undertaken with caution: it is indeed difficult to confirm the allegations and the claims of biological attack, because lack of reliable data

microbiological and epidemiological reports that confirm these alleged or attempted attacks, because of the propaganda that uses these allegations, and the secrecy surrounding the programs biological weapons. In any case, an examination of historical sources shows that the interest for biological weapons has persisted throughout history and is not about to die out.

2.1 Biological Warfare in Ancient Times

Some authors argue that the use of biological agents dates back to ancient times (Mayor, 2008). At the earliest stage, biological agent as microorganisms and toxins used to attack the enemy is the idea of nearly as older as humanity itself. Edgar J. DaSilva said that biological warfare is the intentional use of epidemics of plague, cholera, smallpox, typhoid fever and many other diseases which have always had a significant impact on people's lives that may kill or incapacitate humans or animals and also terrorizing civilians (DaSilva, 1999). Throughout human history, biological agents which cause infectious disease have posed the highest threat to human lives and caused the number of deaths and injuries during the warfare.

The older and most frequent method used, even though not much effective, was sweeping corpses with the plague which through over the walls of the besieged cities and the castles (Croddy, Perez-Armendariz, & Hart, 2002). They also dipped the tips of their arrows and swords in some kind of pathogenic substance like snake venom or feces before attacking to the enemy that was ancient method to infect the wound of the enemy forces. Consequently, this method also enhances the power of the arrows much more. The tribes from South America used all the toxins of the serpentines to poison the arrows and thus incapacitation their opponents or animals.

Fortunately, there is no firm historical evidence that provides an understanding of why the ancient transitional civilizations utilize abandonment of

poison as a weapon for creating violence. The most common method to practices biological weapons was reflected in the contamination of resources like drinking water, whether by carcasses of animals or humans. In it, an extensive list has recorded the use of substances that could lead to contamination with hostile's troops. Substances included, from poison to powder ointments from plants, animals or insects that caused the death (Mayor, 2008). Furthermore, biological weapons have always posed a danger to the health and lives of soldiers and the civilian population.

The historical incidents show that any fighting party ceased to rely on a natural outbreak epidemic or widespread intoxication in the enemy, but it has taken certain steps to assist in the occurrence of such an event the oldest known cases of the use of toxins as a means of warfare ensued during the 6th century. Additionally, the use of insects as a biological weapon was most common among the ancient Greeks. Likewise, the Greeks launch bee nests and bee hives as biological bombs against their enemies. They also painted scorpions and snakes as a symbol on the shields, in order to cause fear and panic on the opponents. Similarly, Adrienne Mayor also said that the ancient civilizations utilize abandonment of poison such as wide collection of poisonous plants, toxic chemicals and pathogens, venomous insects and reptiles were weaponized in ancient Europe, the Mediterranean, North and South America, the Middle East, North Africa, Central Asia, India and China, and indication for the practice and concept of toxic warfare can be traced back thousands of years, to the Hittites of Asia Minor (Mayor, 2019).

The use of primitive forms of biological weapons has been known since ancient times and middle ages and has common roots with chemical weapons. This is because toxins of plant or animal origin were most frequently used in hunting or fighting. They were used to smear the tips and blades of conventional weapons or to

digest water sources. The earliest recorded incident of drinking water poisoning occurred in Greece. Specifically, around 590 AD, many Greek city-states formed an amphitheater in order to protect the famed delphi oracle. During the First World War, the alliance attacked the heavily fortified city of Kirra that controlled the road from Corinthian Gulf to Delphi. Kirra had taken possession of some of the oracle territory and had mistreated pilgrims travelling to Delphi.

2.2 Scythian archers in the 4th century

In the beginning of the 4th century BC, the Scythians used poison for their arrows and they were able to hit targets around 450-meter distance and could also shoot 20 arrows in per minute. The preparation and processing of which was relatively complex. The most famous archers of antiquity who used poison in their arrows were the Scythian nomads of Central Asia. In fact, approximately in 400 BC, the Scythian archers polluted their arrows with decomposing human bodies to injure their enemies in battle (Robertson & Robertson, 1995). The weapons, which were used extensively in ancient times as carriers of biological agents, were the bow and arrow which were filled with poisonous substances. However, "an Indian manual of statecraft from the same era, the Kautiliya Arthasastra, advised rulers on the clandestine use of poisons, suggesting that the prohibition may have been more theoretical than real" (Kangle, 1986).

The reputation of the Scythians for equestrian archers has been enormous since early antiquity. In the 4th century BC, Kautilya, an Indian philosopher and consultant King Chandragupta, wrote the famous thesis "Arthasastra", one strategy and policy book (Prakash, 1993). According to writers of the ancient, India was particularly rich in deadly plants, drugs and reptiles. Poisonous weapons could be made from acorns and offal bugs to cobra venom. An ancient Indian text,

Arthasastra, is a strategy and policy book written by Kautilya who was in the service of Maharaja Chandragupta. This book is a clear expression of realpolitik, the realistic school of science and strategy. In Chapter 14 of this book, Kautilya lists a large number of poisoning substances and recipes that could be used for military purposes.

It is unknown how many Kautilya's recipes of biochemical has outcome or results as in many cases the materials and substances that are mentioned and can be mixed are rather imaginative and the result would probably not have been as expected. However the deterrent effect of the strange and ominous ingredients may possibly have been part of the book's appeal. Certainly, Kautilya himself mentioned to the valuable effects of propaganda by exposing the intimidating effects of his biological weapons to causing "terror among the enemy", but in many cases also, the reference to snake poisons and harmful plants is, according to modern researchers, real and their composition would result in the creation of influential biological weapons. The substances and materials that are mentioned and can be mixed are rather imaginative and the result would probably not be as expected, however the deterrent effect of the strange and awful ingredients might have been part of the book's appeal.

The poisonous plant weakened the inhabitants so much because of the symptoms of diarrhea that they failed to show serious resistance and were subsequently exterminated. The above historical records express that in various cases where biological agents were intentionally used by humans in combat and even in various forms. However, there are also a large number of strategies and cases that are more indirect forms of biological warfare. One of them was the pressure on the enemy to camp in lands that could have a detrimental effect on an army and which

has been a regular tactic in antiquity. They successfully repelled the Persian army, led by King Darius I, through their raids and ambushes. In addition, their ability to use the bow, the speed that the horse used to give them in combination with the unorthodox war methods they used, they forced the Athenians to employ Scythian archers to fight alongside the Athenian hoplites in the 5th century. In 331 BC, the Scythian equestrian archers managed to defeat even the armies of Alexander the Great.

The complex recipe of Scythian, as this poison was called, can be reproduced from some references by Aristotle. The first documented war use of these "classic" biological weapons occurred in 190 BC in the naval battle of Hannibal against King in Pergamus, the Hannibal used poisonous snakes in the fleets of Eurymedon (Zajtchuk & Bellamy, 1997).

2.3 Peloponnesian War (430 - 429 BC)

The Peloponnese War, which broke out in Athens in 429 BC, during this period first rumours of biological warfare appeared. Biological Warfare events were devastating in 430 BC, after the outbreak of plague in Athens in the Peloponnesian War. According to Thucydides, during the Peloponnesian War, the outbreak of the disease in the city of Athens which rapidly killed thousands Athenians and was ascribed to poisoning of the water wells by the forces of Spartans (Tucídides, Warner, & Finley, 2006).

2.4 First Sacred War (595–585 BC)

The first historical record of the use of poisoned arrows in a war conflict comes from the Greek-Herodotus from the 5th century BC. Herodotus described the Scythian archers from the Black Sea, who prepared the material for poisoning their arrows so that human blood and faces were added to the bodies of poisonous snakes,

and this mixture was rotten barrels. Such a mixture apparently contained mainly. In the sixth century BCE, the Greeks laid siege to the city of Krissa and poisoned its wells by using the potent herb hellebore. In addition to the use of poison arrows, another widespread method of biological warfare used in ancient times was the poisoning of drinking water and food supplies, a practice that was primarily applied to city sieges (Noji, 2001). In the 6th century, there were often cases of contamination of wells or canals by plants containing toxins. Similarly, in the sixth century Assyrians poisoned enemy's wells with the help of ergot. Ergot is known as chemical substance which produced fungal diseases. The Assyrians have infected their enemy wells with a slug of mercury sponge that contains chemicals material. Excluding for the nests and beeswax, sack with poisonous snakes or scorpions, which were launched into the ship or dropped between to enemy soldiers the ancient Greeks used in their battles.

The virus is believed to have been used several times for the same purpose in centuries earlier, as in the Elephant War in the city of Mecca. Around in 568 AD Ethiopia put a siege on Mecca through hundreds of war elephants but this invasion was failed because outbreak of deadly disease (Roy & Ray, 2018). While, Axumites army attacked Mecca, but the attack was not succeeded the event also described in five verses of Sūrat al-Fīl of the Quran (Marr, Hubbard, & Cathey, 2015).

2.5 Biological Warfare in Mid-14th Century

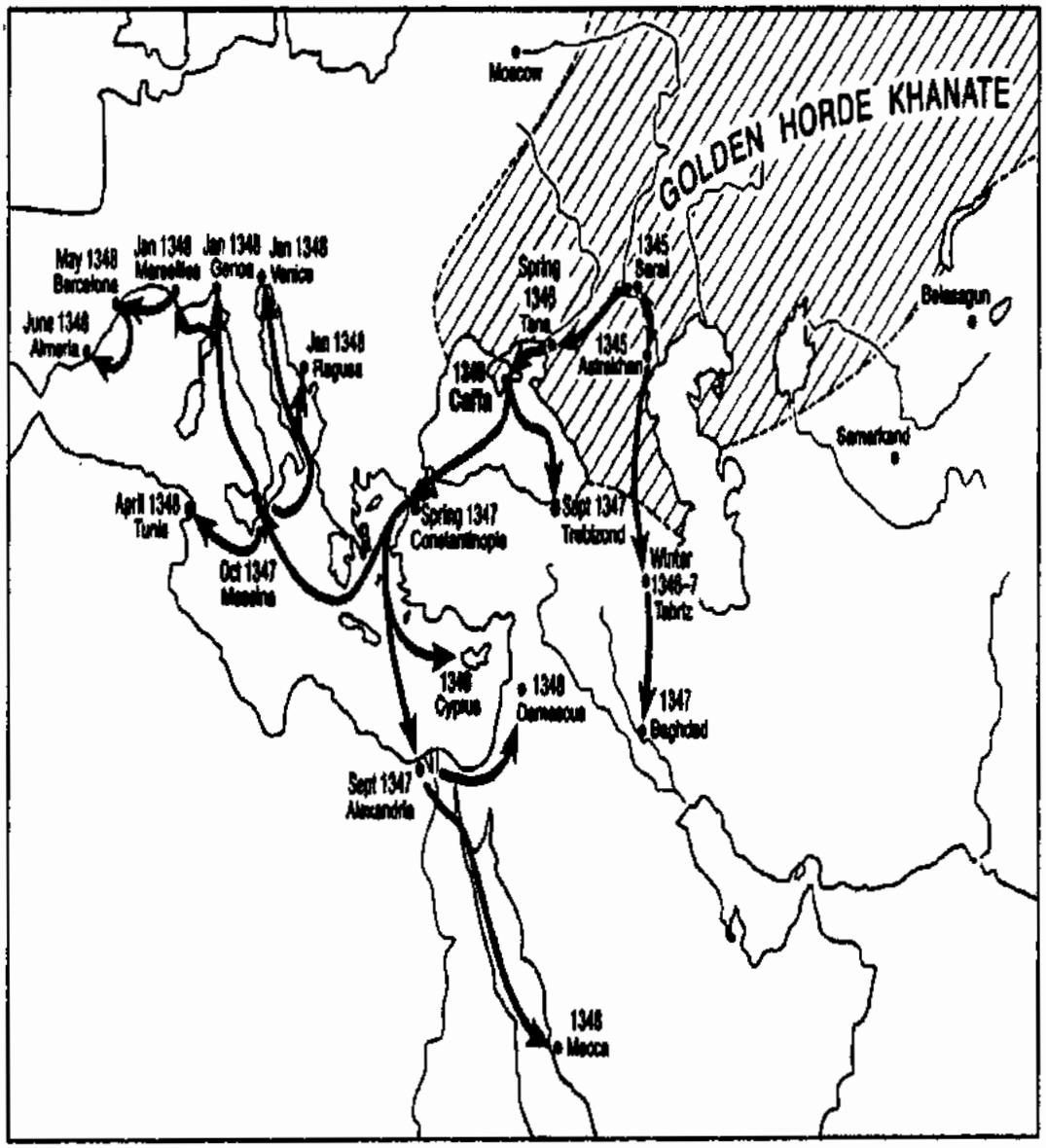
The discovery of the potential impact of infectious diseases on armies comes from the primitive use as weapons of dirt, human corpses and carcasses animals, and the principle of contagion. These were used to contaminate food, animal fodder, water supplies or military and civilian populations during wars that have marked antiquity, the Middle Ages and our contemporary era. One of the first attempts to use

fomites (term which designates all the objects that can harbor and transmit infectious disease agents) in a population illustrates the epidemiological problems raised by biological warfare.

In 1346, during the siege of the city of Caffa (Feodosija, Ukraine), a plague epidemic broke out among the attacking Tatars. The Tatars army of Kipchak khan Janibeg besieged the city of Caffa (Ebner & Tomecki, 2009). The transform their misfortune in an opportunity, they catapulted their own corpses into the besieged city to cause a plague epidemic there. Caffa is reasonable and reliable with the technology of that time, and despite its historical insignificance, the siege of Caffa is an influential and terrible after diseases were used as weapons (Stefan Riedel, 2004). They knew how to turn their misfortune against the besieged city by hurling plague corpses over the ramparts. A plague epidemic broke out in the besieged city and forced the defenders to surrender. After the city was taken over, pest-infected residents of Caffa fled to Genoa, Venice and other Mediterranean cities with sailing ships and spread the disease further (Ditrich, 2017). Some historians suspect that Caffa was the starting point.

The Christian merchants, who had been driven out by force, were so terrified of the power of the Tartars that, to save themselves and their belongings, they fled in an armed ship to Caffa, a settlement in the same part of the world which had been founded long ago by the Genoese"(Wheelis, 2002). This technique of catapulting the bodies of sick in the fortifications under siege was common at the time and is described in numerous works (Poupard & Miller, 1992). This epidemic has claimed lives one third of all Europe's population, or about 25 million victims. From a global point of view, we can say that the most effective use of biological weapons in history (Christopher, Cieslak, Pavlin, & Eitzen, 1997).

Figure: Chronology of plague spread in the mid-14th century



Source: Biological Warfare at the 1346 Siege of Caffa

2.6 Early Civilizations and Mythologies

Man from the beginning of its existence met poisonous plants and animals and gradually these poisons he learned to use for his own benefit. The best-known example is the use of poisons to catch prey more easily in the form of arrow poisons. But one uses toxins and used to protect against intrusive insects, when the fungi kill red flies, protection from dangerous creatures when the beasts were killed by poisoning baits, etc. Also known are cases where poisons have been used as a means to remove uncomfortable people.

The fact that in the ancient world the use of biological agents was not unknown even appears in mythological references in this regard. It is well known and accepted, after all, that myths usually revolve around a core of historical events and reflect the history and habits of people who live in one place at a particular time. Heracles is the first hero of Greek mythology who created the first biological and biochemical weapon. Using resin-impregnated arrows, which were then set on fire, Heracles created the first recorded biochemical weapon, combining the use of biological (resin) and chemical (combustion) agents. Then, Hercules, after killing Lerna Hydra, took the lifeless body, tore it, pulled out the bile, and dipped the spikes in his poison into arrows, thus turning them into deadly poisoned arrows, which he used of his enemies.

2.7 Sir Jeffrey Amherst

One of the most powerful and ruthless biological warfare attempts was that made by the English general Jeffrey Amherst against the Native Americans between the years 1754-1767. With the aim of (according to his own words) "remove this execrable race", he distributed as blankets the blankets used by English sufferers of smallpox. Since the Americans lacked antibodies against this disease, it was a matter of days

when an epidemic spread that killed more than 100,000 people. The idea of this plan is perfectly reflected and well documented in letters that Jeffrey Amherst exchanged with Colonel Henry Bouquet, although, it must be said, some historians believe that this smallpox outbreak may have arisen before by other means, leaving the attack. At the time of colonization of American and Pacific areas, events such as the one described above occurred on a regular basis, mainly due to the lack of defenses of the natives against new diseases.

Sir Jeffery Amherst gave the order to in- the blankets that defended Fort Pitt were given blankets contaminated with smallpox virus, which led to decimate the status of the defenders and the subsequent introduction virus among Native American tribes living in the Ohio River Valley. The English used the same tactics in 1763 faithful to America. In 1777, General George Washington issued caries for variolization (early form of vaccination against genuine of the Continental Army. He gave the order after what he failed to recharge Quebec because of the great the number of deaths of his soldiers from smallpox.

The English used the smallpox virus against the Indian population not immunized against this disease, thus causing a devastating epidemic. It was the demonstration of an explicit will of "ethnic cleansing." Indeed, Sir Amherst wrote to his NCOs: "You will certainly try to contaminate the Indians using these covers, but do not hesitate to use any method that can get rid of this awful breed". It can be said that the first time biological weapons were used for military purposes was in 1763 when the British armed forces fought against the troops of the first American colonies, which years later would proclaim their independence under the name of the United States.

2.8 Robert Koch germ theory in 19th century

The triumphal advance of the natural sciences in the 19th century and the success of researchers such as that of the German bacteriologist Robert Koch in the field of bacteriology and disease control also served in the early 20th century to make biological warfare more systematic and efficient. There is documentary confirmed evidence (the files of the cipher of the Foreign Ministry) that the German agents during the first world war the General Staff organized sabotage conducted, including the release of animal diseases and the decommissioning of cereal with fungi or toxins. In general, however, these attempts remained unsuccessful. There was a huge boom in bacteriology in 19th century. Robert's work is most important Koch and formulation of his so-called Koch postulates. There is to develop methods of cultivation and isolation of microorganisms. The formulation of Koch's postulate and the expansion of modern microbiology allowed isolating and producing stocks of pathogenic microorganisms.

2.9 Biological weapons in the 20th century

Admittedly, the chief use of biological weapons in the 20th century was directed against animals, not humans. The Germans implemented during the First World War a program of sabotage by disseminating agents of anthrax among horses and cattle in France, Romania, Spain, Norway, Argentina and the United States. The authors who reported this biological warfare attempt against the resources of the enemy in detail and in horses do not all agree on the success of the operation, but some claim that it has killed or weakened hundreds of animals (Robertson & Robertson, 1995). But whatever its success, the German anti-animal war program is of critically important to Wilson et al. (2000) because:

i. The first national biological warfare program;

ii. The first biological warfare program developed on foundations scientists;

iii. Only two confirmed events of the use of biological agents in the wartime;

iv. The first and perhaps the only extensive use of warfare agents biological by secret agents;

v. It was the first anti-animal biological warfare event properly documented (Wilson, Logan-Henfrey, Weller, & Kellman, 2000).

Japan conducted research on biological weapons in occupied Manchuria from 1932 to 1945, within a unit called "unit 731", grouping 150 buildings, five camps satellites, a staff of over 3000 scientists and technicians. While developing modern biological arms the Japanese killed almost 850 human (Regis, 1999). According to Harris (1992), at least 10,000 prisoners succumbed to experiences. Program 731 scientists by the Soviet Union during the Second World War admit to having conducted twelve large-scale experiments on at least eleven Chinese cities, contaminating food and water, homes, spraying agents by air. The plague was notably disseminated by fleas fed in the laboratory on infected rats, harvested, then dropped by air over Chinese cities (15 million fleas per attack).

2.10 Bioterrorism challenges in the modern period

In the 20th century and in the start of 21st century, bioterrorism has become an increasingly hazard to the security policy. Bioterrorism has appeal for contemporary terrorist because bioweapons can produce cheaply and easily moreover it has variety of unique features. Bioterrorism describe as "the illegal use of fungi, bacteria,

viruses, toxins, or further pathogenic essence in opposition to a government, the national population, domestic animals, crops, or whichever part thereof, in furtherance of societal, economic and political intentions" (Estes et al., 2004). Bioterrorism is purposeful utilization of germs and toxins to produce death and disease in human being, crops and domestic animals. Bioterrorism may be circulated through sprays or foodstuff and water pollution.

The terrorism via deliberate spread of biological agents has grown and also has innovative sort of consequences to the health and security. Anthrax attacks of 2001 indicated as "a vital shift in the nature of the biological terrorism threat"(Parachini, 2001). Anthrax outbreaks in September, 2001 crystallized the perception that terrorist are willing to victimize the lives of citizens so as to lead their plan. The danger must therefore be taken into account, in particular after September 2001, but as already mentioned, this danger was even before that date. Nowadays it is essential to worry about the threat of biological attack through the terrorists. In the modern period terrorist groups have planned to use new kind of the weapons such as biological weapons. Two different incidents indicate in United States terrorist groups utilized biological agents such as the salmonella used by the Rajneeshee cult and the anthrax attacks.

2.11 Historical incidents of bioterrorism

The attempts and threat of using biological weapons by terrorist against humans has increased in recent years. There were three deep rooted efforts of using biological weapons by terrorist groups these are such as the salmonella used by the Rajneeshee cult in 1984, anthrax used by the Aum Shinrikyo in 1995 and the anthrax attacks in the United States in late 2001. In addition, there have been claims that terrorist has to

cultivate biological agents in addition to many false claims or hoaxes that biological attack has been executed.

2.12 Rajneesh Attack in 20th Century

The only victorious modern biological assault in the United States, prior to the proceedings of 2001, was in 1984. Rajneeshee sect in The Dalles, Oregon utilized *Salmonella typhimurium* to fatal salad bars at ten local restaurants. The group first obtained the salmonella bacteria from a medical supplier and used their own laboratory equipment and university – trained microbiologists to culture it (Salerno, Gaudioso, Frerichs, & Estes, 2004). Hence, Rajneesh was the paramount recognized biological attack assault in the United States. Up till then, there had been most serious case of biological weapons terrorist attack was occured in September 1984, when the religious sect Bhagwan Shree Rajneesh contaminated food in restaurants salmonella Typhimurium, resulting in 751 Cases of salmonellosis, nacquitted did not die from the infected. This case is one of many attempts to poison and thereby incapacit the voters in the forthcoming elections.

The Dalles, "Oregon, by using *Salmonella typhimurium* to sicken voters and swing an upcoming election " (H. S. Parker, 2002). Of these, only the "Rajneeshees use of a crude biological weapon resulted in significant nonfatal casualties, causing 45 to be hospitalized and 751 to fall ill" (Wetter, Daniell, & Treser, 2001). In after 1984 local public health executives accomplished the outbreaks were accidentally caused by infected food handlers. It acquired only four days for local health care facilitators to recognize '*Salmonella typhimurium*' as the cause, but more than a year for the Centers for Disease Control and Prevention to dossier its final statement and prove that a solitary strain had caused all of the sicknesses. The attacks existed unrecognized to bioterrorism until the sect splintered from within. In September

1985, the Rajneesh director publicly indicted others in the group of misconduct and poisonings. "The Federal Bureau of Investigation and local law enforcement found an open vial of *Salmonella enterica* Typhimurium that matched the strain that was found in the salad bar poisoning cases" (Bernett, 2006). The Oregon Attorney General focussed a combined task force among the Federal Bureau of Investigation and state police that ultimately resulted in the group's termination.

An amalgamation of sluggish medical inspection and meager law enforcement incorporation with the public health system concludes a lack of vigilance for biological outbreaks. The Rajneesh cult attack was "the first case to reveal the vulnerability of civilian populations to chemical, biological, radiological, or nuclear terrorism" (Tucker, 1999). Consequently, "Biological Weapons Anti - Terrorism Act of 1989" was formed and accepted (J. Lewis, 2002). Similarly, it transformed law enforcement and public health outlooks concerning bioterrorism, but did slight to precede bio-security awareness in the United States.

2.13 Aum Shinrikyo

Nobody imagined that these outlawed weapons could be used against civilians. The initial rethinking process and public awareness of this new form of threat was triggered by the 1995 attack on the Aum Shinrikyo cult chemical warfare agents in the Tokyo subway. After the unthinkable has happened, it has become conceivable. "the Aum Shinrikyo cult, using a variety of front companies, high-pressure fund-raising, insurance fraud, and other criminal activities, grew to an organization of some 10,000–60,000 members with assets totalling between $300 million and $1 billion dollars" (Rosenau, 2001).

According to Mayer "Aum Shinrikyo shows that extremely dangerous and lethal terrorism" (Mayer, 2001). Ian Reader's anylsis that "Aum case demonstrated,

religious movements can become violent primarily because of internal factors and because of the characteristics and dynamics of the movement itself'(Reader, 2002).

The CBRN terrorism was caused by a great Japanese sect called Aum Shinrikyo, who attacks terrorized imperial Japan. Fortunately, none of the biological attacks was successful, and no loss of life was recorded. In April 1990 she tried to attack the Japanese Parliament and its surroundings. Modified vehicle, using exhaust gases, she tried to spread botulinum toxin. They wanted the same car to disrupt the planned wedding of the Japanese Crown Prince. Botulinum toxin was to be used again.

The city of Sverdlovsk (now Yekaterinburg) is located 1,400 km east of Moscow and in the late 1970s its population was 1.2 million inhabitants. In early April 1979, a leak accident occurred anthrax-inducing spores into the atmosphere. About this accident with fatal consequences, however, the world learned many years later.

The end of the year Soviet medical journals admitted the existence of anthrax in domestic cattle in the spring of 1979 arguing that human infections occurred after ingestion of contaminated and contact with infected animals. Western scientists failed until 1986 visit the site of the accident; then they met four doctors who worked in Sverdlovsk during the epidemic. Back in 1988, when two of these doctors came to the US, they claimed it was ingested by contaminated meat. The first in 1992 Boris Yeltsin in a private interview admitted for the first time that in this case there was a misinformation whose.

Table 2: History of Biological weapons (modified by: U.S. Department of Health and Human Services, 2007)

Mediaeval Time	**Scythian archers**	**Dipped arrow heads in manure and rotting corpses to increase the deadline of weapons**
1346	Crimean peninsula, B lack Sea and Italy	Catapults to hurl the plague-infested bodies
1518	Latin America	Smallpox by Spanish
1710	war between Russia and Sweden	Russian troops used the cadavers of plague victims
1767	English general, Sir Jeffery Amherst	Blankets infected with smallpox to Indians who are helping the French defend Fort Carillon.
1930s & 1940s	Japan	Fleas infected with plague in China and Manchuria
1942	Gruinard Island, Scotland	British conduct anthrax tests on sheep. Today, the uninhabited island is still believed to be infected with anthrax spores.
Nov. 25, 1969	U.S.	The entire U.S. arsenal is destroyed by 1973, except for seed stocks held for research purposes.
1979	Soviet city of Sverdlovsk	Outbreak was caused by an accidental release of anthrax spores from a nearby suspected biological weapons facility
1980-88	Iran-Iraq war	Iraq was forced to halt its biological, chemical and nuclear weapons programmes. The U.N. Special Commission (UNSCOM) begins post-war inspections
1984	Rajneesh cult, USA	[redacted] poisoning
1993	Aum Shinrikyo cult, Japan	Anthrax mist spray from the rooftop in Japan killing many.

2. 14 The Anthrax Attacks in 21st century

Biological terrorism is relatively rare and has not been devoted to more attention. This notion changed after the 11 events September 2001 and subsequent incidents with envelopes containing B. anthracis. At the same time the terrorists were also arrested in United Kingdom, Manchester in 2002 , the terrorists product the ricin and there plan was to attack the Russian embassy through the toxin (Mishra & Trikamji, 2014). The case of an anthrax letter is a very well-known and people suddenly began to realise biological agents vulnerabilities. The use of *Bacillus anthracis* through the U.S. Postal System marks the first biological attack on American soil in the twenty-first century (Ellis, 2014). The attacks resulted, in11 inhalational cases and five deaths and substantial disruption to the important public services and to government in the whole country (MacIntyre, Seccull, Lane, & Plant, 2006).

These incidents occurred shortly after the attack on the World Trade Center. The addressees of these letters were mostly of the politicians and journalists. On 18 September letters were sent containing anthrax spore powder into a television station NBC, New York Post and others editors. The other two letters with the spore powder- the anthrax was sent on 9th October in Washington, to Congressmen Tom Daschle and Patrick Leahy. In October 5, 2001, Robert Stevens, who was working at Florida tabloid as a photography editor died of inhalational anthrax (Canedy & Wade, 2001). This case, was investigated by the FBI and give the codename this case as "Amerithrax" and this was one of the largest and most complex cases in the history of the investigation. This incident was a wake-up call to Americans and

policymakers identical, and provided as a tipping position in national security policy that led to numerous of the bio-security initiatives.

The 2001 U.S. anthrax attacks "tragically confirmed the importance of disease surveillance, since the speed with which doctors recognized the signs of anthrax infection determined whether patients were treated immediately or sent home, only to return later to die"(Chyba, 2002). In this way the 2001 U.S. anthrax attacks, otherwise known as Amerithrax, signalled "a fundamental shift in the nature of the biological terrorism threat" (Chyba, 2002). It also suggested the importance of enhancing local defenses, particularly since "many tools used to address natural disease threats will be needed to respond to an intentional attack"(Chyba, 2002). A comprehensive evaluation shows the United States was remote from having a complete national biosecurity approach despite the lessons of the 1984 Rajneesh assaults.

Conclusion

The history of biological warfare is almost as old as the history of war itself and is full of various incidents that exemplify the use of living organisms or products to fight the enemy, such as using arrows with natural toxins. The history of mankind records the constant confrontation of man with the occurrence of devastating epidemics. Much of the human quest has been to explain and address the great calamities translated into the spread of disease and the configuration of epidemics and pandemics. From ancient times, human drama has been reported in the face of the scourges caused by disease. Studies and reports often emphasize the association between epidemic and pandemic events and environmental and social transformations, considering the focus on environmental quality.

The complexity of the man/nature relationship favors deep imbalances, contributing to the occurrence of epidemic scourges, generating important conditions for shaping risk contexts such as environmental degradation, wars, hunger and large-scale poverty, among others. History also records the use of infectious agents as biological weapons. The use of chemicals and biological agents as a military strategy of domination is not a recent warfare. Historical studies affirm or suggest various situations of the use of patient corpses as a source of water contamination, aiming at the decimation of populations. In industrial society, some countries have invested in the strategic improvement of biological arsenals as an instrument of global domination policies through the creation of official programs for the use of biological weapons.

The ethical part of the use of biological agents in the war was an issue that has been so intensively discussed by philosophers, generals and politicians of ancient times that it still concerns military experts and scholars today which proves that ethical questions about biological weapons are not exclusively present a modern phenomenon. The use of biological weapons in wars is an ancient sabotage strategy. Even before the creation of war programs, they began to study these agents during World War I; pathological microorganisms were used empirical way in great strife. Historically there are several reports; officially one of the first would be about the use of the smallpox virus by British forces, around 1763, in the French-Indigenous war in North America. Unlike the biological wars intended to cause a large number of deaths the main focus today is bioterrorism, which usually makes minor attacks with real impact small but with disturbing effect.

CHAPTER-3

AN OVERVIEW OF POTENTIAL BIOLOGICAL AGENTS AND THE DEVELOPMENT OF BIOLOGICAL WEAPON PROGRAMS

3. Introduction

The previous chapter describes the usage of biological weapons in the ancient times. It also describes biological warfare is characterized as an attack by biological weapons, which is prepared, organized and executed by the State against another State or their group. This chapter introduces two basic agreements firstly, the first part of the chapter focuses on the biological agents challenges while the first part is mostly focused on the list of the most common biological agents in the relevant period, together with a description of the most striking moments of their use.

There is an extensive history of nations and peoples applying biological agents as weapons. Consequently, these are much easier to produce, handle and transport than nuclear or conventional weapons, and they are much cheaper. Secondly, the second part of this chapter focuses on the use of biological weapons by the State and programmes for the development of biological weapons of selected States, which in fact constitutes a violation of these agreements. Biological agents and toxins are living organisms, existing in nature, available in a variety of forms like viruses, bacteria and rickettsia (bacteria that can live inside host cells) (Raber, Jin, Noonan, McGuire, & Kirvel, 2001). Hence agents are normally originated in natural world; however it is probable that they possibly be changed to enlarge their capability to grounds sickness.

Biological agents hazard are a global problem and have accompanied mankind since its inception, in times of war and peace. Biological agents are live pathogenic microorganisms or their toxic products which are capable of causing infectious

diseases, death or incapacitation of humans and animals, or which may cause mortality and damage to plants. Biological weapons are unique in their ability to inflict large numbers over a wide area, with a minimum of logistics, being virtually undetectable.

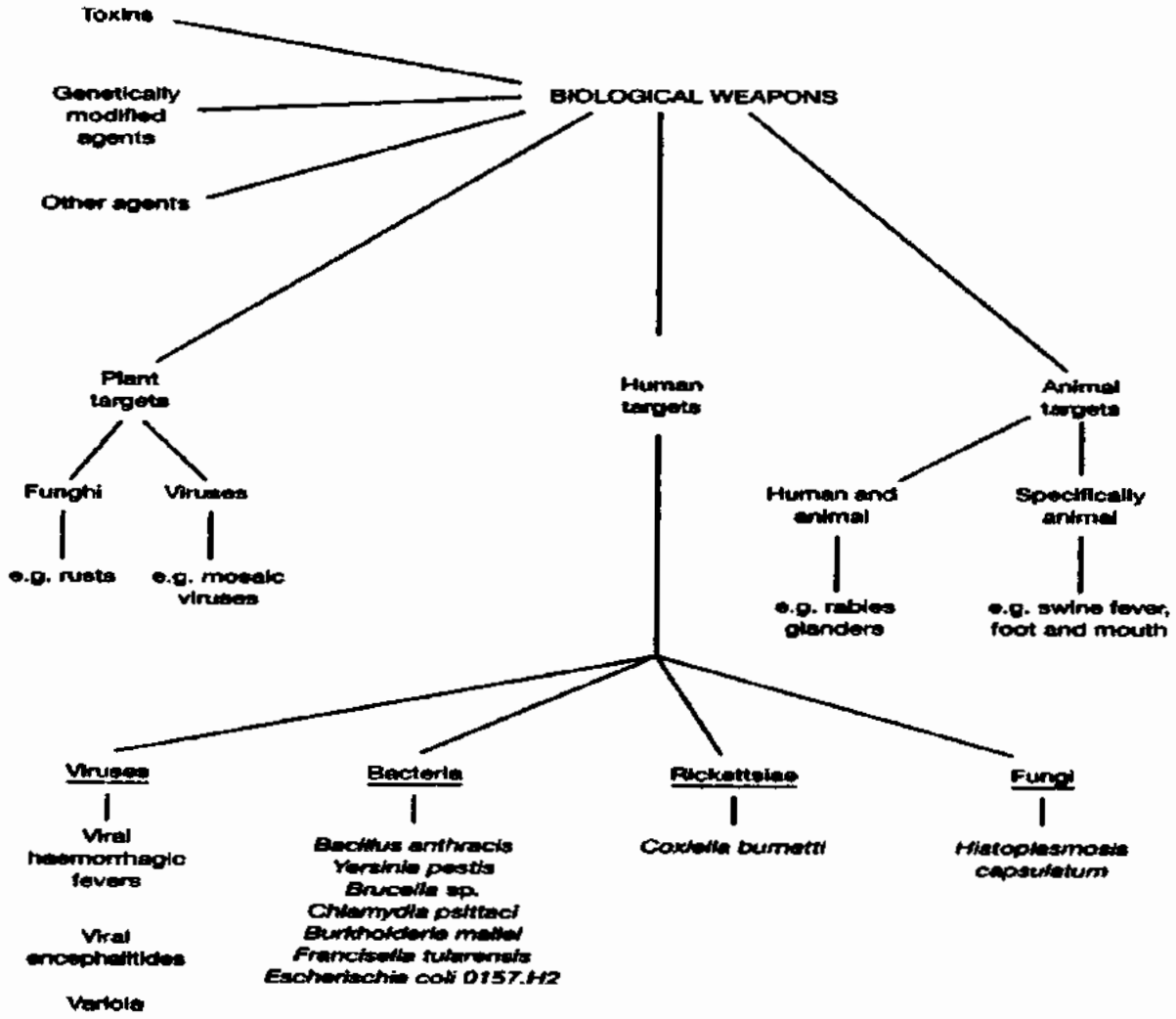
Usually biological weapons are characterized according to their purpose, for example the same biological agents produced for the purpose of military use are considered to be biological weapon, but if they are demonstrably kept for peaceful purposes, the weapon is not. If we consider division by military standpoint, it is more important to divide weapons according to their target, for instance against people, farm animals or plants. From a technical point of view, an agent or toxin placed in suitable ammunition or other device is considered a biological weapon. From this point of view, the envelope containing Bacillus Anthra CIS is therefore not considered a biological weapon.

A biological attack can take several forms. Some forms of attack are classified according to the type of microorganism or poison used, others arranged according to the way weapons are spread against the attacked target. The fact that the attack is being prepared, organized and implemented, its possibilities and extent of attack also plays an important role. These circumstances are decisive for the means by which an attacker can choose what they can afford in both financial and professional terms and what means they can use to spread biological material.

Nowadays, the idea is that biological weapons are its products modern times, as their development requires advanced scientific knowledge of epidemiology, biology and chemistry. Although as a concept of biological warfare has been relatively recently identified, the use of biological. Factors for military purposes were well known widespread since antiquity. Various biological and toxic agents substances, in their

natural form, were used for war purposes, too before man can grow viruses and bacteria in the laboratory. The goal then and now remains the same: to gain an advantage in battle and the final dominance over the opponent.

Figure 3: Categories of biological agents



Source: White, S. M. (2002). Chemical and biological weapons. Implications for anaesthesia and intensive care. *British journal of anaesthesia, 89*(2), 306-324. https://www.sciencedirect.com/science/article/pii/S0007091217371118#fig4

3.1 Indicators of possible use

When using a biological weapon, a distinction must be made between targeted and untargeted use. Targeted use means an attack on individuals or groups. An untargeted use goes against the general population. A dangerous property of biological warfare agents is their silent, invisible and imperceptible spread. In compare to conventional weapons, biological agents can also be transported easily and unobtrusively. Metal sensors and X-ray systems cannot identify biological weapons any more than detection dogs. Unfortunately, the physical early warning systems currently available do not yet provide reliable evidence. Nobody would notice if, for example, anthrax spores were blown into the intake pipes of the air conditioning system of a shopping center or office building. The following night, hundreds or thousands of people in a wide area would have a rapidly developing, unusual disease and die within days of bloody coughing, acute respiratory and heart failure .

A biological weapons attack could be carried out covertly; because biological warfare agents are invisible, odorless and tasteless. The time delay between the release and action of a biological weapon increases the perpetrators chances of escaping undetected after an attack. The effects of an attack with conventional weapons are immediately apparent. In the case of an attack with biological weapons, however, several days of incubation usually pass before the first victims fall ill with the living germs. Within the incubation or latency period, contaminated people or animals can move away from the exposure site and thus contribute to a further spread of the biological warfare agent. Important indicators are following which may be indicating biological weapon attack has occurred these are:

- Sudden occurrence of unexplainable illnesses and deaths;

- Disease which not typical belong to the geographic region;
- Patients with the same disease;
- Synchronized disease courses;
- Cases of illness with an unusually disease;
- Epidemiologically unusual transmission paths;
- Cases of illness in non-contiguous regions;
- Intelligence information

3.2 Dissemination of biological agents

The biological agents disseminated in the environment are the main instruments of bioterrorism. Disseminating biological agents is the path taken by the biological agent from the source exposure to the host. Knowledge of agent transmission mode of biological importance is of fundamental importance for the application of measures to contain the spread of the pathogen. To be a biological agent, microorganisms must be able to penetrate the human body and cause disease. Biological agents can enter the body in a variety of ways and ways. This may occur for inhalation agent in the form of infectious aerosols, ingestion contaminated food or drinking water, or through the skin through infected vectors of such as tick, flea, fly, etc., Or also by surface contamination which passes Biological agents through damaged skin cover or absorbed through intact skin.

The following dissemination paths of dispersal of biological agents:

- Inhalation (inhalation of biological warfare agent aerosols)
- Ingestion (consumption of contaminated drinking water and food);
- Injection (targeted attack, whereby a biological warfare agent is injected);
- Skin absorption (skin injuries);

- Indirect routes via insects;
- Damage to the animal or plant population;

3.2.1 Aerosolization

The most effective way of spreading biological agents appears to be an aerosol cloud of microscopic particles. The aerosol spread of agents by air an aerosol consists of solid or liquid particles containing living pathogenic microorganisms. The particle size in the aerosol ranges from 1 to 5 microns. This ideal size helps the particles penetrate deep into the lower respiratory tract, into the lung vesicles, alveoli, or into the terminal bronchi that enter into them. Particles of a few tenths of a micrometre are taken out of the alveoli and the entire respiratory tract again by a stream of air. But particles smaller than a quarter of a micron in size are easier to trap in the alveoli due to the swirl (Brownian motion). Since richly perfused lungs, the biological agents penetrate into the bloodstream and further distribute blood throughout the body. Such aerosol has other advantages, and that is usually invisible, tasteless, odourless, has a delayed effect, the initial symptoms are non-specific, it is hard to detect and find efficiency (efficacy can be demonstrated on the example of comparison biological agents with chemicals in which for application of the same amount of anthrax would be lethal concentrations in size up to a thousand times greater than for sarin). Furthermore, the settled matter could again stirred so as it was after the accident in 1979 in Sverdlovsk, when members of the liquidation crews were infected with anthrax while trying to wash contaminated areas with a stream of water.

On the other hand, liquid suspensions, although relatively easy to manufacture, are difficult to distribute effectively as an infectious aerosol. For

instance, a biological agent sprayer that is used in agriculture could be used to scatter. But that would be a misconception, because if the aircraft sprays liquid, there is no aerosol, but sprinkling. For this reason, it is not possible to spray anything with fans in the subway, tunnels or air conditioning. It would also be a misconception to try to disperse an infectious fluid reservoir by an explosion from an aircraft. However, the biological agent in the form of an aerosol could be expanded, for example, by means of a dispersion device which would be attached to a movable device. The extent of the affected area would then be affected by natural conditions. It should be noted that these wet substances must be stored refrigerated until use and also lose their viability and efficiency over time. In addition, since a large amount of energy is required to aerosolize the droplet in an appropriate magnitude of the extent of airway infection, more than 90% of the microorganisms in liquid form would be destroyed during the aerosolization process.

3.2.2 Dry powder

Another situation would arise using a dry aerosol dispersed as a fine powder. A dry powder with microorganisms or toxins is easier to store, process and spread than a liquid suspension, but is much harder to manufacture. Drying and grinding bacterial or toxin agents requires complex and costly equipment that is beyond the reach of most countries, let alone terrorist groups. However, to make such powder could hit the victim on a larger area, it would be very fine, homogenized, light to float while the sediment should not be hygroscopic, it was allowed to be solidify into heavier lumps and had would also serve as a suitable carrier to protect the life of the microbes. The agents would be adsorbed on the powder and protected by some protective supplement against natural conditions. A protein coating could

be applied as a protective supplement. But for non-state terrorists to get this material would be very difficult.

3.2.3 Resistance of Biological agents in the environment

Most microbial and toxic substances are highly sensitive to the environment. Much depends on temperature, sunshine, drying, the shape of the microorganism, kinetic energy, the method of atomisation or the composition of the medium in which the agents will be dispersed. It also depends on the size of the micro droplets, when the axes of the motive ratios change during drying. In principle, the stability and persistence of non-spontaneous agents can be enhanced by a technique called "microencapsulation" which involves coating microscopic particles or droplets containing a pathogen or toxin with a thin layer of protective material.

3.2.4 Water or food contamination

Ingestion is most often consumed by contaminated water or food. This way of spreading the Biological agents would be effected by entering food stores or water treatment plants. Wells or small water sources would be possible and easy to reach, but for the deliberate contamination of, for example, water reservoirs, a significant amount of agents are needed because they dilute considerably in water. Therefore, it would be advantageous and effective to use a disease that is able to survive in the aquatic environment for a prolonged period and in which a small number of microorganisms, such as cholera, are sufficient to cause disease. An important factor is the water exchange and mixing. Concerning food, they can also serve as a breeding ground for Biological agents. However, there is a risk that not everyone who consumed the food may get sick because the Biological agents may not be evenly distributed.

3.2.5 Direct application

Biological agents can spread through infected vectors, especially insects such as mosquitoes, ticks, lice, flies, etc. which has also been misused (e.g. for the spread of plague by the Japanese army in China during World War II). Transmission occurs by contamination at the site of injection with saliva of the insects during blood suction, or if insect excrement is injected into the damaged skin. The disadvantage of this method would be the terrorists would feel in producing and storing the vector.

3.3 Surface contamination

Infected linen, clothes, bedding or tableware can be used to transfer the agent. This mode of transmission is not very likely, as the skin is a relatively good barrier against the ingress of biological agents into the human body if it is not broken. Mucous membranes or conjunctiva can also serve as an entrance gate.

3.4 Categorization of Biological agents

Given the experience and risk of attacking Biological agents, the capture and organization of population protection against a terrorist attack is entrusted to the use of Biological agents by the collective designation CDC headquartered in Atlanta, USA. The CDC divides Biological agents into three categories (A, B, and C) according to their probability of use and hazard. Biological agents are alienated into three groups depending on how effortless they can be spread and the brutality of sickness, poor health or death agent's grounds. Centers for Disease Control and Prevention categorize biological agents into three categories establishment proceeding on their strength to cause wide-ranging public health emergencies.

These are following:

1. Category A
2. Category B
3. Category C

Category A agents are measured top hazard and Category C agents are measured growing fear for sickness. Critical Agent List categorizes a comparatively ranking of feasible biological agents in the direction of used in biological warfare or else in bioterrorism. This list was shaped by the Centre for Disease Control and Prevention in combination by means of armed, intelligence, health and medical agencies:

3.4.1 Category A

Category A includes those pathogens that are easy to spread or are transmitted from person to person. A high percentage of infected people fall ill and their illness often ends fatally without timely therapy. These pathogens have a high panic potential in the population and place high demands on the healthcare system. This category agent contains of top concern agents for the reason that these agents are mainly probable to grounds fatalities, produce horror and involve a fastidious public health reaction. These high potential agents consist of organisms or toxins that create a hazard towards national security for the reason that organisms or toxins can be spreader as of person to person and outcome is elevated death rates, or contains high potential to cause public distraction. The most attention is paid to selected pathogens and toxins in terms of their availability, resulting mortality, population health impact, distribution potential, and subsequent transmission.

3.4.2 Category B

Category B agents are the second top concern agents, as well as individual agents that may perhaps pollute water or food. In category B, agents are grouped that are relatively easy to spread and cause moderate morbidity and mortality in the population. These pathogens make specific demands on diagnosis and surveillance. Agents classified in category B are not as readily spread as category A pathogens. The mortality caused by the disease is also not as high as in

category A, but they are still capable of causing panic, loss of life and material damage. These category gents are comparatively simple to circulate, and need enhanced disease assessment and investigating capability. Many of these agents, such as brucellosis, glanders and ricin, were either weaponized by state-sponsored programs in the past, or utilized successfully in biological warfare or terrorist incidents. These agents are quite easy to circulate and outcome in low death rates. This group includes, for example: Brucelosa, Glanders, Ricin, Cholera, Q fever, Yellow fever, Shigela, Salmonella sp., Escherichia coli

3.4.3 Category C

Category C includes those pathogens that are regarded as "emerging pathogens". In the future, it may be even easier to use through genetic modification. These pathogens are available, easy to produce and use, and are characterized by high morbidity and mortality potential. This category agents are the third top concern agents, in addition to rising pathogens that could be weaponzed in the outlook for the reason that of the comparative easiness of accessing, manufacturing and spreading the agents. These agents consist of rising disease agents that might be root for distribution in the viewpoint, for instance Nipah virus. Furthermore, In this group agents are emerging pathogens and toxins that can be designed for mass spread in the future because they can be genetically modified. They are easy to manufacture, expand and have the potential for high mortality and morbidity. This group includes, for example: Nipah virus, Hantavirus, SARS, HIV Virus avian influenza (H5N1 variant) or MDR-TB.

Table 3; **Classification of possible biological agents and toxins being used as bioweapons and be used for bioterrorism purposes**

(Classification according to CDC)

Category	Disease	Agent	Agent Type
A	Anthrax	*Bacillus anthracis*	Bacterium
A	Botulism	*Clostridium botulinum toxin*	Bacterial toxin
A	Plague, Pneumonic	*Yersinia pestis*	Bacterium
A	Smallpox	*Variola major*	Virus
A	Tularemia	*Francisella tularensis*	Bacterium
A	Viral Hemorrhagic Fevers	*Arenaviruses (Lassa, Machupo)* *Bunyaviruses (Congo-Crimean, Rift Valley)* *Filoviruses (Ebola, Marburg)*	Viruses
B	Brucellosis	*Brucella species*	Bacteria
B	Q-Fever	*Coxiella burnetii*	Bacterium
B	Psittacosis	*Chlamydia psittaci*	Bacterium
B	Typhus	*Rickettsia prowazekii*	Bacterium
B	Food Safety Threats	*Salmonella* *Shigella* *Escherichia coli 0157:H7*	Bacteria
B	Glanders	*Burkholderia mallei*	Bacterium
B	Melioidosis	*Burkholderia pseudomallei*	Bacterium
B	Water Safety Threats	*Cryptosporidium parvum* *Vibrio cholerae*	Parasite Bacterium
B	Ricin Toxin	*From Ricinus communis*	Toxin from Castor Beans
B	Viral Encephalitis	*Eastern equine encephalitis* *Western equine encephalitis* *Venezuelan equine encephalitis*	Viruses

Source: Bioterrorism Agents

(Available at: http://labtestsonline.org/understanding/conditions/bioterrorism/)

3.5 Biological Agents as a unique hazard and challenge

Biological agents facades a unique threat as diverge fundamentally from other weapons of mass destruction. The majority possible bioterrorism agents are natural matters or living microbes (pathogens). Microbes are skilled of causing disease are called pathogens. Pathogens are potentially infectious agents that rarely cause disease. Biological agents have need of hours to days or yet weeks of incubation prior to ground sufferers as contrasted to nuclear and chemical weapons start immediate fatalities. High-priority agents can be effortlessly transmitted and spread, consequence cause huge fatality. The disease agents are used as a terrorist weapon from centuries. Various types of gent cause following diseases.

Pathogens are invisible, reproduce within the sufferer and can marked in lethal, communicable and harming symptoms. Approximately a dozen microorganisms deliberately convert into agent by utilizing bacteria, viruses or toxins that cause mass casualties. More than a few categories of biological agents that might be helpful intended for bioterrorism. As many agents are useful for a bioterrorist attack, so it is important to be aware of dangerous agents because they cause numerous fatalities which happen in a small moment of time. A brief analysis of these disease agents that might be used in bioterrorist attacks are following:

3.5.1 Anthrax

The anthrax is a highly infectious disease occurring predominantly in herbivores such as horses, cows, sheep and goats. A sick animal secretes bacteria by its feces and other animals become infected if they are grazed on contaminated pasture. Transfer to humans is most often done by direct contact with a sick animal. The originator of this disease is the bacterium bacillus anhtracis, discovered in the year 1855. Infection, which is usually caused by spores, penetrates into the body by

inhalation, ingress of poorly cooked meat, cracks in the skin and possible transmission of stinged insects. Disputes are very durable and may persist in nature (soil) or in animal products for several decades.Incubation period is 12 hours to 5days. We distinguish three forms of the disease: cutaneous, inhalation and intestinal. The skin form occurs most often on the hands and forearms, when at the site of the injury arises blackened ulcer up to the carbunkl. The pulmonary form is more rarely caused and is most often found in the employees of the tanning plants and the enterprises where the skin of the animals is processed. This disease manifests itself by bloody inflammation of the lungs, bleeding in the chest, the spread of bacteria through the blood and the central nervous system. Intestinal anthrax arises after consuming a contaminated diet or water with symptoms of sudden abdominal events, bloody diarrhea and high fever. These spores are moderately resistant to sunlight, heat treatment and disinfectants, which are essential properties for use as a biological weapon. According to recent research, the lethal dose for humans in the inhalation form is 2500-55000 . Anti-anthrax can be vaccinated and antibiotic treatment is effective.

3.5.2 Brucellosis

This infectious disease is induced by the bacteria of the genus Brucella.These are small, immovable and slow-growing. This genus has several species, of which three species are dangerous for humans: Brucella melitensis, Brucella abortus and Brucella suis. Transmission to humans is either direct contact with the secrets of infected animals (most often cattle and pigs) through injured skin, mucous membrane (conjunctiva) or infected with aerosol or after ingestion of unpasteurised dairy products. In soil and water these microorganisms survive for many weeks.Brucella suisIt was used as a biological weapon in the 40 and 50 years of the

20th century and is assumed to be prepared for these purposes in other states. The spread of these pathogens takes place through the blood and themfatic system. The incubation period is from 5 days to several months. Disability suffers from fever, chills, sweating, headache or anorexic conditions. The disease causes liver involvement, changes in the blood picture and also tends to chronicity.

3.5.3 Abdominal typhoid

Typhoid infection is an infectious disease caused by the *salmonella type of the abdominalis.*The Source of the disease is a sick person or a carrier (storing salmonella in the gallbladder). The disease is transmitted through the fally-oral route and the most common vehicle is contaminated water, milk or food. For this reason, this bacterium may appear to be a suitable weapon for possible terrorist use. The bacterium is resistant to frost and drying. The disease is characterized by fever, headache, enlarged liver, spleen and in the skin of Typhoon Roseol.

3.5.4 Cholera

The 19th century became a concept that raised fears among people and testified for poor health conditions. Cholera is an acute intestinal disease induced by the moving bacterium *Vibrio cholerae.* The source of the disease is a sick person who has become infected after ingestion of contaminated water (here the organism can survive for several years). The microorganism is transmitted by the fall oral route. The incubation period is up to 5 days. Victims suffer from painful diarrhea, vomiting, convulsion in the calves and a drop in blood pressure. The disease is interesting for terrorists especially for the rapid course of the disease.

The plague belonged to the most feared disease in the history of mankind in the middle ages. This disease was ramped up almost in 1713. Yersinia pestis is a non-moveable bacterium that induces black plague disease. It is a disease transmissible

from animals (rats and other rodents, most often through fleas) to human organisms. At present, there is a disease with natural outbreaks, which mainly affects the areas of the steppe and forests. Plague occurs in several forms, namely, bubonic, pulmonary, septic (blood-stained), cutaneous and meningeal (affects the inflammation of the brain).

The most common form of the disease is a form of bubonic. The natural entry of the disease is a puncture by the infected flea. The incubation period for the bubonic form is from a few hours up to 12 days. The victim has a swollen lymph node, a blue-black skin discolouration and later ulcers.

The aerial route of transmission may be applied upon contact with the sick person or the manipulation of dead infected animals. The perception of unprotected persons to the disease is generally known. For pulmonary plague, the incubation period is 1-3 days depending on the infectious dose. The pulmonary form is interesting because less than 10 microorganisms are sufficient to induce the disease, which is very suitable for terrorist abuse.

3.5.5 Tularemia

The disease is an acute infectious disease caused by the bacterium *Francisella tularensis.* This disease occurring in rabbits and deer is transmitted to humans by contact with the infected animal by tissue or body fluids. Less common route is inhalation of contaminated dust, ingestion of contaminated food or water, glue. This micro-organism is durable and the weeks survive in water, soil, the skin of the infected animals and the years in the frozen meat. The incubation period is 1-21 days (usually 3-5 days). This disease usually begins with a sudden rise in temperature; chills, shivering, headaches, muscles, anorexia and insomnia appear. In the case of victims, there is also an enlargement of the lymph nodes and the place of penetration

of the microbe into the organism, rash, blistering, chest pain, red and swollen mucous membranes. For possible terrorist misuse, the spread of bacteria in the form of aerosols occurs when primary pulmonary oedema tularemia arises.

3.5.6 Viry

They are non-cellular organisms that are not capable of self-existence. These are parasites that need a host cell for their life. They cannot reproduce and do not have their own metabolism. Simple structure makes it easy to change and adapt to conditions. The simplest viruses contain their genetic information in the form of RNA or DNA. The viral particles have a different shape and their size ranges from 20 nm to 300 nm. Viruses cause a large number of significant infectious diseases.

3.5.7 Major Smallpox

Smallpox is caused by *variola* virus in earlier times; the variola belonged to the most feared human diseases. The first surviving records of true pox were already from the 4th Century B.C. Currently, this dangerous virus is already present in the human population. It is a microorganism resistant to the influences of the external environment. The Virus of true pox is easily transmissible from person to person, especially with a drip infection (cough, talking or sneezing) in direct contact with sick or contaminated objects (personal or bed linen). The incubation period is 7 – 14 days. After intoxication, in a few days the virus is spread through the blood. The initial symptoms are as in acute virosis. Patients suffer from high fever, pain from and head, chills, shaking and vomiting. The afflicted often gets into delirium. At the same time, rash and crusts appear, especially on the face and extremities. Death is caused by the toxicemia induced by the over strain of the virus. Haemorrhagic fevers are exotic infectious diseases of viral origin, characterized by a febrile course, with a tendency to bleed and often even fatal termination.

3.5.8 Ebola a Marburg

It is the most famous viral hemorrhagic fever. Ebola fever was first recorded in 1976 in western Africa, the Marburg fever was first diagnosed in 1967 in Germany in Marburg, hence its name. The Natural hostile Ebola and Marburg viruses are not known, but are easily transmitted by infected blood, tissues, secretions and excreta. The incubation period for Ebola is 2-21 days, for Marburg fever 3-9 days. During the incubation, we observe non-specific symptoms such as fever, muscle pain and H-lavy pain. In addition, diarrhoea, vomiting or cough occurs. The late phase is manifested by surface diffuse bleeding with the formation of large hematomas. During the second week, either the patient falls into shock with multi-organ failure or begins to heal.

3.5.9 Lassa

Lassa fever is an acute disease and this disease occurs predominantly in West Africa. The causative agent of this disease was recognized in 1969 in Nigeria as an occupational disease in central medical personnel. The transfer to humans is most often contaminated with the urine of rodents (rats) or by contact with urine, faeces, saliva, vomit and blood of the sick. Transmission by inhalation of contaminated dust is possible. In most cases, fever has a slight course. In the rest of the cases, this is a serious illness affecting almost all systems. Sufferers suffer from chest pain, back, abdomen, vomit; have diarrhea, proteinuria, and bleeding from the mucous membranes can occurred.

3.5.10 Dengue

It is an acute febrile disease, transmitted by mosquitoes of the genus that occurring in most tropical regions of the world. The causative agent of the disease belongs to the *Flavivirus* and the incubation period of this disease is 3-15 days. An infected

person cannot redistribute the disease, but approximately 6 days can be a source of viruses for mosquitoes. The disease begins with chills; there is a sudden fever, severe headache, eyes, joints pain in the extremities, considerable exhaustion and a typical rash. The Palms and soles are blackish-swollen. The convalescence is very lengthy here.

3.5.11 Crimean-Congo haemorrhagic fever

Crimean-Congo haemorrhagic fever is a contagious disease occurring in some countries of Africa, Asia and Eastern Europe. The causally of the Fever is the *nairovir* group virus. The virus was isolated in 1969 in Congo. The microorganism is transmitted by arthropods of many species, especially ticks of the genus Hyalomma. In most cases, there was a transfer to humans when working with infected animals in direct contact with blood or tissues. The development of the disease occurs within one week after the infection of the individual. In the affected, fever, dizziness, vomiting, diarrhoea, back pain, headache, abdominal, eye and sensitivity to light appear. The pitch ranges from 9-50 %.

3.5.12 Yellow fever

Yellow fever is a tropical viral disease induced by *arbovir* Group B, which is transmitted by mosquitoes of the genus Aedes aegypti from man to man. This virus is related to the virus of tick-encephalitis. This disease occurs in tropical regions of Africa and the South America. We distinguish two types of this disease, namely the type of urban and jungles. Urban type spreads in cities and outdoor areas, the jungles type has the character of infection with natural outbreaks. The source of this type of infection is mostlypice, marital and primate mosquitoes. Yellow fever has two to six weeks incubation periods. Fever, headaches and muscles appear, followed by

conjunctivitis, jaundice and internal bleeding. There is a vaccine against this infection

These are very small microorganisms occurring on the interface of bacteria and virus. The transporter of these microorganisms is an infected insect. For their life, Rickettsia need host cells that they use for their reproduction. Some of the diseases that can because include speckled typhoid fever and the Rocky Mountains.

3.5.13 Q fever

This fever was first observed in 1935 Quinsland, Australia therefore the name the disease Q (for query) fever (Gwida, El-Ashker, & Khan, 2012). The causally of this disease is the bacterium *Coxiella burnetti.* This is a microorganism, which was formerly assigned to Rickettsii, but nowadays we already know that this is merely a similarity to this kind. Q fever is an acute or chronic disease transmissible from infected animals such as sheep, goats or cows. The originator of the disease is excreted from infected animals with urine, faeces or milk. Coxiella burnetii infections are very dangerous organism, since one inhaled microorganism can be infectious for humans, for this reason it may be suitable as a biological weapon (Madariaga, Rezai, Trenholme, & Weinstein, 2003). Manifestations of the disease are nonspecific. A number of infections appear to be asymptomatically. In patients, cough, fever, chills, pneumonia may occur. The incubation period is from 12 to 72 hours although can occur late as several weeks (Porche, 2002). The average Smrtnost is 2.4%. with timely administration of antibiotics in the incubation period, we can prevent the onset of the disease.

A very important feature of toxins is their toxicity or venomousness. There are toxins that are not intended to be killed, but may induce physical incapacitation. Small concentrations, for example, cause irritation of the eyes, upper respiratory

tract or mental impairment. It depends very much on the mechanism of toxic action and their possible use. The dominant position thus has highly toxic neurotoxins.

Botulinum toxin formerly called also as "sausage poison" is known due to intoxicated spoiled preserves. These toxins are produced by the bacterium *Clostridium botulinum.* There are several kinds of botulinum toxins, of which for humans are dangerous botulinum toxins A, B and E. These toxins are very permanent in the dry state and well water-soluble. They have neurotoxic effects, when they block neuromuscular transmission.

The route of transmission is most often fally-oral, the source of the disease is contaminated food, especially poorly processed green new or canned meat. Clinical signs are already occurring after 18-36 hours and include headaches, muscular weakness, and problems with speech, swallowing, visual acuity or respiratory disorders. Rapid death occurs by failure of the heart or respiratory muscles, within 24 hours after the appearance of the first symptoms. Toxicity of this toxin is extreme. For humans, a lethal dose of 1 microgram is given. The treatment is very costly. The most likely method of intoxication in possible terrorist misuse is aerosol, and also contamination of drinking water or food. This toxin is attractive to terrorist groups primarily because a very small dose is sufficient to induce disease and subsequent

The use of raw infectious substances in warfare ancient times had no diseases of a similar magnitude to them that has the use of modern laboratory-processed biological weapons. But then and now, besides illnesses, there is terror in the fighters, even by spreading information or rumours that the enemy is using it poisoned arrows and weapons. Also, has a particularly negative effect on depressing appearance and the unpleasant smell of infected wounds.

The biological weapon usually has two parts: the pathogen and the dissemination mechanism, where the pathogen is the microorganism that threatens health, and the dissemination mechanism is the method in which said microorganism reaches the victim.

Among the characteristics of biological weapons is their high efficiency, taking into account the amount and weight of the original source of infection and the subsequent number of dead. At the same time, biological weapons pose a threat to both the target victims and the attackers, because the agents of the disease are not able to distinguish between them. The production of biological weapons is relatively easy and cheap, but at the same time it is difficult to prove their use, as the biological agents range is freely found in nature. Biological weapons pose a threat only to living organisms and are harmless to equipment and infrastructure.

The most important characteristics of Biological agents that are suitable for the production of biological weapons are high pathogenicity (high disease-inducing ability) and ease of mass cultivation. Furthermore, it is an easy way of spreading Biological agents among the target population and the stability of Biological agents in natural conditions.

3.6 THE FIRST WORLD WAR

Much evidence demonstrates the significant development of biological in Germany during the First World War. It was the first national offensive program to was built on scientific foundations. In 1916, Romanian sheep were infected anthrax and glanders, the sheep for export to Russia. These microbial cultures were confiscated at the German Embassy in Bucharest and subsequently identified at the Institute of Bacteriology and Pathology in Bucharest. Further, the German army attempts to anthrax spread in northern Norway and Finland. It was an attempt to exterminate the

reindeer who served as a transport animals for British Army units. Based on the horrors that caused the use of chemical weapons during the First World War, diplomatic action aimed at limiting the development and production of weapons of this type. The result of this endeavour was the signing of the so-called Geneva Protocol, in 1925. This contract, entitled 'Prohibition of the Use in War of Asphyxiating, Poisonous, or Other Gases, and of Bacteriological Methods of Warfare ', but does not prohibit basic research in this area. They weren't even no rules for possible inspections. Among the states that, despite the signing of the Geneva Protocol, continue to develop and produce biological weapons Canada, Belgium, France, Great Britain, Italy, Netherlands, Poland and Russia. The United States has not ratified Geneva Protocol until 1975.

3.7 Biological Warfare

Biological warfare is characterized as an attack by biological weapons, which is prepared, organized and executed by the state against another state or their group. Such a state usually owns large funds, even a state relatively poor and not very developed. Even poor dictatorships can afford to dedicate an unreal amount of money to military adventures and therefore are good customers for arms manufacturers in the world. These include predominantly non-democracies with a large number of population and they are dictatorships of individuals or ruling political parties or dictatorship of the military, to the government of church dignities. According to US intelligence services, this includes Iran, Iraq, Libya, North Korea, and possibly Somalia, more recently also Afghanistan. These states are considered to be criminal or are deemed to support and cover bioterrorism.

Furthermore, the state may ensure the cooperation of scientific and research centres with the necessary equipment and qualified personnel for the development and

production of biological weapons. Other advantages include that the state is able to ensure cooperation with military forces, such as the Air Force and fleet, transport large quantities of bio-environment over the territory, or to the shores of the attacked opponent, and use huge sprayers or Special bombs to spread biological weapons.

3.8 Japan's Secret Biological Weapons Program

The Japanese General Ishii Shiro built a secret biological warfare programme in 1934 (Guillemin, 2006). The Japanese biological program was the most offensive for all the states that participated in World War II. Ishii Shiro (1932–1942) and Kitano Masaji (1942–1945) examined 25 causative agents of infectious diseases, the causative agent such as cholera, anthrax and plague. Japan was developing huge quantities of poison gas bombs, plus mustard gas , shells of chlorine, and phosgene (Barenblatt, 2004). Gold's book provides a history of the Japanese General Shiro's Unit 731 during the profession of Manchuria. Japan had established this Unit 731 in Pingfang this unit was near to the China. Japan to defeat the Chinese hurriedly while, using the plague bombs during the war. Therefore, Chinese resistance during Manchuria war forced the Japanese army to use abundant chemical weapons for wining war (Bix & Lee, 2001).

Dr. Al Parmet states that how significant Ishii Shiro expansion of the Japanese program. Parmet further discusses that Hal Gold point of view in his book *Unit 731: Testimony* was how after World War I Japanese develop chemical and biological weapons program (Byrd, 2005).

Japan was the only country which use the destructive biological weapons during World War II (Byrd, 2005). According to the Barenblatt, Ishii Shiro and a small group of the scientists worked on lethal bacteria and develop lethal weapons

(Barenblatt, 2004). Ishii Shiro Unit worked in complete secrecy and it was the basis for biological research, production and use of these weapons on people.

Unit 731 plays a large role in the Japan-Manchurian War, which has become known, among other things, for the use of large quantities of biological agents. According to surviving evidence, it is reported that at its peak the unit produced up to 300 kg of plague bacteria each month and could also cultivate up to 45kg of plague fleas within a short period of time. Prisoners arrested by the Unit have infected with the plague. They were eventually drugged, scalped a main thigh artery with a scalpel, and the contaminated blood used to infect fleas that they used against the Chinese.

3.9 USA

The USA offensive biological weapons began in 1943 (Bernstein, 1987). The USA biological weapons program was both defensive and offensive. The U.S. government has launched a biological weapons program since President Franklin Roosevelt's order in 1943. After World War II, the United States had the largest arsenal of biological weapons. The then American Secretary of War Harry L. Stimson had the National Academy of Sciences found a body in 1941 to deal with research into biological warfare agents. The War Research Service (WRS) was founded in 1942 after Japan's attack on Pearl Harbor and the associated US entry into World War II. This was led by pharmaceutical company George W. Merck and was used to coordinate the United States' biological weapons program.

However, the civilian WRS was dissolved shortly afterwards and the program for the production of biological weapons passed into the hands of the Ministry of War. In the 1950s, American biological weapons researchers were also increasingly concerned with viruses. Among other things, tests were carried out with yellow fever viruses that were to be transmitted by cultivated mosquitoes. Uninfected mosquitoes

have also been released in the United States to investigate the extent to which a pathogen could spread. It was also planned to spread the mosquitoes through airplanes, missiles and bombs. Fleas and flies were also used, with which cholera or anthrax could have been transmitted. Biological warfare agents have also been tested on humans in the USA.

In 1955, Camp Detrick volunteers were voluntarily exposed to the cause of Q fever in order to avoid military service, which they refused on religious grounds. The trials were carried out under medical supervision and taking antibiotics. The experiments on the volunteers who exposed themselves to aerosols from the pathogens showed the scientists that they were particularly well suited for the spread of the biological warfare agents. In the 1950s, human trials were not only carried out on volunteers. For example, secret tests with simulants of biological warfare agents were carried out throughout the USA in order to be able to predict the spread of these in an emergency. The spread of the pathogens could be measured with special measuring devices. In 1950, for example, two ships of the US Navy destroyed a large amount of the bacterium showed the scientists that these were particularly well suited for the spread of biological warfare agents.

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The measurement results showed that about 800,000 people in an area of 117 square miles were exposed to the bacterium. Although the bacterium was actually considered harmless, a few days after the test, eleven residents showed symptoms of the disease, and one of the infected even died. In 1957 there were further tests with simulants across the country, whereby pathogens were released both in rural areas and in large cities by spray planes or specially converted cars. These tests once again showed the US scientists and military personnel the huge spread of the pathogens. For example, simulants from a test in the US state of Minnesota were carried by the wind to Canada and New York, and again tested to the Gulf of Mexico.

3.10 South Africa

Project Coast was established in 1981 as South Africa's official but secret offensive and defensive program for the development of biological and chemical weapons. Delta G Scientific and Roodeplaat Research Laboratories (RRL) were two

different military companies which were established for conducting the research, and both companies produce and develop products for Project Coast. RRL was established by Dr Daan Goosen in 1975. He was veterinarian at the University of Pretoria. According to Burgess and Purkitt the formation of the biological warfare essential component of Project Coast to the isolation of the apartheid state in the late 1970s and early 1980s (Burgess, 2001).

They used a huge amount of Biological agents. For example, cholera and anthrax contaminated glue on envelopes, cigarette filters or chocolate further contaminated beer botulinum, paratyphoid deodorants, sugar and whiskey salmonella bacteria. When Roodeplaat was closed over time, almost all toxic and biological work was destroyed. In addition to this program, South Africans also used Baens in military missions. Such abuse occurred mainly in Namibia, where it contaminated water resources with cholera and hepatitis.

Tom Mangold in his book *Plague Wars* provides a lopsided picture of Project Coast (Wars, 1999). As, the statement about Project Coast was the "world's second largest offensive biological warfare programme"(Wars, 1999). But on the other hand Japanese and Soviet programmes were considerably bigger than the South African (Blewett, 2004).

3.11 Iraq

After the second Gulf War (1991), Iraq also had to admit that it had made biological weapons. Christopher said that Iraq has largest biological program that were produced approximately 380,000 liters Botulinum toxins and along with 84,250 anthrax liters spores (C. J. Davis, 1999). In April 1991, the United Nations Security Council adopted Resolution 687, which created the United Nations Special

Commission (UNSCOM), whose task was to oversee the destruction or disposal of nuclear, chemical, and biological weapons in Iraq (P. Lewis, 2001).

In August 1991, representatives of the Iraqi government told UNSCOM that research was under way in Iraq in laboratories in Salman Pak and al-Hakam about the offensive use of various strains of bacteria and fungi, viruses and toxins. In 1995, UN inspectors became aware of more information about the offensive weapon program in Iraq.

Accordingly, Iraq carried out research and development work on anthrax, botulinum toxin, Clostridium perfringens, aflatoxins, wheat fire (smut) and ricin. Biological warfare agents have been tested in various weapon systems, including missiles, bombs and spray containers. The operation did not take place during the war because the Allied troops had superiority from the start and the Iraqis did not see any possible use.

According to Iraqi information, the biological weapons program was stopped after the Gulf War in 1991 and all remaining stocks were destroyed. However, Iraq has never provided verifiable evidence of this information. However, the fact that no biological weapons have been found to date - neither in the UNMOVIC inspections carried out from November 2002 to March 2003, nor in the search for weapons of mass destruction by US units since the beginning of the Iraq war in 2003 - suggests that it does after 1991, there was no longer an extensive, active Biological weapons program in Iraq or that the UN inspectors from UNSCOM and UNMOVIC had uncovered and destroyed the Iraqi programs.

However, the scenario cannot be ruled out in which the biological weapon stocks from the former Iraqi biological weapons arsenal fall into the hands of militant

terrorist groups or individual, similar-minded perpetrators and could thus develop their immediate threat and destruction potential again.

At the beginning of the Saddam regime, a program for the research and development of biological weapons was established. This program included research on anthrax, plague, botulinum, cholera, camel pox, etc. They also conducted research on hemorrhagic conjunctivitis. These are small resistant viruses that can be sprayed on clothing or skin. Transmission is then done when you wipe your eyes, and then there is infecting viruses, which has resulted in acute pain and heavy bleeding. Among other things, Iraqis owned several hundred Italian pesticide dispersion systems equipped with jet sprayers capable of generating aerosols of one to five micrometres in size. And they owned aircraft that carried two tanks with 300 liters of anthrax. If they were dispersed over a populated area, such as the example of Kuwait City, they died by millions of people. F1 aircraft as a , remotely controlled from manned vehicles and equipped with 2,200 liter tank and spray mechanism. In 1991 biological tests were conducted in the field using remote-controlled airplanes, but the results of this test are not known.

Conclusions

Biological agents can be used as weapons to cause damage to the world population in circumstances of biological warfare, while constitute the main element in bioterrorism, actions carried out by small groups of individuals in order to harm other people of a certain region with its employment and consequently cause damage to environment. About 1,200 types of biological agents are known, which are also known as bacteriological weapons, which cause diseases, death and constitute a threat by pollution of the environment. Potentially it is considered the most destructive weapon known to the humanity; because the agents are in nature and it is

difficult differentiate outbreaks of natural diseases from a possible attack with biological weapons. Outbreaks of large-scale animal diseases cause a great economic impact, because its consequences act as direct way about production, local economies, markets and disease control costs. Other forms of dissemination include insects that constitute an effective instrument for the propagation of pathogenic organisms, like other objects such as feathers, leaves of trees, corn kernels, which can carry them and cause diseases when man, to animals and plants. Technological advances in Biology and Genetic Engineering achieved in the last decades have made it possible to modify and even create new microorganisms more resistant to treatment, which causes greater diagnostic and therapeutic difficulty, in addition to increasing the dangers environmental and its direct effect on human health, so it is necessary increase the measures of biological agents with the objective of differentiating an outbreak of natural or intentional origin. Cuba has been the victim of the systematic biological aggression it has charged valuable human lives and has brought serious effects on crops and animals of wider popular consumption. For decades, laboratories of the CIA and the United States Department of Defense dedicate numerous resources to bioterrorism and in particular in the search for inoculation of diseases such as cancer, as well as other types of viruses or bacteria, capable of causing massive damage to specific people, forces military and ordinary citizens, without paying attention to prohibitions established by the United Nations.

The use of biological weapons implies political, economic, scientific-technological, legal and psychological, related to its use indiscriminate, so biodefense protects people with the use of sanitary measures against biological agents, therefore it is the set of measures for prevention and action against a health alert, which should be planned and follow appropriate epidemiological criteria, as these situations merit

quick and energetic actions that guarantee a return to normal in a short time and without serious consequences for the area or affected country; in addition to avoiding parallel dissemination to others regions and consequently global damage, if it is dominated that surveillance and early detection activities are essential for a timely response to an attack of a biological nature.

CHAPTER-4

THEORETICAL FRAMEWORK: EXPLORATION OF REGIME THEORY

4. Introduction

This chapter is an assessment of theoretical perspective of regime theory, and the basis for the formulation which shed light on salient aspects of regimes. The aim of this chapter is to take a closer look at the theoretical footing of regime theory. In particular, it will provide an overview of regime theory. This chapter deals with the regime theory that will be a guide for putting the issue into the corresponding international political context. This study seeks to explain limitations in existing theories that applied to the regime and identifies issues within the regime. Basically, regime theory has derived from the liberal tradition that argues that international institutions or regimes affect the behavior of states or other international actors.

It assumes that cooperation is possible in the anarchic system of states, as regimes are, by definition, instances of international cooperation. In addition, this study will analyse the behavior of states; specifically, it pursues the insight of regimes reflects the growth in the area of international institutions that are firmly rooted in substantial interests of states. How international institutions for example regimes affect the behavior of non-state actors and the states? How the effectiveness and efficiency of the international regime on the prohibition of biological weapons? Which aspects located within the institution for determining the stability and the success of international regimes? Generally, while joining the international regimes occasionally states sacrifice its national interests so as to protect long span cooperation among states. The major function of international regime is to provide standards and regulatory framework to states.

4.1 The evolution of regime theory

The notion of the international regime has been developed in the literature of international relations since the Second World War. Research on international regimes in the field of international relations began rapidly in the mid-1970s, although regimes themselves are much older entities. International regimes have emerged as one of the strong streams of empirical research and theoretical discourse in international relations. Actually, three schools of thought such as realists, neoliberals and cognitivist most frequently explain the emergence of the international regimes (Hynek, 2017). The main difference among three schools of thought is the "institutionalism" as realist emphasis on power-based relationships, neoliberal emphasis on interest-based relationships and cognitivist emphasis on knowledge-based relationships (Hansclever et al. 1997).

The theory of regimes is, therefore, a liberal attempt to explain international cooperation. However, realist conceptions of state-centric groundless for the international regimes because realist is determined on materiel power whereas the role of norms markdown. In contrast, the neoliberal conception is the driving force that interprets the creation of regimes. The neoliberal inclined to believe and emphases on regimes because regime allow much more room for norms as they increase cooperation between states.

Table 4 : Three schools of thought in the field of international regimes

Central variable	Power	Interests	Knowledge
Institutionalism	Weak	Medium	Strong
Behavioral model	Relative gains	Absolute gains	Role-player

The analysis of international regimes, which allows us to understand international order and international cooperation through the interpretation of the origins, evolution and conditions of existence of regimes, has undergone many changes over the past forty years that are reflected in its approach to research. The analysis of international regimes reflects the development of research in the field of international institutions, which has also determined its interests.

4.2 Proponents and Opponents of Regime Theory

The concept of international regime is very complicated and there is no complete consensus on its content. There is a continuing debate among theorists to remove the vagueness of the term international regime and to delimit its content more precisely. The nature of international relations is, according to realists, anarchic, which fundamentally determines the motives and actions of individual states, which focus mainly on issues of power distribution and ensuring their own security. Despite some common interests, states are often unable to cooperate, and their relations are rather competitive or even conflicting in nature.

In the anarchic environment of the international system, actors face the obstacles to cooperation that Keohane explains that mutually benefits are possible through

creating the negotiation agreements (Keohane, 1982). Haas explains a regime as "norms, rules, and procedures agreed by states in order to regulate an issue area" (Haas, 1992). According to Rittberger, the analysis of regimes has established itself as a major milestone in the development of the theory of international relations. It succeeded in tackling the problem of international cooperation more successfully than other approaches and international institution building in the anarchic world of sovereign states without a central government. Furthermore, the major purpose of regime theory is:

"the institutionalized co-operation of states for managing conflicts and interdependence problems, instead of relying on self-help strategies, either individually or collectively (alliances), even though self-help action may seem to produce greater individual benefits or less individual costs in the short-term" (Rittberger & Mayer, 1993).

Already in the 1982 Strange criticized the regime theory and reported against five "dragons". The concept of regimes is meaningless and misleading, according to the conventional structural orientation represented by, for example, Strange in the debate on regimes. As the basic independent variables (especially power and interests) change, the regimes also change, in other words, according to this perspective; the regimes do not have an independent influence on the actors' behavior. She also argued that "distorts by overemphasizing the static and underemphasizing the dynamic element of change in world politics. And…it is narrow-minded, rooted in a state-centric paradigm that limits vision of a wider reality" (Strange, 1982). Susan Strange further said that "tends to exclude hidden agendas and to leave unheard and unheeded complaints, whether they come from the underprivileged, the disenfranchised or the unborn, about the way the system works … government,

rulership, and authority are the essence of the word 'regime', not consensus, nor justice, nor efficiency in administration" (Strange, 1982).

At this point, it should be noted that the realism view of these factors is quite the opposite of neoliberal institutionalism. In this context, realists are convinced that the likelihood of cooperation increases in a situation where the nature of the relationships is less permanent, the number of actors involved is high and there is no interconnection of themes (Grieco, 1988). Greico also concludes that "states are fundamentally concerned about their principle survival and political independence. Survival and independence both result from and depend upon a state's own efforts and thus its relative capabilities.

As a result, states want to know what the impact will be of virtually any relationship on their relative defense capabilities: hence the realist insight that states in anarchy are generally defensive position lists. Defensive state positionalism, in turn, generates a relative-gains problem for cooperation: a state will decline to join, will leave, or will sharply limit its commitment to a cooperative arrangement if it believes that gaps in otherwise mutually positive gains favor partners" (Grieco, 1988). Some critics of international regimes argue that the inherent distinction between conventions, international regimes and international organizations is not at all as clear as one might think. Existing contracts often combine explicit rules and are more or less ambiguous.

4.3 Definitions of Regime

The emergence of regimes is the result of ideas, cognition, learning, shared knowledge, normative and institutional structures. The question of defining the term international regime is an extensive subject and long-term discussions. The pioneered John Ruggie in 1975 sees regimes as "set of mutual expectations, rules

and plans, organizational energies and financial commitments, which have been accepted by a group of states" (Ruggie, 1975). The international regime is a very complicated concept and there is no complete consensus on its content. Its most common consensual definition, written by Stephen Krasner, defines the international regime as; "Regimes can be defined as sets of implicit or explicit principles, norms, rules, and decision-making procedures around which actors" expectations converge in a given area of international relations. Principles are beliefs of fact, causation, and rectitude. Norms are standards of behavior defined in terms of rights and obligations. Rules are specific prescriptions or proscriptions for action. Decision-making procedures are prevailing practices for making and implementing collective choice" (Krasner, 1983).

Although this complex definition has also been subject to some legitimate criticism and also criticized for its ambiguity, therefore, Krasner definition mostly has been discussed as 'classic and famously vague' (Dimitrov, Sprinz, DiGiusto, & Kelle, 2007). The concept of an international regime can have multiple meanings and is itself problematic.

Robert Jervis in 1982 coined the idea of security regimes, that are "principles, rules, and norms that permit nations to be restrained in their behavior in the belief that others will reciprocate" (Jervis, 1982). Robert Keohane has, therefore, come up with an alternative definition that is more concise and simpler. He describes the definition of international regimes as: "Using this definition, regimes can be identified by the existence of explicit rules that are referred to in an affirmative manner by governments, even if they are not necessarily scrupulously observed" (Keohane, 1993).

Although opinions on international regimes differ among scholars, they agree that it is an international institution, or a permanent and interconnected set of formal and informal rules that determine roles, behavior and activity and influence expectations. According to the Claes international regimes are cogitate as a subgroup of the international institutions and international organizations cogitate as formal sub-class: "If you start from the regime tradition one would say that regimes cannot be accompanied by organizations; if you start from the international organization tradition, one is inclined to stat that organizations can include regimes"(Claes, 1999). In practice, it is often not easy to distinguish the individual building blocks of a regime - principles, rules, standards and procedures. For example, Keohane and Nye define a regime as a set of regulatory arrangements that include a system of rules, standards and procedures that regulate behavior and control its influence. International regimes stand among the structure of power the international system and the political-economic bargaining that takes place within it. The structure of the system considerably it affects the essence of the regime.

4.4 **Organization of international regimes**

Regimes are permanent arrangements of rules between actors of international relations, regulating their behavior and expectations in a certain political space. Regimes are institutions with a differentiated structure that is divided into four hierarchically interconnected levels - principles, standards, rules and decision-making procedures.

4.4.1 Principles

Principles form an essential basis of regimes and are a prerequisite for their institutional structure. The existence of principles makes it possible to derive more detailed codes of conduct and to interpret the facts to be cooperative. Principles

are basic statements about the realism in the problem area of a regime, about the causes and effects of the problems as well as about the evaluation criteria shared by the participants. This defines cooperation goals and the appropriate purpose means relationship. If principles are not defined by consensus, cooperation is not promising due to the different problems. The principles formulate common perspectives on certain problems and ideas about the possibility of achieving goals.

4.4.2 Standards

The standards set out general behavioral guidelines for members of the regime, in the form of rights and obligations so as to comply with the principles. Norms are the relevant standards and mandatory guidelines for the appropriate behavior of the participants. They define social roles, rights and obligations of participants and general standards of conduct that by means of a specific rule.

4.4.3 Rules

The rules contain precise provisions for behaviors that concretize standards, turn them into specific regulations and prohibit certain behaviors. Rules are specific regulations and prohibitions, formulated in concrete and mostly legally binding rules. They are the operational center of a regime.

4.4.4 Procedures

As such, the design of the mode is not capable of addressing the many problems that come with the development of the mode. Specified processes and procedures allow the regime to respond to the latest developments, current issues and questions. Procedures include the possibility to change the mode. These are for example, revision, consultation or verification procedures.

Significant incentives for states to become members of an international regime are the acquisition of information by exchanging information about the regime, as well

as a reduction in transaction costs, those financial and organizational expenses, in the negotiations on specific cooperation agreements, the control of contractual compliance and the implementation of the agreed goals arise.

The hierarchical structure of the components of the mode allows categorizing of two types of regime change. Principles and standards are the basic defining elements of the regime. Changes in rules and decision-making procedures are changes within the regime, while the principles and standards remain unchanged. Changes in principles and standards mean a change of regime as such. If principles and standards are abandoned, the regime either changes to a new one, or the regime disappears completely from that area. It is also necessary to distinguish the weakening of the regime from the changes in or between the modes. If the principles, standards, rules and decision-making procedures become less coherent or if current practice is increasingly in conflict with principles, standards, rules and decision-making procedures, then the regime is weakened.

The principles are the basis of regimes and a prerequisite for their further institutionalization. Through them they are formulated common positions on certain problems and ideas about possible goals. Since regimes are not necessarily legal in nature, they are standards their core part, as they lay down general conduct guidelines for members of the regime. Already rules are more formalized. These contain precise and clear provisions for the behavior of individual actors, thereby specifying and enabling standards evaluation and review. Decision - making procedures are procedures which: through the modes are able to respond to current developments, including unexpected problems and complications. These procedures may include review, sanction, consultation or expansion of the regime. Possible changes in rules and decision-making of the procedures should be seen as changes

within the regime which, while changing the conditions of its regime but not it is the essence. Conversely, changes in principles and standards mean the fundamental transformation of the regime.

4.5 The effectiveness of regimes

For international institutions such as international regimes, their effectiveness and strength (resilience) can be analysed. The effectiveness of the institution occurs at a certain moment, and it is possible to distinguish two lines of meaning. The first concerns the extent to which the international regime is respected. The second meaning of effectiveness is based on the success of the regime in terms of fulfilling the purpose for which it arose. Most of the researchers' attention is drawn to "the intention to strengthen the state's ability to cooperate in a particular area". Compared to efficiency, the strength or resilience of an institution dynamically develops in response to changes in the environment.

Such changes may include, for example, changes in the distribution of power, changes in interests, etc. The regime is resilient if, in the event of changes in the distribution of power, it does not undergo a certain normative transformation or change in its observance (Hasenclever, Mayer, & Rittberger, 2000). As already mentioned the efficiency or effectiveness of the regime is understood as a measure of compliance with the norms and rules of the regime by its members and at the same time a measure of fulfilling certain aims and objectives (Hasenclever et al., 2000). Investigating efficiency and trying to determine its assumptions is widespread in the field of international environmental regimes, see eg Miles et al. (2002) and Wettestad (1999) or Young (1999) or Young (2011). Studying international environmental regimes has evolved into a sophisticated so-called Oslo-Potsdam

approach to measuring efficiency. Moreover, it does not take into account the length of time the regime operates in international relations.

It is clear that measuring the effectiveness of the international regime must reflect the nature of the area that the regime regulates and the objective the regime seeks to achieve. The international regime for the prohibition of biological weapons, as is apparent from its main normative documents, aims at total disarmament in the field of biological weapons and their destruction. This is related to the prohibition of their development, production, accumulation and especially use.

The effectiveness of the international regime for the prohibition of biological weapons is thus based on the extent to which the regime is able to enforce prohibitions and compliance, to verify that they are not violated and to ensure that those responsible are punished if they have been violated. On the basis of the above mentioned concept of the effectiveness of the international regime, nine criteria were chosen for the purposes of this work, which are further used to evaluate the effectiveness of the international regime for the prohibition of biological weapons. In general, the efficiency criteria below can be used to evaluate any international regime for which enforceability of prohibitions and compliance with the rules are crucial.

A regime can be described as efficient if actors have changed their behavior due to the existence of a regime in favor of cooperative structures. This defines the concept of regime efficiency through behavioral components. Accordingly, the following indicators can be valuable as criteria for the success of an international regime:

- the unambiguity and acceptance of the principles and norms,
- the implementation of regime rules by the member states,

- the determination of the possibility of a review of contract compliance

4.6 Regimes Cooperation

Starting from Krasner's consensual definition of the international regime, the term international regime for the prohibition of biological weapons can be understood as a set of principles, norms, rules and decision-making processes that interact to regulate the area of biological weapons prohibition (Krasner, 1983). In addition to the Convention on the Prohibition of Biological Weapons, the basic norm forming the main pillar of this regime is the Protocol on the Prohibition of the Use of Warfare, Poisoning or Similar Gases and Bacteriological Means Or Geneva Protocol.

4.7 The basic normative pillars of the regime

As already mentioned, the fundamental pillars of the international regime for the prohibition of biological weapons are the Geneva Protocol (1925) and the Convention on the Prohibition of Biological Weapons, which came into force in 1975. If we are to assess the quality of the processing of the pillars we have for measuring their content and form.

The Geneva Protocol (1925) is written very briefly and contains only the "vague and declarative wording of the ban" on the use of suffocating and other toxic gases and bacteriological methods of warfare. The essence of the Protocol is expressed in two paragraphs and "it makes clear that it contains no definitions, criteria or verification mechanisms, let alone sanctions for infringements".

Although the Convention on the Prohibition of Biological Weapons should complement the Geneva Protocol (1925) and ensure greater effectiveness of the international regime for the prohibition of biological weapons, it itself contains a

number of shortcomings. Like the Protocol, the Convention is very brief, since it has only fifteen articles in addition to the Preamble to ensure full disarmament in the field of biological weapons. This fact already suggests that it is not a detailed document. Moreover, it was adopted at a time when genetic engineering and biotechnology were just beginning to develop, and therefore the document does not reflect the current view of the hazards of this type of WMD.

The most serious defects suffered by the Convention. These include: "very general definitions, lack of clearly formulated binding criteria, complete absence of objective verification mechanisms and the absence of an international supervisory organization with an inspection apparatus: the Convention does not require implementation measures at all in the Contracting States, ie the National Bureau of Compliance. It also does not require the adoption of national implementation legislation, respectively.

Review conferences are a platform that seeks to patch those major flaws in the Convention. It is important to reiterate that the Convention does not in itself contain a prohibition on the use of biological weapons. Only the Geneva Protocol (1925) prohibits their use. Consequently, only these two documents, combined with each other , provide meaningful protection against biological weapons . Only when both documents work together is the international regime for the banning of biological weapons complete and maximally effective. To this day, there are countries that have entered only one of the pillars of the regime. This makes the regime for the prohibition of biological weapons extremely unreliable and therefore not very effective internationally.

In view of the above arguments, it can be argued that the quality of the processing of the basic normative pillars of the international regime for the prohibition of

biological weapons is not sufficient. Therefore, the international regime does not fulfill the criterion of their quality and the fact that the pillars do not have the same membership base further weakens the regime.

4.8 The qualities of regimes

As indicated in the previous subchapter, the Convention on the Prohibition of Biological Weapons does not contain any definitions of terms used in its Articles and does not specify the permitted or prohibited quantities of biological materials or toxins. Moreover, states do not have to admit the species, quantity or purpose of using the materials they.

As a fundamental problem of the Convention, which is related to the criteria, Andrew states that the Convention *"It does not oblige the Contracting States to communicate what the initial numbers of such weapons are,"* which in his view may lead to incomplete compliance with Article II. This means that states (in part) might not honour their commitment to destroy or transfer for peaceful purposes the biological weapons they own. The wording of the Convention is very general. Only the evaluation conferences, subsequently also with the help of the Intersessional Process, raised a number of questions to the right. They have led to a consensus on the meaning of terms such as a biological weapon, toxin, peaceful purposes, etc. However, it should be borne in mind that decisions taken by consensus at evaluation conferences are merely a political commitment, not a legal commitment and therefore not legally enforceable.

The consensus on definitions and criteria that arose from evaluation conferences, the international regime for the prohibition of biological weapons is more effective than when the Convention on the Prohibition of Biological Weapons came into force. Consensus clarified ambiguous terms and additionally set criteria. But the

effectiveness of these clarifications is hampered by the fact that states are bound by them only politically, not legally.

Given the mere political binding nature of the definitions and criteria, the way and quality of their definition can be considered inadequate. Thus, the international regime for the prohibition of biological weapons does not meet the quality criteria of the definitions and the criteria with which it operates.

4.9 The breadth of the regime's membership

According to the UN, there are 195 sovereign states in the world: 193 UN members and its two observer states - the Holy See and Palestine (United Nations, 2015b). For the time being, a total of 138 states have joined the Geneva Protocol (1925). So far, more than 172 countries have adopted the Biological Weapons Convention. Fifteen countries have not yet acceded to it, and nine have only signed the Convention. It should be recalled that for the effective functioning of the international regime for the prohibition of biological weapons, countries need to adopt both of its pillars. There is still a high percentage of states participating in only one of the two pillars of the regime. Given the considerable scope for expanding the membership of the international regime on the prohibition of biological weapons, it is clear that its effectiveness is not ideal, but there is the potential to increase it in this area.

However, taking into account the fact that states' access to international treaties usually takes many years, the membership of the international regime for the prohibition of biological weapons is relatively rich. Taking into account that the regime is based on two international treaties and both were roughly joined by 65% of UN sovereign states, it must be noted that the international regime quite successfully meets the criterion of widening the membership base.

4.10 Legally and politically binding of the regime

Both the Geneva Protocol (1925) and the Convention on the Prohibition of Biological Weapons are multilateral international treaties to which States are parties. These are documents by which Member States are bound by international law. Only what is explicitly stated in these documents is legally binding on Member States. Given the brevity and exhaustiveness of both the Geneva Protocol (1925) and the Convention on the Prohibition of Biological Weapons, the obligations under the documents are not specified in detail. There are a number of contentious terms and undefined areas.

Assessment conferences held at approximately five-year intervals seek to remedy this fundamental lack of an international regime for the prohibition of biological weapons. Whatever the effort to strengthen the international regime for the prohibition of biological weapons in this process, it can never completely solve the problem. The problem lies in the mere political binding effect of all decisions taken at evaluation conferences. In order to make it more effective, it would be necessary to adopt a document addressing the shortcomings of the regime, which would have the same legal force as the Geneva Protocol (1925) and the Convention on the Prohibition of Biological Weapons.

At the same time, it would have to be accepted by all Member States of both pillars of the regime and would *de facto* expose such a document to a new pillar on which the international bioweapons regime could rely. However, the document does not exist and therefore the current legally binding rules of the international regime for the prohibition of biological weapons are insufficient and the political ones cannot replace them. It can therefore be said that, given the criterion of legally and politically binding measures, the scheme is ineffective.

4.11 Neo-liberal and the stabilization of regimes

The literature of the neoliberal regime theory sees as a basis for the existence of regimes the demand of the states for institutional functions, which are to help the participants to overcome those obstacles, which their co-operation buzzed. Such obstacles are, for example, the uncertainty, whether the other participants in an agreement abide by it, or whether they seek their own benefits through national politics. The neo-liberal institutionalism holds back with statements about impact possibilities of individual participants. Nevertheless, national action can be conceptualized on the basis of a neoliberal institutionalize paradigm. The central argument is that national policy is not carried out in an area free from relations, but in an environment made up of situational conditions, competing preferences, but also of an institutional set of rules and the underlying institutional demand. The national stabilization policy is then set in relation to the demand for institutional solutions.

4.12 Essential function of Regimes

The crucial part of regime theory is to understand how regimes perform various functions or how regimes work. The international relations that arise in the area of arms control are largely shaped by cooperation, which aims to ensure the survival of states and living conditions in an anarchic world of states. In the security area in particular, a high degree of mistrust due to a lack of transparency must be assumed. A good part of the international regimes and international organizations can be assigned to the security area. Security and disarmament are the classic areas of work for international institutions. In these, the first political experiences with international regimes and international organizations were made and approaches, theories and analyzes developed from them, which formed the core of the political science debate on the origin and functioning of international institutions.

The theoretical superstructure for this study is neoliberal institutionalism, a theory that has developed since the late seventies in contrast to traditional realism or neorealism. Neo- liberal institutionalism developed statements about the conditions of institutionalized cooperation, with reference to microeconomics and game theory. Neo-liberalism and neo-nealism are based on the same set of basic assumptions: The relevant actors in international relations are states that use rational decision-making processes to maximize the utility of given interests. The international system is characterized by anarchy, in the sense of lack of superior authority and force. The state actors are therefore forced to help themselves in the realization of their interests

Neoliberal institutionalists value the conditions for cooperation differently from their neo-realist colleagues. They understand international cooperation as dependent on their underlying power structures. Neoliberalism are exploring the barriers to co-operation and developing wider expectations regarding the role of institutions in stabilizing and consolidating co-operation. They explain the emergence and preservation of institutions - which include regimes - from the demand from governments for institutional 'services' they need to work together. This is based on a cooperative understanding that takes account of the problematic interdependencies that can prevent intergovernmental cooperation, even though there is overlapping interests between the actors in cooperation. This may be the case even if national policy is not enough to achieve optimal results. Examples are free trade, trans-boundary environmental problems or multi-disarmament. In such situations, the fear of being exploited by a partner who unnoticed and unpunished may terminate cooperation (defector) and thereby gain relative benefits may hinder co-operation. Institutions, on the other hand, can facilitate cooperation by providing

more credible and specific information, cheaper consultation and, if necessary, penalizing the rule-breaker.

According to a fundamental neoliberal definition, institutions are "persistent and connected sets of rules (formal and informal) that prescribe behavioral roles, constrain activities and shape information". This view of institutions implies that both tacit agreements and codified, negotiated agreements are among the most widely used Institutions can be counted as long as they are consistent and coherent sets of rules . Keohane distinguishes organizations, regimes and conventions. *Regimes* are explicit rules systems that are negotiated by state actors. *Conventions*, on the other hand, are informal institutions, with implicit, not negotiated, rules, but they nevertheless provide a reference framework for decision-making. For the present study, these internal demarcations between the institutions' families are secondary, but not insignificant.

The view of the analysis of regimes allows for a special perception of international relations. In addition, this study concludes that the behavior of interested state actors also influenced the evolution of the regime, indicating the presence of a feedback loop, and supporting the contention that institutions are intervening variables between causal factors in international politics.

At the beginning it tried to prove that international institutions are a necessary part of international policy. Today, the modes are valid functional structure that contributes to the development of international politics in the interest, interests of individual states the effects of varying behavior on the evolution of the regime. Similarly, ultimately, this study argues that for emerging technology weapons direct or indirect threat to the states.

International regimes differ from international organizations in their inability to act independently because they lack legal personality and thus cannot act independently in international law as subjects of international law. According to this differentiation promoted by Keohan, international cooperation is also realized in each other beneficial agreement and not only in regimes. It is the modes then providing their principles, standards, rules and decision-making procedures contribute to achieving such agreements. International regimes focus on one specific area, while the agenda of international organizations often extends to diverse areas. In practice, it is common for an international organization's agency to operate within a particular international regime and strengthen its existence.

4.11 Critiques on Regime Theory

A number of critiques of Regime Theory are presented here which challenge assumptions about regime types, the limitations of state centeredness and the difficulty of analyzing single elements in a complex international system. We will use it to describe the differentiated structure of international regimes. A large number of international regimes have developed in recent decades. They seldom work without problems because of their lack of efficiency and fairness. Since the emergence of regime theory, numerous variants and manifestations of the theory have developed, including from constructivism, the central criticism of which is the assumption that the interests and identities of states are assumed as given. From a constructivist point of view, regimes can also influence states in the long term and in the opposite sense by manipulating their interests.

This complex definition is criticized for its ambiguity. In practice, it is often not easy to distinguish the individual building blocks of a regime - principles, rules, standards and procedures. Robert Keohane has, therefore, come up with an alternative

definition that is more concise and simpler. He describes the definition of international regimes as: "institutions with clear rules on which governments have agreed and which are related to a set of problems in international relations ".

There is a continuing debate among theorists in an effort to remove the vagueness of the term international regime and to delimit its content more precisely. Although opinions on international regimes differ among scholars, they agree that it is an international institution, or "a permanent and interconnected set of formal and informal rules that determine roles, behavior and activity and influence expectations". International regimes differ from international organizations in their inability to act independently because they lack legal personality and thus cannot act independently in international law as subjects of international law. International regimes focus on one specific area, while the agenda of international organizations often extends to diverse areas. In practice, it is common for an international organization's agency to operate within a particular international regime and strengthen its existence.

Conclusion

Relationships based on power and power form the basis of the theory of international regimes from the perspective of realists. Constellations of interest are the focal point of exploring neoliberals and knowledge, communication and identity are of interest to cognitivism. Alexander Wendt, a social constructivism in international relations theory, also elaborates on "the relationship between agency and structure and concludes that they are mutually constituting"(Wendt, 1999). According to constructivists, "a shared identity among States increases the likelihood of regime formation"(Bradford, 2007).

For international institutions such as international regimes, their effectiveness and strength (resilience) can be analyzed. The effectiveness of the institution occurs at a certain moment, and it is possible to distinguish two lines of meaning. The first concerns the extent to which the international regime is respected. The second meaning of effectiveness is based on the success of the regime in terms of fulfilling the purpose for which it arose. Most of the researchers' attention is drawn to "the intention to strengthen the state's ability to cooperate in a particular area". Compared to efficiency, the strength or resilience of an institution dynamically develops in response to changes in the environment. Such changes may include, for example, changes in the distribution of power, changes in interests, etc. The regime is resilient if, in the event of changes in the distribution of power, it does not undergo a certain normative transformation or change in its observance. Starting from Krasner's consensual definition of the international regime, the term international regime for the prohibition of biological weapons can be understood as a set of principles, norms, rules and decision-making processes that interact to regulate the area of biological weapons prohibition. Protocol (1925) and the Convention on the Prohibition of Biological Weapons, the documents of international law, treaties, which in essence define the international regime so that define what Member States may and must not, and how should or should not behave. These rights and obligations are further elaborated by specific rules, or "special proposals or prohibitions for action". In the case of the Geneva Protocol, the rules are set out in a declaration, and in the case of the Convention on the Prohibition of Biological Weapons they are dealt with in individual articles.

Regime effectiveness is largely assessed with its "success" or "failure" in a given issue area. More precisely, success would entail solving the problem. This front

examines "the hypothetical state of affairs that would have come about had the regime not existed". The work assessing the significance of the nuclear, chemical, and biological weapons regime conducted by Parker (2001) would fall into this category assessing regime effectiveness.

CHAPTER-5

AN ANALYSIS OF THE INTERNATIONAL REGIME FOR THE PROHIBITION OF BIOLOGICAL WEAPONS

5. Introduction

This chapter pursues to explain how the international regime contributed to constraining the use of biological weapons. This study combines the conceptual tools of the regime theory specifically with the area of the prohibition of biological weapons. This deals with the analysis of the two basic pillars underpinning the international regime for the prohibition of biological weapons, the Geneva Protocol and the Convention. Substantially this is an assessment of the effectiveness of regime theory that explains whether a regime increases cooperation among states and success of the regime in terms of fulfilling the purpose for which it arose. This chapter examines regime theory as a theoretical framework which profoundly analyzes the effectiveness of the emerging regimes and evaluating how well implementation of the regime is carried out and what reform might be in future to countering biological weapons.

The use of primitive forms of biological weapons has been known since ancient times and has common roots with chemical weapons. This is due to the fact that toxins of plant or animal origin were most frequently used in hunting or fighting. Accordingly, various norms were traced back against the use of biological warfare these were developed in the pre-Christian periods and norms were also establish in various cultures (Zanders, 2003). In the 19th century scientists discover bacteria as the cause of some of diseases so that in this period, International legal regulations and central rules were developed. This, in turn, led to an even more intense study, in particular in the pursuit of effective defense.

5.1 Development of norms against poison weapons

Simultaneously, the poison weapons taboo was rapidly institutionalized in the shape of international treaties and conventions. The law of armed conflict (known as humanitarian law or war law) is an important part of public international law. It should be noted that the war, respectively armed conflict of two and more, it is not only an act of "failure" of classical diplomacy but also periodically a recurrent, legally adjustable phenomenon. Although the birth of modern law of armed conflicts can be born to speak only in connection with the adoption of The Hague and Geneva Conventions.

5.1.1 The Brussels Declaration

The Brussels Conference of 1874 mentions toxic weapons for the first time and prohibits "employment of poison or poisoned weapons" (Declaration, 1874). Brussels Declaration established 56 articles "Laws and Customs of War". The use of poison in armed conflict has been considered dishonorable for centuries.

5.1.2 The Hague Conventions

In the 1899 and 1907 conferences held in The Hague, Netherlands, the conclusion of declarations was regulating the ways of waging war. The declarations express a ban on the use of ammunition and weapons that would contain suffocating and destructive gases or would be poisoned or toxic. The Hague Convention on the Laws and Customs of the Land War was adopted, in which the provisions of the Brussels Declaration were adopted and expanded. The warring parties are restricted in the choice of means of warfare, the use of poison or poisoned weapons or those that cause unnecessary suffering is explicitly prohibited. The Hague Conventions ban the

use of missiles diffusing "asphyxiating or deleterious gases" (Van der Bruggen & ter Haar, 2011). The Hague Convention of 1907, which deals with the laws and customs of war. The provisions of the Hague Convention have not been respected by the States, especially during the First World War, where it was widely used biological and chemical weapons on their opponents.

5.1.3 League of Nations

At the initiative of the League of Nations, a commission was set up to discuss the ban on biological. In early 1921, "the Temporary Mixed Commission on Armaments was a committee of eminent figures formed by the League of Nations to consider the problem of international disarmament in its widest aspects and to suggest potential initiatives, plans and solutions" (Webster, 2008). At the beginning of the twentieth century an important movement in public opinion broke out that allowed the opening of negotiations within the League of Nations, whose objective was none other than the prohibition of such procedures. Furthermore, "the commission's work resolved into a battle between interventionist British members and resistant French members, led respectively by Lord Robert Cecil and Colonel Edouard Réquin" (Webster, 2008). Lord Robert Cecil at a League of Nations meeting in 1922 mentioned that: "Nor is poison gas the only example of the future development of chemical warfare … there is the whole department of bacteriological attack which may be developed as science progresses. It is of great importance that the peoples of the world should realise before it is too late what those new methods of warfare will mean in future, not only to the armies in the field but to the civil population at home" (Walker, 2016).

In 1920 the work of the Commission for the reduction of armaments began and four years later, during the twenty-fifth Assembly of the League of Nations a draft

Convention for the prohibition of chemical and biological weapons was presented. At the initiative of the League of Nations, a commission was set up to discuss the ban on biological and chemical weapons. From this moment on, there is a period when both types of weapons of mass destruction have been strongly intertwined and negotiations have been held to ban them together. Finally, states agreed to sign a protocol so "the Geneva Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or other Gases and of Bacteriological Methods of Warfare was signed on 17 June 1925" (Jefferson, 2014). The U.S. had an active role in arms control as "Fifty years earlier, at the Geneva Conference for the Control of the International Trade in Arms, Munitions and Implements of War, the United States had played a key role in drafting and reaching agreement on the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or other Gases and of Bacteriological Methods of Warfare"(McElroy, 1991)

5.1.4 Geneva Protocol

The Geneva Protocol (1925) is based on the principle of condemnation and a ban on the use of poisonous substances. This protocol condemned "the use in war of asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices" (Protocol, 1925). The protocol also condemned "to the use of bacteriological methods of warfare" (Protocol, 1925). Initially, the protocol was signed by forty countries, including France, the United Kingdom, Japan, Italy, Germany and the United States. It was nothing more than a moral commitment, as no verification procedure was foreseen, even no sanctions in case of violation. Neither research nor the production or transfer of these weapons was prohibited.

Despite these shortcomings, the Geneva Protocol was considered, by most of the States parties, as a condemnation of the use of both types of weapons, while retaining the capacity to reply if necessary. Moreover, many of the States, at the request of France, reserved the possibility of using chemical or biological weapons if the enemy used them first. After the consistent international assessment of the verifiability of the convention and the uncontrollability of the risks of biological weapons, proposals for further agreements by Great Britain and the Warsaw Pact were made during the permanent, international disarmament conference in the 1960s. The Geneva Protocol was not the first struggle for combating the use of biological weapons some other international treaties also combats the use of biological weapons such as "The 1868 Declaration of St. Petersburg prohibited the use of weapons that caused unnecessary suffering. The 1874 Brussels Declaration, though never formally adopted, sought to forbid the use of poison and poisoned weapons. Inspired by these earlier efforts, the Hague Gas Declaration of 1899 attempted to ban the use of projectiles the sole object of which is the diffusion of asphyxiating or deleterious gases" (McElroy, 1991).

The result of the efforts of the Commission, the Protocol on the prohibition of military use of bacteriological methods of management of the war, which is referred to as the Geneva After the end of World War II, it was revealed that the development of biological weapons and the preparation of their deployment in combat had already taken place in a number of countries in the interwar period. The countries developing bio-weapons on a larger scale were mainly the USA, Great Britain, France and the Soviet Union. The security dilemma forced them to conquer in this area, as Germany suspected of preparing biological retaliation for defeat in the First World War. Japan

also had a very sophisticated and extensive biological weapons development program, the first to use new biological weapons in combat (Guillemin, 2006).

It was the first attempt to codify the Laws of war. It consists of 157 articles. It was prepared by Francis Lieber, a professor at Columbia College in New York, and promulgated by President Lincoln on April 24, 1863. Therefore, "the Lieber Code, issued in 1863 by United States President Abraham Lincoln to US armies in the field in the US Civil War; and the first Geneva Convention, on wounded soldiers in armies in the field, adopted in 1864 by the representatives of 12 European states" (Roberts, 2019). It greatly influenced the codification of other states and was the rudiment of subsequent international conventions such as the Brussels Declaration and the adoption of the Hague Conventions. The states continued their activities and research around biological warfare. Only the "diplomatic forms" were maintained and in this sense any official reference to the offensive programs was omitted, referring, in any case, to the defensive nature of the investigations that were carried out in the territory of the State concerned.

After World War II and with the advent of the cold war, the governments on both sides of the Iron Curtain continued experimentation to find more deadly forms of anthrax. The opening of the Chinese government and military archives showed that the United States integrated bacteriological weapons into its military structure, using them in the Korean War (1950-1953), although "only" on an experimental basis. In the framework of an urgent program the manufacture of a long list of products begins. Among them, we work in a bacteriological pump, carrier of anthrax spores and in vectors (means of distribution) of contamination of crops and food. Ammunition is developed, which by means of aerosols causes the infection of the respiratory tract, and is even experimented with "insects-vectors" and their

means of propagation. It is decisive to make the spread of diseases such as cholera, dysentery, botulism, etc. as "natural". The most frequently observed abnormal diseases were plague and anthrax, priority objectives of American research. It is known that the United States devastated wheat crops in North Vietnam in the 1960s, and attempted to spread diseases among Nicaraguan export crops in the late 1970s. This growth stopped, at least officially, with the signing of the treaty that emerged during the Toxic and Biological Weapons Convention of 1972.

"On April 2, 1979 in Sverdlovsk, in the former Soviet Union, in military complex number 19, there was an explosion that accidentally released a few milligrams of *Bacillus anthracis* spores. A few days later, 96 people became ill with anthrax; 69 of which died. This was the worst human anthrax epidemic acquired by inhalation of spores recorded to date. For years, the authorities of the former Soviet Union argued that the epidemic was caused by the consumption of meat contaminated with anthrax bacilli, a situation that very occasionally occurs, especially in regions where this bacillus naturally inhabits, as it is the case of Sverdlovsk (today Yekaterinburg). It is also believed that the Iraqi army used chemical agents in 1987-88 against the Kurds in Iraq. And weapons of this kind have also been used against the Tutsi in Rwanda and against the peoples of East Timor.

5.1.6 Development of Biological Weapons Convention

After the adoption of the Geneva Protocol (1925), which, prohibiting the use of biological and chemical weapons, although it proved to have only limited influence on the forbidding of biological weapons. It was clear that it would be necessary to continue international negotiations with a view to further securing biological and chemical weapons issues. In the 1930s and 1940s the situation was complicated because of German aggression. Although "Hitler was deterred from using

poisonous gas and bacterial warfare in World War II by the Geneva Protocol" (Utgoff, 1991). After World War II, when the military plans of its participants were unveiled, efforts to fully biological and chemical disarmament gained new significance.

The main focus of arms control and disarmament efforts during this period was on the nuclear and conventional weapon methods. Daniel Feakes stated that "scientific advances in the 1940s opened up the potential for using biological agents not only for sabotage but also as tactical and even strategic weapons" (Feakes, 2003).

Lastly, in the late 1960s, it was decided that negotiations on biological and chemical disarmament would take place separately. In 1960, an armaments committee was formed in Geneva within the framework of the United Nations, which initially consisted of five NATO and Warsaw Pact countries and was expanded in 1962. Hedley Bull, in 1960, he was head of the "Arms Control and Disarmament Research Unit (ACDRU)" in U.K. he transformed the perception of the biological threat. Bull argued: "Interest in CBW possibilities is now overshadowed by the nuclear question, but every success in exorcising the nuclear threat must revive interest in other means of mass destruction, and every advance in biological knowledge in the underdeveloped countries will hasten their ability to make them; neither development is one that we would, or could, obstruct; so we must forestall their likely side effects" (Wright, 2002). In the wake of the Vietnam war, in which the United States used tear gas and total herbicides in large quantities therefore "CB weapons returned to the international political agenda only in the mid-1960s, prompted by the use of chemical weapons in the Yemeni civil war, by concerns expressed publicly by eminent scientists, but mostly by the use of toxic chemicals by the US in Vietnam" (Feakes, 2003).

In 1966 Hungary applied for the adoption of a resolution requiring strict compliance with the Geneva Protocol for all states and any use of chemical and biological weapons banned. Furthermore, "the situation in Vietnam and the public attention it was attracting inspired the United Nations General Assembly to adopt a resolution on CB warfare in 1966 which led to the inclusion of CB weapons in the agenda of the Geneva disarmament conference" (Feakes, 2003). In 1967, Malta suggested extensive revision in the Geneva Protocol (Utgoff, 1991).

The first international negotiations devoted to the drafting of a treaty banning biological and chemical weapons began in 1968 within the framework of the United Nations. When the discussion began, there was much debate about whether a ban on weapons contained in the Brussels Protocol should be sought or if it should only contain a ban on biological weapons. The United States, which at that time was not part of the Geneva Protocol, declared its unilateral renunciation of biological weapons and toxins during 1969-1970. In 1969, a report by the United Nations Secretary-General on the effects of chemical and bacteriological (biological) weapons was published by a group of experts from western and eastern countries and was the first comprehensive UN document of this kind.

In 1969, US President Richard Nixon announced that the United States would forego biological warfare and destroy all existing stocks of bacteriological weapons, including toxin warfare agents (Tucker, 1999). In the same year, Great Britain proposed at the Geneva disarmament conference that negotiations on chemical and biological weapons should be conducted separately. When the Soviet Union approved this proposal in 1971, the way was opened to negotiate a ban on biological weapons.

5.1.6.1 Biological Weapons Convention (1972)

The first document dealing with disarmament and disposal of Biological weapons was signed on 10th, April 1972 in Washington, Moscow and London. Approximately after three years, BWC entered into force on 26th, March 1975.The BWC was "first multilateral disarmament treaty banning an entire category of weapons, entered into force on 26 March 1975. Since then, many States have joined the Convention, which currently has 183 States Parties and four Signatory States" (UNOG, 2019). The state parties agreed in 1975 that " never in any circumstances to develop, produce, stockpile or otherwise acquire or retain biological weapons"(Ter Haar, 1991). The BWC is the first multilateral disarmament treaty to ban an entire category of weapons John Hart stated that "BWC is one of the most widely ratified multilateral treaties concerning armed conflict since the Geneva Conventions. Its core principle has not been challenged: no country argues that the use of biological weapons is legitimate"(Hart, 2011).

The central criticism is of lack of a credible verification regulation as "criticism has rather focused on weaknesses in the BWC regime. The most obvious target has been the lack of a permanent implementing body that could, among other things, confirm countries' claims that they have destroyed their biological weapons, along with the associated infrastructure, and are not researching new ones. Also, the BWC does not have a legally binding data submission mechanism"(Hart, 2011).

5.1.7 The Australia Group

The Australian group (AG) is an informal association of countries and has been in existence since 1985. In 1984, the Secretary General of the United Nations set up a special investigation committee to examine whether chemical weapons had been used in the war between Iran and Iraq war (1980-1988). In the early 1990s, the

Australian group expanded its common checklists to include materials and technology needed for the proliferation of biological weapons. As there is no international organization to support the implementation of the BWC, the approval requirements of the Australian Group with regard to pathogens and biological weapons equipment are the only coordinated form of control of these goods. Consequently, "AG is another international body, which also has a list of agents that are controlled from a counter-proliferation point of view. Once the priority agents have been identified, they need to have enhanced protection" (Whitby, Novossiolova, Walther, & Dando, 2015).

The AG "called for concerned states to harmonize their national export controls and share information to improve their effectiveness" (C. F. Parker, 2003). The measures adopted within the framework of the AG are not binding for the participating states under international law; the effectiveness of the cooperation is based on the measures that each participant takes at the national level. The export controls applied by the Australian Group participants contribute to a positive and secure environment for the lawful trade in chemical and biological goods. There are currently six control lists that cover the following products to an export license:

- Precursors for chemical weapons
- Production plants and equipment as well as corresponding technology for the production of multi-purpose chemicals
- Biotechnological equipment with multi-purpose character
- Biological agents
- Plant pathogens and
- Animal pathogens

Group participants ensure that the private sector is aware of the dangers of the uncontrolled export of chemical and biological materials and equipment, and raise awareness of their duty to help protect the world from the threat of such weapons of mass destruction. The participants in the Australian group want to use export controls to ensure that international trade in chemical and biological goods is peaceful.

1.1.8 UN Security Council Resolution 1540

This the resolution focuses mainly on physical protection in the area of non-proliferation of weapons of mass destruction. In April 2004, the UN Security Council adopted Resolution 1540 which adopted states undertake to take and strengthen effective measures to introduce domestic controls to prevent the spread nuclear, chemical or biological weapons and their carriers, including through the introduction of appropriate controls related materials. It requires "no state has fulfilled all of 1540s obligations, and the vast majority has only a few of the resolution`s domestic legal requirements in place" (Crail, 2006).

The main reasons were to increase the effectiveness of controls to ensure greater safety, to ensure better quality regulatory environment for the industry and achieve greater consistency in the application of the Regulation Member States by adopting guidelines or best practices for its implementation. Therefore, "1540`s sole intention is to create binding obligations regarding all three weapon types and avoid the negotiation process and voluntary commitments under these treaties"(Crail, 2006)

5.2 Overview of the BWC Provisions

BWC is the first document to regulate the development, production and accumulation of biological and toxin weapons and their subsequent destruction, and thus becomes the first document for both arms control and disarmament. The

Convention has only 15 articles, which are, however, continually supplemented at the evaluation conferences, which are carried out each five years. In the preamble of the BWC , the objective of the convention is to achieve universal and complete disarmament of not only biological and toxin weapons, but also weapons mass destruction in general. BWC builds on the protocol and acknowledges its relevance and continued validity. The preamble to the Convention on the Prohibition of Biological Weapons endorses the principle of full disarmament in the field of weapons of mass destruction and the principles contained in the UN Charter.

Article I contains the obligation of countries not to develop, produce, accumulate, acquire or hold microbiological and biological agents and toxins irrespective of them origin or method of production, of such species and in such quantities as are emblems for preventive, protective or other peaceful purposes, as well as weapons, equipment or carriers intended for the use of these substances or toxins for hostile purposes or in armaments-conflicts. The obligation refers to types and quantities of materials. Furthermore, the Article refers to weapons, equipment and carriers, with the help of which the above materials can be used as a biological weapon and applies the same obligations to them. Article I leaves two essential queries unanswered: First, it is not made clear what exactly is meant by "biological agents". This enables a broad range of interpretations, ranging from a very broad conceptual interpretation ("everything is organic is biological"; according to this interpretation biological agents would include prions and viruses as well as humans themselves) to a narrow conceptual interpretation that borderline cases. Second, the text of the convention leaves open the question of exactly what is meant by the terms "peaceful and hostile purposes".

Article II contains the rule for destruction or commitment to the destruction of biological weapons within nine months after entry into force of BWC. It contains the most significant commitment of states to disarmament. The States Parties undertake in Article II to, within no more than nine months from the entry into force of the Convention, to transfer or destroy, for peaceful purposes, any "incriminated" materials referred to in Article I. These are any materials owned by the country from it's or has control over them. The article emphasizes the need to protect the population and the environment during the fulfillment of obligations arising from this article of the Convention.

Article III obliges parties to directly or indirectly not transmit to other entities materials and systems laid down by Article I. It is also committed to other states or groups or international organizations, not helped acquire and produce prohibited materials and systems, and also to the they did not encourage and encourage their acquisition or production.

Article IV invites Member States to take all necessary measures to prohibit and prevent the development, production, accumulation, acquisition or possession of materials and systems set out in Article I. These measures shall be adopted in accordance with the constitutional procedures of a particular country and shall apply to all national territories.

The Convention, in **Article V,** formulates the obligation of States to consult and cooperate on any contentious issues that may arise in accordance with the objectives of the Convention and their implementation. Under Article V, such cooperation and consultation may take place within the relevant structures of the United Nations and in accordance with its Charter.

Article VI lays down the possibility for a State to lodge a complaint with another Contracting State to the UN Security Council if it finds that the State concerned is in breach of the provisions of the Convention. It also stipulates that such a complaint must be supported by as much evidence as possible and include a request for its consideration by the UN Security Council. At the same time, the article obliges Member States to cooperate with the UN Security Council on a potential complaint investigation. Furthermore, the Article guarantees to the states that they will be informed about the course of the investigation.

Article VII, the Contracting Parties undertake to assist or support a country requesting such assistance and the United Nations Security Council shall approve State assistance on the basis of a potential threat to the State as a result of a violation of the Convention.

Article VIII defines the interpretation of the entire Convention in such a way as not to undermine the obligations arising from the adoption of the Geneva Protocol (1925).

Article IX ensures that all States that have acceded to the Convention recognize, at the same time, the need to ban chemical weapons and undertake to pursue negotiations aimed at their destruction, a prohibition on the development, production, accumulation and destruction of all can be used when using them.

Article X deals with the issue of international cooperation in relation to the possible use of bacteriological (biological) and toxin agents for peaceful purposes. Here, States commit themselves *to* 'sharing as *much as possible* both scientific and technical knowledge, and to exchange information, materials and equipment, for example, in order to prevent disease. The exchange of information can take place at individual and group level, including the involvement of international

organizations. Furthermore, Article X expresses the intention of the Convention in no way to restrict the development of States Parties in the field of economy and technology or international cooperation associated with the peaceful use of bacteriological (biological) and toxin agents.

Article X I, the Convention grants each Contracting State the right to participate in amendments to the provisions of the Convention, including the right to table amendments. If approved by a majority of the Contracting States, they will enter into force for them as soon as they are accepted by them.

Article XII provides that no later than five years after the entry into force of the Convention, a conference of the Contracting States should take place in Geneva, Switzerland. This conference should evaluate the functioning of the Convention in relation to its objectives and provisions. The assessment should reflect current scientific and technological changes relevant to the subject matter of the Convention. In addition, Article XII provides that progress in efforts to ban chemical weapons should also be assessed. In order for the conference to take place earlier, it would be necessary to submit to the depositary governments a request from most of the Contracting States.

Article XII provides for an unlimited duration of the Convention. It further provides for the possibility of a State Party to denounce the Convention should it endanger its interests. When a State does so, it must inform the other Contracting States and the UN Security Council of its action three months in advance. The information on the planned step must include the circumstances that lead the state to take action.

Article XIV contains information on the possibility of all States to sign the Convention until its entry into force. The article states that it is possible to accede to the Convention at any time. It also states that the signatories must

subsequently ratify the Convention. The article sets out the depositary governments to which the instruments of ratification and accession will be deposited. These are the Governments of the United Kingdom of Great Britain and Northern Ireland, the Union of Soviet Socialist Republics and the Government of the United States of America.

Pursuant to Article XIV, the Convention shall come into force at the time when the instruments of ratification of 22 Contracting States or, as the case may be, other States designated by the Depositary Governments, are deposited with the Depositary Governments. Following the entry into force of the Convention, it shall become valid for the other States on the date on which their instruments of ratification or accession are deposited with the depositary governments. The Depositary Governments are required to inform the signatory and acceding States of the dates of the deposit of instruments, entry into force or other communications. Conclusion Article XIV speaks of how to register the Convention. The registration of the Convention is carried out in accordance with Article 102 of the UN Charter by the Depositary Governments. **Article XV** - of the Comment is the form and imposition of the Convention. The text of the Convention is written in almost all UN languages. The English, French, Spanish, Russian and Chinese transcriptions of the Convention shall be equally authentic. The document is deposited in the archives of the depositary governments mentioned above. Each signatory or acceding State shall receive a certified copy of the Convention. The article further refers to the signatures of the Convention and mentions the capital cities in which the originals of the Convention are deposited, i.e. London, Moscow and Washington.

Table 5 : Principles, standards, rules and decision-making procedures in BWC

Principles, norms, rules, decision-making procedures	Contained in
Principle	
The use of pathogens and other biological agents for non-peaceful purposes is prohibited under all circumstances	Preambles to the Geneva Protocol and BWC
Norms	
Not using biological weapons (BW)	Geneva Protocol, Article I of the BWC
Not in possession of BW	Article I of the BWC
Rules	
No development, production, storage, no acquisition and no retention of BW	Article I of the BWC
Destruction or conversion of BW within nine months after the BWC comes into force	Article II of the BWC
BW will not be passed on to third parties	Article III of the BWC
Implementation of the BW ban in national law	Article IV of the BWC
Cooperation in resolving controversial questions	Article V of the BWC
Right to lodge a complaint with the UN Security Council if violations of the contract are suspected or found	Article VI of the BWC
Help obligation	Article VII of the BWC
Commitments to promote scientific exchange and not to hinder peaceful development of states	Article X of the BWC
Decision-making procedures	
Change of BWC	Article XI of the BWC
Review of the BWC	Article XII of the BWC

5.3 Evaluation of review Conferences

The convening of the first Review Conference is enshrined in Article XII of the Convention. All other evaluation conferences were then held on the basis of the results of the meetings of the individual evaluation conferences, which are included in the final conference documents. Article XII of the directly states that the aim of the first evaluation conference is to:

i. An assessment of the operation of the Convention, ie to what extent the objectives set out in the Preamble and the obligations of the Contracting Parties have been met since the Convention entered into force ;
ii. Assessing the impact of science and technology innovation on the functioning of the Convention,
iii. Assessing progress in biological disarmament.

The following evaluation conferences had the same goals. Their conclusions do not change the text of the Convention, but merely present the consensus of the Member States on its interpretation and implementation. Conferences are primarily supplementary explanations, procedural modifications, definitions and politically binding measures.

In principle, the Conference makes a briefly drafted Convention easier to grasp and more effective if unanimous consensus is reached between Member States. They assess the past five-year period and present the direction of the Convention for the next five years. They are the only possible instrument that can be used to enhance the effectiveness of the Convention.

5.3.1 First Review Conference

The first review conference took place from 3 to 21 March 1980. The review conference drew attention to strengthen the convention and expounding the implications of the BWC. The absence of implementing legislation could result in begin to fail to enforce the provisions of the Convention. The depositary states submitted a joint paper in which they describe the technological and scientific developments in the field of biology describe and assess their possible effects on the BWC. The member states of the Convention discussed at the first review conference how to consult each other for solving problems and how to increase the atmosphere of trust and security cooperation within the framework of the United Nations. Conditions were created for consultation of national legislation through the UN, and the way of cooperation in the peaceful use of microbiological materials was amended. The consultation and complaint procedures described in Articles five and four of the BWC were the focus of the debate. An important explanation was Article five, which provided for the possibility to initiate an investigation into alleged violations of the Convention. Moreover under Article VI, how member states could handle compliance apprehensions without going to the UN Security Council. During the First Review Conference, reports of an anthrax outbreak in Soviet Union near the city of Sverdlovsk were published. Anthrax occurred in Sverdlovsk in April and May 1979 (Meselson et al., 1994). Moreover, during the first review conference discussions the United States Ambassador Charles Flowerree stated whether a lethal biological agent was present in Sverdlovsk and United States also rejected the Soviet statement of accidentally outbreak of anthrax (Gordin, 1997). So, the investigation procedure more flexible since it is not necessary to first contact the UN Security Council as set out in Article VI. This is also reflected in the Final Declaration of the

Conference, which states that the Convention applies to all emerging biological agents.

5.3.2 Second Review Conference

The second review conference took place from 8 to 26 September 1986 but member states extended and deferred decision till 1991. The conference discussed innovations in the fields of biotechnology and genetic engineering and the possibility of their potential use for combat purposes as Article one applies to such a developments. The first creation requests were made but the most significant event was the establishment of Confidence-Building Measures, or CBMs. Instead, CBMs represent the political commitment of the State for annually reporting by the UN. States Parties are committed for information exchanges under the following four criteria such as of unusual and sudden outbreaks of disease, relevant publications, relevant important personal contacts and laboratories along high biosafety level where biodefense measures are under high security. These measures should serve to strengthen confidence between the Contracting States and thereby enhanced capacity and security. However, they are provided on a voluntary basis, so not all Contracting Parties to the Convention report. Member States would select experts to devise ways of exchanging information between the Contracting States and the content that such information should cover was finalized.

5.3.3 Third Review Conference

The third Review Conference took place from September 9-27, 1991. The main agenda in the general debate was the need to strengthen the BWC. It has contributed to the extension of CBMs to other categories that Member States should inform each other. In the final declaration, the comprehensive ban on possession of biological weapons set out in Article I was confirmed. The BWC in particular the optimization

of the CBM and the verification of possible verification measures and the BWC were moved to enhance developed in three areas:

- The provisions of meetings were further specified
- The CBM was expanded and included in annual reports
- An agreement was reached for possibilities of verification

Confidence-building measures further included national legislation which are related to the issue of biological weapons, on former biological weapons development and production programs and the requirement to provide an overview on vaccine production facilities for human use. According to the decision of the Member States asked to appoint a group of government experts. The resulting VEREX group was formed whose task over the next two years to compile a list of scientifically and technologically useful measures to verify compliance with the Convention on the prohibition of biological weapons, by extension, the entire international regime for the Biological Weapons.

Table 6: Confidence Building Measures (CBMs)

CBM A	**Exchange of information on (i) research centres and laboratories, and (ii) national biological defence research and development programmes**
CBM B	Unusual outbreaks: Exchange of information on outbreaks of infectious diseases and similar occurrences caused by toxins
CBM C	Encouragement of Publication : Encouragement of publication of results and promotion of use of knowledge
CBM E	Declaration of legislation, regulations and other measures
CBM F	Declaration of past activities in offensive and/or defensive biological research and development programmes
CBM G	Declaration of vaccine production facilities

Source: https://www.un.org/disarmament/biological-weapons/confidence-building-measures

5.3.4 The VEREX group

A report was prepared for each of the 21 identified measures, which included the definition, characteristics and necessary technologies, capacities and restrictions as well as a list of possible links with other measures. The VEREX group finally identified "the 21 potential verification measures against the agreed mandate criteria indicated that capabilities and limitations existed for each measure in varying degrees, although reliance could not be placed on any single measure by itself to determine whether a State Party is developing, producing, stockpiling, acquiring or retaining: microbial or other biological agents or toxins, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes or; weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes" (BWC/CONF.III/VEREX/8, 1993). During the third VEREX conference it became clear that on the one hand on-site measures are considered to be more useful than non-on-site measures and on the other hand that most measures can be optimized by combining them with others . The final report of the VEREX group, which was written in September 1993, is supported by a positive basic consensus on the possibility of verifiability of the BWC and was transmitted to the member states.

Table 7: The 21 measures recognized by VEREX

Off-site measures	On-site measures
1. Surveillance by satellite	14. Visual inspection (on-site)
2. Surveillance by aircraft	15. Identification of key equipment (on-site)
3. Ground-based surveillance (off-site)	16. Auditing (on-site)
4. Sampling and identification (off-site)	17. Interviewing (on-site)
5. Observation (off-site)	18. Sampling and identification (on-site)
6. Auditing (off-site)	19. Medical examination (on-site)
7. Surveillance of publications	20. Continuous monitoring by instruments (on-site)
8. Surveillance of legislation	21. Continuous monitoring by personnel (on-site)
9. Data on transfers, transfer requests and on production	
10. Multilateral information sharing	
11. Declarations	
12. Exchange visits (off-site)	
13. Exchange visits - international arrangements	

Source: BWC/CONF.III/VEREX/8. (1993). Ad Hoc Group of Governmental Experts to Identify and Examine Potential Verification Measures from a Scientific and Technical Standpoint. https://www.unog.ch/bwcdocuments/1993-09-VEREX4/BWC_CONF.III_VEREX_08.pdf

5.3.5 Ad Hoc Group

At a special conference on the Convention on the Prohibition of Biological Weapons, it was decided to create the so-called Ad Hoc Group. This group, accessible to all Member States, should have sought. The negotiations of the ad hoc group were chaired by the Hungarian ambassador Tibor Tóth, who assisted in negotiating the individual topics in accordance with the mandate of the AHG.

5.3.6 The special conference

A special conference on the Convention on the Prohibition of Biological Weapons was held in September 1994. Its purpose was to discuss a document resulting from the work of the VEREX Governmental Expert Group. The group met four times and on the fourth meeting of the completed list of twenty-one scale. The criteria for monitoring compliance with the Convention were to make a significant contribution to increasing efficiency and facilitating its implementation. Various states such as Australia took the position that a significant strengthening of the BWC is now possible and necessary, while China, India, Indonesia and Iran expressed doubts about the feasibility of the verification. The US criticized the term "verification" and concluded that the goal of further efforts should not be verification, but "strengthening the Biological Weapons Convention" or "compliance enhancement. In any case, the result of the special conference was the establishment of an ad hoc group with the task of developing proposals for a strictly binding control instrument for the BWC.

Table8 : Phases of the Negotiation Process

Negotiation Phase/Year	Key Changes
Pre-Negotiation (1991-1994)	1993: VEREX Report suggesting provisions to the BWC, including verification measures 1994: Creation of Mandate that stated what would be covered in the Ad Hoc negotiations: definitions of terms, confidence building measures, compliance measures, measures to promote peaceful cooperation among the states parties
Negotiations (1995-1999)	1995: Implemented the "rolling text" style of negotiation 1996: Extended negotiations because of the complex nature of issues needing to be negotiated
Final Negotiations (2000-2001)	2000: Final text was given out by Chairman. Ad Hoc group was asked to submit final revisions. 2001: Rejection of final draft; United States refuses to continue negotiations but does not leave the table

5.3.7 Fourth Review Conference

The **fourth review** conference took place during the work of the Ad Hoc Group (AHG) from November 25 to December 6, 1996. The contributions to the debate focused on the universality of the BWC and the work of the AHG. At the time of the conference, there was no doubt about the technical and political feasibility of a verification system for the BWC. Iran only requested that a ban on the use of biological weapons be explicitly mentioned in Article I of the Convention, whereupon the conference's final declaration confirmed that the use of BW would violate Article I and that a change to the text of the Convention was therefore obsolete. This conference reaffirmed the mandate of the Ad Hoc Group and established a tradition of providing space for the expression of NGOs active in the relevant area. The conference made an effort to support the work of the VEREX Group in order to strengthen the Convention and the whole regime for the prohibition of biological weapons as soon as possible by means of the so-called Verification Protocol on which the group worked.

The verification procedure provided for in this text consisted of an initial declaration by the member states, followed by annual declarations. The content of these declarations should include information on current Bilogical protection programs, facilities with a high level of biological security, facilities that carry out activities with particularly dangerous pathogens and facilities that either produce vaccines or have large production capacities.

To verify the truth and completeness of the declarations, three types of visits were planned:

- routine visits
- clarification visits
- visits to request technical assistance from member states

In the event of suspected violation of the BWC, clarification procedures and short-term suspected inspections with special powers of the inspectors were provided. At this point in time, the goal was to present the draft treaty, which is in principle no longer negotiable, if it did not meet the expectations of all states, but would ultimately be acceptable areas of conflict that remained, were

- the definition of terms,
- declaration of Biological protection measures specific measures for strengthen the Convention ,
- the visits
- Decision-making procedures for inspections,
- Promotion of compliance
- Non-discriminatory and Regulations for the transfer biological materials

At the 24th AHG meeting, the US spoke up and said that the draft contract was not acceptable to them. In the United States' view, the draft contract does not help to verify the content of the BWC, nor does it have a deterrent effect, and it also endangers national security and industry. The approach is unsuitable to improve confidence in the loyalty of the BWC member states. The USA continues to support the BWC and announced that it would develop ideas and new approaches. But this made an agreement on the draft contract without the consent of the United States unthinkable. As a result, the AHG was not entirely clear and unable to fulfill its

mandate and disagreements emerged in Fifth Review Conference. Bolton threw the entire conference into turmoil on Dec. 7, the last day of the meeting, when he announced that the United States would seek the formal end of the AHG's mandate.

5.3.8 Fifth Review Conference

The Fifth Review Conference of BWC took place in two periods such as in 19 November to 7 December 2001 and in second period it took place in 11 to 22 November 2002. The failure of the AHG was not a favourable condition for the Fifth Review Conference, which started on November 19, 2001. In addition to the traditional debates on BWC treaty compliance, the universality of the BWC or the effects of scientific and technological innovations, the strengthening of the BWC was the focus of the discussions, for which all states fundamentally spoke out. Much of the member states felt that multilateral efforts were under Instructions for the AGH, whose mandate has not been revoked, would be the appropriate approach. This contrasted with the United States, which insisted on its and wanted to end the mandate of the AGH. There was an agreement on annual state meetings and expert discussions, but the United States linked its approval to the dissolution of the AHG. The abrupt change in position in the USA caused upset in the group.

In order to prevent the conference from failing in a similar way to the AHG, it was interrupted at the suggestion of the chairman Tibor Tóth and postponed to one year. Before the Fifth Review Conference could continue on November 11, 2002, the United States once again surprised its partners in the Western Group with the suggestion that the conference be brought to an end in one day and that the Sixth Review Conference should only be scheduled , Thus, the Fifth Review Conference faced two options: either the states agreed to the modest work program presented by

the chairman, or the conference ended without result, effectively depriving efforts to strengthen the BWC.

The only substantive result of the conference remained the agreement on a follow-up mechanism, which should serve on the one hand to "cool down the conference climate" and on the other hand to maintain the multinational discussion forums to develop measures to strengthen the BWC. The US's perceived approach to extortion met with great criticism: the Non-Aligned Movement (NAM) countries reaffirmed the continued existence of the ad hoc group and the WEOG countries expressly stated that they welcomed the decision of the Fifth Review Conference. The proposal for the follow-up includes annual meetings of the contracting states from 2003 to 2005, each lasting one week, which must be prepared by a two-week meeting of experts. At the same time, the topics for this first " Inter-sessional Process (ISP)" were defined. From this point on, success was / is dependent on measures to strengthen the BWC on the accommodating and political positioning of the USA .

The Fifth Review Conference was convened for the period from 19 November to 7 December 2001, a few months after the attacks on the World Trade Center in New York and anthrax shipments that were also distributed in the US (Van der Bruggen & ter Haar, 2011). Although these events urgently called for an effective solution to the problems related to the prohibition of biological weapons. The United States, whose representative John Bolton disrupted the negotiations by refusing to accept the Verification Protocol supplementing the Convention on the Prohibition of Biological Weapons. Moreover, John Bolton demanded to terminate the Ad Hoc Group mandate (Zanders, 1992). He argued that the protocol "Threatens US national security and confidential business information". He further argued, countries should:

"adopt and implement restrictions for the access of dangerous micro-organisms, in addition member states also implement restrictions on domestic and international transfers; speedy report internationally if any outbreak that could affect countries; and create a code of conduct for scientists who are working with pathogens"(Rissanen, 2002). He also argued that the US would not accept imperfect texts, which were adopted solely on the basis of the length of their deliberations. In addition, he openly accused Iraq, Iran and Libya of violating the Convention and inferred that they would undoubtedly violate the protocol in question (Van der Bruggen & ter Haar, 2011). Fifth Review Conference addressed multiple issues such as

- advances in science and technology
- compliance
- bioterrorism
- scientific and technological co-operation
- export controls
- upset protocol negotiations
- universality

The fate of the Ad Hoc Group was also to be decided at the conference. The US was actively pushing for its abolition under the threat of blocking any decision that the conference will seek (Sims, 2011). The future of the Ad Hoc Group has not been resolved and the failure of the conference culminated in the failure to accept the final declaration. Negotiations were suspended and postponed to November 2002, which in effect provided virtually the only option that would ensure the continuation of negotiations on the prohibition of biological weapons and not its complete collapse.

Indeed, since the opening of the Convention on the Prohibition of Chemical Weapons until it was signed in January 1993, there has been negotiations in the field of biological weapons in order to create an analogy to the international regime for the prohibition of chemical weapons. As was the case with chemical weapons, a monitoring mechanism for compliance with the Convention should be established and an organization should be created to supervise the implementation of the Convention. This course of action has proved impossible, although there are still its proponents. Ambassador of Hungary Tibor Tóth proposed a so-called Intersessional Process. His proposal was adopted unanimously. As a result, the continuity of negotiations on the prohibition of biological weapons and the functioning of the international regime were preserved.

5.3.9 Intersessional Process

Creation of Intersessional Process dissonance the deadlocked fifth review conference in 2001 moreover the intersessional process was proximately valuable for continuing dialogue between the parties and making them focused on nonproliferation of the biological weapons. The Intersessional Process is to maintain annual meetings and take place when there is no Review Conference. The issues discussed at the Review Conference are featured discussed duration of these gatherings so the aim Intersessional Process is effective action and common understanding. The Intersessional Process is consisted of two types such as a two-week meetings of experts and one-week meetings of the member states of the Convention. The experts discuss the topics at their meeting and present the results of the expert discussion as a basis for Member States' negotiations. These agreement on the approach to the topics discussed, which in turn contributes to achieving significant shifts in the discussions at the evaluation conferences. Although, the intersessional process

meetings lack the authority so the decisions cannot be made with some political or legal power.

5.3.10 Intersessional Process 2003-2005

In 2003, BWC has introduced annual Intersessional Process and the main aim was to adapting national legislation to bring it into line with the Convention and the need to introduce criminal sanctions for violations. Since, 2003 and 2005 different topics were discussed for strengthening the BWC treaty. The talks of 2004 focused on international measures in the case of alleged use of biological and toxin weapons and surveillance of situations of unusual outbreaks of disease in the territory states. In Intersessional Process 2005, a code of conduct for scientists working with biological materials and toxins was addressed. Nongovernmental organization along scientists and member state representatives were included in meetings (Dando, 2009). Both sorts of meetings were to reach conclusions an assessment of the process, containing decisions regarding additional action, would include in Sixth Review Conference.

5.3.11 Sixth Review Conference

The Sixth Review Conference took place from 20 November to 8 December 2006. The most important event of the conference was the decision to create the Implementation Support Unit (ISU). The ISU is a three-member group of full-time workers in Geneva at the United Nations Office on Disarmament. States parties agreed on to extend the inter- sessional process until 2010 and set up one ISU with three workplaces in Geneva. Since then, the ISU has acted as a point of contact between the contracting states and replaced the contact point. The ISU's mandate lasts until the next Review Conference and is set out in the Final Document of the Conference. At this point it seems appropriate to examine the role of the ISP in more detail. The meetings, which were originally intended as an "emergency solution" to

maintain the negotiations within the BWC, developed into a useful instrument to overcome the negative effects of the failed negotiations within the framework of the AHG and represent a new approach to strengthening the BWC. Implementation Support Unit in Geneva main functions as:

1. established administrative support during the Meeting of the Parties
2. facilitate communication and manage CBMs as well as ensuring the exchange of relevant information between the Member States of the Convention
3. assisting Member States in their efforts to comply and uphold universality of the BWC

ISU's efforts to promote universal acceptance of the ban on biological and toxin weapons are also momentous. Another important event was the evaluation of the past Intersessional Process. It was identified as a very successful project and it was therefore decided to continue it in the period 2007-2010. However, the Sixth Review Conference ended with a final statement that hadn't been there since 1996. Within the framework of these meetings, which are predominantly dominated by experts, topics are dealt with by the previous review conference. A more informal conference climate compared to the review conferences opens up the possibility of finding solutions for BWC relevant topics by consensus. The ban on possession and use and reflects the role of non-state actors, deals with the topic of biological terrorism and recognizes important synergies with international organizations and civil society.

5.3.12 Inter-sessional Process 2007-2010

In 2007, the Inter-sessional Process again focused on strengthening national legislation, the role of national institutions and ways of enforcing laws related to compliance with the Convention. In addition to the national level, ways of addressing this issue at regional and sub-regional level were discussed. In the subsequent meeting in 2008, a great deal of space was devoted to biologists. Most of the focuses of 2007 and 2008 meetings were:

- national implementation
- codes of conduct
- biosecurity
- biosafety

The ranges of biosafety such as safety of work in laboratories where biological agents are handled and biosecurity as safety of laboratories where biological agents are handled were discussed. Moreover, the scenarios to raise awareness and ways to avoid such circumstances were also discussed. In 2009, the meetings focused on international cooperation, supporting capacity building in the areas of detection, diagnosis, protection against the spread of infectious diseases and surveillance of infectious diseases. Furthermore, in 2010 again debates brought on assistance and preparedness against biological weapons. Additionally, the sophistication of public health systems was discussed and the ability to supervise disease outbreaks. The meeting covered areas that are also on the agenda of the World Health Organization (WHO) or the World Organization for Animal Health (OIE) and the possibilities for cooperation with them. It also addressed the universal adoption of the Convention, the CBMs, began preparations for the Seventh Review Conference and set a date for its launch. All the topics discussed during the 2007–2010 session touched on

bioterrorism and thus included areas related to non-state actors. For this reason too, many NGOs participated again in the negotiations.

Table 9: Intersessional Process 2003-2010

Year	Topic
2003	[redacted]
2004	III. Enhancing international capabilities for responding to, investigating, and mitigating the effects of cases of alleged use of biological or toxin weapons or suspicious outbreaks of disease IV. Strengthening and broadening national and international institutional efforts and existing mechanisms for the surveillance, detection, diagnosis, and combating of infectious diseases affecting humans, animals, and plants
2005	[redacted] I. Ways and means to enhance national implementation, including enforcement of national legislation, strengthening of national institutions, and coordination among national law enforcement institutions II. Regional and subregional cooperation on implementation of the convention
2007	[redacted]
2008	III. National, regional, and international measures to improve biosafety and biosecurity, including laboratory safety and security of pathogens and toxins IV. Oversight, education, awareness raising, and adoption and/or development of codes of conduct with the aim of preventing misuse in the context of advances in bioscience and biotechnology research with the

Source: Bansak, K. C. (2011). Enhancing compliance with an evolving treaty: a task for an improved BWC intersessional process. *Arms Control Today, 41*(5), 13. https://www.armscontrol.org/act/2011-06/enhancing-compliance-evolving-treaty-task-improved-bwc-intersessional-process#7

5.3.13 Seventh Review Conference

The Seventh Review Conference took place from 5 to 22 December 2011 and produced little surprising results: the debates dealt with the universality of the BWC and the continuation of the intersessional process. It was attended by a total of 103 States Parties to the Convention and, in addition, five States which have signed but have not yet ratified the Convention. Israel and Cameroon joined the conference as observer states. With regard to the creation of a legally binding verification mechanism, it was clear from the start that no agreement could be reached due to the divergent positions of the contracting states.The final declaration emphasizes the need to take precautionary measures to prevent terrorists from seizing biological agents and the toxins or technologies needed to produce biological weapons, the so-called dual-use items. It also appeals to states that have not completed the ratification of the Convention or have not yet acceded to it. The declaration presents an evaluation of the Intersessional Process 2007-2010. In view of the positive results of the negotiations, the Declaration sets out the decision on a new block of negotiations for the period 2012-2015. It was decided that both expert meetings and Member States meetings would take place every year for five days and that the outcome of the negotiations would be assessed at the eighth Review Conference. Seventh Review Conference focuses on these basic trends:

- the advancement in science and technology
- the global circulation and applications of science and technology research
- the extensiveness in the "life sciences."

In connection with Article X, the ISU agenda has been expanded. The relevance of science and technology rising quicker, there is a need for a regular and assessing their implications and structured revenues of monitoring developments (Ban, 2010).

It was decided to set up a database to facilitate cooperation and communication between States offering or requesting assistance as defined in Article X of the Convention. The ISU will manage this database while supporting the implementation of decisions taken at evaluation conferences . Its mandate was extended for the period 2012-2016. The conference also addressed the evaluation of developments in the field of science and technology, the strengthening of national implementation of the Convention, the promotion of CBMs and the need for universal adoption of the Convention. Seventh Review Conference agreed to promote intersessional programme, so 2012–2015 meetings addressed following issues:

- strengthening assistance and cooperation under Article X
- Review the growths of the science and technology field
- Strengthening and assisting the member states for national implementation

Table 10: Decisions made by the Review Conferences

Review Conference	Date	Main Amendments/Decisions
1	**Mar 3 – 21, 1980**	Texts of implementation measures should be provided to the United Nations
2	**Sept 8 – 26, 1986**	Permitted the WHO to coordinate emergency response measures in cases of alleged use of biological and toxin weapons • Established the Confidence Boosting Measures (CBMs)
3	**Sept 9 – 27, 1991**	Requested state parties to re-examine implementation measures • Revised Formal Consecutive Meetings • Revised CBMs • Encouraged United Nations Secretary General to conduct investigations into allegations of biological and toxin use • Established Ad Hoc Group of governmental experts, entitled VEREX
4	**Nov 25 – Dec 6, 1996**	Established that all destruction and conversion activities of former weapons and related facilities should takes place prior to accession to the convention
5	**Nov 19, 2001 – no agreement* Suspended until Nov 11 – 22, 2002**	Established a series of annual Meetings of Experts and Meetings of States Parties in order to strengthen the convention
6	**Nov 8 – 20, 2006**	**Series of decisions of recommendations to strengthen the convention • Creation of the Implementation Support Unit (ISU) • Plan of Action to expand membership**
7	**Dec 5 – 22, 2011**	Established a re-structuring of the intercessional meetings to include specific agenda items including developments in science and technology, promoting cooperation and assistance, and strengthening national implementation

Source: unog.ch/bwc

5.3.14 Intersessional Process 2012-2015

As already mentioned, the Seventh Review Conference agreed to continue the next round of negotiations within the Intersessional Process. The Conference also set out the topics to be discussed by experts and representatives of the Member States of the Convention. These are issues that have been addressed in the past within the Intersessional Process and are still a crucial part of the efforts to improve the Convention on the Prohibition of Biological Weapons, respectively. Throughout the Intersessional Process, it focuses on Article X cooperation and assistance issues each year, assessing developments in science and technology related to the Convention and strengthening the implementation of the Convention at national level, ensuring broader participation in CBMs over two years and strengthening Article VII implementation.

5.4 The procedure in case of violations

The Geneva Protocol (1925) makes no mention of what to do if it is violated. Perhaps that is why it has been proven to have been violated several times in the past. Nor is the Convention on the Prohibition of Biological Weapons informing a Member State of failure to comply with its obligations, nor has it always been respected in the past. The Convention only regulates the procedure in the event of a suspected violation. This procedure is described in Article VI and provides for an investigation by the UN Security Council. However, since the 1980s, there has been a so-called UN Secretary-General mechanism that can investigate alleged violations of the international regime on the basis of a proposal from a Member

State. Only if the breach of the undertaking proves would assert the role of the Security Council. Within the UN, a certain international procedure initiated, in accordance with its Charter, as described in Article V of the Convention, which provide a solution to the ensuing situation.

The Security Council would probably seek to adopt a resolution in response to the situation. However, the problem would arise when the interests of a permanent member of the Security Council vetoing the resolution were at stake. It can therefore be stated that the unclear procedure and developments in the event of a violation of the Convention considerably undermine the effectiveness of the international regime for the prohibition of biological weapons and that the regime therefore does not fulfill another of the selected criteria.

5.5 Verification mechanism

There is currently no mechanism to verify Member States' compliance with their obligations under their international bioweapons regime. However, in an attempt to strengthen the function of the Convention on the Prohibition of Biological Weapons, efforts have been made to verify the mechanism for planting. The VEREX group worked on the preparation of the verification mechanism from 1992 to 2001. It drew up a sophisticated document to be adopted as an amendment to the Convention on the Prohibition of Biological Weapons and would not alter or interfere in any way with its content. The Verification Protocol envisaged three possible ways of overseeing compliance with the regime's obligations - declarations, investigations and visits. It has been elaborated in the form of a preamble. It established lists of regulated biological materials and toxins, including specific permitted amounts applicable for peaceful purposes. Although long negotiations have taken place and a verification protocol has been drawn up that would undoubtedly serve to

streamline the international regime for the prohibition of biological weapons, it has not been adopted. Although the absence of a verification mechanism represents an obvious gap in the effectiveness of the international regime for the prohibition of biological weapons, there is currently no effort to complete and accept it. The current negotiations under the regime are moving in a different direction, and the establishment of the Biological Weapons Ban is not very likely either. For this reason, it can be stated that the effectiveness of the international regime for the prohibition of biological weapons it is significantly weakened as compliance is not properly monitored. Thus, the international regime does not fulfil the criterion of the existence of a verification mechanism.

5.6 Implementation of national legislation

The Geneva Protocol (1925) does not contain any provisions regarding the requirement for the adoption of national legislation reflecting the Protocol obligation. The Convention partially addresses this issue in its Article IV. However, it does not refer specifically to the incorporation of elements of the Convention into the law of a Member State. Thus, Article IV does not specify what they mean *"All necessary measures"*. It is therefore entirely up to each Member State to decide how and to what extent they will implement these measures, as the perception of *"all necessary measures"* is very subjective. As the resolution of the Article IV obligation is not specified and its effectiveness is not guaranteed, this also affects the overall effectiveness of the international regime for the prohibition of biological weapons. It can be said that the lack of a requirement to implement the elements of the regime into the national legal systems of the Member States significantly hampers the effectiveness of the international regime for the prohibition of

biological weapons as a whole. The implementation of elements of the scheme in national legislation is therefore another criterion that the scheme does not meet.

5.7 Efforts to improve the regime

Whatever the international regime has countless deficiencies, it is essential whether some efforts are being made to eliminate them or at least alleviate them. The international regime for the prohibition of biological weapons has a number of weaknesses, especially those mentioned above. However, it was also mentioned that the Intercessional Process takes place every year and that evaluation conferences meet every five years to assess the development of the international regime for the prohibition of biological weapons.

Although the conclusions of the conferences provide only politically binding declarations, this is not negligible. Moreover, the negotiations serve to monitor the situation and it cannot be ruled out that they could serve in the future as a platform for the creation of a new legally binding a document that would avoid all the apparent shortcomings associated with the pillars of the regime.

In order for the international regime to prohibit biological weapons to be effective, it is essential that the Intersessional Process continues and evaluation conferences meet. It is also important for experts and scientists (epistemic communities) to comment on the issue , who can draw attention to existing and emerging problematic areas of the international regime and come up with proposals for their solution. Given that the Intersessional Process is currently underway and the Eighth Review Conference is planned for 2016, we can say that the scheme meets the criterion of improvement efforts.

5.8 Nongovernmental organizations

The international regime for the prohibition of biological weapons is not an isolated system but, on the contrary, is closely linked to other areas. The agenda it addresses is partly overlapping with other regimes, with the work of international governmental and non-governmental organizations and other institutions. The international regime for the prohibition of biological weapons deals with the issue of weapons that may endanger human and animal lives, it is interested in issues dealt with by the regime, such as the WHO or the OIE. But biological weapons can also damage crops, the production of which depends on the whole economy and which are a source of food for millions of people. Therefore, representatives of the Food and Agriculture Organization (FAO) also participate in the negotiations under this international regime. Another organization to mention is the International Committee of the Red Cross (ICRC), as the international regime for the prohibition of biological weapons is related to international humanitarian law. However, these organizations presume only a narrow selection of a number of international institutions that are actively interested in developing an international regime for the prohibition of biological weapons.

In addition to international governmental organizations and nongovernmental organizations are also following developments in the international regime for the prohibition of biological weapons. Their interest in the area of the prohibition of biological weapons has increased significantly and, for example, during the Intersessional Process 2007-2010, at least one session attended a total of 48 nongovernmental organizations. Numerous associations, forums, projects, institutes, research centers, as well as academic institutions are among nongovernmental organizations in the documents issued under the regime's activities. Worth mentioning are the Acronym Institute for Disarmament Diplomacy, the BioWeapons

Prevention Project, the Global Security Partnership, the Scientists Working Group on Biological and Chemical Weapons and the University of Bradford.

The importance of the activities of governmental and non-governmental institutions in the international regime for the prohibition of biological weapons is undisputed. By following its development, they can capture significant changes in its surroundings and in it. They are therefore able to comment on developments, make various suggestions and comments, which may or may not be heard.

It can be said that nongovernmental organizations have a high potential to contribute to a gradual streamlining of the regime. They need to continue, if not to a greater extent, to be involved in the Intersessional Process and Evaluation Conferences and to continue their own research activities. Insights and conclusions from their research are essential for the effectiveness of the international regime for the prohibition of biological weapons and its increase. In view of the above, it can be stated that the international regime for the prohibition of biological weapons meets the criteria of nongovernmental organizations active in the relevant area.

5.9 The prospect of the international regime

The international regime for the prohibition of biological weapons is unusual in many respects and therefore it is difficult to outline its future development. However, the previously mentioned information can draw certain tendencies within which it will most likely you improve workforce. Van der Bruggen and ter Haar state that the international regime for the prohibition of biological weapons does not adhere to the traditional structure of a regime prohibiting WMD. The traditional regime is based on an international treaty, an organization that checks compliance with the treaty, and states that should follow the

treaty. Moreover, how the traditional international regime for WMD banning works. However, the international regime for the prohibition of biological weapons is a kind of international network of various entities that interact and complement each other. Non-state actors have and will continue to play an increasingly important role in this complex network of relations, although states and normative documents continue to form the basis of the regime.

It is clear that the way the international regime for the prohibition of biological weapons will operate will not change fundamentally in the coming years. Meetings of Member States' experts and representatives will continue to be held at the Intersessional Process meetings, and discussions and news in science and technology will be discussed at evaluation conferences every five years. There can be no doubt that the pursuit of universal acceptance will persist both the Geneva Protocol (1925) and the Convention on the Prohibition of Biological Weapons, as there is still a few non-member states left.

In addition, CBMs will certainly be encouraged to expand the range of countries that voluntarily inform other members of the regime of relevant criteria in order to increase mutual trust. However, CBMs are criticized on the grounds that they are considered as the only confidence-building instrument and are not used by all states in the regime, as they operate on a voluntary basis. It is therefore likely that efforts will also be underway to develop additional mechanisms to enhance confidence between Member States. Proposals for such an atmosphere of trust include, for example, peer review, a peer review that would primarily be used to consult on how to improve existing Member States' practices on the prohibition of biological weapons.

Although in the past the Verification Protocol with which the VEREX Group came up has failed, there are still states that recognize the need to establish a legally binding mechanism to make the international regime more efficient. However, it will be necessary to come up with a proposal that does not cause any further stratification of the regime that would have occurred if only a few countries accepted the new document.

The European Union (EU) points out that a legally binding protocol, to which only a limited number of members of the international biological UNSC Resolution 1540 identifies the proliferation of WMD and its carriers as a threat to international peace and security. It also obliges States to prevent, by all available means, non-state actors from acquiring, producing, possessing, carrying, transferring and using nuclear, chemical or biological weapons and their means of delivery.

Negotiations on such a protocol should therefore be avoided. The EU proposes to conclude separate agreements in areas on which members of the regime can consensually agree. This solution is much more promising than a single protocol, because it is much easier to reach a consensus on modifying a narrower issue. The result would be to create a legal obligation only in a limited area, but applicable to all members of the regime. In addition, negotiations on other areas requiring legal force would not be blocked and this counterbalances the negative nature of the gradual adoption of sub-standards.

In the EU 's view, it is still desirable that the international regime on the prohibition of biological weapons should include a verification mechanism to verify compliance with the rules of the regime. The original Verification Mechanism of the VEREX Group is already out-dated and linked to a bad political experience. It is currently impossible that it could be followed up. It is necessary to examine the scientific and

technological changes that have taken place since its preparation and to clarify what and how the new verification mechanism should ensure. The Eighth Review Conference could serve as an informal forum where debates will be held to see if there is a common will among states to set up a verification mechanism. In the future, the conclusions of the informal discussions could lead to the establishment of a verification mechanism that would suit Member States.

It is expected that the ISU agenda could be expanded in the future. It is likely to be more closely involved in improving national implementation of the elements of the regime in individual countries, deepening the co-ordination between ISU and WHO, FAO and OIE, and strengthening the role of the ISU in monitoring science and technology developments in the relevant field. Due to the small number of ISU employees, its performance is limited. It cannot therefore be ruled out that the number of its employees could increase.

The so-called convergence of biology and chemistry will pose a major challenge for the international regime on the prohibition of biological weapons. As already mentioned, the fields of biology and chemistry are highly interconnected. In the past, their proximity was reflected in efforts to jointly ban biological and chemical weapons. Finally, for practical reasons, both areas were treated separately. Thus, two separate and very different international regimes for the prohibition of WMD were created . Over time, chemistry and biology began to become more interconnected by science and new technologies, especially in industry and commercial manufacturing. Biological processes have begun to be used to prepare chemicals and chemical reactions have begun to be used in biological changes materials. At this point, from the point of view of the WMD ban, there was again an increased interest in biology and chemistry in their interrelationship.

The Scientific Advisory Board (SAB), operating under the international regime for the prohibition of chemical weapons since 1998, is tasked with gathering information on developments in science and technology in relation to chemical weapons. Convergence is now reaching such intensity that its consequences are beginning to have a significant impact on the area of the ban on chemical and biological weapons. Questions arise as to whether and how international biological and chemical weapons ban regimes should respond to ongoing changes. It is more than likely that the integration of the biology and chemistry agenda under a single unit will take place at national level. How convergence is reflected in the international sphere is not entirely clear.

Informal contacts and information exchange between the Organization for the Prohibition of Chemical Weapons (OPCW) and the ISU are on-going. There are also opinions that convergence should extend into the sphere of regulation of both areas in order to create a single international regime based on a single normative document. However, this idea seems unlikely given the differences in the two regimes in the number of Member States, the existence of an institutional framework, the possibility of verifying or treating the way of national implementation. The convergence of biology with chemistry and all risks associated with this process will most likely continue to be discussed informally. Expert monitoring of convergence developments will take place, inter-state cooperation may take the form of an intergovernmental security program and a number of NGOs will undoubtedly address this issue.

Obviously, as soon as it was set up, the international regime for the prohibition of biological weapons suffered from certain shortcomings. Since its inception, efforts have been made to eliminate them. Nowadays, when changes in all areas occur at a

dizzying pace, there is a need to continue to make the regime work more efficiently and at the same time to reflect the regime that directly affects it. The future will show how the representatives of the Member States of the regime and the expert groups on whose efforts the operation of the regime depends.

Conclusion

The coming review conference has extremely important, as it more strengthening the BWC treaty regime. The threat of destruction and the more massive use of biological weapons have led states to push for their ban. During the 20th century, an international regime for the prohibition of biological weapons was completed. It is based on the two pillars such as the Geneva Protocol (1925) and the Convention on the Prohibition of Biological Weapons. These two documents, in combination, prohibit not only the use of biological weapons, but also their development, production and accumulation, while demanding the destruction of their existing stocks. The international regime for the prohibition of biological weapons, resp. its two pillars, critics are often referred to as imperfect and therefore ineffective in enforcing the law and from the above activities. For this reason, the main objective of this thesis was to assess the effectiveness of the international regime. At the same time, as a measure to which the regime is able to enforce prohibitions and compliance, to verify that they are not violated and as the ability to punish those who have been violated. Essentially, the article concurs with the views of regime critics. Both documents are very brief and the prohibitions they contain have not prevented the use of biological weapons in the past. Moreover, only the Geneva Protocol contains a ban on their use 1925. The different membership of the Protocol and the Convention thus weakens the effectiveness of the regime that works best when both pillars operate. The manner and quality of defining the definitions and criteria with

which the scheme operates are also insufficient. They are defined during negotiations whose conclusions have only political binding, not legal ones. The criterion of legally and politically binding measures of the regime is linked to this fact. Only the provisions contained in the Protocol and the Convention are legally binding on States and, as already mentioned, they are very brief and do not contain all the necessary wording. The Convention on the Prohibition of Biological Weapons merely mentions the procedure in case of suspected violation of its provisions. The Geneva Protocol (1925) does not comment on the situation of the violation itself. The international regime for the prohibition of biological weapons also lacks a functional verification mechanism because negotiations on its creation have failed. Furthermore, the regime does not include the requirement to implement its elements in the legal systems of individual Member States, so it is purely up to the States to decide how their entry into the regime will be reflected in their legislation. The international regime on the prohibition of biological weapons will most likely continue to evolve in a networked form of diverse interconnected entities that interact with each other. In this complicated network of relationships, nongovernmental organizations will become increasingly important. The Intercessional Process model is likely to be maintained, an evaluation conference will take place every 5 years and the ISU mandate will be strengthened. There is an endeavour to universal acceptance of the pillars of the regime and to extend the application of CBMs. Undoubtedly, efforts will be made to make the rules of the international regime more legally binding, probably by adopting sub-standards that can be reached by consensus between them. At the informal level, the subject of the adoption of a verification mechanism to verify the fulfilment of the regime's obligations will most likely be raised again. The future

development of the regime could be significantly influenced by the so-called convergence of biology with chemistry. Its formal reflection on the international stage is uncertain, but it will informally manifest itself through frequent contacts and cooperation between OPCW and ISU. Although the international regime prohibiting biological weapons suffers from a number of shortcomings but it plays an irreplaceable role in the international environment. Its existence ensures regulation of a significant area and contributes to a safer world. Due to its constant development, it can be expected that in the future it will improve and further reduce the threat of biological warfare. The BWC came into force at a time when the concept of security differs significantly from today's approaches. While it was located in a disarmament context at the time of its creation, constantly emerging challenges have initiated its further development into a universally applicable security regime. There is basic agreement among the member states about the need to strengthen the regime, but there is a lack of consensus regarding the starting points and goals that an additional verification protocol should create. In terms of globalization, the focus has developed from an interaction between states also within the framework of the BWC to a plurality of transnationally acting, including non-state actors. This process is itself dynamic and, with regard to BWC, is characterized by a certain need to catch up. National sovereignty as can be seen, for example, in the behaviour of the United States, creates obstacles to new types of governance and prevents rapid solutions to international and transnational problems. From the point of view of regime theory, the attempts to strengthen the BWC within the framework of the review conferences and other negotiating platforms can be rated as understandable. Due to unfulfilled expectations (as a result of non- compliance cases, phenomena of bioterrorism that has taken place or are suspected, and new

biotechnological developments), the effort to implement control measures and the intended creation of a designated international organization is a logical consequence. The BWC member states have no doubts about the principles and norms of the BWC, but rules and decision-making procedures need to be clarified and adapted to the current challenges. Establishing an international organization for the BWC would undoubtedly mean a loss of sovereignty for the member states, which in total could only be compensated for by a relative gain in security. With the initialization of the international process at the latest, constructivist approaches make it possible to interpret the development of the BWC. The interactions between the member states, including relevant nongovernmental organizations, enable the standstill of contract development to be overcome. The more informal and more subject-oriented treatment in the intercessional meetings of those problem areas resulting from the BWC promises to align the perceptions and interpretations of the member states. At the present time, however, it cannot be assessed whether the BWC will develop into a "verification regime" or a "regime of trust".

CHAPTER-6

GLOBAL MEASURES AND POLICY TOOLS FOR CURTAILING BIOLOGICAL WEAPONS

6. Introduction

The possibility of natural and deliberate outbreaks of biological agents is worldwide enormous threat. Since Non-state actors are utilize biological agents like viruses, bacteria and germs intentionally to produce fear or grounds sickness or cause mass casualties with the intention of to attain their purpose. This chapter discusses how the deterrence strategy applied for the countering of the biological weapons threat what part deterrence plays for discouraging and deeming the possibility of successful attack of biological weapons from non-states terrorist groups. Furthermore, it looks at how to reduce the threat of natural outbreaks of biological agents and raise awareness of biological security. The major goals of this analysis are to ruminate the possible contribution of potential deterrence strategies majorly focuses on the punishment and denial strategies how the both strategies would address the growing challenges of reducing the biological weapons threat. The chapter concludes how these strategies would essential for reducing vulnerable consequences of prevailing pre- post natural and deliberate outbreaks of biological agents.

The use of biological weapons threat from non-state actors was substantial after 2001. Therefore terrorism via deliberate spread of biological agents encompasses a spectrum of the greatest threats to the world peace and security. Anthrax attacks in 2001 identified that non-state actors were succeeded in obtaining biological weapons and were willing to victimize the lives of citizens to lead their plans. Therefore, Anthrax attack signalled a fundamental shift in the nature terrorism because non-state actors achieved the capability to carry out attacks with biological weapons.

Consequently, extensive literature and studies are available related to both the use of biological weapons as instruments in the warfare and the purposeful discharge of biological agents by the non- state actors. For instance, Joshua Lederberg describes biological terrorism as a huge threat to world peace and exists worldwide (Lederberg, 1999). As he further argues "bioterrorists could cause over a thousand casualties" (Lederberg, 1996).

Non-state terrorist groups' attempts to use biological weapons have rapidly increased in the 20th and into the 21st century like a Rajneeshee cult in 1984 and Aum Shinrikyo in 1990 to 1994 utilized biological weapons. Consequently, Milton Leitenberg argues that Al Qaeda had a great interest in biological weapons and precisely anthrax in 1997 to early 2002 (Leitenberg, 2005). Nevertheless, there are numerous high-level gaps in the existing literature of security studies that theoretically strengthen the countering biological weapons threats. Though more often, the threat of biological weapons has been highlight through the viewpoint of securitization theory. Furthermore, the limited volume of literature is available on theoretical arguments that show how to deny the motivations of non- state actors against using biological weapons. Therefore, this research uses the deterrence theory paradigm as per closer inspection indicates relatively little efforts were devoted to the study of deterrence in relation to biological weapons threat and non-traditional security. Historically, deterrence strategies related to nuclear weapons such as deployment of these deterrence strategies utilized for controlling fissile materials and used as instruments of controlling the access to the materials. Similar implementations of deterring strategies improve biosecurity and reduce the serious risks of misuse of biological material especially deny the access of dangerous pathogens.

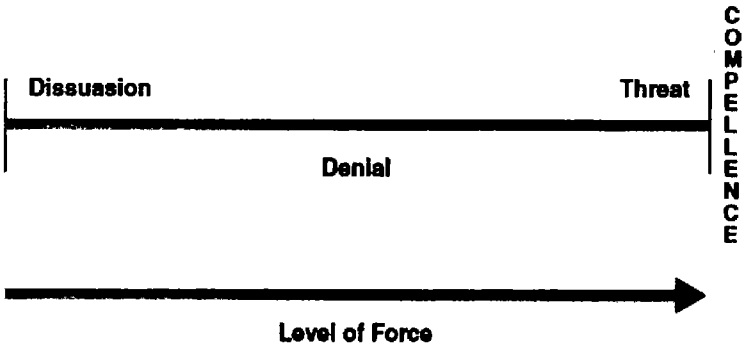
This argues that whether adoption of deterrence strategies would be reliable or not to prevent the biological weapons hazards. Non-state terrorist groups will continue to seek to disclose our weak points and use for their own motives. Biological weapons attacks can be countered, through sustaining international norms and surveillance systems, deterrence strategies by indicating a strong national and international response. Ronald Atlas says that we need to tackle the age of bioterrorism because terrorists could potentially misuse pathogen (Atlas, 2002). Jeanne Guillemin believes that the best hope for protection against lies in the range of legal restraints (Guillemin, 2004).

6.1 Concept of deterrence

Deterrence is theory as well as an effective strategy morover deterrence is also assumes a knowledge of the opponent. As Patrick Morgan stated "Deterrence has been intensively studied and tested as to its use in terms of strategy in international relations, the maintenance of stability in international relations, the conduct of violence and warfare in both international and domestic contexts, and in political affairs. Since deterrence is the use of threats to block or reduce the inflicting of serious harm"(Morgan, 2017). General deterrence is a long-term strategic concept that allows stabilization situation. Thomas Schelling work has foundational importance for deterrence. Deterrence is a type of power relationship as according to Schelling, there are two ways the threat may force and change the enemy's behavior. The aim of deterrence is to deter the deterrent from specific actions, which concern the interests of the deterrent. As Thomas Schelling states, "the essence of these tactics is some voluntary but irreversible sacrifice of freedom of choice. They rest on the paradox that the power to constrain an adversary may depend on the power to bind oneself" (Schelling, 1980).

Glenn Snyder's work, which we can rightfully considered one of the best classic conceptualizations of deterrence. Moerover, Glenn Snyder stated that "Security benefits in a mutual defense alliance include chiefly a reduced probability of being attacked (deterrence), greater strength in case of attack (defense) and prevention of the ally's alliance with one's adversary (preclusion)" (Snyder, 1983). It is very difficult to somehow evaluate the effectiveness of deterrence. According to Adam Lowther "understanding the culture, interests, and objectives of adversaries has the potential to decrease the number that cannot be deterred" (Lowther, 2013).

Figure 4: Deterrence Model



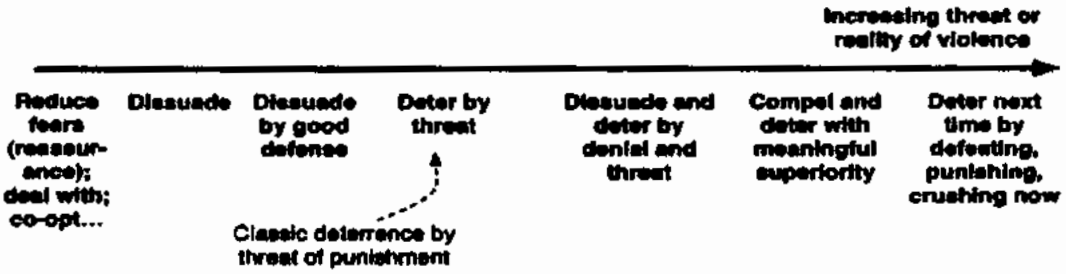
Source: Lowther, A. (Ed.). (2013). *Thinking about Deterrence: Enduring Questions in a Time of Rising Powers, Rogue Regimes, and Terrorism.* Air University Press, Air Force Research Institute.

6.2 Deterrence Spectrum

These are typically efforts to deter the enemy from initiating an attack. Deterrence can be define as "Prevention of action through the existence of a credible threat in the form of an unacceptable counterattack and belief that The cost of the work will

significantly exceed the possible profity "(Staff, 1994). In addition to enforcement strategies, there are a number of other means they have to force the actor to behave in a certain way. Within these strategies, however does not represent the force or threat of its use, but rather works with motivation, negotiation or reductions.

Figure. 5: The deterrent spectrum of influences



Source: Davis, P. K. (2014). Deterrence, influence, cyber attack, and cyberwar. *NYUJ Int'l L. & Pol.*, *47*, 327. https://nyujilp.org/wp-content/uploads/2015/11/NYI203.pdf

Paul K. Davis shows a detailed model of spectrum which Illustrates that "such uses of violence as punishing an actor now for past deeds so as to deter or preclude his future actions" (P. K. Davis, 2014). The actors then behave as rational decision-making they will conclude whether it is better for them to act and bear the punishment, or whether they will undergo deterrence and will not be active. So, "deterrence can be a significant part of dealing with those different threats" (P. K. Davis, 2014).

6.3 Deterring non -state actors

One key concern for countering biological threat has been how to deter the non -state terrorist groups? While there may be deterrence succeeds if the non -state terrorist groups' wished-for utilizing biological weapon. Still, they seek alternative ways for an attack because of the vigorous defensive system as well as of high costs to attain for their objectives. While deterrence is a strategy that uses convince the terrorist groups that the cost of a particular action would more deleterious than benefits—these multifaceted approaches aimed at lowering the risk posed by a biological weapon.

According to Patrick Morgan, deterrence situations, a potential challenger has not yet seriously considered an attack and actors maintain regular forces to deter general potential threats. In immediate deterrence situations, one actor is considering an imminent attack and the defender issues a threat of retaliation to prevent it while denial strategy eliminates the threat largely through defensive deterrence measures, in that they demonstrate credible capacity by a state to respond and mitigate the consequences of an attack (post) or reduce vulnerability to an attack by making it ineffective (pre).

Moreover, Wyn Bowen advocates that the state punish states that are supportive of terrorist organizations, as well as convincing them to cease their support to the terrorist organizations. While the deterring terrorism literature is in some agreement that the focus of the state's policies should shift from punishment to denial, this perspective suggests the new focus ought to move beyond a combination of denial and punishment strategies to an offensive campaign that targets the terrorist organization's policy of attrition.

6.4 Defensive deterrence measures

The critical consideration for deterrence strategists contains two different aspects, one is of deterrence by denial, and second is deterrence by punishment. Deterrence by punishment or denial strategies would not wholly eliminate biological weapons threats, but would considerably reduce it. Deterrence by denial occurs when non-state actors desire to utilize disease as a weapon but do not do so because they are convinced that they cannot achieve their motives and objectives because of the vigorous biological defensive system. Therefore 'deter' plainly means to halt non-state terrorist groups from doing somewhat by terrifying and convincing them it won't work.

In a sense, then, what lends credibility to the threat is not so much the risk of costs, but the risk that it may lead the leader is signalling a willingness not to utilize biological weapons because he must know about the opponent's defensive capabilities. Over time, according to Lawrence Freedman, terrorists begin to doubt the effectiveness of their tactics, losing confidence that their strategy would succeed. Deterrence by denial strategy for countering biological threats and deploys defenses to prevent natural or deliberate outbreaks of biological agents. The Nation's capability to counter with a bioterrorist assault, hence, depends significantly on the condition of awareness of its therapeutic care systems and public health infrastructure. Therefore, a strong public health infrastructure is imperative not only to protecting and enhancing the public's health but also to the nation's security.

Prevention measures such as threat investigation, attack warning, biosurveillance, global laboratory and vital infrastructure protection, research cooperation, research and development of diagnostics and countermeasures, response planning, medical countermeasures and refinement. These approaches aim to reduce the consequences of an attack, afford earlier detection, and reduce vulnerability. Besides, biological

weapons are a means of extraordinary psychological effectiveness. The possibility of an attack generates fears or panics the population and demonstrates terrorist deterrence potential.

That exerts pressure on political and military leaders and changed strategic thinking. The biological weapons have the most significant potential for damage per weight and volume, and relatively easy to secretly produce, transport and use, aware that they may become instruments of state or non-state terrorism, intimidation or retaliation policy. A successful bioterrorist stop should probably be a significant loss event and thus a challenge for public health. The health system and the regulatory authorities are burdened to the brim of their capacity: in extreme cases could panic, mass escape, looting and finally collapse of public order threaten. The effective communication of pre and post-attack alleviating fear and provide a sense of preparedness.

6.5 Fear of failure

Strong denial and punishment raised the organization's prospect of failure and loss of prestige. The success of deterrence depends on the particular attributes of the terrorist organization,

6.6 Threat of punishment

Deterrence by punishment is situations which influence the choices of non-state actors or terrorist groups. These situations cause fear among cults and terrorist organizations as acts of denial were successful when the state used military forays to disrupt the terrorist organization's operations and to detect and disrupt their communications and preparation for an attack. Strong denial and punishment raised the organization's prospect of failure and loss of prestige to ensure peace.

Punishment as a medium for communicating the deterrence message creates "conscious and unconscious inhibitions against committing a crime,"

According to Liddell Hart, the gradual process of punishment enables humans to accommodate to the situation. The effects of punishment are limited, and escalation dominance is non-existent. According to Jervis, deterrence works only if the threat to punish is coupled with the promise to refrain from such action if the potential challenger does not attack. Deterrence succeeds if the challenger intended to attack but refrained from an attack because of the threat. Deterrence by punishment also affects the cost calculus of terrorist organizations-- "deterrence is said to be effective if it produces a cost-benefit calculation within an adversary's decision making in which the expected utility of pursuing a given action is less than its expected cost." Gerald Steinberg argues that the state's response needs to be excessive to make the costs high enough to deter further terrorist attacks.

The threat of punishment is an effective deterring defensive strategy to halt and counter biological weapon threat. An inherent tension exists between the twin variants of deterrence—punishment and denial. Nonetheless, even though deterrence by punishment has difficulties, it remains a crucial part of the defense against biological weapon threat.

6.7 Non-State Actors Motivations

Biological weapons have the greatest attraction for non-state actors because they can produce cheaply and easily moreover it has a variety of unique features. These types of groups pose the greatest threat due to access, resources, and capabilities. However, the danger from the anthrax letters was not exclusively dependent on the availability of anthrax. Still, the concern is that biodefense makes us less secure by proliferating biological agents that could provide potential. Biological weapons

threat is not a new phenomenon, and the biological agent has been used as a weapon for centuries. In the 20th century, almost every leading nation designed, twisted, and even employed in encounter panoply of biological agents such the same as anthrax, plague, and typhoid. The first reported utilizing of smallpox as a biological agent was by Pizarro, who was not kind the native residents of South America during the 15th century. Smallpox had previously grown to be common within Europe in 1500, a circumstance to facilitate it purely a childhood sickness; it is opening into the New World utilizing the colonizers rooted an unbelievable danger. Pizarro presented the smallpox virus-contaminated clothing to indigenous peoples of South America. Smallpox was a principally shocking disaster and catastrophe for South America. Even though the supposing approximates contrast, the original Aztec population of with reference to 25 million might have been reduced to 16.8 million. At the same time, the Incas misplaced 200,000 of their initial 6 million people from 1524 to 1527.

The Federal Bureau of Investigation and local law enforcement found an open vial of Salmonella enterica Typhimurium that matched the strain that was found in the salad bar poisoning cases. Amerithrax signalled "a fundamental shift like the biological terrorism threat." It also suggested the importance of enhancing local defences, particularly since "many tools used to address natural disease threats will be needed to respond to an intentional attack."

A biological terrorism substantial attack is the purposeful discharge of bacteria, viruses, or other microorganisms used to grounds sickness death or produces disease in the population, plants, or animals. Microbes, Germs and venom are skillfully spread through infectivity of water or food, through vectors such as creatures; or the same as aerosols floating in wet or dry formulations.

6.8 Pathogen Destruction and Detection

Biological agents' facades a unique threat as diverge fundamentally from other weapons of mass destruction. The majority possible bioterrorism agents are natural matters or living microbes (pathogens). Bacteria are skilled in causing disease are called pathogens. Pathogens are potentially infectious agents that rarely cause infection. Biological agents need of hours to days or yet weeks of incubation before ground sufferers as contrasted to nuclear and chemical weapons start immediate fatalities. High-priority agents can be effortlessly transmitted and spread, consequence cause colossal fatality. The disease agents are used by the terrorist as a weapon from centuries. Pathogens are invisible, reproduce within the sufferer and can mark in lethal, communicable and harming symptoms. Approximately a dozen microorganisms deliberately convert into an agent by utilizing bacteria, viruses or toxins that cause mass casualties. A brief analysis of these disease agents that might be used in bioterrorist attacks are the following:

6.9 Managing the biological weapon attack

Biological agents need of hours to days or yet weeks of incubation before ground sufferers as contrasted to nuclear and chemical weapons start immediate fatalities. The public health system would soon encircle by a bioterrorist attack. For the public health system to be effective in its tasks of discovery and intervention, more consideration should be rewarded for fixing the infrastructure of public health and bioterrorism surveillance system accurately.

Unlike other measures to protect national security, for example, the proposed missile defense system; defense actions against bioterrorist attacks were appropriate dual-use implications that could help American citizens in disaster and in everyday life. Development of the public health infrastructure not only defends the case of

bioterrorism attack, but will also help recognize and manage natural outbreaks of infectious diseases in peacetime. The primary mechanism or occupations of the public health infrastructure and medical intervention, regarding the scope of the system, then it is necessary to choose such that which brings the most advantages and eliminates the maximum number of disadvantages that they can lead to possible conflict escalation and stability distortion. Possibility of absence the missile defense system is no longer current or too sensible, because there are actors with a limited arsenal who can under different motives.

Conclusion

Detection of biological substances and toxins in real-time and in the free environment is a complicated matter. This is due in particular to the fact that the amount of resources that terrorists can use is too much, and most of the recognition plans and procedures are specific to the biological agents and, for this reason, it is generally not in the one country's security. The measures mentioned above and other legislation, international agreements and programmes related to biological weapons are undoubted of great importance concerning relations between States and international security as it is often discussed about their effectiveness. However, in the case of biological terrorism, in which a non-state actor plays a significant role, the terrorists do not regard international treaties and laws. One of the objectives of international treaties or strategies on biological weapons is the suppression of biological terrorism, but it is instead a reduction of the likelihood of terrorists with the State and the prevention of state-sponsored terrorism. More important in this respect are programmes and strategies that focus on the preparedness of States and protect its inhabitants in the event of a biological weapons attack.

CHAPTER-7

TRANSFORMATION OF POLICY TOOLS AGAINST BIOLOGICAL THREATS: PAKISTAN'S RESPONSE AND PREPAREDNESS

7. Introduction

Biological and Toxin Weapons Convention (BTWC) play a major role in the controlling of biological arms and the first legally multilateral biological disarmament negotiation treaty. This explores how BTWC is a milestone to prevent the biological weapon's acquisition, production and stockpiling. This chapter focuses primarily on the BTWC role in the implementation of national legislation and the proper implementation of the convention provisions by its member states. It discusses how states parties during the past decades are connected through BTWC to address the substantial obstacle for the implementation of the Convention's provisions.

The major focus of this chapter is how the convention has ambiguity in the verification mechanism because of no provisions for verification and how review conferences are positively contributing in verification and monitoring mechanism to strengthen BTWC. The BTWC regime successes and flaws as well as identify the international cooperation and national implementation enhanced the future credibility and practicability of the BTWC. Furthermore, it shows how Pakistan as a responsible state party of BTWC and has strong adherence to strengthen the BWC regime. It discusses how Pakistan remains to adhere to and implementing Convention's provisions entirely.

The Biological and Toxin Weapons Convention (BTWC) is a foundation of the multilateral disarmament treaty and has the purpose to eliminate all kind of biological and toxin weapons from the world. The Biological Weapons Convention

(BWC), also known such as the Biological and Toxin Weapons Convention that has been a landmark treaty and an instrument which control the proliferation of biological weapons. BTWC considered successor of Geneva Protocol which proscribed the use of entire kind biological and chemical weapons during war times. The Geneva Protocol was founded after the destructive use of chemical materials in World War I. Since in June 1925 Geneva Protocol was signed at Geneva and subsequently came into force in February 1928.

Geneva Protocol zealous proponent condemned the use of asphyxiating, gases or poisonous during war. Predominantly, the Protocol addresses the use of chemical and biological weapons during warfare while it does not address the use of chemical, biological weapons during peacetime. Therefore during peacetime signatory states of Geneva Protocol were allowed to develop and built the dangerous chemical or biological weapons. However, the uniqueness of Protocol was to impose complete restriction on the signatory states against the extensive use of bacteriological methods during the war.

Biological threats pose unique hazards to both the national level and international levels of security. Biological agents which rapidly circulate infectious diseases are the leading cause of death worldwide in the 21st century. Biological threat agents primarily needed to enhance preparation which adequately deals with the comprehensive framework for countering biological threats. The foremost objective of this chapter is to encapsulate the dangerous weaknesses in existing preparedness capabilities. Furthermore, this chapter attempts to give an overview of current policy tools which tracks and also regulate the deficiencies along with the implementation challenges that lie in future. Also, it explores the capabilities and policies of Pakistan to tackle and curb the rising biological threats. Particularly highlight the significance

of existing policy tools and critical gaps in policy tools for countering biological dangers, especially in Pakistan.

In the contemporary era, the biological threat is a new dimension of the most significant security concern. Biological agent threat contains the possibilities that terrorist may utilize biological agent materials as well as another intensified fear that holds with the naturally occurring diseases or accidental outbreak of biological agents (Koblentz, 2010). Biological agents are highly infectious and pathogenic microorganisms (bacteria, viruses, and fungi) as well as the discharge of bacteria, viruses, or germs (agents). Natural outbreaks and deliberate dissemination of germs (agents) produce mortality rates high among plants, people or animals (Edelstein et al., 2000). Deliberately terrorist can be circulated bacteria, viruses and toxins through sprays, the contamination of food, water or as aerosols suspended in wet or dry formulations (Zilinskas, 1999).

The incidents of September 11 using anthrax-laden letters upraised and also revealed numerous weaknesses in the existing policy tools for countering the biological threats (Spencer, 2003). In recent, the increasing biological threats and incidents, especially after the end of the prolonged cold war considered and claimed high-priority policy concerns for decreasing the possibility of future attacks. Moreover, the nations must boost to address these threats by enabling the preparation, response, threat reduction programs, and developing remediation policy plans (Bush, 2003).

7.1 Major objectives of the treaty

The Biological Convention was created for defensive purposes; its objective is to achieve progress effective disarmament to make the complete elimination of the use of bacteriological agents and toxins as a method of war. In this way, the Convention of Biological Weapons prohibits in a clear way, in any circumstance, the

development, production, acquisition, storage, transfer, deposit, storage or use of biological agents or toxins as well as equipment or vectors that use them.

However, the Convention does not define the prohibited elements or the objectives to which the prohibitions refer. According to article four, each State undertakes to adopt, in accordance with its constitutional procedures, the necessary measures to prohibit and prevent the development, production, storage, acquisition or retention of agents, toxins, weapons, vectors, that are in their territory or in regime and prevent chemical rearmament any place, or under its jurisdiction. Qazi Humayun articulates that "there were weaknesses in the international conventions on chemical and biological weapons as they could not stop a country if it started making such weapons without declaring them. He said that even though Pakistan strictly abides by international conventions on the elimination of chemical and biological weapons, the safety measures and mechanisms against such threats needed to be enhanced" (Today, 2012).

Accordind to Tehmina Janjua "Pakistan was among the first countries to support the National Authority Mentorship Programme; She added that the malicious use of bio-sciences could kill humans, animals and plants, trigger wars, and disrupt infrastructure, and that a coordinated approach needed to be developed to prevent such misuse" (Dawn, 2015).

However, the Convention does not establish specific measures to verify compliance with those obligations. Article X of the BTC involves States Parties to "facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information". Brig Muhammad Afzal Khan said that "Chem-Bio Threat and Response, argued that through control measures and control regime our threat perception would be increasingly

crystallized. He also pointed out to the challenges of handling the bio-and Chem-threats, having diverse and unpredictable manifestations" (Khan, 2018). Jehanzeb Khan said, "Pakistan has also supported the Russian proposal for the elaboration of an international convention for the suppression of acts of chemical and biological terrorism in the Conference on Disarmament" (Nation, 2018). Geneva Ambassador Farukh Amil believed that "Pakistan had prioritized the universalisation of the convention on biological weapons and the implementation of all its articles. However, the most sustainable method of implementing the convention was through multilateral negotiations aimed at concluding a legally binding protocol for all countries" (Today, 2017).

7.2 Content of the Convention on the Prohibition

Kamran Akhtar, DG Disarmament of Pakistan "believed in most credible and sustainable method of strengthening the Convention through multilateral negotiations towards a legally binding Protocol, including verification provisions, dealing with all the Articles of the Convention" (Khan, 2018). The various chapters of this Convention and their names adequately describe what the Convention does and what its ideas are.

Preamble

1. Prohibition of the development, production, acquisition and
2. Commitment to destroying weapons
3. Commitment not to receive and not to transfer weapons
4. Fulfillment of the Convention in the territory of a Member State or under its jurisdiction
5. Consultation and cooperation
6. Violations of the Convention

7. Assisting Member States in the use or risk of using weapons
8. Relationship to the national protocol
9. Commitment to negotiations on the full and general prohibition of chemical weapons
10. Technological and economic development
11. Amendments to the Convention
12. Evaluation Conferences
13. Duration
14. Signature, ratification, accession, depository
15. Authentic Texts

7.3 Implementation of the BWC in the legal system of Pakistan

The (Biological) and Toxin Weapons and on their Destruction became part of the legal system of the Pakistan since the 1975. Pakistan assumed and fulfilled international obligations as the "Pakistan government has also taken credible legislative measures domestically against proliferation including nuclear, chemical, and biological transactions, which can provide assurance to international community about Pakistan's commitment to non-proliferation. Pakistan has taken multiple measures which are supported with rules regarding licensing" (Bukhari & Rehman, 2011).

The basic requirements of BWC have been continuously incorporated into the Pakistan legal system since the mid 1975s. The Pakistan legal system also introduced principles resulting from other relevant international regulations, such as the UN Security Council Regulation 1540. The UN 1540 Committee maintains a directory of states and international and regional organizations that offer to assist states in developing legal and administrative infrastructure for implementation of

UNSCR 1540. Zawar H. Abidi, stated that "in line with increasing threat of terrorism, the risk posed by various microorganisms as biological weapons need regular evaluation" (Khan, 2018). Despite the political difficulties in agreeing to a model law, such model laws nevertheless can serve as a useful tool for drafters of national legislation, providing them with a checklist of sorts to determine if the obligations under BWC are being met by existing legislation and what further provisions need to be enacted.

The key legislation is Act on Certain Measures Related to the Prohibition of Bacteriological (Biological) and Toxin Weapons and on the Amendment to the Trade Licensing Act, which significantly contributes to the fulfillment of the obligation under Article IV of the BWC. Zafar Nawaz Jaspal described that "Pakistan's Parliament legislated an Act–the Export Control on Goods, Technologies, Material and Equipment Related to Nuclear and Biological Weapons and their Delivery Systems Act–in September 2004. The purpose of this Act is to further strengthen controls on the export of sensitive technologies, particularly related to nuclear and biological weapons and their means of delivery. In addition, in April 2007, Pakistan established a Strategic Export Control Division (SECDIV) in the Ministry of Foreign Affairs. The purpose of the SECDIV is to further tighten controls over exports, by monitoring and implementing the Export Control Act of 2004" (Jaspal, 2008)

7.4 Pakistan adherence to strengthen the BTWC

Pakistan as a responsible state party of BTWC and has strong adherence to strengthen the BTWC regime since 1972. "National Implementation of BTWC is significant approach to control the use of biological weapons. Pakistan fully supported the first multilateral disarmament convention as BWC comprehensive

negotiation framework has necessary safeguards which minimize and prevent the spread of biological of biological weapons|.

In **April 2016**, during the BTWC's **Eighth Review Conference**, Ambassador Tehmina Janjua stated that "Pakistan believes that the most credible and sustainable method of strengthening the Convention is through multilateral negotiations aimed at concluding a legally binding Protocol, including on verification provisions, dealing with all the Articles of the Convention in a balanced and comprehensive manner," The convention promotes cooperation among states parties particularly with developing countries like Pakistan. Hence, the Government of Pakistan has actively takes part in periodic conferences of the BTWC active in the global efforts to strengthen the regime.

Consequently, the convention also interlink regional organizations and states parties that assist states in developing law, national legislation, strengthen national capacities and also raise awareness among scientific community in the peaceful use of biological science and technology. Article X of the "BTWC which indorses technical cooperation among the States Parties. Ambassador Tehmina Janjua further also stressed that "We attach special importance to Article X of the Convention concerning transfer of knowledge and technology for peaceful uses of biology". Zamir Akram said that "due to the rapid science and technology developments, countries need to meet more than once in five years to discuss measures to confront the "dual use" nature of biological weapons. He also stated that, "Article X of the BWC that emphasizes on international cooperation and assistance because of the tension that exists in promotion of biological technology transfers in the presence of strategic trade controls to address proliferation risks". He highlighted "Pakistan's

stance in support of implementation of all articles of the BWC in a balanced, non-discriminatory and comprehensive manner" (Khan, 2018).

In 2006, Ambassador Masood Khan "articulated that under Article IV of the BTWC, Pakistan is obligated to take adequate preventative measures to restrict the acquisition, development and stockpiling of any type of weapons of mass destruction, in as much as terrorist groups are active in Pakistan". Ambassador Masood Khan further he articulated, at "the 7th BWC Review Conference held in December 2011 that Member States are required to adopt a series of measures aiming at improving public health surveillance, early warning and detection capabilities. Pakistan fully supported the international community effective national legislation this end by initiating fresh approaches in the regional context and also supporting international community in their efforts".

Article X of the Biological and Toxin Weapons Convention clearly aims to promote cooperation and exchange of equipment, materials and scientific and technical information associated with microorganisms and toxins for peaceful purposes. There is however a fundamental difficulty in implementing Article X which needs to be taken into account in a future legally binding instrument. This stems from the fact that the parties to the Convention are the States Parties, whilst much of the know-how and intellectual property necessary to achieve the aspirations set out in Article X are held by industry. It also builds the treaty regime into normative structures at the national level and helps, even if only marginally, puts developing states like Pakistan on a moral high ground for demanding the privileges promised under Article X of the BWC which promotes international cooperation for research and development in related areas. Masood Khan, put it in celebrating the ''historic moment'' of completing the successful review, the delegates had been stalked by the

shadow of the past but were nimble enough to stay ahead of it and ''quickly moved into the brighter lights of the future.'

In recent years, advances in the field of biological sciences have opened up new avenues for the peaceful application of biotechnology as well as international cooperation in this area. The fulfilment of our obligations under BWC and the establishment and maintenance of effective bioethics, bio-safety and bio-security standards as well as focus on dual use education, should contribute towards enhancing international cooperation." In other words, BWC enhance international cooperation and also strengthen nation's capacities against the bioterrorist threat and natural outbreaks of biological agents in various respects. Such as BWC Article V mainly emphasize and guide states parties "to consult one another and to cooperate in solving any problems which may arise." This means to enhance government body and institutions which implement the Convention at the national level.

Pakistan has always pursued the notion of the development of enforcing legal regulations to ensure the strengthening of the regimes. The binding obligation on BWC states parties to put in place national implementing measures for the convention is abundantly clear, as Article IV requires states parties to take 'any necessary measures' to give effect to the convention at the national level, in accordance with their constitutional processes. Along with the above mentioned measures, Pakistan is actively working on creating awareness for the full and effective implementation of the BTWC.

Even the proponents of the model law realize that any state is unlikely to implement the model law as such because of the presence of pre-existing legislations and inspector systems etc. It is just one of the many possible ways in which the BWC obligations may be implemented. The laws and policies proper implementation have

adequate safeguards to prevent biological threats. Therefore, limiting the biological threats require to raise awareness among scientific community, law enforcement agencies, policymakers and health regulatory agencies in Pakistan. The obligation of prevention is precious; it requires national measures to implement of the Convention on Biological Weapons of very high quality, which should be a guarantee of their effectiveness. If the prohibitions and legislation adopted by a State Party are not sufficiently rigorous to prevent biological weapons activities as defined in article 1 of the Convention.

Dr Zafar Ali is DG Export Control Division "highlighted that Pakistan has adopted stringent bio-safety and bio-security measures for safety and security of biological agents, facilities, technologies and equipment. He emphasized the point that although the Strategic Export Control Division was functioning and the Strategic Export Control Act was effective since 2004, there is a need to enhance coordination at national and international level for effective bio-ethics, bio-safety and bio-security standards and adoption of Internal Compliance Program. Awareness raising and capacity building is important in implementing peaceful application of biology for socio-economic development" (Khan, 2018).

However after the 9/11 anthrax incident in US, Pakistan conduct defensive preparations, according to the report that "Scientists and doctors in Pakistan are preparing contingency plans to respond to the threat of biological and other unconventional weapons that could emerge as a result of the crisis in Afghanistan, officials said. As part of the plans, hospital authorities are arranging for extra beds and medicines and are training doctors and paramedical staff in ways to cope in case terrorists unleash such weapons in Pakistan in response to an expected U.S. attack on neighboring Afghanistan. It was thereby noted that Pakistan's two defense

laboratories—one in Karachi and the other in Islamabad—were working to prepare enough vaccines to combat anthrax and other biological agents. Pakistan urged the World Health Organization to help Pakistan with technological assistance in preparing a defense against biological weapons" (Press, 2001)

Crisis management is implemented in a crisis situation, which are management activities of the institutions aimed at analysing and evaluating the security risks, planning, organising, implementing and controlling the activities carried out in connection with the resolution of crisis situation.

Biosecurity is a system of countermeasures that prevent biological agents or toxins, information and technical means. Biosafety is a wider area that includes aspects in work safety, safe food production, transport of biological material, medical security etc. According to Aamer Ikram it appears to be regulating the biosafety policy at national level in Pakistan "The latest formidable step as part of national obligations was the launch of the Biological Safety Association of Pakistan in March 2008. There has been an overwhelming response from scholars, scientists, microbiologists and people from public health across the country. The core aspirations are capacity-building in terms of developing biosafety expertise in the scientific, legal and technical areas, with extensive coverage of the relevant issues, for example, in risk assessment, risk management, laboratory design and certification, surveillance and auditing, among others. Major focus is on: national training on biosafety; GMO applications and implications; BWC implementation; the training of institutional biosafety committee heads; and developing post-graduate and undergraduate curricula" (Ikram & Einstein).

7.5 Policy Tools for Countering Biological Threats

The hazard and risk of expulsion of biological agents with the intention to threaten a nation or influence a government is usually referred to as deliberate explosion of biological outbreak and also refer as "the poor man's nuclear bomb" (Cordesman, 2002). Since, September 11, 2001 disaster and consequent anthrax outbreaks made the states conscious that the public health system is not prepared to administer a large-scale emergency.

Biological attack poses an exceptional challenge to the therapeutic care and public health systems. Unlike an outburst or chemical attack, which outcomes in instantaneous and visible tragedies, the public health impact of a biological threats can disclosed gradually over time. Until an adequate number of people appear at emergency rooms and doctors' offices complaining of same indications, there could be no symptom that an attack has happened.

The Nation's capability to counter with a biological threat attack, hence, depends significantly on the condition of preparedness of its therapeutic care systems and public health infrastructure. Therefore, a strong public health infrastructure is imperative not only to protecting and enhancing the public's health but also to the nation's security.

Biological agents threat is a major danger to public health and security as a result biodefense as a policy tool is transforming and transmitting resources to preparing for counter biological threats at all levels. Biodefense policy includes measures to detect, prevent, recover and respond from damage or destruction caused by biological toxins to animals, humans health or the food supply. Biodefense policy provides a comprehensive framework for threat awareness, prevention and protection, surveillance and detection, and response and recovery. Biodefense as a

policy tool perform different tasks for the investigation of the threat; brainpower collection; practical prevention; vital infrastructure protection; attack warning; attribution; response planning; medical countermeasures; and refinement.

The comprehensive policy framework for countering the biological threats from natural outbreak of biological agents or bioterrorist attack consists of four essential policy tools. These policy tools are organizing principles for threat awareness; prevention and protection; surveillance and detection; and response and recovery. While these policy tools were developed to direct public health efforts to protect against natural outbreak of biological agents or bioterrorist attack hazards. The vital policy tools against biological threats are following:

1. Threat Awareness policy
2. Prevention and Protection policy
3. Surveillance and Detection policy
4. Response and Recovery policy

7.5.1 Threat Awareness as a policy

Intelligence communities produce an upheaval that creates new opportunities for integrating efforts, to recognize new scientific tendencies. Although the natural challenges of classifying and illustrating biological attacks agenda that predict biological attacks however Intelligence Community has ability to accumulate, investigate and counter hazard.

Consequently Intelligence communities engaged for establishing new research and investigating understanding of the risk created by biological agents. Thus, the involvement of agencies are important policy tool to work together to increase the capability of law enforcement, public health, agricultural, diplomatic, defense, and

carrying infrastructures to identify and tackle such threats and to control rising biological threats.

7.5.2 Prevention and Protection Policy

Biodefense policy for the 21st Century declared that preventing biological attacks is by far the most cost-effective approach for countering biological threats. Biodefense policy to countering Weapons of Mass Destruction, places a unique emphasis on necessitates for proactive steps to tackle threats. Deterrence needs the persistence and development of current multilateral agreements to limit the access of lethal biological agents, knowledge, groups, or individuals pursuing to produce, grow, and use these agents. Additionally, the involvement of intelligence agencies for curbs the biological threats timely and candid information help to maintain proactive prevention.

7.5.3 Infrastructure Protection Policy

Protection of infrastructure has the special impact while biological attack for maintain the security concern. For the reason that a biological attack capacity might repudiate entrance to necessary services and reaction capacities. Consequently, to looking up the survivability and make sure the stability and re-establishment of procedures of infrastructure division. Evaluating the susceptibility of infrastructure, predominantly the medical, food, public health, water, and transport areas, is the emphasis of in progress efforts. The agencies, directs these efforts, which contain rising and organizing bio-detection tools and refinement procedures.

7.5.4 Attribution Policy

Early caution, detection of biological agent's outbreaks to allow appropriate response to moderate their outcome is a fundamental factor of biodefense policy.

Deterrence is the historical foundation of defense, and recognition that uncovering attack — structure the base ahead which deterrence have a rests. Biological attacks, on the other hand, lend themselves to hidden or concealed attacks that could allow the performer to remain unidentified.

7.5.5 Response and Recovery Policy

A biological attack is identified, alacrity and harmonization of the state level, local level and private sector response determinate and justifying the lethal, medical, psychological, and economic cost of attacks. In response conclusions and measures taken are after a disaster with a view to repairing or improving the pre-disaster existing circumstances of community. Whereas reactions to biological weapons be contingent on pre-attack planning and preparedness, measurement to treat fatalities, risk infrastructures, substantial control measures, medical countermeasures, and refinement of capacities. Fundamental capacities for reaction and improvement against biological attacks based on developments that are derived from reasonable threat assessments.

7.5.6 Mass Casualty Care Policy

A biological agent outbreak must be speedily brought to tolerate to stop of life, illness, trauma, and to hold the increase of potentially infectious diseases. Current medical counter-measures could significantly decrease the impact of a biological agents attack. Provision of timely protective treatments such as antibiotics or vaccines saves lives, protects scarce medical capabilities social order, and is cost effective. The management is functioning strongly with state level and local level public health systems to support plans to speedily share out desired medical countermeasures.

7.6 Gaps and deficiencies in current policy tools

Serious weaknesses in current preparedness competences offer an overview of current policy edges to address these critical deficiencies, and expand the implementation challenges that lie in future. Following are series of critical gaps that need to be addressed to ensure the population is adequately protected against future bioterrorism threats.

- Developing harmonization and Communication Policy
- Extending Laboratory capability Policy
- Increasing the Public Health labor force Policy
- Expanding the Development and Distribution of therapeutic modalities Policy

7.6.1 Developing Communication Policy

The incidents of September 11 and the consequent anthrax attacks revealed an enormously intricate set of executive troubles for public health departments, with communication and harmonization being mainly hard. These attacks demanded rapid harmonization between local, state and federal public health societies on technical concerns that developed quickly.

7.6.2 Gaps in the policy of scientific investigation and decision

The second barrier of communication was associated with the various complex scientific issues that necessitated new collaborations of experts to tackle. Mainly health care professionals relied on CDC for the response to technical scientific queries during the disaster.

7.6.3 Gaps in the policy of delivering communication

A third type of communication challenges were connected to issues of sending information. During the emergency the information approaching from public health sectors was often too slow for what health care providers required; in further cases, public health departments were making therapy recommendations rapidly, but there were no simple methods for sending the information to their targeted clinical audience.

7.6.4 Increasing the Public Health labor force

Nation's capability to plan for and respond to bioterrorism attack rests mainly in states' public health systems. To achieve their objectives, states must reconstruct many components of the public health infrastructure, enlarge their conventional focus to include the threat of bioterrorism, and organize endeavors across various levels of government. Moreover, the need for a sufficient number of well-trained skilled persons equipped to offer proper diagnosis, therapy and prophylaxis is essential.

7.7 Pakistan's policy and preparedness against biological threat

The proliferation of biological threats has become one of the greatest security concerns in Pakistan. Till date, no case of deliberate usage of biological agents has been reported in Pakistan. However, Pakistan has gaps in the current policy to tackle broader issues related with rising biological threats. The broadening vision of policy transformation requires management and public health preparedness for countering biological threats.

Achieving the security in Pakistan the most effective tool for countering biological threats is proper implementation of laws and policies. The laws and policies proper implementation have adequate safeguards to prevent biological threats. Therefore,

limiting the biological threats require to raise awareness among scientific community, law enforcement agencies, policymakers and health regulatory agencies in Pakistan.

7.8 International policy instrument and laws for counter biological threats

International and national laws are crucial components to counter biological threats. The first measure and law to counter biological threats were taken in the Hague Conference in 1899. The main prohibition so that avoid and control the use of poisonous substances and biological agents was regulated clearly under Article 23 of the Hague Convention. In 1925, Geneva Protocol was signed it only banned the use of biological agents and poisonous substance as weapons, but not their stockpiling and development. However, Geneva protocol clearly explained that the use of diseases and biological agents in war would be illegal as stated by international provisions.

The 1972 Biological Weapons Convention which was based on the 1925 Geneva Protocol stimulated the international community to approve Convention. Initially 100 countries gave their endorsement and afterward a large number of countries more than172 including Pakistan endorse BWC. BWC is first multilateral disarmament of international and legal treaty banning the production and development of the whole category of biological weapons.

BWC negotiations and non-proliferation treaty has greatly contributing to banning the production of lethal biological material. The Nation's capability to counter with a bioterrorist assault, hence, depends significantly on the condition of awareness of therapeutic care systems and public health infrastructure. Therefore, a strong public health infrastructure is imperative not only to protecting and enhancing the public's health but also to the nation's security.

7.8.1 International Health Regulations (IHR)

The IHR purpose is to control and counter infectious diseases. Thus, partnerships with WHO and IHR provide guidelines to be applied in any event of an outbreak. In 2005, Pakistan along with other 196 countries particularly in all member states of the World Health Organization (WHO), implemented the revised International Health Regulations. IHR involves signatory countries to build a crucial infrastructure and responsibilities to build the core capacities required to detect, identify, alert, respond, assess and report international public health emergencies.

These regulations boost countries to expand their capabilities to detect and report threats early, with the aim of prevention and keeping the effect of infectious diseases threats to a minimum. In addition, the IHR is designed to prevent, control and counter the threats of biological events. Pakistan has the implementation of the IHR widely, firming the essential public health capabilities and advancing the building of public health emergency capacity along with to prevent, control and counter the threats of biological events.

Biological agents threat represents a substantial challenge to agencies and organizations responsible for handling biodefense. Preparation in opposition to a biological agents threat and attack is complex, requires the harmonisation of many divisions of government that have not worked together. Early detection and performance organization of an assault, however, will be the primary responsibility of the public health system. The public health system would soon besieged by a biological agents threat. For the public health sector to be actual in its tasks of discovery and intervention, more consideration should be rewarded for fixing the infrastructure of public health and biological agents threat surveillance system specifically.

Development of the public health infrastructure not only defends the Pakistan in the case of biological agents threat, but will also help recognize and manage natural outbreaks of infectious diseases in peacetime. Therefore, there should be a development of public awareness before, during and after such an attack. The people should be educated concerning potential exposure of a biological weapon, and numerous steps that are required to be taken to check our bio-defense capabilities and certify sufficient protection from emerging threats.

The government should provide emergency health insurance coverage during a bioterrorist attack. The Nation's capability to counter with a biological threat assault, hence, depends significantly on the condition of awareness of its therapeutic care systems and public health infrastructure. Pakistan needed to transform policy to strengthening the public health system so the new polices would also strengthen Pakistan capability to respond to any occurrence of infectious disease. Rapid detection and outcome management of an assault, however, will be the major liability of the public health system. As it rests today, the public health system would rapidly be besieged by biological agent's outbreak.

In order for the public health system to be efficient in its discovery and response tasks, more consideration must be rewarded towards fixing the public health infrastructure and the biological threat surveillance system, specifically. Unlike other national security protection measure for example the proposed missile defense system; defense actions against biological outbreaks have suitable dual use implications that would help Pakistan citizens in a disaster and in daily life. Developing the public health infrastructure not only defends Pakistan in the case of deliberate outbreak of biological agents, but will also assist recognize and manage naturally occurring infectious disease eruptions in times of peace.

Existence emerging state, Pakistan has deficient financial and human assets to afford adequate health facilities to its whole population. Consequently, detection and anticipation of infectious diseases, such as Crimean-Congo Hemorrhagic Fever (CCHF), mat early stage is very remote, particularly in rural areas and also peripheral districts of the Pakistan. Pakistan has experienced a number of hemorrhagic fever (HFVs) outbreaks caused by dengue and Congo virus. The major components and prominent policy tools that provide a comprehensive framework or to strengthening the public health system are Medical Management, Training and Education, Information and Communication, Surveillance and Laboratory Capability.

In general, preparedness against biological threats is complex, and needs the coordination of numerous branches of government that have not previously worked together in Pakistan. In terms of existing policy measures to prevent biological threats, Pakistan has the Drug Act (1976), Export Control Act (2004), Environmental Protection Act (1997), Anti-Terrorism Act (1997), National Biosafety Guidelines (2005), Pakistan Biosafety Rules (2005), International Health Regulations (2005) National Counter Terrorism Authority Act (2013) and National Internal Security Policy (2014). A major component of national regulatory framework policy is legislation, which includes biological threats connected to guidelines and rules.

7.9 Medical Management policy in Pakistan

Pakistan pre-post disaster preparedness planning's have a passive impression. The comprehensive policy framework and preparedness polices of medical management can decrease vulnerabilities in Pakistan.

7.10 Laboratory capability policy in Pakistan

In the Pakistan, the laboratory capability policy refers to the blockades that prevent biological threats whether theft or deliberate or accidental or natural release of dangerous biological agents from laboratories. No single tool is adequate to definitively recognize any biological threat; hence, diagnostic systems must be competent to identify numerous biological markers. An integrated diagnostic policy is anticipated to identify the biological threats of the future.

7.11 Surveillance policy in Pakistan

The vulnerabilities to natural outbreaks of biological agent's upheavals rank top in third world countries like Pakistan. The emergence of infectious disease especially dengue and congo virus are serious health problem in Pakistan. Consequently, there is a need of rapid identification of disease surveillance policy which consequences is timely tracking the public health system and controls the dangerous pathogens in Pakistan. Such an initiative the technologies which reduce the time and detect biological agents outbreak is vital component of the disease surveillance system.

Surveillance system is an emerging policy instrument in epidemiology that plays a major role in preparedness and also gives early warning which is a significant factor in minimizing the biological threats. Deployment of health surveillance polices are links between the systematic collection, interpretation, analysis, and distribution of health data which indicate biological outbreaks and provide diseases transmission information about a person, time and place immediately after diagnosis.

The existing disease surveillance system and reporting system in Pakistan did not execute properly and response is slow to detect the natural or deliberate outbreaks. There is also a need for constant surveillance and awareness for successfully component of detecting biological agent outbreaks. Adaptation and implementation

of national surveillance policy in "Pakistan would integrate federal, state, and local public health departments, health care providers, and non-traditional surveillance partners such as local pharmacies, emergency medical services, and the veterinary community."

7.12 Future Threats

The current COVID-19 pandemic is an opportunity to revise the biodefense policy and develop new norms against biological risks. No single tool is adequate to recognize any biological threat definitively; hence, diagnostic systems must be competent to identify numerous biological outbreaks. In Pakistan, there is a need to identify critical gaps in preparedness and also prioritizing defense against the biological risks. As there are a huge number of coronavirus cases in Pakistan, thus Pakistan is engaging the government agencies and mobilizing the private sector to work collaboratively against the COVID-19 pandemic and health threats. Yet, COVID-19 pandemic cases are prevailing in Pakistan because of the shortage of workforce, risk communication, surveillance, preparedness, laboratories and training. Thus, Pakistan needed to strengthen the capacity-building strategies against biological risks at the national and local level such as health workforce, a technical support unit, monitoring and early reporting of disease. Moreover, global and national cooperation needed sustainable developments for countering new challenges of a natural outbreak of COVID-19 pandemic and future biological risks.

Conclusion

The natural or accidental and the subsequent deliberate use of biological agents after 9/11 have clear implications and threaten the world in the past. So, extensive organizational measures at the international and national levels have been taken against the natural or deliberate proliferation of biological agents. Yet, the terrorist

incident of 9/11 and recent incidents of natural outbreaks of a novel coronavirus in Wuhan and Ebola virus particularly in Africa upraised and revealed numerous weaknesses in the existing policy tools for countering the biological threats. Though, the biosecurity predominantly early detection, identification of the pathogen, early diagnosis by real-time, vaccines or drugs is necessary tools for combating the biological outbreaks. COVID-19 has occurred in late 2019, which has postured a global health threat; thus, the concrete steps have taken to counter ongoing pandemic. WHO is also promoting and supporting national public health responses against the natural or deliberate outbreaks and also focusing on rapidly investigation, surveillance and contamination. Hence, comprehensive policies are an appropriate tool or mechanism against countering biological threats. Moreover, to meet these new challenges, there is still a great need for research in the area of the early detection of attacks with biological weapons and control of infectious diseases. Pakistan may have already embarked on the path of building up laws and policies which proper implementation has making adequate safeguards against the biological threats. Nevertheless, no single tool is sufficient, consequently limiting the biological risks require raising awareness among the scientific community, law enforcement agencies, policymakers and health regulatory agencies, especially in developing countries such as Pakistan. Currently, Pakistan needs long-term funding in the field of biosecurity for the elimination of potential current biological risks and future outbreaks.

Chapter: 8

CONCLUSION AND RECOMMENDATIONS

This study suggests that the events of September 11, 2001 and the subsequent global wave of terrorism have clearly shown that a radically new form of transnational terrorism has grown up and is threatening the world. It found that biological agents can be used as weapons to cause damage to the world population during biological warfare or terrorist attack. It is assumed that the use of weapons of mass destruction, in particular biological weapons, by terrorists must be considered as a possible threat scenario and to be assumed as a real threat. This assessment further shows that fear of using biological agents as a weapon has instigated government agencies to think about new precautionary measures. About 1,200 types of biological agents are known, which are also known as bacteriological weapons, which cause disease or death.

It was further found that biological agents potentially considered the most destructive weapon because the agents exist in nature; moreover, it is also difficult to differentiate weather natural outbreaks or deliberate outbreaks. Accordingly, outbreaks of large-scale animal diseases cause a great economic impact, because its consequences act as a direct way about production, local economies, markets and disease control costs.

It could also be argued that the use of biological weapons indicates political, economic, scientific-technological, legal and psychological, it's also use indiscriminately, so biodefense policies protects people against biological agents. There are numerous tasks involved for prevention measures and action against a health alert, which should be planned and follow appropriate epidemiological criteria, as these situations need energetic actions that guarantee a return to normal in

a short time and without serious consequences for the area or affected country. In addition to avoiding parallel dissemination to other regions and consequently global damage, if it is dominated that surveillance and early detection activities are essential for a timely response to an attack of a biological nature.

8.1 General findings

Primarily, I have identified general conclusion of this dissertation; secondly, I have sketched out the most important findings and recommendations of this study, and finally, this study was sketching out the possible opportunity for future research. The first part of this thesis Chapter one, Chapter two and Chapter three explored the history of bioterrorist attacks that has shown in the past. Also, the usage of biological weapons in ancient times and briefly describes the history of biological warfare. It explored that terrorists can deliberately use non-lethal bacteria, because their goal may not be to reach a large number of casualties. Still, it is an economic shock and a cause of fear in society. So this study recommends that the sufficient public awareness of the various aspects biological threats.

Moreover, Chapter four and Chapter five, provided regime theory as a theoretical framework which profoundly analyzes the effectiveness of the emerging regimes and evaluating how well implementation of the regime is carried out and what reform might be in future to countering biological weapons. In Chapter six this thesis explores how the deterrence strategy applied for the countering of the biological weapons threat what part deterrence plays for discouraging and deeming the possibility of a successful attack of biological weapons from non-states terrorist groups. Chapter seven offers how states parties during the past decades are connected through BWC to address the substantial obstacle for the implementation of the Convention's provisions. Furthermore, I chose to analyse how Pakistan as a

responsible state party of BWC and has strong adherence to strengthen the BWC regime. It discusses how Pakistan remains to entirely adhere and implementing Convention's provisions. Also, explores the capabilities and policies of Pakistan to tackle and curb the rising biological threats. It was meant to show that existing policy tools and critical gaps in policy tools for countering biological threats especially in Pakistan.

8.2 Recommendations to Combat Future Threats

At the fundamental stage, combating the multifaceted threat of bioterrorism will call for strategic planning, financial support, human resources and time. There are also several further recommendations that would improve functions of public health infrastructure to combat future bioterrorism threats. Bioterrorism is also a new topic Pakistan. Nonetheless, extensive organizational measures have been taken against possible bioterrorist attacks in the past years especially after 9/11. The primary target of bioterrorist attacks is the civilian population. Therefore, the measures taken were based on the special requirements of health protection. The question arose how well the health care system in Pakistan is prepared for the threat of bioterrorism and its possible consequences. The necessary strategic preparations were made at the national level, such as the development of scenarios and emergency preparedness plans, the coordination of cooperation between the federal and state governments and the procurement of smallpox vaccine supplies.

If the pathogens of dangerous communicable diseases have been released in a bioterrorist attack, the operations management must plan and control all necessary measures to prevent or combat the epidemic/pandemic. The anti-epidemic measures include among other things, the segregation and care of patients exposed to combat substances, management of the suspect of infection, distribution of antibiotics or the

implementation of vaccinations. In order to avoid further aggravation of the situation due to the uncertainty or even the possible panic outbreak in the population, the press and the population should be informed quickly and factually by the operations management after the pathogen has been identified and the diagnosis confirmed.

8.3 Proper Decontamination

Proper decontamination requires a high level of personnel from trained emergency personnel. Healthy people, injured and sick people, animals, food, drinking water, essential equipment and traffic routes must be decontaminated. In the context of emergency preparedness planning, the decontamination procedures suitable for the most important bioterrorism scenarios must be developed, and the forces and resources necessary for implementation must be planned. If the pathogens used are viable in the environment for a long time (e.g. anthrax spores), decontamination of the affected areas is particularly important in order to prevent new infections of people from the same source again and again.

8.4 Civil-Military Cooperation

Civil-military cooperation plays an important role in coping with damage after a bio-terrorist or natural biological outbreak. In the country's alarm plans, clear responsibilities for the respective scenarios must be specified for civil-military cooperation. If the pathogens released in the event of a bioterrorist attack are not transferable from person to person, logistically, priority must be given to providing medical care, decontamination of people, therapy and transport to a large number of patients. In addition, the possibilities of drug prophylaxis for exposed persons must be checked and contaminated areas in the environment identified.

At the district / city level, it must be determined which hospitals should primarily take care of the affected patients and which hospitals will continue to be available for routine care. It should also be borne in mind that the simultaneous occurrence of a large number makes it more difficult. Therefore, it must be clarified in advance to what extent the necessary medication in the required amount can be procured at short notice or which quantities are to be stored. Ultimately, it is necessary to prepare the distribution of medication logistically. If the use of biological warfare agents in a bio-terrorist attack leads to a disease that can be transmitted from person to person, the focus is on the anti-epidemic measures.

The main mechanism or occupations of the public health infrastructure and medical intervention, following:

- Expand Detection by Surveillance
- Laboratory Capability
- Medical Management
- Training and Education
- Information and Communication
- Public-Private Partnership

8.5 Expand Detection by Surveillance

To develop program designed for increasing national health surveillance system to supply in the early hours caution of biological agents occurrences. National system would incorporate federal, provincial and local public health departments, health suppliers, and nontraditional surveillance buddies for instance local pharmacies, disaster medical services, and the veterinary community. Earlier footstep in the direction of the construction of a national system would be improving national

strategy designed for construction such system. The approach would look at the probability, establish the necessities, and plan a multi-year program in favor of building the system. These approaches of surveillance system counter the future bioterrorism or natural outbreaks of biological threats such as:

- Surveillance systems should institute and amalgamate programmed disease treatment systems, syndromic surveillance systems, and programmed data reporting system from nontraditional buddies.
- Developing a national health surveillance system to distinguish bioterrorism occurrence have need of the establishment of electronic data networks between local public health departments and local area health care suppliers.
- Surveillance grant program and work with Legislature to make certain plenty funds are accessible to construct the essential information communications.
- Local suppliers of surveillance information, counting health care suppliers, should not be anticipated to utilize their individual funds to enlarge the necessary communication transportation.
- A national research and development program paying attention to civilizing surveillance technologies is supposed to be initiated.

8.6 Laboratory Capability

In the event of an attack with biological weapons, it is crucial that the pathogens are quickly identified and immediately identified. This requires a standardized procedure in microbiological diagnostics. Suitable diagnostic systems, including appropriate reagents, as well as potentially useful vaccines, antibiotics or antiviral substances must be quickly available. It is also necessary to decide on appropriate measures within a few hours. The epidemiological monitoring must be able to rapidly detect

biological attacks and to prevent further spread of the agents. These tasks were bundled in the newly established Center for Biosafety of NIH Pakistan, which serves as a national early detection and information network. Detection systems are most important for the bioterrorist relevant pathogens have been established in a number of special laboratories such as:

- Protection of public from the effects of future threats by biological agents needs the collective resources of the US military healthcare laboratories and combination with civilian public health laboratories.
- Future strategies that incorporate revealing of early host responses with the sensitive detection of biological agent indicators can diminish morbidity and mortality by encouraging best therapeutic intervention.
- An integrated diagnostic strategy is desired to identify the bioterrorism threats of the future. No single tool is adequate to definitively recognize any biological threat; hence, diagnostic systems must be competent to identify numerous biological markers.
- Expand safety protocols with clinical laboratories that particularly concentrate on procedures for how to control when a bioterror attack happened.
- Support ongoing education and the guidance essential for the laboratory personnel to become current and completely prepared for a future bioterror attack.
- Improve clinical laboratory preparedness to perform bioterrorism associated taxing (rule-out potential bioterror agents) and optimize clinical laboratories

capacity to contribute in the public health system by helping in a capacity task the same as desired.

8.7 Medical Management

Preparing for public health care is also essential to counteract an attack with biological weapons. This includes measures such as strengthening the infrastructure in public health at the local level, expanding and optimizing the exchange of information between public health institutions, hospitals and experts in infectious diseases, and expanding emergency capacities in hospitals, training the medical profession and medical and laboratory personnel, and continuously training the medical, nursing and laboratory technicians with regard to possible biological threats scenarios. Competencies and responsibilities must be known or internalized beforehand and trained and improved in simulation processes.

There can be no one hundred percent protection against a terrorist attack with biological warfare agents. It is therefore all the more logical to prepare for an emergency. This preparation is time and cost intensive. However, it must be kept at a high level at all times. New scientific knowledge must be taken into account. Wherever it is recognized that scientific data is missing or incomplete, a research project should be initiated. The better networking of knowledge between all those involved continues to contribute to correspondingly good preparation as:

- Localities should enlarge prophylaxis and conduct tactics that are part or busted into escalatory sections.
- Pre-occurrence preparation for where triage will take position requirements to be in position prior to an occurrence. Public information policy should be plan before of an assault that will supply obvious and correct information

regarding while management is needed and somewhere it should be acknowledged.

- Localities should be offered through the funds required to expand a self-regulating primary-rank prophylaxis capability surrounded by medical care suppliers, moreover from side to side common aid harmonies or local buy-ins, to permit for a wide-ranging reaction in the 48 hours prior to federal aid reach on destination.
- Preparations for analysis patients should be finished to decrease terror and perplexity at triage positions and to make sure arrangements.
- Accords must be accomplished in proceed concerning who can construct triage pronouncements in the occasion of a bioterrorist attack, and the medical and legal implications of these pronouncements requires to be considered.
- A few considerations might be specified to providing definite sections of the population with pre-event prophylaxis.
- To make sure well-organized utilize of local funds, a follow up system should be net to track the progress and utilize of medical equipment for the period of a bioterrorism reaction.
- Circumvent in opposition to a probable smallpox occurrence, the present equipment of vaccine should be prepared for a speedy, bunch prophylaxis program and a rush vaccine fabrication capacity should be established.
- Supplementary preparation is required to establish how the state and federal government can supply supplementary manpower in maintaining of prophylaxis and treatment as enclose in opposition to comprehensive

bioterrorism occurrence. Specified the amount of its accessible manpower support and its logistical capacities, the Department of Defense should guide this effort.

- Enhanced assessment techniques, counting the progress of computer reproduction, must be developed to judge the competence of local prophylaxis and treatment plans.
- Local plans for prophylaxis should be acquainted with and account for supplementary state and federal assets that will be completed accessible by planning for how these belongings will be employed.

8.8 Training and Education

- Appropriately trained medical, public health, and emergency personnel is essential for detection, assessment and comprehensive response framework.
- Domestic Preparedness Program duties greater attention to issues of health and medical response, training and criteria should be tailored to focus more on HAZMAT procedures dealing with biological weapons SPECIFICALLY response, the agent and the recognition of outbreaks and treatment measures that include.
- Training duties concentrate on the reaction "big picture", incorporating integrated response, communication, monitoring and reporting issues.
- There should be efforts to draw medical staff to training sessions. Superior stress should be placed on elastic training sessions and the use of electronics and multimedia technical training to accommodate the schedules of health professionals. Primary step is to DP training materials accessible from side to side internet.

- Medical personnel should be involved with the program of local, state and response efforts of the federal government

8.9 Information and Communication

Coordinated cooperation between the federal and state authorities in the field of health, disaster and civil protection plays a decisive role in countering bioterrorist threats. As part of the new strategy a joint responsibility between the federal and state governments for extraordinary or large-scale disasters and centralized crisis management were provided. The existing aid potential of the federal government and that of the federal states should be better interlinked. Above all, new coordination instruments for a more efficient cooperation between the federal government and the federal states, in particular improved coordination of the information systems, should be developed so that the security against such new, unusual threats, how the threat of bio-terrorism can react appropriately. A focus of activities in recent years has been on improving the so-called "biological crisis management". The existing specialist knowledge was pooled across departments in the "Interdisciplinary Network of Experts Biological Hazards". The most important fields of work and research here are the early detection of attacks with biological weapons, public order and logistics after such an attack, risk communication, psychosocial aspects and disease management.

- Harmonization between public health departments and medicine required to be significantly strengthened - a problem that can also be described enhanced connectivity. Health care providers require more proficient mechanisms to communicate information to public health representatives and vice versa.
- The clinical therapeutic care community should extend arrangements to more rapidly correspond key information within its own organizations and

professional agencies. Despite, television or radio transmit, no available information systems could instantly reach a majority of health care providers. Daily conference call to share information can be enormously important for health care providers to deliver information from their society to public health departments and vice versa.

- Public health departments should devise more vigorous processes for integrating the diverse required scientific competences into decision-making during an emergency. A new bioweapons attack with a different pathogen or using different distribution technology would need a new amalgamation of competencies at the table. However, it is significant to assume extensive external scientific collaboration will be desirable and to plan for it.
- Priority should be focused on developing strategies for corresponding with the public. The significance of corresponding widespread, current information to the public in the outcome of such an assault cannot be over stressed, even if it is upsetting information. The potential for optimistic or pessimistic impact is so enormous that this should be a priority.
- Despite communication problems, there is a collection of other strategic initiatives that will be desired to counter the bioterrorism threat. The nation requires local health care plans intended to manage with mass casualty threats. The nation requires a continuous biomedical research and improvement program designed for preventing, analyzing and treating the variety of infectious syndromes that exist now, and that will be developed in the future.

8.10 Public-Private Partnership

- The government should work in the company of the private segment to make sure that they turn out to be partners in bioterrorism preparedness. The most significant are the industries of the health care industry, the pharmaceutical industry print and electronic media and the information technology segment.
- The health care industry is a private partner for the industry particularly significant in arranging for bioterrorism. In isolation, federal officials should focus on the incorporation of the health care industry in bioterrorism efforts. A thought for the first step, as a way of representing political dedication and increased dialogue, is a national height on the medical aspects bioterrorism preparedness.

8.11 Role of Trust in BWC

Trust plays an essential role in international relations, especially in cooperation situations that result from international regimes. The most important source of trust is trustworthiness, which is based on experiences with and knowledge of one another. International relations are generally seen as a low-trust area. Trust or distrust in the BWC can influence the further development of the convention to a significant degree. The establishment and expansion of confidence-building measures remain key components of the Bio and Toxin Weapons Convention.

Biological weapons are unique, for its ability to cause disease considerable distance. These properties ideally predestine them to be exploited by such groups that aim for effort about evoking an atmosphere of panic and fear in society. The material consequences in such a situation will not be limited to function of people in the affected area, but it will also affect other areas, be it medical, economic, social, but surely such an attack would also affect the state itself apparatus. The danger

must therefore be taken into account, in particular after September 2001, but as already mentioned, this danger did manifested even earlier than this date.

8.12 Non-State Actors Unbound

As terrorists are non-state actors unbound by any measures or treaties, such efforts are rather difficult. Therefore, States do not only rely on agreements and strategies to counter terrorism, but also develop programmes for the preparedness of the biological weapons attack and early detection of the weapon. Going forward, the BWC must both address the challenge of enforceability and restrict future possibilities for acts of bioterrorism or natural outbreaks. Given the treaty's past, which includes both failure and success, the adaptation of the BWC over time will enable a clear and meaningful future.

Although the international regime prohibiting biological weapons suffers from a number of shortcomings, it plays an irreplaceable role in the international environment. Its existence ensures regulation of a significant area and contributes to a safer world. Due to its constant development, it can be expected that in the future it will improve and further reduce the threat of biological warfare.

8.13 Futures research

In order to meet these new challenges, there is still a great need for research in the area of early detection and control of infectious diseases. The main research areas are diagnostics, therapy, vaccine development and the development of detection systems for biological warfare agents. Cooperation with industry would be desirable in this context; because many implementations in the field of vaccine production require the involvement of relevant companies, for example in the field of biotechnology.

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Appendix I

QUESTIONNAIRE FOR INTERVIEWS

TOPIC

AN ANALYSIS OF BIOLOGICAL THREATS: APPREHENSIONS AND COUNTER STRATEGIES IN PAKISTAN

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Introduction

Dear Sir/Madam

I am conducting this research because I am interested in observing the countermeasures strategies that can lead to strengthened biodefense and counter biological threats. This study aims to know how to reduce the risk of biological threat from national, regional, and global levels. Furthermore, this study also evaluates the capacity, capability and preparedness of Pakistan in terms of biological agents' outbreaks.

I expect that the knowledge gained will be used to highlight the positive and negative factors affecting the countermeasure strategies of biological weapons defense.

The objectives of this interview are,

- To gain insight about existing rules regarding roles, responsibilities, and ethics against biological weapons and identify the policy gaps
- To explore the development of the biological defense at global and state levels
- Synthesize the possibilities of using deterrence strategies against non-State actors for prevention and elimination of bioterrorism
- To determine the role of the Biological and Toxin Weapons Convention (BWC) regime in the form of incentives/motivation and penalties/sanctions in improving states security

You were chosen to participate because you hold an important position that oversights various aspects of biosecurity. Interviews enable me to get more in-depth information about a particular topic and I will make it as a part of my dissertation. I am very interested to hear your feedback. You don't need to answer all the questions. You can

answer to the best of your ability. Fortunately, **I have** list questions but I am not expecting a long answer you can answer according to your calendar (time).

I'd like to start by having you briefly describe your role and responsibilities of sharing information and views.

Demographics:

Name of interviewee:

Position Title:

Interview conducted at (place):

1) What is your opinion how Biological weapons threats posing unique hazards to both national level and international levels security?
2) What do you think the impact of an attack with biological weapons that can cause harm to the state in warfare or terrorist attack?
3) Do you think that biological weapons have more credible security threat than other weapons of mass destructions (WMDs) for attacks? How terrorist groups utilize biological agents like viruses, bacteria and germs intentionally to produce fear or grounds sickness or cause mass casualties?
4) If a major bioterror attack or naturally occurring epidemic were to occur in the near future, how prepared do you think we are, as a globally and individual state, to identify the biological weapons attacks?
5) Do you see deterrence strategies would essential for reducing vulnerable consequences of prevailing pre- post-natural and deliberate outbreaks of biological weapons?
6) How do you see the deterrence strategy particularly punishment and denial applied for the countering of the biological weapons threat what part deterrence plays for discouraging and deeming the possibility of a successful attack of biological weapons from non-states terrorist groups?
7) How do you see the states parties during the past decades are connected through BTWC how BTWC regime can play a major role in the controlling of the biological arm?
8) What is your opinion how the convention has ambiguity in the verification mechanism because of no provisions for verification and how review conferences are positively contributing in verification and monitoring mechanism to strengthen BTWC?
9) What are the BTWC regime successes and flaws as well as identifies the international cooperation and national implementation enhanced future credibility and how the international regimes (Geneva Protocol or BTWC) contributed to constraining the use biological weapons?

10) How Pakistan as a responsible state party of BTWC and has a strong adherence to strengthening the BWC regime and implementing of the Convention's provisions.
11) What do you see as the key challenges that an effective national biodefense countermeasure development strategy must address from both scientific/technical and security perspectives?
12) Do you believe we currently at the global, regional and national level have an active and comprehensive national biodefense countermeasure development strategy that will better prepare the country to address this kind of threat?
13) Do you agree that Pakistan could significantly accelerate the identification of pathogens used as agents in an attack, as well as the development of therapeutics so that we would have the capability to very rapidly developing and manufacture a therapeutic response to new agents?
14) What is your opinion can be Pakistan needed to transform the policy to strengthen the public health system so the new policies would also strengthen Pakistan capability to respond to any occurrence of infectious disease?
15) What is globally the substantial obstacle for the implementation of biosecurity policy and what are the options to improve biosecurity measures?

Closing: [Time]

This concludes the interview. Thank you for your time and participation.

List of interviewees

Sardar Masood Khan	**President of Azad Jammu and Kashmir, Director General of the Institute of Strategic Studies Islamabad and President of the Biological Weapons Review Conference 2006**
Prof. Brigadier. Dr. Aamer Ikram	**Executive Director, National Institute of Health, Islamabad and Executive Director Pakistan Health Research**
Dr. Zabta Khan Shinwari	**Secretary-General of the Pakistan Academy of Sciences and Chair of the Biotechnology Department of the Quaid-i-Azam University of Islamabad**
Dr Tughral Yamin	**Associate dean of the Centre for International Peace and Stability at the National University of Sciences and Technology in Islamabad**
Ambassador Tehmina Janjua	**Permanent representative to the United**

	Nations (UN) in Geneva
Ambassador Zamir Akram	**Ambassador and Permanent Representative to the United Nations and other International Organizations in Geneva**
Dr. Masoom Yasinzai	**Meritorious Professor of Biochemistry and Rector International Islamic University Islamabad**

Discussions

Lt. General (R) Naeem Khalid Lodhi	**Former Defence Secretary of Pakistan**
Dr. Adil Sultan	**Visiting Research Fellow at the Department of War Studies King's College London and Director, Centre for Aerospace and Security Studies**
Dr. Syed Javaid Khurshid	**Expert in WMDs-CBRN-CWC & BWC, Nuclear Technology-Nuclear Energy & Peaceful uses of Nuclear Technology, Nuclear Diplomacy, Senior Research Fellow at the Centre for International Strategic Studies (CISS)**

Appendix II

Text of the Bio and Toxin Weapons Convention

Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction

Signed at London, Moscow and Washington on April 10, 1972. Entered into force on March 26, 1975.

Depositaries: UK, US and Soviet governments.

The States Parties to this Convention,

Determined to act with a view to achieving effective progress towards general and complete disarmament, including the prohibition and elimination of all types of weapons of mass destruction, and convinced that the prohibition of the development, production and stockpiling of chemical and bacteriological (biological) weapons and their elimination, through effective measures, will facilitate the achievement of general and co mplete disarmament under strict and effective international control,

Recognizing the important significance of the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare, signed at Geneva on June 17, 1925, and conscious also of the contribution which the said Protocol has already made, and continues to make, to mitigating the horrors of war,

Reaffirming their adherence to the principles and objectives of that Protocol and calling upon all States to comply strictly with them,

Recalling that the General Assembly of the United Nations has repeatedly condemned all actions contrary to the principles and objectives of the Geneva Protocol of June 17, 1925,

Desiring to contribute to the strengthening of confidence between peoples and the general improvement of the international atmosphere,

Desiring also to contribute to the realization of the purposes and principles of the United Nations,

Convinced of the importance and urgency of eliminating from the arsenals of States, through effective measures, such dangerous weapons of mass destruction as those using chemical or bacteriological (biological) agents,

Recognizing that an agreement on the prohibition of bacteriological (biological) and toxin weapons represents a first possible step towards the achievement of agreement on effective measures also for the prohibition of the development, production and stockpiling of chemical weapons, and dete rmined to continue negotiations to that end,

The entire contract text published here comes from the website of the Organization for the Prohibition of Biological Weapons. See The Convention: www.opbw.org.

Determined for the sake of all mankind, to exclude completely the possibility of bacteriological (biological) agents and toxins being used as weapons,

Convinced that such use would be repugnant to the conscience of mankind and that no effort should be spared to minimize this risk,

Have agreed as follows:

Article I

Each State Party to this Convention never undertakes in any circumstances to develop, produce, stockpile or otherwise acquire or retain:

(1) 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;

(2) Weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict.

Article II

Each State Party to this Convention undertakes to destroy, or to divert to peaceful purposes, as soon as possible but not later than nine months after entry into force of the Convention, all agents, toxins, weapons, equipment and means of delivery specified in article I of the Convention, which are in its possession or under its jurisdiction or control. In implementing the provisions of this article all necessary safety pre cautions shall be observed to protect populations and the environment.

Article III

Each State Party to this Convention undertakes not to transfer to any recipient whatsoever, directly or indirectly, and not in any way to assist, encourage, or induce any State, group of States or international organizations to manufacture or otherwise acquire any of the agents , toxins, weapons, equipment or means of delivery specified in article I of this Convention.

Article IV

Each State Party to this Convention shall, in accordance with its constitutional processes, take any necessary measures to prohibit and prevent the development, production, stockpiling, acquisition, or retention of the agents, toxins, weapons,

equipment and means of delivery specified in article I of the Convention, within the territory of such State, under its jurisdiction or under its control anywhere.

Article V

The States Parties to this Convention undertake to consult one another and to cooperate in solving any problems which may arise in relation to the objective of, or in the application of the provisions of, the Convention. Consultation and Cooperation pursu nt to this article may also be undertaken through appropriate international procedures within the framework of the United Nations and in accordance with its Charter.

Article VI

(1) Any State Party to this convention which finds that any othe r 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. Such a complaint should include all possible evidence confirming its validity, as well as a request for its consideration by the Security Council.

(2) Each State Party to this Convention undertakes to cooperate in carrying out any investigation which the Security Council may initiate, in accordance with the provisions of the Charter of the United Nations, on the basis of the complaint received by the Council. The Security Council shall inform the States Parties to the Convention of the results of the investigation.

Article VII

Each State Party to this Convention undertakes to provide or support assistance, in accordance with the United Nations Charter, to any Party to the Convention which so requests, if the Security Council decides that such Party has been exposed to danger as a result of violation of the convention.

Article VIII

Nothing in this Convention shall be interpreted as in any way limiting or detracting from the obligations assumed by any State under the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Method s of Warfare, signed at Geneva on June 17, 1925.

Article IX

Each State Party to this Convention affirms the recognized objective of effective prohibition of chemical weapons and, to this end, undertakes to continue negotiations in good faith with a view to reaching early agreement on effective measures for the prohibition of their development, production and stockpiling and for their destruction, and on appropriate measures concerning equipment and means of delivery specifically designed for the productio n or use of chemical agents for weapons purposes.

Article X

(1) The States Parties to this Convention undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological inform ation for the use of bacteriological (biological) agents and toxins for peaceful purposes. Parties to the Convention in a position to do so shall also cooperate in contributing individually or together with other States or international organizations to th e further development and application of scientific discoveries in the field of bacteriology (biology) for prevention of disease, or for other peaceful purposes.

(2) This Convention shall be implemented in a manner designed to avoid hampering the economic or technological development of States Parties to the Convention or

international cooperation in the field of peaceful bacteriological (biological) activities, including the international exchange of bacteriological (biological) and toxins and equipment for the processing, use or production of bacteriological (biological) agents and toxins for peaceful purposes in accordance with the provisions of the Convention.

Article XI

Any State Party may propose amendments to this Convention. Amendments shall enter into force for each State Party accepting the amendments upon their acceptance by a majority of the States Parties to the Convention and thereafter for each remaining State P arty on the date of acceptance by it.

Article XII

Five years after the entry into force of this Convention, or earlier if it is requested by a majority of Parties to the Convention by submitting a proposal to this effect to the Depositary Governments, a conference of States Parties to the Convention shall be held at Geneva , Switzerland, to review the operation of the Convention, with a view to assuring that the purposes of the preamble and the provisions of the Convention, including the provisions concern ing negotiations on chemical weapons, are being realized. Such review shall take into account any new scientific and technological developments relevant to the Convention.

Article XIII

(1) This Convention shall be of unlimited duration.

(2) Each State Party to this Convention shall in exercising its national sovereignty have the right to withdraw from the Convention if it decides that extraordinary events, related to the subject matter of the Convention, have

jeopardized the supreme interests of its country. It shall give notice of such withdrawal to all other States Parties to the Convention and to the United Nations Security Council three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

Article XIV

(1) This Convention shall be open to all States for signature. Any State which does not sign the Convention before its entry into force in accordance with paragraph (3) of this Article may accede to it at any time.

(2) This Convention shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Governments of the United States of America, the United Kingdom of Great Britain and Northern Ireland and the Union of Soviet Socialist Republics, which are hereby designated the Depositary Governments.

(3) This Convention shall enter into force after the deposit of instruments of ratification by twenty-two Governments, including the Governments designated a s Depositaries of the Convention.

(4) For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Convention, it shall enter into force on the date of the deposit of their instruments of ratification or a ccession.

(5) The Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit or each instrument of ratification or of accession and the date of entry into force of this Convention, and of the receipt of other notices.

(6) This Convention shall be registered by the Depositary Governments pursuant to Article 102 of the Charter of the United Nations.

Article XV

This Convention, the English, Russian, French, Spanish and Chinese texts of which are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of the Convention shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding states.

Appendix III

Statement by Ambassador Tehmina Janjua In **Eighth Review Conference of BWTC**

Biological and Toxin Weapons Convention (BTWC) (Eighth Review Conference, Geneva, 7-25 November 2016)

GENERAL EXCHANGE OF VIEWS

Statement by Ambassador Tehmina Janjua
Head of Pakistan's Delegation
Permanent Representative of Pakistan to the United Nations and Other International Organization in Geneva

Mr. President,

I congratulate you on your election as the President of the 8th BWC Review Conference. We appreciate the commendable manner in which you led the preparatory process this year. You can count on my delegation's full cooperation for making substantive progress on further strengthening the Convention in a balanced and comprehensive manner at this RevCon. We are pleased to be supporting you as one of the Vice-Presidents of the RevCon. I am also happy to assist you as a co-facilitator, in my personal capacity, along with Mr. Ian McConville of Australia, on the "Future intersessional work programme and the ISU".

We appreciate the work being done by the ISU with its modest resources and staff and thank them for all the substantive and logistic arrangements that they have put in place for the RevCon.

We welcome Nepal, Liberia, Angola and Cote d'Ivoire as fellow BWC States Parties.

Pakistan associates itself with the statement delivered by the distinguished Ambassador of Venezuela on behalf of NAM States Parties.

Mr. President,

Pakistan ratified the BWC in 1974 as a non-possessor State. We remain committed to its full implementation, for which we have instituted comprehensive legislative, regulatory and administrative measures. We attach great importance to the safety and security of biological agents, facilities, technologies and equipment. Taking necessary steps in conformity with BWC and International Health Regulations, Pakistan has introduced stringent bio-safety and bio-security measures. We have strengthened our export controls and brought them in full conformity with the Australia Group. Pakistan's comprehensive reports to the UNSCR 1540 Committee provide a detailed matrix of information on all these procedures, mechanisms and legislations as well as on their enforcement. Pakistan is also part of the Global Health Security Agenda (GHSA) and has developed a five-year GHSA roadmap to achieve the Agenda's eleven targets with a view to countering biological threats, whether naturally occurring, accidental or deliberate.

Mr. President,

BWC is the first multilateral disarmament treaty banning an entire category of WMDs. We deeply value its contribution to global security. This aspect of the BWC needs to be preserved and strengthened.

Pakistan shares the concerns regarding the possible use of biological weapons including by non-State actors. Our top priorities, therefore, should include the universalization of the Convention, and enhancing the implementation of all articles of the Convention in a balanced, non- discriminatory and comprehensive manner.

Pakistan believes that the most credible and sustainable method of strengthening the Convention is through multilateral negotiations towards a legally binding Protocol, including on verification provisions, dealing with all the Articles of the Convention. Pakistan, however, recognizes the difference of opinion over the need for such a legally binding Protocol. In the absence of consensus on this matter, my delegation will continue

to engage constructively to explore progress where consensus is possible by focusing on areas that unite us.

Mr. President,

We attach special importance to Article X of the Convention concerning transfer of knowledge and technology for peaceful uses of biology. In recent years, advances in the field of biological sciences have opened up new avenues for the peaceful application of bio-technology as well as international cooperation in this area. The fulfillment of our obligations under BWC and the establishment and maintenance of effective bioethics, bio-safety and bio-security standards as well as focus on dual use education, should contribute towards enhancing international cooperation. We believe that there is an urgent need for States Parties to work together to develop procedures to promote full, effective, and non- discriminatory implementation of this Article. In this regard, Pakistan supports NAM's proposal for developing an Article X compliance mechanism.

Mr. President,

The discussions on strengthening the "implementation of Article VII, including consideration of detailed procedures and mechanisms for the provision of assistance and cooperation by States Parties" during the last Inter-Sessional Programme has helped in developing a better collective understanding of this issue. We believe that it is extremely important for affected States Parties to receive timely and adequate assistance. The provision of such assistance should not be conditional on the action or finding by the UN Security Council with respect to the investigation of alleged use. Assistance should be provided promptly on the basis of the request by the affected state. This requires a detailed mechanism for catering to such requests in a timely and effective manner. Concrete and practical measures in this regard should be considered by the States Parties at the RevCon. Mr. President,

Pakistan values the importance of holding regular reviews of the developments in science and technology related to the Convention. We note the significant interest in this subject that is evident from the number of proposals that have been presented.

We support the establishment of a States Parties-led, inclusive and representative mechanism under the Convention for reviewing science and technology related developments. Pakistan believes that S&T review should provide impetus not only to enhanced awareness regarding the risks posed by new technologies, but also towards enhanced international cooperation and sharing of such technologies for peaceful purposes. We firmly believe that the potential dual-use nature of emerging technologies in itself should not be used as a pretext for proscribing or restricting their availability to developing countries for permitted purposes.

Mr. President,

We note the several concrete proposals that have been submitted to the RevCon by various States Parties in the form of Working Papers. Some
important issues as well as some promising new ideas have been raised in these Working Papers. During the course of this RevCon, without prejudice to our priorities, we will give careful consideration to all of these proposals in a positive and constructive manner to strengthen the implementation of the Convention across all its articles.

Pakistan participated actively and constructively in the preparatory process of the 8th RevCon. Besides the two sessions of the PrepCom, we also participated in a regional workshop held in Wuxi, China, and a preparatory conference in Wilton Park, UK. We will engage actively during the RevCon to build on the progress achieved during the preparatory process.

Pakistan supports the Working Papers tabled by NAM. Pakistan is also co-sponsoring three other Working Papers, including two presented by China on the "development of a model code of conduct for biological scientists under the BWC" and the "establishment of a non-proliferation export control international cooperation regime under the framework of BWC"; and the joint Working Paper presented by France and India on the "establishment of a database for assistance in the framework of Article-VII of the Convention".

We hope that all States Parties will see the value and utility

of the concrete and practical proposals contained in these Working Papers. In our view, they will go a long way in strengthening the implementation of the Convention in diverse areas. We, therefore, sincerely hope that all States Parties will be in a position to support them. Mr. President,

Pakistan recalls with satisfaction the successful conclusion of the 7th BWC Review Conference in December 2011, and believes that its Final Document embodied a delicate balance that should be preserved in the Final Document of the Eighth Review Conference. We look forward to working with you and other States Parties in developing a robust, balanced and forward looking Final Document by consensus.

I thank you, Mr. President

Appendix IV

Statement by Ambassador Tehmina Janjua In **Eighth Review Conference of BWTC**

PAKISTAN

PERMANENT MISSION TO THE UNITED NATIONS

56 Rue de Moillebeau, 1211 Geneva Tel: (4122) 749 1930 Fax: (4122) 734 8085

PLEASE CHECK AGAINST DELIVERY

STATEMENT

BY

AMBASSADOR ZAMIR AKRAM,
PERMANENT REPRESENTATIVE OF PAKISTAN
TO THE UNITED NATIONS

AT THE

SEVENTH BWC REVIEW CONFERENCE

Geneva,
06 December 2011

Mr. President,

I congratulate you on your election as the President of the 7th BTWC Review Conference. Since your nomination, we have witnessed your hard work and dedication to make this Review Conference a success. Your efforts were apparent in a number of bilateral visits you undertook this year, including to Pakistan. We are confident that your devotion and commitment will yield positive results. We also felicitate other members of General Committee on their election. As you and your team endeavor to guide this Review Conference towards a successful conclusion, let me assure you, Mr. President, of my delegation's full support and cooperation.

Mr. President,

Pakistan aligns itself with the statement delivered by Cuba, on behalf of NAM and Other States Parties to the BTWC.

Mr. President,

BTWC is an important pillar of the global security architecture, which needs to be preserved and strengthened. Being the first multilateral disarmament treaty banning an entire category of weapons of mass destruction, BTWC reflects the commitment of the international community to non-proliferation and disarmament of biological and toxins weapons. We believe that adherence to multilaterally negotiated treaties is the best way to promote global peace and security. The success of this Convention demonstrates the continuing relevance and importance of treaties negotiated multilaterally on the basis of good faith and equality, while taking into account security interests of all states. This should also show us a way forward to promote the global disarmament agenda.

Mr. President,

Pakistan ratified the BTWC in 1974 as a non-possessor state and remains fully committed to its obligations under the Convention. While emphasizing the effective implementation of the Convention, including establishment of a compliance regime and verification mechanism, Pakistan shares the concerns of the international community regarding the possible use of biological weapons, including by non-state actors. As a state party to BTWC, we are fully cognizant of the potential negative use of biological and toxin agents and our obligations to prevent such use. Pakistan has, therefore, taken a range of comprehensive legal and administrative steps to enhance its bio-safety and bio-security regulations.

Our national regulatory framework includes the Drugs Act 1976, Plant Quarantine Act 1976, Animal Quarantine Act 1979, Anti- Terrorism Act 1997, and Pakistan Export Control Act 2004, in addition to provisions of the Pakistan Penal Code. Pakistan's Strategic Export Control Division regulates strategic exports according to the National Control List 2005, which has been revised in 2011. Pakistan's Bio-safety Rules 2005 and Bio-safety Guidelines 2005 deal with safety aspects of bio-related materials and facilities.

Through an inter-agency consultative process, we have drafted BTWC legislation which will shortly be tabled in our Parliament. This legislation aims to comprehensively prohibit designing, development, manufacturing, stockpiling, transport, import, export, sale, acquisition and possession of biological agents and toxins including their means of delivery. It also envisages an Implementation Authority and Oversight Committee.

Appendix V

***Statement by Ambassador Tehmina Janjua In* Eighth Review Conference of BWTC**

Opening Statement by the President of the Sixth Review Conference of the Biological Weapons Convention, Ambassador Masood Khan (Pakistan)

Geneva, 20 November 2006

Mr. Secretary-General, Excellencies, Ladies and Gentlemen,

I want to thank the States Parties for electing me as the President of this review conference of the Biological Weapons Convention. Let my first act as President be to warmly welcome to our conference, on behalf of all the States Parties, the United Nations Secretary-General, Mr. Kofi Annan.

Today is a special day and a momentous occasion. This conference is the launching pad for our campaign against biological warfare. This conference is where we confront the threat of biological weapons, and where we must discharge our responsibility to ensure that disease is never used as a weapon.

Thirty-one years ago, the original signatories to the BWC decided that biological weapons would never be produced or used. They resolved that biological agents and toxins would be used only for peaceful purposes.

Today, 155 States Parties can look back with satisfaction and say that this Convention has been an effective barrier against the use of disease was a weapon. Stockpiles have been destroyed, the incidence of biological weapons has been low, and no country - State Party or not - would dare contend that biological weapons can ever have a legitimate place in national defence.

But there is no room for complacency. Biological weapons are a real, potent threat to humanity, not a figment of the imagination. They are weapons of mass destruction that may be as deadly as nuclear weapons, and even deadlier.

And the threat is growing. We face the disturbing prospect of terrorists acquiring and using biological weapons. The rapid advances in the life sciences mean it has never been easier or cheaper to develop them. New bioweapons will be more virulent, easier to hide, and harder to combat.

The extraordinary breakthroughs in the biosciences promise better medicines, better crops, and a better environment. But the perfectly legitimate development of new vaccines, or treatments for Alzheimer's and diabetes, has also revealed a more sinister potential for malign use. The challenge will only become greater, with synthetic biology witnessing exponential growth, and biotechnology finding widespread commercial applications around the world.

We need a range of measures to meet these challenges. But no attempt should be made to smother scientific inquiry or to restrict the growth of the biotechnology industry. Our sole purpose should be to ensure that the peaceful applications of science and technology can develop in safety.

This conference is a vital opportunity to take action against a threat which is too serious to ignore. Thanks to the energy, resourcefulness and commitment of the States Parties over the past months, the time is ripe for success.