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Biological Weapons and the Evolving International Norms

Monalisa Joshi*

*[*Monalisa Joshi is a Research Scholar in the Centre for International Politics, Organisation and Disarmament, School of International Studies, Jawaharlal Nehru University, New Delhi, India].*

Norms are standards of behaviour, consensually agreed upon, by a social aggregate to direct social behaviour. States, in an international setting, constitute a society by the virtue of their mutual interactions, trade and diplomatic relations. As such there has to be some principles and norms to guide such inter-actions among states.

However, working towards a consensus on what constitutes universal value or norm is not that easy. The understanding of what is right and wrong may be different at the national and international levels. While national morality is contingent on specific culture, history, social norms and traditions of war, international morality is more general and cross-cultural.[1] This distinction leads to a wide gulf between a state's action and its meaning at the national and international levels. The norms set at the international level are set by nations themselves and they are based on values regarded as universal and fundamental to human civilization. Once the nations agree to accept these norms and abide by them, it becomes obligatory on their part to reduce the level of incompatibility between the national legislations and inter-national norms .[2]

This transition takes place in three different stages.[3] The first stage is, "norm emergence", wherein new norms are identified. The second stage is, "norm cascades", where identified norms gather greater classification and support from a growing number of states. In the last stage, internalisation of norms; political behaviour becomes a matter of routine and the norms are almost taken for granted, independent of any treaty status.

Thus established, the norms select, direct and sustain the behaviour and identity of states. In addition, they also help nations evolve a consensus on issues of global concern. The success of this process lies in the knowledge and the understanding of norms as a route to reach socially optimal solutions against temptations of rational individualistic defections.[4] These solutions become the blueprints of an international regime.

Many institutional mechanisms exist at the international level to outlaw morally abhorrent weapons of mass destruction. Agreements pertaining to nuclear weapons, ban their deployments in new environment and restrict specified developments. Chemical and biological weapons are categorically outlawed, under the provisions of international agreements. The norm to abstain from use of nuclear weapons in war is well understood by the states, given the fifty-year nuclear

moratorium since its first use. However, a rise in the number of states and non-state actors, allegedly acquiring biological weapons (branded as poor man's nuclear weapons), makes it clear that the norm against biological weapons suffers from major flaws. Building norms against biological weapons and ensuring means to strengthen them assumes greater significance because of the rapid proliferation of biotechnology and related knowledge and the linkage of terrorism with biological weapons.

This paper explores questions like— what are norms? What are the norms that have evolved against biological weapons?

The first section provides a general understanding of biological weapons. The second section deals with the history of the origin and evolution of norms against biological weapons. Section three provides an overview of the drawbacks in the operation of these norms. The concluding section covers the future implications.

Understanding Biological Weapons

Biological weapons kill people by releasing pathogens (disease- causing biological agents) in the host's body. Since disease is a naturally occurring phenomenon; all outbreaks of disease cannot be linked to the use of biological weapons. The possibility of the use of biological weapons is established in the case of "the release of living organisms (as well as the means of delivery) intended for use in warfare to cause death or disease and which for its effect depends on the ability to multiply in the person, animal or plant."[5] Biological agents include microorganisms like virus, bacteria, fungi and ricketssia.

Modern day biological warfare agents include *viruses* like dengue, small pox, hepatitis A, hepatitis B, *rickettsia* like epidemic coxillea burneti, *bacteria* like anthrax, cholera, plague and *fungi* like histoplasma, coccidioidomyiosis. Quite often, toxin-weapons are also categorised under biological weapons. However, toxins are not living organisms but substances derived from living organisms, which cause death or injury in an attack.[6]

Biological weapons affect both animate and inanimate targets. When used against inanimate targets, these weapons cause damage to agricultural, animal products and contaminate the enemy's food and water supply. An animate target of biological weapons will show symptoms of disease. The entry points for biological agents in a host are through contaminated water, food air or any cut, wound or passage in the body. In general, the pathogens release toxins, affect immunity and disturb normal functioning of the body. Worst, the victim's susceptibility to other diseases will increase. Once inside the body of the host, the pathogens will spread further, re-infect, mutate or lie dormant.

Laboratory production of weapon- grade biological agents drastically differs from the life-cycle of micro-organisms in nature. The facilities for the production of biological agents are the same as those used in legitimate vaccine or pharmaceutical plants.[7] Both include equipment and materials for microbial fermentation, cell culture or egg incubation, followed by harvest, purification and freeze-drying. The dual-use equipment is similar to that used in making beer, and can be acquired commercially without raising suspicion. The relevant design elements of a

production facility for biological weapons will include containment, purification and sterilisation equipment, ventilation and filtration systems and storage.[8] Containment measures protect the environment from the infectious nature of biological agents. To enhance the effectiveness of agents, a high level of purity is maintained through sterile air, steam or inert gas supply. Ventilation equipment like HEPA (High Efficiency Particulate Air) filters is used at two stages, primary barriers (separating product from operators) and secondary barriers (separating the product from contamination). Bacterial cultures are stabilised for storage or packaging by concentration and drying. Lyophilization (direct freeze-drying), ultra or deep freezing is the preferred method for long term storage of bacterial cultures. The procedure used for the actual replication of an organism is a function of the organism itself. The techniques include cell culture, fermentation, viral replication, powdering and milling. Fermentation is carried out in vessels called bio-reactors where cells are cultured in a controlled environment. Powdering and milling is generally used to produce biological agents, as particles with a diameter less than ten microns can easily be absorbed by human lung. The powder or mud like liquid (slurry) thus obtained can effectively create aerosol clouds. Aerosol dissemination is the most efficient method of spreading biological agents.

The use of biological warfare is traced to the pre-Christian era. In 400 B.C. Scythian archers dipped arrowheads in the blood of decomposing bodies and used these arrows as missile directed towards the enemy.[9] There were allegations of German and the Japanese use of biological warfare agent in World War II. The twin decades of 70s and 80s witnessed the rapid development of process and techniques in biological sciences. The remark-able turnabout was the use of microbial animal or plant cells or enzymes to synthesise; breakdown or transform materials.[10] Present day biotechnology (any technological application that uses biological systems, living organisms or derivatives thereof, to make or modify products or processes for specific use) traces its origin in the ancient and traditional fermentation process like brewing of beer, manufacturing of bread, cheese, wine and vinegar, yet in certain aspects it has been transformed drastically.

In 1970, Joshua Lederberg was first among the scientists to express concern over the misuse of advances in molecular biology.[11] In 1973, Cohen and Boyer demonstrated that scientists could deliberately alter the genetic information of bacteria using the recombinant DNA (r-DNA) technology.[12] Just three decades later it was demonstrated that genetic engineering was possible, it was claimed in the British journal, New Scientist in 1999 that an entirely new artificial organism could be created by biologists.[13] Researchers could now design targeted experiments in which specific genes are cloned, sequenced, and inserted into new organisms.[14] In this way, the properties of two genes in question can be determined with precision by observing the effects on the host cells to which they are transferred.[15] Unlike the classical methods, quantities of specific DNA molecules, proteins and other products can be produced through the use of r-DNA, to impart altered characteristics to host organisms.[16] In addition, all the characteristics desirable in the biological weapon agent – virulence, stability, and disguised antigen structure and production efficiency may be subject to enhancement through genetic engineering.[17]

Biological weapon designers who apply the techniques of genetic engineering may attempt to create agents that possess all of the identified attributes and manifest each trait with maximised potency. It cannot be ruled out that information from such genetic research could be considered for the design of weapons targeted against specific ethnic or racial groups. In addition, fears are expressed about the Human Genome Project (HGP). The HGP to be completed in 2005 will provide the entire human genome sequence.[18] Information from such genetic research could be used for the design of weapons targeted against specific ethnic or racial groups.[19] Furthermore, the merging of chemistry and biology in the genomics/proteomics revolution "significantly expands the threat potential.[20] These new trends and developments have expanded the scope of biological weapons to include genetically manipulated agents and bioregulators.[21] Bioregulators are naturally occurring constitute of a victim's body and could be used to damage health by introducing unnatural quantities of it in the body.

Norms against Biological Weapons

Norm is a word derived from the Latin language for a carpenter's set square, which shows what a right angle is expected and required to be.[22] In international politics a norm can be thought of as an idea, which can be either proscriptive or prescriptive. According to Krasner, norms as constituents of regimes are standards of behaviour defined in terms of rights and obligations.[23] Their application in this sense makes norms, crucial determinants of any social aggregate.

The importance of norms and regimes is contested in international relations. This debate can be located in three different schools of thought of international relations.[24] These are neo-liberalism, realism and cognitivism. Whereas the neo-liberals stress on (self-) interest, the realists emphasise on power and relative power position to be the motive for co-operation and success of an international regime. Cognitivists stress the importance of actors' (state) causal and social knowledge in creating an international regime.[25] This focus on three specific variables renders each strand of thought insufficient to explain regimes on its own. However, all the dimensions of a regime can be well understood by some sort of division of labour or synthesis amongst the various schools.[26]

This synthesis is evident in Gary Goertz's analysis of the contexts of international norms.[27] According to Goertz, the relative importance of both, norm (about 40%) and self interest (about 60%) accounts for the success of a regime. This finding also has an important implication for "security dilemma."[28] Scholars critical of international security regimes argue that a state for which specific calculations are more important, the pursuable long-term interest (as regime) becomes difficult.[29]

The conflict of self-interests can be settled by introducing norms. Although the rules of co-operation can now be chosen for purely instrumental reasons, yet it has a "moral" component in the form of tit-for-tat strategy.[30] This moral component in a security regime lies in reciprocity, facilitating and sponsoring co-operation rather than defection. Power creates norms but the

sustainability of norms is their own property.[31] Once created norms have "inertia", while their creators may have withered away, norms continue to exist.[32]

Any agreement on a norm at the international level is the culmination of the combined efforts of all the states to resolve a problem which cannot be handled independently by one state alone. This effort is manifested at two levels, i.e., official and unofficial. At the official level there exists a treaty mechanism. Unofficially, the commitment of states and public awareness is considered important for the operation of any norm.

The efforts to restrain the production, stockpile and use of biological weapons are pivoted on the operation of "repugnance". Repugnance, a value-laden argument, helps to shape the expected, required and observable behaviour of states. Later, this becomes distinct as a norm.

Various civilizations have demonstrated an aversion to the use of germs in warfare. The Laws of Manu in India, 500 B.C. and the widespread approbation of the use of arsenic smoke in the siege of Belgrade in 1456 are instructive here.[33] The methods and means with which this normative point has been carried forward have changed with times.

International responses to establish norms against biological weapons are traced to the Geneva Protocol of 1925 and the BTWC (Biological and Toxin Weapons Convention) of 1972. In the first World War, there were widespread allegations of the use of biological weapons. German secret agents targeted livestock with the agents of anthrax and glanders in Romania and US (1915-16), Argentina (1916-18) and in Spain and Norway.[34] The League of Nations was established after the war for peaceful settlement of disputes. One of the first manifestations of the aims of the League was the Geneva Protocol of 1925.

The Geneva Protocol prohibited the use of germs or chemical weapons. State parties were "bound as between themselves according to the terms."[35] It contained no verification or compliance mechanism and did not restrict research and development of biological weapons. Geneva Protocol did not play much role in dissuading state parties from using biological weapons in World War II. It is believed that most of the belligerent nations refrained from using biological weapons in the war because they feared retaliation and perceived little military gains from the use of biological weapon.[36]

At times Geneva Protocol was referred to as "no first use" protocol. The state parties could retaliate if chemical or biological weapons were used against them. The importance of Geneva Protocol was highlighted by US President Bill Clinton as "a major step forward protecting the world from the dangers of weapons of mass destruction."[37] Geneva Protocol was a precursor and set the precedence for a comprehensive agreement to ban biological weapons.

In the post-World War II context, voices were raised in the public domain to urgently address the issue of possible health hazards through the release of disease causing biological agents. Two events gave impetus to intense reactions on the theme. First, suspected use of biological weapons in the Vietnam and Korean War and second, nerve gas leak from a US army ground in 1968 that

killed six thousand sheep in Utah. Eventually, President Nixon declared that US was to unilaterally renounce biological weapons and abide by the terms of the formerly denounced Geneva Protocol.[38]

Meanwhile, earnest negotiations started in the UN, to settle various problems of chemical and biological weapon control. The Conference of the Committee on Disarmament (CCD), an international group of experts, was commissioned by the UN General Assembly to study chemical weapons and biological weapons. At that time, the issue of biological weapons control received major thrust because of the absence of field-testing & unproven military potency, as compared to chemical weapons. During this process it was realised that the imperative of large scale testing for biological weapons would render their inspection useless. Therefore, the US and its allies gave up the contending issue of inspection. The insistence of Soviet Union to link chemical weapons and biological weapons was also given up. In time, a convention (BTWC), prohibiting the production and storage of biological toxins and calling for the destruction of biological weapons stocks was signed on April 10, 1972.[39] Moscow and Washington viewed the convention as a means to maintain momentum on arms control to find yet another area in which the USA and USSR shared a common interest and advocated restraint.[40]

BTWC contains fifteen articles. Article I prohibits development, production, stockpiling or retention of microbial, biological agents or toxins "of types and in quantities" without justification for peaceful purposes. Under the terms of Article II the state parties are obligated to destroy all such weapons in a period of nine months. Article III restricts the transfer, assistance, encouragement or inducement to "any recipient whatsoever" for the acquisition of agents, toxins, weapons and the means of using such agents. Article X has provisions for the exchange of equipment, materials and information about the use of biological agents and toxins for peaceful purposes. It ensures the promotion of economic and technological development of state parties "by international exchange of biological agents, toxins and equipment" for the purpose of peaceful uses.

Verification is not dealt with in detail by the BTWC. Article V has provisions for consultation between states in order to resolve mutual problems and disputes. There is also no provision for on-site inspection, given the clandestine nature involved in producing and stockpiling biological weapons. Unlike any other international agreement, BTWC endorses the role of UN as an international organisation. The UN Security Council is empowered to carry out procedures for investigation. Review Conferences for the BTWC are held to update and strengthen the mechanisms of the treaty in wake of the new technological and procedural developments in biological sciences.[41]

Any study undertaken to study norms in relation to biological weapons will have to address the role of two important actors, the state and biotechnology firms. State is the agency which will use (sic) these biological agents, as a deterrent, in war or as a weapon of last resort. Biotechnology firms and associated research labs are the key components of any biological weapon program. It is in these laboratories that virulent strains and biological agents can be stored, produced, multiplied or altered to increase their lethality. Unlike other categories of weapons, the unique characteristic of biological weapons is the dual use technology i.e., it is

used for producing biological weapons and can also be used for peaceful purposes like manufacture of drugs, medicines and antibiotics.

The acquisition of biological agents by the states is a complex and time-consuming process. This process comprises of seven stages.[42]

1. Policy review and decision to initiate an offensive program
2. Budgetary estimates and resource allocation
3. Research and development
4. Agent production
5. Design, test and build munitions
6. Acquire delivery systems
7. Acquire operational capability, develop battle plans, and train troops to use biological weapons; integrate weapons, logistic and plans into military forces.

While the first three are stages of planning, practical procedures start from the fourth stage. The production, storage and stockpiling of offensive biological agents for a state are not difficult. Fermentors, centrifuges, purification and other laboratory equipments are used by the biomedical community and have other academic and commercial applications as well, such as in wineries, milk plants, pharmaceutical houses and for agricultural products.[43[Biological agents can be easily concealed under the rubric of pharmaceutical industry or public health management systems.

However, there are limitations in using biological agents as weapons. Environmental decay after release, lack of predictability of effects and time taken for the symptoms to appear are some of the factors that limit the use of biological agents against military forces.[44] Potency of the weapon is conditional on the susceptibility and immunity of animate targets, which differs radically. In addition, there is a major risk that the wrong area of the enemy may get contaminated. Persistent agents may infect the ground, that has to be crossed or occupied and force the use of protective measures or decontamination. Protective gear, equipment, drugs and medicines can effectively reduce the effects.

These weapons cannot effectively be used as a deterrent. Deterrence is credible as long as it can be clearly demonstrated. Deterrence based on biological weapons will require delivery systems and communication of the intent to the enemy. Both these measures, if undertaken, would be a gross violation of the international norms and be accompanied with loss of inter-national reputation and credibility of the state. The crucial role of biological weapons for a state could be as a weapon of last resort. Few other ways could be economic warfare against enemies, crops or livestock or attacks on cities, bases or by sponsoring terrorist activities.[45]

Terrorist actions are not bound by traditional moral standards. Their goal is to disrupt and destabilise a society by generating fear. Precisely because they are silent, stealthily, invisible and slow acting, germs are capable of inducing levels of anxiety approaching hysteria. Non state actors like extremists, terrorist groups or groups sponsored by a state sympathiser to their cause,

face fewer challenges while using biological weapons. There can be four primary acquisition routes that terrorists could pursue in acquiring biological agents.[46] They are, purchasing an agent from one of the world's 1500 germ banks, by theft, natural sources, from a rogue state, a disgruntled government scientist or a state sponsor. However, terrorists working outside a state-run laboratory infrastructure would have to overcome extraordinary technical and operational challenges to effectively weaponise a biological agent and cause mass casualties. In direct contrast to the frequent public presentations, the technical challenges to produce an effective biological weapon are not simple and straightforward. There are difficulties in acquiring, producing, handling or storing these agents.

Even in case a terrorist group becomes successful in acquiring the agent, obtaining a highly lethal strain is not an easy task. The required technical expertise and the threat of accidental exposure are some of the hurdles while turning the strain into microscopic powder. In addition, several technical challenges have to be overcome in aerosolising, testing, disseminating and maintaining the virulence of the agent.

Challenges to Norms

At present, 169 states are parties to the BTWC.[47] This high participation supports the proposition that a norm against biological weapons exists, yet does not prove its existence.[48] There are problems in proving the existence of a norm against the production, stockpile and use of biological weapons, since, there exists no objective basis to successfully prove a biological weapons programme of a state. No definitive standards for proliferation and lack of corresponding assessment criteria mean that a consensus regarding when proliferation has occurred or starts to pose a risk to international security does not exists.

Even the detection (if possible) of biological weapons cannot conclusively reveal anything about the capability of a state to use them. Moreover, most countries are reluctant to admit having either an active, dormant or a past offensive biological weapon program.[49]

The main source of information on proliferation developments is the US. The US Department of Defense estimates in 2001 show that at least nine countries pose potential threat because of their biological weapons program. These countries are China, India, Iran, Libya, North Korea, Pakistan, Russia and Syria.[50] It is believed that Syria and Pakistan have the resources and capabilities to support limited biological warfare research and development. A similar estimate in 1997 listed seven countries. However, compared to an earlier assessment four countries were conspicuously absent, namely Egypt, Israel, Taiwan and South Korea.[51] The uncertainties in the list are due to the difficulties in assessing biological weapons capability of a country. A web resource shows twenty countries possessing, pursuing or capable of acquiring biological weapons in the year 2000.[52]

The basic prohibition regarding biological weapons is enshrined in Article I of the BTWC. State parties have repeatedly drawn attention to the weakness of this Article in various Review Conferences. The scope of its terms— "microbial or other biological agents or toxins or whatever their origin or method of production"— is ambiguous. The Fourth Review Conference

expressed concern about “techno-logical developments” in the fields of “microbiology, biotechnology, molecular biology, genetic engin-eering and any applications resulting from genome studies.” However, it missed important issues of bio regulators, use of pest or riot control agents, which can be exploited for malignant use.[53] The lack of prohibitory provisions in BTWC regarding these agents may allow states to acquire and use them. There is also no distinction between permitted and prohibited activities and an objective criterion for deciding the permitted quantities of agents. In addition, the incorporation of term “hostile purpose or in armed conflict” in Article I to restrict non-peaceful use of biological weapons is expansive. Hostile purpose is broader than armed conflict, which, in turn, is broader than war.[54]

The existence of flaws, objectivity and omissions in Article I has also adversely affected the compliance and verification procedures of BTWC. Verification as a process serves four functions. First, it is a provider of evidence and second it serves a reassurance function for a state. Third, verification also performs the role of deterrent. A fourth function of verification is a process, ideally a co-operative one.[55] The BTWC lacks verification and enforcement mechanisms. Many issues regarding verification, including the very word verification which should or not be applied to BTWC continue to divide the countries.[56] The fact that biological weapons can be clandestinely manufactured in small quantity guides the US policy of non-verifiability of BTWC. It stems from the belief that the convention understands this concept for other arms control agreement and no verification regime can be devised to make it so.[57]

The close association of legitimate pharmaceutical activities and public health measures with a possible biological weapons program is a highly debatable issue. Any verification and compliance measure which sets out to establish prohibited and permitted activities will invariably compromise security information and Commercial Proprietary Information (CPI).[58]

Other contested issues related to verification are on-site inspections and the list of agents. Concerns for on-site inspection focus on the problems of specification of type of visit, duration, work and selection of inspectors. Moreover, a historical record suggests that a strong response to non-compliance is also not forthcoming. Even after repeated US claims of Soviet Union non-compliance of BTWC in 1980s, countries were unwilling to take action because the evidence was not deemed sufficient. Given this reluctance, a hypothetical construct where elusive military victory drives one state to use off-the-shelf biotechnology to decimate the enemy and collapse its society might prove true.[59]

The verification protocol published after every negotiating session contains a statement for the selection of agents and the list of agents being considered.[60] Countries are divided on the issue whether to include a comprehensive list according to current developments or a simple list of agents to simplify compliance matter. Some headway was achieved in resolving verification and compliance related problems at the conclusion of the Third Review Conference in 1991. Following its report a new ad hoc group was established to recommend a legally bending proposal for strengthening the issue of compliance and verification. The draft protocol thus achieved after six years in 2001 was rejected by the US. It was termed as a “better than nothing”

protocol. This abrupt end calls for immediate attention to other measures of co-operation and confidence building enshrined in the BTWC.

The need to co-operate in the "development and application of scientific discoveries" is the main focus of Article X of the convention. It is the source of a major divide between developed and developing countries party to the treaty.[61] Developed countries are more inclined to provide voluntary technical help to developing countries rather than the mandatory assistance. Unlike the latter, developed countries give more importance to address the problem of verification than the activation of Article X.

However, some provisions of this article regarding trade in equipment; pathogens and toxins are in direct conflict with those of the Australia Group. Article X provides for "the right to participate in the fullest exchange of equipment, materials.." The Australia Group restricts trade in certain equipment, pathogens and toxins. Countries that are at a loss because of inactivation of Article X point out that their pharmaceutical activity and domestic public health is being adversely affected.

On the other hand, countries endorsing export controls rely on Article III of BTWC which restricts transfers to any recipient. It is clear that the provisions of Article X and Article III of BTWC have been used to justify contrary stands. Given the conflicting provisions of the Articles and diverse views of countries, scholars have suggested other measures to implement Article X. These measures include the improvement of bio-safety standards worldwide and a system of facility inspections.[62]

Concerns like quantity, type and the quantity of biological agents, enforcement, verification, compliance mechanics and control on exports have not been successfully determined or resolved. In its present status, the BTWC lacks attributes, the three 3Cs, commitment, consensus and the carrying forward of efforts at international level, which are the backbone for the success of any treaty.

The ongoing researches will produce advances in medicine and basic science that can be carried for commercial or defense purposes and put to hostile use. Moreover, a number of publication, (through internet and text) have alarmed some observers, a huge possibility exists that they might be of great help to someone keen to acquire biological weapons. The key issue is to strike a balance between business interests of these firms and the methods for restraining the proliferation of biological weapons. Some policymakers suggest that regulations controlling access to pathogens and related information should be tightened.[63] Recommendations like regulation of biological data and publication of manuscripts associated with "risky" projects have not received favorable opinion by scientists. Pharmaceutical and bio-technology companies are resisting inspections that would strengthen BTWC. These firms fear inspections because of the potential theft of commercial secrets while the proponents object that the two week advance notice would allow too much time to hide any covert activities.[64]

An editorial published in *Nature*, effectively sums up the issue that there are "no simple answers" to the dilemma about protecting information that could be used for malevolent

purposes.[65] It has been felt that the public does not share the value of openness in science. It will be for the benefit of scientists and researchers not to be seen as helping terrorists or compromising national security interests. Each of the parties, the public, national security community and the research community, should be made to understand the objectives and constraints of the others.[66] Although it is a difficult tasks to achieve, this common understanding will go a long way in creating the basis of a sound policy.

Conclusion

Humankind has been striving to find remedial measures to deadly diseases and has repeatedly achieved what was unthinkable at the beginning of the effort. Throughout history human race has sought measures and developed technologies to live a healthier, disease free life. There exists a normative aversion even to the thought of the use of disease causing biological agents in war or to gain certain political objectives. Disease, the word itself brings to one's mind pictures of misery, pain, helpless-ness and even death.

This argument however should not be seen as advocating death by other chivalrous means. The mankind has inhabited the planet for more than three thousand years. The dictum, "if one wants peace one should be prepared for war "looks a bit out of place and unwanted in today's world getting more and more united thanks to the revolution in the communication technology. What we all are seeking is a world of peaceful existence . Thus, all such problems like the one covered in thesis paper which are pressing us for urgent action should be revisited with a positive, peaceful mindset.

In case of the biological weapons drawbacks in the mechanisms of the BTWC and certain exogenous factors are hampering the norms governing their use. The scope of the treaty is broad, its text ambiguous with several omissions. There is no clear demarcation between prohibited and permitted activities. The issue of verification and compliance is also not clearly spelt out. As such, even after five mandatory Review Conferences, BTWC remains a weak treaty. The issue of the rapid spread of biotechnology and related sciences is pivoted on its own dynamics. The global reach cannot be stopped; it can only delayed or made more difficult to access. Any step in this direction will have to balance scientific temper and arms control measures.

Attempts to achieve such a critical balance are evident in various international initiatives. It would be much better if powerful nations divert their attention to impending core issues related to the BTWC and device other routes for bolstering the norm against biological weapons. States have a major role to play in resolving mutual differences on issues of concern, being transparent about their weapon's program and restraining proliferation of biological weapons through national means. It is of utmost important for states to not only set standards but live up to them. In this, the onus clearly lies with the big powers first. The standards of behaviour defined as rights and obligations against production, stockpile and use of biological weapons can be effectively resolved by addressing the issue of compliance of the biotechnology firms, labs and research organisations.

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