# Bioterrorism & Biodefense: An Environmental and Public Health Preparedness

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#### Abstract

Humans, plants and animals have always been susceptible to the threat of pathogenic microorganisms and their toxins which are present in the nature. Although these microorganisms occur naturally in the environment but they are unnaturally inflicted upon the society in the form of biological weapons. Bioterrorism is defined as the deliberate release of viruses, bacteria or other agents used to cause illness or death in people, and also in animals or plants. Biological weapons have often been referred to as the "poor man's atomic bomb. Biological attacks are more likely to be covert. A covert attack is most disturbing because the event itself might be completely unnoticed until numerous victims fell ill and their common illness has been diagnosed. The spread of biological agent does not have an instantaneous effect because there is a delay between exposure and onset of the illness. Further, it is often very difficult for historians and microbiologists to differentiate natural epidemics from alleged biological attacks. The current concerns regarding the use of biological weapons result from the increasing number of countries that are engaged in the proliferation of such weapons and their acquisition by the terrorist organizations.

The purpose of the present study is to analyse the growing threat of the bioterrorism in the world. It further entails to delineate the sub-sets of bioterrorism, which are agro-terrorism, environmental-terrorism. Further, the impact of bioterrorism on public health, environment is correctly spelled out. Major focus is also given on the current threat of bioterrorism on India and the legal framework which India possesses to counter such threat.

Keywords: Bioterrorism, public health, environment.

#### Introduction

The phrases 'Biological weapons and bioterrorism' are enough to send sudden fear down the spine. Humans, plants and animals have always been susceptible to the threat of pathogenic microorganisms and their toxins which are present in the nature. Although these microorganisms occur naturally in the environment but they are unnaturally inflicted upon the society in the form of biological weapons. Terrorism means the acts that are intended or calculated to provoke a state of terror in the general public, a group of persons or particular persons for political purposes which are in any circumstance unjustifiable, whatever the considerations of a political, philosophical, ideological, racial, ethnic, religious or any other nature that may be invoked to justify them.(UNODC Paper, 2018) Bioterrorism is defined as the deliberate release of viruses, bacteria or other agents used to cause illness or death in people, and also in animals or plants. (Ryan C. P., 2008 p. 276), Biological weapons have often been referred to as the "poor man's atomic bomb." (Roman Kupchunsky, 2019).

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A bioterrorist attack can be either overt (announced) or covert (unannounced). Usually, the chemical attacks are in the nature of overt attacks because chemical agents are absorbed through inhalation or absorption through skin etc. leading to immediate effects. On the other hand biological attacks are more likely to be covert. A covert attack is most disturbing because the event itself might be completely unnoticed until numerous victims fell ill and their common illness has been diagnosed. (Wolfgang F. Klietmann, 2001, p. 364). The spread of biological agent does not have an instantaneous effect because there is a delay between exposure and onset of the illness. Further, it is often very difficult for historians and microbiologists to differentiate natural epidemics from alleged biological attacks, because:

- (i) little information is available for times before the advent of modern microbiology;
- (ii) truth may be manipulated for political reasons, especially for a hot topic such as a biological attack; and
- (iii) The passage of time may also have distorted the reality of the past. (Barras V. 2014 p. 497).

The current concerns regarding the use of biological weapons result from the increasing number of countries that are engaged in the proliferation of such weapons and their acquisition by the terrorist organisations. Current concerns regarding the use of bioweapons result from their production for use in the 1991 Gulf War; and from the increasing number of countries that are engaged in the proliferation of such weapons i.e. from about four in the mid-1970s to around 17 till date. While nowadays significant level of expertise and tacit knowledge is still required for successful delivery and disease manufacture, the ease of microbiological manipulation and the level of sophistication of, for instance, DIY-biologists or growing numbers of bio-science students is increasing. (Erik Frinking, p.35). Such methods are accessible commercially very easily these days. They pose a realistic threat on account of being easily prepared, produced and transported to the location where they have to be used and therefore this threat has to be treated seriously. Increasing media references to the possession or capture of biological agents, such as anthrax or ricin, by non-state actors, decentralization of terrorist networks leading to individual, small-scale attacks of which the preparation thereof remains undetected, and the anticipation of a largerscale attack, suggest that reinforcing and strengthening present biosecurity and biodefense architecture are or should become a bigger priority. (Roman Kupchunsky, 2019).

The focus of counter measures against bioterrorism is mainly on preventing human casualties. A simulation conducted by the Center for Nonproliferation Studies demonstrated that preparedness and being able to respond efficiently may reduce the ultimate casualty figure by 75%. (Jansen H. J., 2014, p. 488, 490). The harm caused by bioweapons also extends to economic losses by infecting the livestock and crops or the contamination of buildings or an entire area altogether. It also has adverse impacts on the environment. We need to focus on developing biodefense by building international cooperation and the countries need to take precautionary and preventive measures against such attacks.

# **Emergence of Bioterrorism:**

The use of biological weapons is not a new tactic and rather goes back in history to 600 BC when infectious diseases were recognized for their effect on people and armies. (Riedel S., 2004, 400). It was realized that the crude use of filth and cadavers, animal carcasses, and contagion had devastating effects and weakened the enemy. (Robertson AG., 1995 p. 369, 370). From the 1100s to

the late 1600s even though people did not have an understanding about germs theory of disease they either connected the dead or decaying biological materials with initiation of illnesses or perhaps would have seen the flinging of rotting corpses or smelly materials onto their enemies as a way of terrorizing their opponents (Texas Department of State Health Services, 2019) Before the microbiology era, many examples of biological warfare can be found.

In the fourteenth century, the Tartars reportedly catapulted bodies of plague victims into the city of Caffa. (Derbes VJ.,1966 p. 59, 61). The heathen Tartar races, invested the city of Caffa and besieged the trapped Christians there for almost three years. (Mark Wheelis, 2002 P. 971, 973). But, the glory for Tartans for short lived as the whole army was affected by a disease and killed around thousand men every day. The common symptoms noticed among them were swellings in the armpit or groin caused by the coagulating humors, followed by a putrid fever. (Mark Wheelis, 2002 P. 973). It was ordered that the corpses should be placed in catapults (trebuchets) and lobbed into the city in the hope that the intolerable stench would kill everyone inside. (Mark Wheelis, 2002 P. 973). Therefore, during the medieval times, it was believed that foul smell of rotting bodies or bad air could be used for spreading diseases. They might not have completely understood the details of disease transmission, but their crude tactics frequently worked. (Texas Department of State Health Services, 2019)

Later, during the 17<sup>th</sup> century, there was still a lack of knowledge with respect to transmission of the diseases and directing the disease to affect the enemy. However, the impact of biological weapons was always known to the military leaders and there are reports of biological agents being used against the armies during this era. It was in the 18<sup>th</sup> century that strategic thinking with respect to biological weapons started i.e. to use disease causing organisms to inflict harm on their opponents. During the French and American Indian wars in American colonial days, it is said that the British deliberately gave Indians blanket contaminated with smallpox. (Hale Sipe C., 1929). In the 19<sup>th</sup> century, use of biological weapons became more sophisticated as the conception of Koch's postulates and the development of modern microbiology made possible the isolation and production of stocks of specific pathogens. (Robertson AG,1995 p.369, 370). Polluting wells and other sources of water of the opposing army was a common strategy that continued to be used through the many European wars, during the American Civil War, and even into the 20th century. (Riedel S., 2004 p. 400) During World War 1, the German army attempted to infect Allies' horses and mules, with glanders & anthrax bacteria in sugar cubes. (The National Academies Press, 2004). During World War II, the Japanese tested biological weapons on prisoners of war in China, killing more than 1000. (Harris S, 1992 p. 21, 24). Around 10,000s of prisoners and Chinese Civilians were infected with plague, typhoid, cholera, contaminated water, inflected fleas, aerial attack anthrax infected chocolates etc. During the Vietnam War, the United States sprayed herbicides over vast areas of South Vietnam to destroy forests and vegetation and deny its enemy cover, mobility and sustenance. (Michael N. Schmitt 1997 p. 1, 9)

Our history is a proof that there is no other form of leading a war with a better trained and armed enemy which could work so effectively, neither there is any weapon that could be so easily hidden, cheap to produce and which with relatively low outlay could cause such great mass losses in humans as biological weapons". (Bogdan Michailiuk, 2016 p. 59, 69). The potential spectrum of bioterrorism ranges from hoaxes and use of non-mass casualty devices and agents by individuals and small groups to state-sponsored terrorism that employs classic biological warfare agents and can produce mass casualties. (Joseph E. McDade, 1998 P. 493).

The use of biological agents for terrorism rather than warfare was first seen in the United States by the perpetrators of the Indian guru Bhagwan Shree Rajneesh with the aim to affect participation of local voters in the county election. They used Salmonella enterica Typhimurium, a strain of Salmonella bacteria that can lead to food poisoning and acute gastroenteritis. Symptoms of the infection include diarrhea, fever, chills, nausea, vomiting, headaches, abdominal pain, and bloody stools. (Recoil Offgrid, 2019). This outbreak of salmonellosis was caused by intentional contamination of restaurant salad bars by members of a religious community. (Thomas J Tőrők, 1997 p. 389).

The most extensive non-state biological weapons program unearthed to date was organized in the 1990s by the Japanese Aum Shinkriyo cult. (William Rosenau, 2001 p. 289, 290). The cult traces its origins to a yoga studio founded by Chizuo Matsumoto (Shoko Asahara), who also said that he could teach levitation and telepathy, told his followers that the world would end in Armageddon and promised to lead his followers to salvation. (The Japan Times, 2018). Over time, this prediction morphed into a belief that the apocalypse was inevitable but the cult members alone would survive it, and finally that the cult should hasten the apocalypse by launching attacks, including with biological weapons. (IAN READER, 2000 p.88-93). In 1995 it was discovered that the Aum Shirikyo group had produced Sarin and had used it to cause large-scale public injury, had also attempted to produce and disperse boyulinium toxin and Bacillus anthracis. (Milton Leitenberg, 2007 p. 149, 150). Therefore, bioterrorism has an existence in our past and we cannot completely deny its presence and threat in the present scientifically advanced society which the biological research increasing day by day.

# **Environment and Public Health:**

Biological weapons cause catastrophic effect on the public health, biodiversity and the environment. As already discussed, the threat from such weapons arises due to the less cost, rapid spread, easy preparation, transport and use. Moreover, due to the clinical symptoms created as an effect of such attacks, it is difficult to distinguish them from normal diseases. The technical knowledge and materials needed to produce the biological weapons is available, however the knowledge about targeting these materials is limited. But precautionary and preventive measures need to be taken considering their chances of being used.

# Impact on Environment:

Biological weapons have a long-term devastating impact on the environment. It has been observed that the microorganisms that are artificially introduced in the ecosystem have the ability to leave it inhabitable for a very long term. These can also be used to deliberately cause epidemics and diseases among humans, destroy the environment, including long term impacts on water, air and soil and target crops and livestock. During World War-II, a biological warfare experiment was conducted by the British, whereby they exploded anthrax bombs on the Scottish island of Gruinard. As a result of the explosion, anthrax spores became buried in the soil of the island. The spores remained viable in the soil for 44 years, until 1986, when formaldehyde treatment of the island finally made it habitable again. (TOM BURROUGHS ET AL, 2002 p. 12).

It can be said without any doubts that the survival of humans is dependent on the diverse ecosystems that make up the biosphere of our planet. Crops, forests, resources obtained from the earth are essential to sustain the life. However, this essence of human life can be easily targeted by the terrorists and other miscreants who can use the bioweapons to cause harm to the environment for multifarious reasons such as to instill fear, harm the economy etc. The introduction of germs during such attacks can contaminate the air. Contamination of air raises another concern as the germs can travel with the air and effect plants and animals. During the Vietnam War, from 1962 to 1971, the U.S. Air Force sprayed nearly 19 million gallons of herbicides in Vietnam, of which at least 11 million gallons was Agent Orange. (Veterans and Agent Orange, 1994). This was done with the primary objectives of defoliation of trees and plants to improve observation and destruction of enemy crops. (Veterans and Agent Orange, 1994). As a result of this American action, the international treaty of Environmental Modification Convention (ENMOD) was formed, which entered into force in the year 1978. Although this treaty does not directly enforce a ban on the use of herbicides, but it prohibits the use of hostile military weapons for the purpose of environmental modification. According to certain Pentagon documents, US conducted test as to how siren gas would disperse after being released in artillery shells and rockets in aspen and spruce forests. (CBS News, 2019) Such tactics can also be used by terrorists to further their agendas. Recovering from such ecological damage can take decades.

Water resources can be subject to attack by biological weapons as well. They can also spread many lethal infectious agents. It has been found that one gram of Clostridium Tetani poison can kill eight million people within six hours. (Nura A. Abboud, 2018). If we look at history, during World War II, the Japanese had contaminated Chinese Water supplies with B. anthacis, Shigella spp., Salmonella spp., Vibrio cholerae, and Y. pestis. (GABRIEL BITTON, 2014). Since 2001, several sporadic cases of bioterrorism threats to water supplies around the world have been documented. (GABRIEL BITTON, 2014 P.161). Water is the source of life for humans, plants and animals on the planet, therefore, it is feared as a potential target for bioterrorist attacks.

# **Crops and Livestock:**

Biological weapons can also be deployed specifically to harm the crops and livestock in a country. Agriculture might not be a primary target for terrorists because it lacks the capacity to create immediate shock effect that terrorists aim to create, but still it is considered as an easy secondary target for them. Since crop failure can lead to huge economic losses for a country, it makes it vulnerable for bioterrorist attacks. The Tamil militants in Sri Lanka had threatened to introduce diseases into tea gardens and rubber plantation owned by the Sinhalese. (Surinder Sud, 2005) There are numerous varieties of crop, which are suitable to a particular set of climate and soil and are sensitive to certain viruses. These crop pathogens are tailored to take advantage of these properties by isolating them and developing weapons, like bombs targeting the particular crop. It is very easy to bring pathogens in a country to cause damage to the crops. According to the United Nations, more than 10 crop diseases have been identified which has the potential to be converted into a weapon, internationally. (Tanvi Kaur, 2019). The crops which are at a high risk include wheat, rice, corn, sugarcane, potatoes, coffee and different kinds of fruits, etc. (Tanvi Kaur, 2019).

Attack on livestock can also affect the food supplies and economy of a targeted nation. Livestock bioterrorism poses a huge threat due to easy availability and difficult detection of biological agents used against them. Further, even a small amount of such agents has the capability to create a huge impact. Thus, preparedness is required as the possibility of such an attack cannot be refuted.

# Animals:

Bioweapons can have catastrophic effect on animals because deadly diseases caused by bioweapons can easily be spread among the animals. For example- *Canine distemper*, a natural viral disease that infects wild dogs and wild animals belonging to the same group. (Nura A. Abboud, 2018), *Canine distemper* was also developed in bioweapon laboratories. Other than this, if the habitat of the animals is destroyed due to a bioterrorist attack, the chances of decline or maybe extinction of the wildlife living there is also a possibility. Terrorists can use biological weapons to infect thousands of animals, these pathogens spread rapidly from animal to animal. They can easily identify where the outbreak of a particular disease is and get the samples to infect other animals. In such a process no specific training in microbiology or other related sciences would be required.

### Public Health:

A 1970 World Health Organization (WHO) study estimated that 50 kg of Bacillus anthracis released over an urban population of 5 million would sicken 250,000 and kill 100,000 people, and a 1993 Office of Technology Assessment (OTA) study estimated that between 130,000 and 3 million deaths would follow the release of 100 kg of B. anthracis. (David B. Levin, 2003). This data reflects that bioterrorist attack poses some major threats to the public health of any nation. Firstly, most of the countries in the world are dealing with developing their public health infrastructures. In such a situation a bioterrorist attack will add to this existing burden. Secondly, it is very difficult to identify and differentiate a bioterrorist attack from a natural disease outbreak. Thirdly, most of the drugs and vaccines a limited shelf life and hence cannot be stocked up. In such a situation, the countries might not be in a situation to provide effective and immediate remedy to the public in case of a possible bioterrorist attack. The outcome of such attacks depends on the preparation of a country to deal with it. Lastly, unorthodox use of bioweapons may result in disease with unexpected symptoms and epidemiology. Until 2001, the possibility of cross-contamination of anthrax through the mail was discounted by most experts.

Some diseases that can be used in a potential bioterrorist attack include anthrax, smallpox, cholera, avian flu, viral haemorrhagic fevers, brucellosis etc. The Bhopal Gas Tragedy accident killed around 16,000, injured and exposed thousands of people, illustrates the possible effects of using a toxic pesticide as bioweapon. The biological weapons can enter the human body through inhalation, contact with skin or mucus membrane and the gastrointestinal tract. Epidemics of plague in India, avian (H5N1) influenza in Hong Kong, ebola haemorrhagic fever in central Africa and Nipah virus (NiV) infection in Malaysia and Singapore required national and international response. During the plague and ebola investigations, concerns regarding possibility of bioterrorism were raised, though not supported by subsequent findings. (Das S., 2011). In March 1995, members of the Patriot Council, an anti-government group, were arrested and charged with manufacturing ricin to kill law enforcement officers. (The Federal Emergency Management Agency, 1997). Their plan was to mix ricin with a solvent that can be easily absorbed through the skin, and put it on doorknobs and steering wheels. 0.7 gram of ricin manufactured by them was sufficient to kill around 100 people.

#### Assessing the threat: a historical Indian background:

India has a hostile neighborhood, with Pakistan in the North, China in the North-East and Bangladesh in the East. India's relations with Pakistan has been never stable as the two nuclear powers have been involved in a series of wars, starting right from the year 1947 and the threat now

also looms large due to the recent revocation of Article 370 (Indian Constitution, 1950) by the Indian Parliament (The Hindu, 2019).

It is pertinent to make reference to the 1965 Indo-Pak war, wherein there was a serious threat to the public health and the environment due to a suspicion of probable launch of bio-warfare by the Pakistan Army by causing a *scrub typhus* outbreak. India's defence and intelligence outfits were alert to the outbreak of pneumonic plague (Rohit Sharma, 2001 P. 714) Besides the above state actors, there are numerous non-state actors in India and her neighborhood. Way back in 1987, there was a communiqué issued by an unidentified Tamil militant group threatening to make use of biological agents in their struggle for independence against Sri Lanka. The group had threatened to disseminate river blindness and "yellow Fever" among human populations of Sri Lanka and poisoning the water supplies, besides attacking rubber and tea plantations with leaf curl and rust diseases respectively (Bioterrorism and India, 2019). In the lights of the above background, a threat to India cannot be ruled out.

# Agricultural Bio-terrorism:

The Environmental Protection Act, 1986 defines "Environment" as to include water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, microorganism and property. The Hon'ble Supreme Court has observed that the definition of environment is very wide which includes not only water, air and land but also plants and microorganism. (Bombay Environmental Action Group, 2019).

Agro terrorism is a subset of bioterrorism, and is defined as a deliberate introduction of an animal or plant disease with the goal of generating fear, causing economic losses, and/or undermining social stability (Manuel FZ., 2017). It includes the deliberate use of any pathogen to contaminate a nation's food supply, the supply chain, or the spread of contagious diseases through the food supply (Wilson TM, Gregg DA, King DJ, Noah DL, Perkins LE, Swayne DE, Inskeep W 2nd., 2001). Traditionally, India has been an agriculture-based country. It is pertinent here to mention that the campaign to ward off terrorism was to protect human life and property and not much attention was given towards the protection of crops and agricultural products. It can be said that as there has not yet been an incidence of bioterrorism in India, as a result not much legislative or executive focus has been given to prevent the possibility of any such threat in the future.

It must be noted that cattle are said to be the lifeline of Indian agriculture as majority of farmers in India are small farmers, who run agriculture for meeting the necessities of life and not as a factory (Elisa et al., 2015 P. 94, 98). So, there might also be a tendency among the State actors or the Non-State actors to cause bioterrorism amongst animals which are essential to agriculture.

It is a settled position now that animal disease pathogens can travel distances through air and other means more rapidly than crop ailments. Besides, animals, including birds, move around. The dreaded diseases such as foot-and-mouth, rinderpest (cattle plague) and mad-cow disease can be highly infectious and can cause colossal losses (Surinder Sud, 2005).

# Threat to India of Bio-terrorism:

Though India does not have a special enactment or a special nodal agency for countering the growing threats of bioterrorism, but there are some established agencies upon whom the onus to provide the mechanism for dealing with the existing threats lie. It is pointed out that the Ministry

of Home Affairs is the nodal ministry for countering terrorism, while the Ministry of Health and Family Welfare is responsible for handling epidemics. Indian Council of Medical Research (ICMR) is responsible for the formulation, coordination and promotion of biomedical research with National Institute of Virology (NIV) at the apex (Emily Rodriguez, 2017). It is further pointed out that the Ministry of Agriculture specifically deals in animal and crop epidemics.

It cannot be denied that some areas of the world are terror-prone areas, which definitely includes India. Also, the terrorist attacks of September 11, 2001, in the United States and recently in France, taught the world that the acts of terrorism can occur anywhere. India has been a target of terrorist attacks since decades. Since 2001, India has faced several acts of terrorism including 2001 attack on the Indian parliament and 2008 Mumbai attacks (Government of India Ministry of Agriculture & Farmers Welfare, 2011).

The unpredictable security environment in South Asia, rapid rise in fundamentalism and extremist implosion of Pakistan, the cloud of civil war in Afghanistan and the emergence of the Islamic State of Iraq and Syria (ISIS) further accentuate this threat.

Therefore, a need for a robust public health system is essential to counter any such contingency. Presently, India lacks an effective health system to respond to respond to the threat of bioterrorism (National Disaster Management Authority, Government of India (NDMA), 2008). There is sorry state of affairs with only with only 10.3 per cent medical beds being available for 70 per cent of the rural population (National Disaster Management Authority, Government of India (NDMA), 2008). Not only this, the way they are poorly maintained and lack basic specialties and services raise some serious concern in the event if infectious disease or virus spreads. The government spending on creation of a well-diversified health infrastructure is extremely low as we spend only 1% of our GDP on public health, which is among world's lowest and is also evident from the fact that government hospitals are not equipped to handle mass casualties, lack integrated ambulance network and have no or limited stockpile of drugs and important vaccines (Sekhani, R, 2015 p. 1, 4). Taking clue from the ongoing threat, Government of India through Ministry of Home and Family Affairs, has come up with an Integrated Disease Surveillance Programme (IDSP) in the year 2014. Its major objective is to "strengthen/maintain decentralized laboratory-based IT enabled disease surveillance system for epidemic prone diseases to monitor disease trends and to detect and respond to outbreaks in early rising phase through trained Rapid Response Team (RRTs)" (Integrated Disease Surveillance Project (IDSP), 2004).

# Assessment of Threat: a Statistical Perspective:

India is the world's second most populous country and in line to become the world's most populous by defeating China (Population Division of the United Nations, 2019). It must be noted that there are around 54 cities in India with a population of more than one million each. Many cities like Delhi and Mumbai have population density of more than 60000, per square mile. Therefore, the impact of such an attack would be much more on a densely populated Indian city and hence, will take a chunk on a large number of population (Indo-Asian News Service, 2019).

Furthermore, quoting from the report of Centers for Disease Control and Prevention (CDC), it noted that the impact of a bioterrorist attack which employs anthrax could range from Rs. 20.7 billion to Rs. 822.4 billion for every 1,00,00 persons exposed. It is pertinent to mention that the monetary burden will be even more for a developing country like India whose growth can be severely hampered due to many adverse effects like withdrawal of FDI and closure of trade routes, etc (Abraham D. Sofaer, George D. Wilson, Sidney D. Drell, 1999).

It is posited that the cost per casualty for atomic weapons was assessed to be Rs. 1,35,000 conventional and chemical weapons as Rs. 29,000, whereas the cost per casualty for biological weapon was assessed to be about Rs. 50 (Sumeet Abrol, 2016 P. 146, 150). Whereas, the military budget of Lashkar-e-Taba as per the report of US Intelligence is Rs. 240 million (Central Intelligence Agency, 2019).

### The Public Health Law of India:

The Epidemic Diseases Act was the erstwhile mechanism for countering epidemic threats and plague epidemic (The Public Health Bill, 2017). It had an archaic framework with a number of flaws due to the evolving society and threats. Apart from the isolation or quarantine measure the act was mum on the legal framework of availability and distribution of vaccine and drugs and implementation of response measures (Binod Patro et al, 2013 p. 109, 11). Also, it had no explicit reference pertaining to the ethical or human rights principles during a response to an epidemic.

Hence, the need to bring in a single umbrella legislation so as to assemble all the provisions as required to tackle the present-day problems of bioterrorism, epidemic was the need of the day as we could not rely and depend on old blunt legislations.

### The Epidemic Diseases Act, 1897:

The Epidemic Diseases Act, 1897 was considered as a draconian piece of public health legislation as it gave sweeping powers to the government authorities. Government Officials could enter any house and forcibly examine a sick person or someone suspected to carry infection (The Public Health (Prevention, Control and Management of Epidemics, Bio-terrorism and Disasters) Bill, 2017). As a result, it was later modified significantly to allow the government only to detain international travelers suspected of carrying an infectious disease.

Now, the government has attempted to replace the century old archaic law with the (Public Health (Prevention, Control and Management of Epidemics, Bio-terrorism and Disasters) Bill, 2017). The bill has been made as per the current societal norms but still contains a lot of tough measures as the bill under Section 3 (Public Health (Prevention, Control and Management of Epidemics, Bio-terrorism and Disasters) Bill, 2017) provides that, when a public health emergency is declared, a state government, district authority or local authority can take measures to prevent and control the emergency as they can quarantine the people who might have been exposed to the disease, conduct medical examinations, provide treatment and ban any activity they deem 'inimical to public health'.

# Problems with the Bill: an Analysis

It is stated that the bill is silent on the duties of the government during a public health emergency. Public Health Emergency has been defined as "any sudden state of danger to public health including extension or spread of any infectious or contagious disease or pests affecting humans, animals or plants, occurrence of or threat of dangerous epidemic disease, epidemic prone disease, disaster or bio-terrorism or potential public health emergency requiring immediate action for its prevention, control and management which cannot be dealt with by any law other than this Act".

It is submitted that though, the bill suspends liberties of the individuals but it barely holds the government accountable as it is silent on the duties of the government during a public health emergency. This means that the bill is silent about the responsibilities of the government in ensuring that measures are evidence based and effective, that the duration of time of restrictions are appropriate and that the infringement into the privacy of the population is proportional (Public Health Bill, 2017). The bill further entails the government to authorize any official or person to enter and inspect, without prior notice, any premises where public health emergency has either occurred or is likely to occur (Public Health Bill, 2017). or it may also ensure inspection and detention of any shipment, cargo or objects being transported, e.g. vessel, cargo ship, etc.

#### International Legal Regime: the International Standards:

The International Health Regulations are a legally binding instrument of International Law as provided by the United Nations and the World Health Organisation. It aims to "assist countries to work together to save lives and livelihoods endangered by the international spread of diseases and other health risks". It means that IHR will provide the mechanism to prevent, protect against, control and provide a public health response to the international spread of disease.

It is further pointed out that the policy of the Government of India has been quite ignorant of such potential threats which needs to address at an urgency. This inadequacy of threat assessment can lead to suboptimal policy decisions as the Government must not forget the impact of possible bio-terrorist attacks as they have been rightly described as 'weapons of mass destruction' (Weapons of Mass Destruction Commission Report, 2006).

The International law does not have a single umbrella legislation to provide for the framework of law against bio-terrorism and epidemic plagues. Instead, the framework comprises of a web of International Conventions which provide the preventive mechanism against bioterrorism.

**Firstly**, the Biological Weapons Convention under Article 1 mandates that the states parties shall **never in any circumstance**, develop, produce, stockpile or otherwise acquire or retain:

Any Microbial or other biological agents, or toxins whatever their origin or method of production is and the quantity produced that have no justification for prophylactic, protective or other peaceful purposes;

Weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict. (The Biological Weapons Convention, Article 1). But this definition has caused some fundamental provisions one of which is the problem of '**Dual Use**'. It says that as many agents for which there is a ban as per the Convention can be used for some other additional purposes. So, the countries though they can use these drugs for peaceful purposes in limited quantities, but will come under heavy international scrutiny for the same.

While this approach attempts to address the issue of dual use by allowing for production and possession of agents that also have non-weapon purposes, and is perhaps an attempt to "future-proof" the treaty in light of anticipated scientific developments (Beard, 2002 p. 107, 124). But, a lacuna in the Convention is that, it has not defined or provided for clarificatory rules as to what is the actual meaning of "no justification for prophylactic, protective or other peaceful purposes" is.

An ironical part of the Biological Weapons Convention is that, it has not banned the use of a biological weapon but has banned the antecedents used to make a biological weapon. This is also because the Geneva Protocol already banned use of such weapons. Finally, use of biological

weapons is so widely circumscribed in international law and practice that using them is arguably a violation of customary international law, whether or not a state is party to the Geneva Protocol or BWC (Eric Merriam, 2014 p. 1, 3).

### UN Security Council Resolution 1540, 2004:

This UNSC resolution is not limited to biological weapons and is currently termed as the most direct and effective framework for addressing bioterrorism (S.C. Res. 1540, U.N. Doc. S/RES/1540 (2004). It calls on all the members of the United Nations to criminalize the proliferation of weapons of mass destruction, to enact strict export controls consistent with international standards, and to secure any and all sensitive materials within their own borders. (White House Archives, 2003).

Therefore, it is submitted that in an era of never-ending biological research and understanding, the problem of bioterrorism is always increasing rather shrinking. The international legal regime is only one element of the world's effort. Political and practical realities have a great bearing on the threat of bio-terrorism, including response-focused activities and the level of cooperation among states.

### **Conclusion:**

Bioterrorism is a growing threat in the world and one the main reason for such growth is the continuing advancement in the biological research arena. Another main reason is the growing hostilities between the neighboring countries which give the states an incentive to work towards building this cheap weaponry mechanism. Though, the use of bio-weapons is completely prohibited by the Geneva Protocol of 1925 but its precursors are still allowed to be used though only for pharmaceutical or other allied purposes.

The domestic measures of India are entirely disproportionate to the threat it faces from the state and non-state actors as the relevant legislation is now still pending the approval of Parliament since 2017. Another source of spreading bioterrorism is through the manipulation of crops of one country. India has no specific measures that deal with such form of bioterrorism. But on a comparative analysis the United States of America has a very rigid mechanism when it comes to preventing any threat of bioterrorism. As a matter of law, any crop, fruits and vegetables are banned from entering the USA and they are disposed at the airport itself by the custom authorities.

Bioterrorism has a deep impact on public health and environment. It can seriously contaminate environment which can never be restituted back with-it purity. In our opinion, Artificial Intelligence as already discussed in the paper can be a great mechanism to deal with the ongoing and ever-growing threat of Bio-terrorism. The International Law Regime regarding the prevention of bioterrorist attacks is convincing but as a matter of fact the International law is heavily based on Politics and the diplomatic relations among States. So, it solely cannot play a role in ensuring that nothing wrong takes place in the world. Threat of destruction lies on the water bodies, cattle and crops which are undoubtedly an easy target for the enemy. India is a high-density population country which is under a greater category of threat and therefore, a robust mechanism is essentially required to counter such threat. So, India must give due consideration in its policy to this threat of bioterrorism and its consequent impact on the Public Health and Environment. Otherwise, in case of an eventuality of a like nature we would suffer such harm which no government or people would be able to restitute.

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