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# BIOLOGICAL DISASTER MANAGEMENT

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**Abstract-**The increase in the number of major disasters in the recent years with the increased exposure of people and property to natural and technological hazards is perhaps the reason for growing interest of people in understanding the concept of disaster management. What then is a disaster? A disaster may be natural or man-made phenomenon which causes or threatens serious disruption of life with little or no warning. Though the origin of the word as per Oxford English Dictionary is traced to the sixteenth century. French word 'Disaster' means 'Evil Star'. The United Nations Department of Humanitarian Affairs (UNDHA), 2001, defines disaster as a "serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the ability of affected society to cope on its own resources". Lethal animal virus epidemic coronavirus, which has sent panic waves across the world, may have its origins at the epicentre of the epidemic, Wuhan, in a laboratory which has been linked to China's covert biological weapons programme. The Washington Times reported the link with China's biological weapons quoting an Israeli biological warfare expert. According to the report, Radio Free Asia this week rebroadcast a local Wuhan television report from 2015 showing China's most advanced virus research laboratory known as the Wuhan Institute of Virology.

The laboratory is the only declared site in China capable of working with deadly viruses. Dany Shoham, a former Israeli military intelligence officer who has studied Chinese bio warfare, said the institute is linked to Beijing's covert biological weapons programme.

**Keywords-**Community participation, Disasters, Case study, Hazard Assessment, Management Assessment, Risk assessment, Corona Virus.

## 1. INTRODUCTION

One of the most important facets of Disaster Management is that it involves the government having the prime role, as the most vulnerable section of the society. the poor have neither the resources nor the capacity to limit, prevent or cope with the impact. The social and economic costs of disasters are very high and sometimes difficult to estimate on a national or global basis. But what assumes importance is whether we are prepared and prepared enough for such emergencies. They may be either natural or man-made. Among the natural, earthquakes remain the most devastating with little or no response time as they are highly unpredictable. They sometimes trigger secondary disasters like Tsunamis and volcanic eruptions. There are many highly sensitive seismic zones already identified in India and have experienced both primary and secondary level disasters.

Extreme weather conditions of heat and cold waves have affected a large chunk of the population. Famines, fires, floods have no less impact than landslide, mudslide or storms. The States of Gujarat, Orissa, Andhra Pradesh, Bihar, Tamil Nadu, Himachal Pradesh, West Bengal, Maharashtra have often been exposed to such calamities. These incidents have directly affected the primary sector of sustenance, i.e., agriculture. The food production levels have dipped and are hugely responsible for inflationary conditions. Moreover, it is disheartening to note that there has been a growing tendency of farmers' suicides in States of Maharashtra, Andhra Pradesh, Orissa, etc.

The rehabilitation of the victims of such calamities is always a distant dream due to lack of resources and the support of the state. Sometimes the relationship between the Centre and the affected State act as a stumbling block to successful deliver the relief programmers. The amicable relation between the Center and the State often determines the quantum of Grants-in-Aid and not the causality per se. There are many such populations who are yet to be rehabilitated after such disasters. The National Crime Records Bureau reports more than 16,000 farmer suicides in almost all four states due to failed crop and increased indebtedness. The largest number of reported cases was concentrated in the districts of north east Maharashtra (Vidarbha), northwest Andhra Pradesh and northern Karnataka, where cotton was increasingly planted in the 1990 in response to demand generated by the large textile industries in Mumbai. There are also man-made disasters which are often categorized as 'armed conflict' or 'technological disasters'. Development remains a key area for the human cause of calamity. Development is often seen as a race against time to keep in pace with the set standards of globalization. India, as a developing country, also faces the dichotomy of balancing development with ecology. There has been a growing concern for environmental degradation as it leads to a large number of man-made disasters.

## 2. TYPES OF DISASTERS

Generally, disasters are of two types – Natural and Manmade. Based on the devastation, these are further classified into major disaster and minor disasters. Major natural disasters are: flood, cyclone, drought, earthquake whereas major

manmade disasters are: deforestation, epidemic, setting of fires, technological disasters etc. To overcome this catastrophic event, a strategy is implemented known as disaster management plan. The process may be initiated when anything threatens to disrupt normal operations or puts the lives of human beings at risk. Government on all levels as well as many private sectors as the experience shows have been creating some sort of disaster plans to mitigate disasters.

One of the essential elements of disaster management involves defining the types of catastrophes that could possible disrupt the day to day operation of a particular location. Besides, identifying potential disasters is also a prime area of study which makes it possible to create contingency plans, assemble supplies, and create procedures that can be initiated.

In world history, one of the major disasters is "Biological Disasters". Biological disasters are scenarios involving disease, disability or death on a large scale among humans, animals and plants due to toxins or disease caused by living organisms or their products. It might be caused by epidemics, accidental release of virulent microorganism or Bioterrorism (BT) with the use of biological agents such as anthrax, smallpox, etc. Biological agents (BA) are microorganisms such as viruses, bacteria or fungi that infect humans, livestock or crops and cause a fatal disease. Microorganisms can cause diseases in other organisms or in humans, animals and plants.

Communicable Disease: An infectious condition that can be transmitted from one living person or animal to another through a variety of routes, according to the nature of the disease. Disinfectants are anti-microbial agents that are applied to non-living objects to destroy microorganisms. During the occurrence, symptoms of illness do not appear immediately but only after some delay, or 'incubation period', that may last for days or weeks. Such disasters may be natural in the form of epidemics or pandemics of existing, emerging or re-emerging disease and man-made by the intentional use of disease-causing agents in Biological Warfare (BW) operations or incidents of Bio-terrorism.

Bio-terrorism: It is the intentional use of microorganism, or toxins, derived from living organisms, to produce death or disease in humans, animals or plants. Biological weapons include any organism or toxin found in nature that can be used to incapacitate, kill or cause physical or economic harm. Biological weapons are characterized by low visibility, high potency, substantial accessibility and relatively easier delivery methods.

The three basic groups of biological agents, which could be used as weapons, are bacteria, viruses, and toxins. Most biological agents are difficult to grow and maintain. Many break down quickly when exposed to sunlight and other environmental factors, while others, such as anthrax spores, are long lived.

# 3. TYPES OF BIOLOGICAL AGENTS

The following categories of biological agents are found for causing disaster:

### 3.1 Anthrax

Anthrax is caused by the gram-positive bacteria. During the industrial revolution, the inhalation from was first recognized as an occupational pulmonary disease in workers in the wool industries of Europe. Anthrax makes ideal biological weapons. The inhalation form of disease is highly lethal. The spores can maintain virulence for decades and they can be milled to the ideal particle size for optimum infection of the human respiratory tract. Anthrax patients usually develop fulminating, toxic, and fatal illness.

Amount or form of a disease depends on the route of the exposure, Inhalational anthrax presents with non-specific symptoms that cannot be distinguished from other diseases based on early clinical manifestations or usual laboratory tests. Therefore, despite aggressive medical attentions, sometimes there develops a fatal disease.

### 3.2 Smallpox

Biological agent is a virus? If used a biological weapon, smallpox has long been considered as the most devastating of all infectious diseases and today its potential for devastation is far greater than at any previous time. It is closely related to the viruses causing cowpox and monkey pox. Transmission of this virus can occur in several different ways: generally, by droplets, occasionally by aerosol, by direct contact with secretions or lesions from a patient, and rarely by formats contacted with the infected virus from a patient. Transmission risk increases if the index patient is coughing or sneezing or if he or she has hemorrhagic disease. Typically, the virus enters the respiratory mucosa and then travels to regional lymph nodes where it replicates. The incubation period from infection to onset of rash ranges from 7 to 17 days, averaging 12 to 14 days. Smallpox scabs remain infectious until they off, whereas chickenpox is no longer infectious once the lesions are crusted.

### 3.3 Plague

It is bacterial disease. It has already killed millions of people across the world. When an infected flea bites, the biological agents enter the lymph node region through lymphatic fluids where they multiply and the disease is noticed. Plague most likely progresses very rapidly to severe pneumonia conditions with copious with copious watery or purulent sputum production, hemoptysis, respiratory insufficiency, sepsis and shock.

**3.4 Botulism**

This is a toxin which is very deadly. A toxin is a harmful substance that can be product in an animal, plant, or microbe. The toxins produce serious disease in human beings. Many natural toxins can be produced by chemical synthesis or can be expressed artificially. Toxins are natural and non-volatile and generally do not penetrate into the intact skin, which happens in case of chemical weapons. There are different types of toxins and they are immunologically distinct. Humans can be intoxicated either by oral means, inhalation, or wound infections. Mass casualties can be produced through a contamination of food source or by means of aerosol disseminations. The incubation period of means of aerosol disseminations. The incubation period of botulism can range from as short as 24 to 36 hours to several days from the time of inhalation.

**3.5 Tularemia**

It is caused by bacteria. Tularemia is a zoometric disease acquired in a natural setting by humans through skin or mucous membrane contact with the body fluids or tissues of infected animals or from being beaten by infected deerflies, mosquitoes, or ticks. It can remain viable for weeks in the environment or in animal for years if frozen. Unlike Anthrax, which requires thousands of spores to infect someone? Tularemia can cause illness with as few as 10 to 50 organisms. After an incubation period of 2 to 10 days, pneumonia symptoms develop associated with weight loss and nonproductive cough.

Along with nuclear and chemical agents, biological agents have been accepted as agents of mass destruction capable of generating comparable disasters. The growth of human society has rested largely on the cultivation of crops ad domestication of animals. As crops ad animals became necessary to sustain a divergent social structure, the depletion of these resources had far reaching consequences. Along with the growth of societies, crop and animal diseases acquired more and more importance. Epidemics can result in heavy mortalities in the short term leading to a depletion of population with a corresponding drop in economic activity, e.g., the plague epidemics in Europe during the middle ages, or the Spanish influenza during 1917-18. An epidemic is the outbreak of a disease affecting or tending to affect a disproportionately large number of individuals within a population, community, or region at the same time. On other hand, Epidemiology is the branch of medicine concerned with the incidence and distribution of diseases and other factors relating to health.

Infections like Tuberculosis (TB) might not kill in the short term but thrust nations towards socio-economic disasters. Another example is the Human Immunodeficiency Virus (HIV)/Acquired Immune Deficiency Syndrome (AIDS) epidemic in Sub-Saharan Africa that has wiped out the benefits of improved health care and decimated the productive segments of society leading to economic stagnation and recession.

**3.6 Corona Virus**

Certain laboratories in the institute have probably been engaged, in terms of research and development, in Chinese (biological weapons), at least collaterally, yet not as a principal facility of the Chinese BW alignment," Shoham told The Washington Times. Work on biological weapons is conducted as part of a dual civilian-military research and is "definitely covert," he said. From 1970 to 1991, he was a senior analyst with Israeli military intelligence for biological and chemical warfare in the Middle East and worldwide, holding the rank of lieutenant colonel. China in the past has denied having any offensive biological weapons. The State Department, in a report last year, said it suspects that China has engaged in covert biological warfare work. Chinese officials so far have said the origin of coronavirus that has killed many and infected hundreds in central Hubei Province is not known. Gao Fu, Director of Chinese Center for Disease Control and Prevention, told state-controlled media that initial signs as of Thursday indicated that the virus originated from wild animals sold at a seafood market in Wuhan. As per the Washington Times, one ominous sign, said a US official, is that false rumours since the outbreak began several weeks ago are being circulated on the Chinese internet claiming the virus is part of a US conspiracy to spread germ weapons. That could indicate that China is preparing propaganda outlets to counter future charges the new virus escaped from one of Wuhan's civilian or defense research laboratories.

The World Health Organization is calling the microbe novel coronavirus 2019-nCoV. At a meeting in Geneva on Thursday, the organization stopped short of declaring a Public Health Emergency of International Concern. The virus outbreak causes pneumonia-like symptoms and prompted China to deploy military forces to Wuhan this week in a bid to halt the spread. All travel out of the city of 11 million people was halted.

The Wuhan site has studied coronaviruses in the past, including the strain that causes Severe Acute Respiratory Syndrome, or SARS, H5N1 influenza virus, Japanese encephalitis, and dengue. Researchers at the institute also studied the germ that causes anthrax -- a biological agent once developed in Russia.

It is not known if the institute's array of coronaviruses are specifically included in biological weapons programme but it is possible, Shoham said. Asked if the new coronavirus may have leaked, Shoham said: "In principle, outward virus infiltration might take place either as leakage or as an indoor unnoticed infection of a person that normally went out of the concerned facility. This could have been the case with the Wuhan Institute of Virology, but so far there isn't

evidence or indication for such incident". The former Israeli military intelligence doctor also said suspicions were raised about the institute when a group of Chinese virologists working in Canada improperly sent samples to China of what he said were some of the deadliest viruses on earth, including the Ebola virus. In a July article in the journal Institute for Defence Studies and Analyses, Shoham said the Wuhan institute was one of four Chinese laboratories engaged in some aspects of the biological weapons development. He identified the secure Wuhan National Biosafety Laboratory at the institute as engaged in research on the Ebola, Nipah, and Crimean-Congo hemorrhagic fever viruses. The Wuhan virology institute is under the Chinese Academy of Sciences. But certain laboratories within it "have linkage with the PLA or BW-related elements within the Chinese defense establishment," he said. In 1993, China declared a second facility, the Wuhan Institute of Biological Products, as one of eight biological warfare research facilities covered by the Biological Weapons Convention (BWC) which China joined in 1985. The Wuhan Institute of Biological Products is a civilian facility but is linked to the Chinese defense establishment, and has been regarded to be involved in the Chinese BW programme, Shoham said. "The US has compliance concerns with respect to Chinese military medical institutions" toxin research and development because of the potential dual-use applications and their potential as a biological threat," the report added. The biosafety lab is located about 20 miles from the Hunan Seaford Market that reports from China say may have been origin point of the virus.

### 3.7 Protection Procedures

Legitimate access to important research and clinical material must be preserved. Prevention of unauthorized entry/exit of biological materials can be achieved by adopting adequate detection methods such as x-rays and other scanning methods to identify microorganisms, plant pathogens and toxins at international airports, ports, etc. Suitable assessment of the personnel, security, specific training and rigorous adherence to pathogen protection procedures are reasonable means of enhancing bio-security. All such measures must be established and maintained through regular risk and threat assessments reviews and updating of procedures. We should focus more on bio-safety programmed and national standard for bio-security for remedial action and streamlining of procedure for eradication of bio-weapons.

### 3.8 Bio- Safety and Bio- Security

Strict compliance measures with bio-safety and bio-security provisions at all levels will deny the possibility of terrorists reaching facilities where microorganisms are stocked and available. This will act as a second layer of defense and reduce the possibility of any bio-terrorist activity. The important components of bio-safety and bio-security measures are explained below:

Microorganisms are handled extensively in medical, agricultural and veterinary fields and in research laboratories. They are also used for the preparation of enzymes, sera and reagents which have commercial value and are handled exclusively by commercial manufacturers. There must be a system for inventory control in the laboratories dealing with bacteria, viruses or toxins which can be a source of potential causative agent for biological disasters. Therefore, specific information about organisms and toxins handled in different laboratories are to be documented by the respective laboratories/organizations. Within the laboratory, dangerous pathogens must be housed inside secure incubators, refrigerators or storage cabinets when not in use. For research and clinical laboratories, a method for identifying authorized users of the laboratory ad for establishing effective mechanisms for controlling access to the laboratory ad detection of unauthorized individuals has to be formulated. In may be necessary to develop a system of inventory for effective contingency planning. Bacteria and toxins are frequently exchanged between countries for research and training programmers. Though there is a system of checks for bulk import, small amounts of organisms packed in small containers can easily be brought into any country. The existing system designed to control these exchanges has to be examined, strengthened and implemental accordingly.

## 4. PREVENTION AND MITIGATION MEASURES

- General population should be educated and the made aware of the threats and risks associated with it.
- Only cooked food and boiled/chlorinated/filtered water should be consumed.
- Insects and rodents control measures must be initiated immediately.
- Clinical isolation of suspected and confirmed cases is essential.
- An early accurate diagnosis is the key to manage casualties of biological warfare. Therefore, a network of specialized laboratories should be established for a confirmatory laboratory diagnosis.
- Existing disease surveillance system as well as vector control measures have to be pursued more rigorously.
- Mass immunization program me in the suspected area has be more vigorously followed up.
- Enhancing the knowledge and skills of clinicians plays a vital role in controlling the adverse impact of the attack. As bio-terrorism related infections will remain rare events, creative ongoing strategies will be required to sustain attention to potential new cases.

## 5. NATIONAL DISASTER MANAGEMENT AUTHORITY (NDMA)

It is headed by the Prime Minister with up to a maximum of nine members nominated by Prime Minister. The Authority may constitute an Advisory Committee consisting of experts in the field of disaster management. The Authority shall be assisted by a National Executive Committee of Secretaries to be constituted by Central Government. It lay down the policies, plans and guidelines for disaster management. NDMA shall recommend guidelines for the minimum standards of relief provided to persons affected by disaster.

## 6. STATE DISASTER MANAGEMENT AUTHORITY (SDMA)

At state level coordinating all activities which comprises of eight members to be nominated by the Chief Minister and the Chairperson of the State Executive Committee. One of the members may be designated as the Vice-Chairperson of the State Authority by the Chief Minister. SDMA may constitute an Advisory Committee of experts, as and when necessary. The State Government shall establish a District Disaster Management Authority (DDMA) in each district. The District Authority will be headed by District Magistrate and shall consist of members, not exceeding seven, as may be

prescribed by the State Government .The District Authority shall act as the district planning, coordinating and implementing body for disaster management. The Local Authority shall ensure training of its officers and employees and maintenance of resources so as to be readily available for use in the event of a disaster. It ensures that all construction projects under it conform to the standards and specifications lay down. It carries out relief, rehabilitation and reconstruction activities in the affected area within its jurisdiction. National Institute of Disaster Management (NIDM) shall plan and promote training and research in disaster management &Start documentation, development of national level information base of disaster management policies, prevention mechanisms, mitigation measures, networking.

## CONCLUSION

Victims or would be victims of disasters should always keep their ears open to all official guidelines as they are the only authentic sources of the on-going and possible ways to fight the danger. The delivery of medical services for a biological event may be handled carefully to respond to the needed exigencies. The basic public health procedures and medical protocols for handling exposure to biological agents in any case are the same as for any infectious disease. All the micro-organisms are not necessarily harmful.

Some of them are useful when they act in moderation. But they can be extremely harmful when they multiply in excess. Hence, their spread has to be controlled and curtailed. Good health is an indication for a sustainable society. We can preserve our green society by implementing various legal framework to avoid any type of disaster and finally we can achieve a green, eco-friendly and healthy earth.

The Delhi government has declared coronavirus an epidemic. Chief Minister Arvind Kejriwal has decided to close all theaters and multiplexes by 31 March in Delhi. Chief Minister Kejriwal said that schools and colleges which do not have examinations, have also been decided to remain close. Prime Minister Narendra Modi has told the countrymen that there is no need to panic about Coronavirus. He tweeted, 'Say no to panic, say yes to caution. central government minister will travel abroad in the coming days. I also urge my countrymen not to travel non-essential.

We can stop it from spreading and stay safe by avoiding crowded places. The Prime Minister said that the government is completely cautious about coronavirus. All appropriate steps are being taken. The facility of visa-free travel to migrant citizens to deal with coronavirus by April 15, the Union Health Ministry gave a press conference on Thursday to inform the current situation in the country. On behalf of the ministry, Joint Secretary Luv Gupta said that the facility of visa-free travel to Overseas Citizens of India (OCI) card holders has been extended till 15 April 2020. It will come into force from 12 noon on 13 March 2020. He said that out of 73 cases registered in the country so far, 56 are Indians and 17 are foreign nationals. So far the Indian government has evacuated 900 Indian nationals from 48 other countries such as Maldives, Myanmar, Bangladesh, China, USA, Madagascar, Sri Lanka, Nepal, South Africa and Peru. He said that a total of 56 sample collection centers and 52 testing facilities exist for testing blood samples of people infected with coronavirus across the country.

Joint Secretary Aggarwal also informed that we already have about 1 lakh test kits available, additional test kits have already been ordered. He said that it is not necessary to wear masks at all times to protect yourself from coronaviruses. If a person maintains sufficient distance from the people around him then he does not need a mask. So there is no need to panic. He said that this virus has not spread its foot in a big way among common citizens at present. We have only a few cases which have come from outside and in these cases also the infected patients have mainly affected close family members. Joint Secretary Luv Aggarwal said that all the facts related to coronavirus are being studied. However there is no confirmation study yet. It is generally expected that the virus may have difficulty surviving at high temperatures, but this has not been definitively confirmed.

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