Chapter Four: Civil Defence Systems

India faced an unprecedented terror strikes on November 26, 2008. Such a major metropolis was held in ransom by a dozen well-trained terrorists. These terrorist attacks created havoc and panic at the level where India’s intelligence system and security system appeared completely ineffective. These attacks proved that the terrorist organization can use any possible mean to achieve their aim to achieve maximum destruction and terrorize common man. Indian Navy chief Admiral Suresh Mehta attributed the Mumbai terror attack to a "systemic failure" and said that they had no prior “actionable” intelligence inputs. (Ians: The Indian news Website 2008)

Civil Defence Systems:

In the light of potent threat of use of bio-weapons by non-state actors and inefficiency of norms and technologies to provide a comprehensive defence against bio-weapons, it becomes very important to enhance public and community health as well as general awareness about bio-weapons at civilian level. Therefore, all these efforts could be collectively called as “Civil Defence Systems”. According to Encyclopedia Wikipedia,

"Civil defence is an effort to prepare civilians for military attack. It uses the principles of emergency operations: prevention, mitigation, preparation, response, or emergency evacuation, and recovery." (Encyclopedia Wikipedia Website 2008)

Civil Defence is one of the important features or duties of a government today and we can find even in the history of ancient times that the rulers used to ensure civil defence against any attack and prepare common men to fight in odd situations. Since ancient times, the meaning, definitions and focus of civil defence is continuously changing or we can say expanding. Since the end of the Cold War, the focus of civil defence has largely shifted from military attack to emergencies and disasters in general. The new concept is described by a number of terms, each of which has its own specific shade of meaning, such as crisis management, emergency management, emergency preparedness, contingency planning, emergency services, and civil protection and in some countries, the all-encompassing nature of civil defence is denoted by the term
"total defence" such as the Swedish word totalförsvare. (Encyclopedia Wikipedia Website II 2008)

During the Cold War, civil defence was seen largely as defending against and recovering from an attack involving nuclear weapons. After the end of the Cold War, the focus moved from defence against nuclear war to defence against a terrorist attack. Today, after seeing their inclination towards using unconventional means to cause destruction and chaos, the focus is on preparing a comprehensive civil defence against terrorist attacks involving chemical or biological weapons. Developed countries are already aware of such kind of threat and therefore promoting research and development of new techniques and equipments to ensure a potential civil defence against bioweapon attack. In European Union, the term "civil protection" is currently widely used to refer to government-approved systems and resources tasked with protecting the civilian population, primarily in the event of natural and technological disasters. (Encyclopedia Britannica Website 2008).

In the early 21st century, terrorism became as great a concern to the defence of many countries as conventional warfare had been in previous generations. In the United States the 9/11 attacks set in motion a massive civil defence initiative with the creation of the Department of Homeland Security. Safeguards were added to such potential targets of terrorism as airports, sports stadiums, nuclear power generators, seaports, and water storage facilities, as well as at events and structures of national significance. In addition to preventative measures, which included warning the general public of national threats, and emergency response procedures were redesigned in order to minimize the effects of a successful act of terrorism.

Significant civil defence measures include provision of warning and of communications, training of the general public to respond in emergency with first-aid means and in radiological monitoring and modification of general urban planning to incorporate such features like, increased structural strengths and fireproofing of buildings, duplicate and emergency public utility services, community shelters, and wide streets and adequate parks to provide firebreaks. (Encyclopedia Britannica Website 2008).

US and biodefence

To develop and incorporate all these measures, major funding, comprehensive planning and action at practical level is needed. In the light of potential threat of
bioterrorism, many countries are working at national as well as international level to develop strong civil defence against bioweapon attack. US is the main example to start with. In 1969, for the first time in the history of US, National Security Decision Memorandum (NSDM 35 and NSDM 44) were announced under which offensive biowarfare program was terminated. These memorandums prohibited offensive bioweapon programs and approved biodefence research and development. The US Army Medical Research Institute of Infectious Disease (USAMRIID) was established soon after to prepare a potential biodefence by research and development of new vaccines and other techniques against various bioweapon agents. This was the time when US government believed in transparency regarding its biodefence policies as it made it clear openly in 1980s, under Programmatic Environmental Impact Statement (PEIS) which covered biological pathogen research, testing and evaluation, that its biodefence program is purely to prepare a potential defence against bioweapons and the government is very clear about not to develop new bioweapons. However, this transparency slowly shifted to secrecy in 1990s. This policy continued till Bioshield project was announced in 2003 and it became a law in 2004. (Animesh Rout 2008: 15)

*Bioshield Project*

Bioshield Project is a ten year program manly aims at developing a comprehensive civil defence against BW use especially by terrorists. Recently, Project BioShield has been granted with huge budget in the fiscal year 2009. It is also going to receive an additional $2.175 billion as a result of FY2004 legislation. $6 billion has been granted by government to this project for ten years to achieve following objectives:

1. To enhance the performance of National Institutes of Health (NIH) to develop better medicines and vaccines using latest technologies.
2. To work with Food and Drug Administration (FDA) to make it able of responding in emergency situations by establishing an emergency safety approval and regulation for pharmaceutical companies, and
3. To ensure that resources are available to pay for "next-generation" medical countermeasures (drugs and vaccines) for Strategic National Stockpile program, formerly the National Pharmaceutical Stockpile (NPS). (The Federation of American Scientists Website I 2008)

*Increasing budget for biodefence*

Enormous budget is required for such programs and US government is ready to spend lucratively to ensure a potential civil defence against BW use. In last five years, government funding for biodefence research and development has been increased tremendously. After the 9/11 terrorist attacks on the United States, the US government has allocated nearly $50 billion among 11 federal departments and agencies to address the threat of bioweapons. For Fiscal Year 2009 (FY2009), the US government has allotted additional $8.97 billion for biodefence research. This budget is approximately $2.5 billion (39%) more than the amount allotted for FY2008. The US biodefence program mainly focuses on research and development vaccines, medicines and other new techniques to counter against bioweapon attack. In order to assure complete civil defence, significant funding is spent to purchase protective equipment, enhancing medical surveillance and environmental detection of biological weapons agents. The US government is also promoting the improvement of hospital preparedness at local as well as national level. The funding for the Biomedical Advanced Research and Development Authority (BARDA) within the Department of Health and Human Services, is also going to be doubled in FY2009. (The Arms Control Center Website 2009)

*Cooperative projects to ensure civil defence*

US is not only funding for developing civil defence at state level, it is also engaged in some cooperative projects to prevent proliferation of bioweapons and to ensure international security.

The former Soviet Union had potential bioweapons including genetically-altered, antibiotic-resistant pathogens and sophisticated delivery systems but in the
post-Soviet era, former Soviet states drastically reduced and in some cases eliminated funding for these biological research and production centers (BRPCs). The facilities, weapons technology, and thousands of strains of pathogens at these BRPCs became vulnerable to theft, sale or misuse. (The Federation of American Scientists Website II 2008)

In the mid-1990s, the United States began engaging BRPCs throughout the former Soviet Union in four kinds of cooperative projects aimed at preventing proliferation of BW capabilities. Collaborative research projects involve former BW scientists in projects with American scientists and seek to deter former BW scientists from selling their expertise to terrorist groups or proliferating states. Several U.S. government agencies are involved in collaborative research projects, most of which are funded through the international science centers. Biosafety enhancement projects are intended to make BRPCs safe places for collaborating scientists to work. In combination, collaborative research and biosafety enhancement projects give U.S. officials routine access to laboratories and facilities that were once used for BW research and production. Biosecurity projects consolidate and restrict access to pathogens. Biosafety, Biosecurity, and Dismantlement projects are funded through and carried out by DOD's Cooperative Threat Reduction Program. (Ibid)

Since 1995, the United States has gained access to many BRPCs in former Soviet states and has sought to prevent proliferation of BW capabilities. These efforts are directed toward several policy objectives, including, Increasing transparency at BRPCs that once participated in the Soviet/Russian BW program; Securing or destroying pathogens and weapons technology so that they are not sold, stolen, accidentally deployed or leaked, or used to reactivate a biological weapons program in Russia and/or other former Soviet states; and Redirecting biological weapons scientists towards peaceful pursuits and discouraging them from interacting with terrorist groups or proliferating states. (The Defence Technical Information Center Website 2009)

Other international measures for enhancing civil defence against bioweapons
In 1999, the Department of Defence, US (DOD) announced its intention to commence the Family and Force Protection Initiative (FFPI) in order to provide enhanced protection against biological agents to the dependents of US military services members and to civilian Department of Defence employees and their families. This programme was first implemented for US Forces Korea and the range of recipient has since been expanded. In December 2002 the Department of Defence, US announced plans to begin smallpox immunization of the certain DOD personnel. (US Department of States 2003)

US have had a biological counter measures program since 1998, when it began to deploy chemical antidotes and antibiotics to selected posts abroad. The US military had developed a field apparatus that can test an air sample for the presence of specific biological agents called Biological Integrated Detection System (BIDS), it can confirm the presence of a handful of micro-organism including anthrax and plague bacteria. The Biological Warning and Incident Characterization (BWIC) system has also been developed to ensure civil defence.

The Biological Warning and Incident Characterization (BWIC) system is designed to help public health and emergency-management officials to prepare and respond against biological weapon attacks by terrorist groups. In response to local and state requests, BWIC is developed by the Department of Homeland Security (DHS). It provides integrated decision support to facilitate timely warning, attack assessment, communications, and effective response in case of a bio weapon attack. BWIC helps in interpreting the significance of a confirmed biological event detected by Biowatch and other environmental-monitoring systems. Such events activate the BWIC system, which can further be used to evaluate the threat to public health, the extent of the contamination, and the choices for response defence.

BWIC system is controlled at local level and every such system combines community data from multiple sources, sophisticated and user-friendly models, and visualization tools to aid local response to bio weapon attacks. The BWIC system obtains environmental-monitoring data from Biowatch and U.S. Postal Service (USPS)
detectors. It alerts the officials when an attack occurs, and assembles information for BWIC-assisted response. In addition, the system can be used as a platform to support training, response planning, and response exercises against bioterrorism.

By assembling data in the BWIC system, local agencies obtain a common view of an attack, thus support in decision making and coordination for defence. BWIC is also compatible with different analysis tools and applications used at the jurisdictional level and interfaces with existing local information technology systems.

The BWIC system has an important feature of flexibility that enables local jurisdictions to arrange each system so that it is consistent with local response plans and concepts of operations. Each jurisdiction decides the specific features to be included in its BWIC system. These components are then assembled within BWIC to provide situational awareness. BWIC components include the following: Locally provided geographic information system (GIS) maps, Biowatch and USPS monitoring data, local meteorological information, Atmospheric-dispersion models, Day and night population information, Disease progression information, Subway and facility interior information and links to public health surveillance information.

The BWIC system can display Biowatch, USPS, and additional biological-environmental data on a number of GIS platforms. BWIC can also provide various historical information. In addition, officials can enter important facts directly on the maps, overlaid with GIS data as appropriate. This allows users to include data that was not anticipated for example, information from law enforcement or federal investigators as well as subjective information from responders witnessing suspicious activity or unusual events, such as distressed or dead animals.

Enhancing public health monitoring results with BWIC data and predictions can help determine the public health significance of a bio weapon attack. BWIC is designed to run in parallel and exchange data with a public health surveillance system. In addition, users can input data into BWIC as desired. For example, officials can enter
public health monitoring metrics, such as the number of reported hospital cases or the number of people reporting symptoms in a given locality.

The BWIC modeling tools incorporate data feeds from local meteorological stations to visualize and feed airflow information. BWIC displays the meteorological data along with wind fields created from the data. The meteorological information is also used for BWIC’s air-dispersion models, which include outdoor models and indoor and subway models where applicable.

BWIC can help users perform release reconstruction by modeling potential upwind-release areas consistent with the meteorological and environmental-monitoring data. BWIC can also send environmental-monitoring information to the Interagency Modeling and Atmospheric Assessment Center (IMAAC) and incorporate modeling results from IMAAC back into the BWIC system.

The BWIC population-modeling tool maps the exposed population within geographic-area contours. The exposed population can be manually selected by users or can be determined from indoor or outdoor modeling results. Both nighttime and daytime population maps using census tracts are included in BWIC, enabling users to identify the number of people within a selected region and visualize the movement of that population.

BWIC can be used for training, response planning, and exercises. After each BWIC system is installed, local personnel are trained to use the system and its models. Additional information about the system’s capabilities is provided in a user’s manual and is embedded within the software for the user’s reference. Moreover, data feeds that simulate biological events are provided for a number of local scenarios to support user training and the development of local emergency response plans.

In support of user-defined scenarios, planning, and response, BWIC includes a capability to model the progression of infectious and noninfectious diseases. By using existing epidemic models, this tool can simulate the movement of exposed populations and then provide the number of cases for each census tract.
Finally, the BWIC system includes a link to Centers for Disease Control (CDC) Web-based information and contains an internal bio agent reference tool. The bio agent reference tool provides answers to key questions about CDC Category A and B agents, as well as selected Category C agents. (See annex.l) Agent summaries with references are provided to help users diagnose, mitigate, and prevent these diseases. (Sandia National Laboratories Website 2006)

**UK’s measures for improving civil defence against bioweapons**

UK is also developing improved systems for warning and reporting, which will automatically take hazard data from sensors, predict duration and movement and alert units to an impending chemical or biological hazard. Improvements are also being made to individual protection equipment. A number of systems intended to destroy ballistic missiles are being developed, notably in the US. Such systems may play a part in helping to counter the risk posted by bio-weapon attack and their means of delivery. (The National Homeland Security Knowledge base Website 2008)

Basically in the intensified security environment of the post 11 September world, much attention has been placed on preparing for what was previously thought not to be so important. Threat of bio-weapon attack has resulted in plans to develop and procure vaccines against biological weapon and development of public and community health systems to guard against potential attack. Not only developed countries, developing countries are also spending on developing and establishing potential civil defence against bio weapons.

**The Role of China**

China is also concerned about preparing a comprehensive and strong defence against bioweapons. After experiencing devastating effects of SARS, China has increased funding to advance its biotechnology industry and biodefence research. Chinese government funding for biotechnology has increased 400% from 2001-2005 to $12 billion as compared to the 1998-2000 period. A new committee has been established to coordinate biotech research funding, which comes from several
China has also cooperated and engaged in various programs to promote non-proliferation at international level. China has become a party of various international nonproliferation norms like Nuclear Nonproliferation Treaty (NPT), The Biological and Toxic Weapons Convention (BTWC) and Chemical Weapons Convention (CWC). China has also adopted exports control measures on chemical and biological agents. Today, because of new technologies, various new agents have been manufactured like food weapons (for details refer to chapter one Introduction). Then, there is always a dual use possibility of bioweapon agents because of which it becomes very difficult to check their illegal transfer and export. In the light of all these new aspects, China has established regulations to achieve comprehensive export control regime. The Export Control and Related Border Security (EXBS) Program can be taken as an example for such initiatives by Chinese government. The EXBS program is established for the training of Chinese law and enforcement officials to strengthen export control regime. Since 2006, the EXBS program has coordinated two training events to help Chinese Customs officers identify controlled commodities. These events were sponsored by the Department of Energy’s International Nonproliferation Export Control Program (INECP) and took place in Shanghai and Dalian, focusing on training Chinese frontline Customs enforcement officials and technical experts responsible for interdicting illicit shipments of dual use weapon materials and technologies. (Patricia McNerney 2008)

However, it is still believed and observed that Chinese firms are involved in transfer of various BW related materials and technologies for international use. Because of their dual use, it becomes difficult to put allegations but because of these transfers we can not deny the possibility of their use as weapons to threaten regional and international security. To quote as an example, some Chinese firms supplied restricted materials under UN Security Council resolutions to Iran and Iran further transferred these materials to Shia militants in Iraq as well as Hizballah group. The transferred technology and materials were used in Iraq in 2004. In 2006, a Chinese C-802 anti-ship cruise missile, which has been supplied only to Iran in the region, was used by
Hizballah to attack an Israeli naval ship. The United States put sanctions on the alleged Chinese firms under the Iran and Syria Nonproliferation Act and Executive Order 13382 for the sale of materials with the potential to be used as weapon or weapon launchers.

(Ibid)

German biodefence initiatives

Germany is also one of the countries working to prepare potential defence against bioweapons. Over the years, budget allocation for biodefence research has been increased by German government to ensure against possible bioweapon attack.

It is a general perception that German defence ministry does not makes its information related to biodefence research public. Though, it is also believed that German army follows the prohibition on offensive bioweapon research. German defence ministry spent ten million Deutschmarks in 1999 for biodefence. This budget is nearly 60% more than that of 1994. German biodefence program is developing defence against bioweapons at two levels. At first level, the focus of the government is to ensure protection of its Army against any bioweapon threat. Therefore, nearly half of the funding for biodefence has been spent on projects within the German Army, mainly at the German Armed Forces Medical Academy (Sanitätssakademie) in Munich and the German Armed Forces Scientific Institute for Protection Technologies NBC-Protection in Munster.

At second level, the other half of the budget allotted for biodefence has been spent on research and development of novel technologies against bioweapons. Some of the major universities of Germany like University of Munich, the Veterinary University in Hannover and the Universities of Hohenheim and Giessen are working on various biodefence projects.

The main objective of German biodefence program is to develop rapid early warning systems, which are considered to give the best protection against bioweapons.
Development of vaccines is another important task as vaccination is a very important factor for preparing potential defence especially civil defence against bioweapons.

German scientists have successfully developed vaccines against various bioweapon agents. For example, they have developed vaccine against botulinum toxin which is considered as one of the most lethal and dangerous bioweapon agent. They have also succeeded in preparing vaccine against anthrax and tularemia bacteria. Various Genetic engineering techniques have also been developed against bioweapons. (Aken Jan Van, the Sunshine Organization website 2003)

India and civil defence

Civil Defence was firstly established in India on 24th October 1941. It was enacted by Parliament on May 1968 as Civil Defence Act 27 of 1968. The policy of the Government of India till the declaration of emergency in 1962 was confined to making the States and Union Territories conscious of the need of Civil Defence measures and to ask them to keep ready Civil Defence Paper Plans for major cities and towns. Two events of major significance which gave fillip to Civil Defence in India, took place since independence. The first, which really marked the revival of Civil Defence in the Country, was the Chinese aggression in November, 1962. The other was the Indo-Pakistan conflict in September 1965, when, for the first time after Independence, the nation was subjected to enemy air attacks. This led to considerable rethinking about the policy and scope of Civil Defence and as a result the Civil Defence policy, as it exists today, was evolved. The country was subjected to further hostile attacks from Pakistan in December 1971 when the Civil Defence Organization performed its duties commendably. Since then, as per policy, the revision and renewal of categorized towns is being done at regular intervals, the basic criteria of categorization remains the threat perception. (The Director General of Civil Defence website)

Till 1985, all Civil Defence Preparedness were restricted against threat of conventional weapons. During 1985, revision of list of categorized Civil Defence Towns, preparedness against nuclear threat to a very limited extend was considered by
the Ministry. The zones/town so identified against nuclear threat has been categorized as Category I-A Civil Defence Towns. Civil Defence is to be organized as an integral part of the defence of the country. The scale is to be such as the nation can live with it on long term basis. (Directorate of Civil Defence and Home Guards Website 2009)

For a country like India, it is very important to establish a potential defence against bioweapons as the threat of use of bioweapons comes from both, state as well as non state actors. To meet with this challenge, The Indian government has established Nuclear, Biological and Chemical (NBC) warfare directorates for monitoring of attack of nuclear, biological or chemical weapon. Indian government has also established a Nuclear, Biological and Chemical (NBC) cell at Army HQ to study the effects of NBC warfare and to prepare a proper defence system against it. By incorporation of new technologies in detection and response against bioweapons, The Defence Research and Development Organization (DRDO) is helping in enhancing protection against bioweapons. It involves designing and manufacturing protective clothing and equipment for military personal. India has developed five types of protective systems and equipment for its troops as a safeguard against nuclear, biological and chemical (NBC) attack. The development of all five types of protective systems and equipment has been completed and their induction into the service has been formally approved. The five types of protective systems and equipment are: NBC individual protective equipment, NBC collective protection system, NBC medical protection equipment, NBC detection equipment and the NBC decontamination system. The Defence Research and Development Establishment (DRDE) at Gwalior is also established for research and development in toxicology and biochemical pharmacology and development of antibodies against several bacterial and viral agents. There are various vaccination programs running to increase immunity against various organisms which could also be used as a bioweapon by terrorist organization. However, there are no awareness programs to aware common man about bioweapons and bioterrorism. (The Nuclear Threat Initiative Website 2008)

In case of a bio-weapon attack, the warning may come too late for the people to seek the physical protection. For this reason, medical countermeasures and awareness
play a very important role for bio-defence. The effects of bio-weapon agent on the human body are the result of a complex interaction of two living biological systems, the agent and the victim, each capable of modifying or being modified by the other.

First, there are possibilities for altering the manner in which the human body responds to infective challenge. Therefore, most important here are the possibilities for immunizing people against bio-agents, and so protecting them in advance against bio-weapon attack. The immunity may be specific or non specific. The specific immunity requires knowledge of the agents likely to be used in the attack. The non-specific immunity may provide barriers against a wide range of agents, but as it is short lasting, it requires knowledge of the likely time of the attack. (World Health Organization Report 2004)

**Development and use of vaccines at international level**

Traditionally, the main goal of vaccines has been remained to counter against natural health threats. Today, their role is not only remained to create immunity against natural attack of pathogenic agents but also to provide security against bio weapon use by state as well as non- state actors against civilians and defence personnel. For this, various initiatives have been taken by various international organizations to develop a web of local level civil defence including vaccination programs in order to ensure international security. However, there are some concerns regarding international development and use of vaccines for public health.

The idea of converting past bio warfare facilities into producing vaccines against public threat is sound but there is a risk associated that focusing on alleged bio weapons could promote proliferation. It could bring bio weapons to the attention of developing countries in order to develop vaccines against these bio weapons. Also, the conversion of past offensive bio warfare facilities into those producing dual threat agent vaccines could raise concerns that such converted facilities might be changes back in a short space of time to offensive bio warfare facilities.
This concern could be reduced if the offensive bio warfare facility could be converted to a facility producing public health vaccines which had no links to bio warfare or dual threat agents.

There are other issues of concern also like, their production in large quantity, their logistics and distribution and quality. However, their role in creating a potential civil defence is undoubtedly important. To provide an effective defence, these vaccines should be saved to fall in the hands of aggressors to examine, evaluate and defeat.

Defence vaccines are generally produced by national facilities. These vaccines could be developed further to be effective against an aerosol challenge involving as wide range of strains of the bio warfare agents as possible. There should be increased security in some duplication between such national facilities as it could increase the uncertainty for the attacker as to whether resorting to bio warfare would be militarily beneficial. Use of defence vaccine technology for civil vaccine applications could increase the potential of vaccination programs for civil defence.

The vaccines should be seen as a part of preparing a potential civil defence against bio weapon threats and should be considered in the context of International Biological Monitoring Agency with its aim of promoting the contribution of biology to peace, health and prosperity in the world.

Today, there is a strong need for a cadre of civil defence experts, detailed contingency plans for the organizations and NGOs to run programs to increase awareness about bio-weapons and a manufacturing base to keep ready for the mass production of protective equipments at the time of attack. For countries, where financial assistance is needed to run civil defence program, contingency arrangements might be made with their capable allies. 

Preparing Public and Community Health System

The first step to respond to an attack with a toxic substance having immediate effects are likely to be the police, fire departments and emergency medical personnel on
or near the scene. In contrast, the first to respond to an initially undetected attack with an infective or toxic agent having only delayed effects are more likely to be regular health-care providers, including nurses, physicians and hospital accident and emergency experts. For developing a strong public health system against bio-weapon attack, various factors of society at various levels have to be involved.

China has conducted various training programs and courses for establishing strong public and community health at national as well as international level for which it is important to promote technical exchanges and training at international level. To quote as an example, a protection and assistance training course was conducted in 2008 jointly organized by the Chinese government and the Organization for the Prohibition of Chemical Weapons (OPCW) at Shanghai and Dalian to implement the protection and assistance article of the Chemical Weapons Convention (CWC). Twenty-Five participants from eighteen countries took part in this course to get training on enhancing and preparing community health against chemical weapon attack as well as new techniques to respond in case of an emergency. (Sun Yunlong, The China View Website 2008)

In case of a bio-weapon attack, an expert will have to locate and identify the contaminated area immediately and may have to act within minutes if lives are to be saved. On the other hand, a covert release of a biological agent will be more likely to become apparent over a longer period of time, i.e. days or even weeks, and will probably take the form of the appearance of cases of infectious disease. Because some victims are likely to move around in the symptom free incubation period after exposure, cases of the disease may appear in different locations, even distant ones, and the full picture may become evident only after information, medical reports and surveillance data from many areas have been combined. Bio-agents that are transmissible from person to person can also generate clusters of secondary outbreaks.

Depending on the nature of the organism involved and the normal pattern of infectious disease in the locality concerned, the attack might initially appear to be a natural outbreak of disease. These differences are important in planning public health
preparedness for bio-weapon attack. However, in the early phases of an incident, it may not be clear whether the causative agent is biological or chemical, or possibly a mixture of the two. As a result, first responders may find themselves needing to manage both types of incident before the relevant specialists for biological or chemical incidents become involved.

In order to prepare for bio-weapon attack, the authorities concerned have to make maximum use of existing emergency-response resources, and to adopt an approach that is consistent with the principles on which the management of any other type of public health emergency is based. While bio-weapon attack will have some special features, they do not necessarily require the formation of completely new and independent response systems. A well designed public health and emergency response system is quite capable of responding to a limited biological attack and can take the measures necessary to mitigate its effects.

A community's existing capability to respond to such an accident is therefore an essential component of preparedness for such an attack. A bio-weapon attack will generally have the characteristics of a disease outbreak, so that city, state and regional public health authorities will have to be involved in the response, which will have much in common with the infection control strategies used in any outbreak of disease.

Preparing to respond

The risk of a bio-weapon attack cannot be eliminated completely, and could have serious consequences if it occurs. Accordingly, a preparedness program may be necessary, and this will require the acquisition of equipment and supplies, the development of appropriate procedures, and training.

Countries need to examine their existing hazardous-materials protocols, public-health plans, and the current training of the police, firefighters, emergency medical service experts and public health experts, including physicians, epidemiologists, veterinarians and laboratory staff. These will have to be adapted in the light of the features unique to deliberately released bio-weapon agent.
Most civilian health-care providers have little experience of illnesses caused by bio-weapon agent, and may therefore not suspect, especially in the early phases of an incident, that a patient's symptoms could be due to such weapons. Therefore it is needed to train health-care workers in the recognition and initial management of both biological and chemical casualties, and for a rapid communication system that allows sharing of information immediately an unusual incident is suspected. (World Health Organization Report 2003). Education and training must cover the general characteristics of biological agents, the clinical presentation, diagnosis, prophylaxis and treatment of diseases that may be caused by deliberate agents, and sample handling, decontamination and barrier nursing.

Training, planning and exercise should be directed at physicians and staff for the management of mass casualties, providing respiratory support to large numbers of patients, the large scale distribution of medication, and supporting the local authorities in vaccination programs. Providing the necessary education and training is expensive and may also be intensive, yet may be the most cost-effective method of medical preparation for bio-weapon attack. Such training will also work as an approach to prevent anxiety and fear in health-care workers, something that might be expected after a bio-weapon attack and that could disrupt the provision of health-care services.

Because early diagnosis of bio-weapon attack will be important in the choice of treatment and response, preparation should include the establishment of a reference laboratory or a network of laboratories in large areas in which potential agents can be identified.

In addition to the need for diagnosis for purposes of medical treatment, samples obtained from a delivery system or the environment, or from patients, will require forensic analysis. Earlier diagnosis will be facilitated if regional laboratories have the necessary equipment and staff for that purpose. New diagnostic technologies means that bio-agents can be identified quickly even at the attack site.
Where a particular need for equipment, antidotes, antibiotics or vaccines has been identified, pre-attack stockpiling and planning of distribution systems, or designation of sources of rapid supply, to make them available to the exposed population is necessary. The financial cost of such stockpiles, depending on the items chosen and the quantities stockpiled, may then be very high. The cost and logistic burden of this type of preparation may not be feasible in underdeveloped countries or those in which large numbers of people will need protection. In such cases, and depending on the agent involved, selective protective measures may still be considered for high-risk groups.

The National Institutes of Health (NIH) of US has extended funding for the Midwest Regional Center for Excellence in Biodefence and Emerging Infectious Diseases (MRCE), at Washington University School of Medicine in St. Louis to continue its research to prepare strong biodefence system. The center has also received a five-year, $37 million grant from the National Institute of Allergy and Infectious Diseases to continue to support research in biodefence and emerging infectious diseases in the Midwest region of US. MRCE scientists are mainly focusing on developing built-in protection against some bacterial bio weapon agents, and also working to find better protection against diseases caused by West Nile virus and poxviruses, which include smallpox. They have also worked to improve the safety of vaccines, discover new viruses, and develop new antiviral treatments.

The MRCE was established in 2003, to develop new or improved ways to treat, diagnose and prevent bioweapon agents like anthrax, or infectious diseases, like West Nile fever, plague and dengue fever. The MRCE is one of the 11 Regional Centers of Excellence (RCE). The main aim of these RCEs to provide scientific expertise to first responders in case of a bio weapon attack or to a naturally occurred epidemic emergency.

The MRCE is an association of institutions that include Case Western Reserve University, Saint Louis University, Kansas State University, Iowa State University, the Midwest Research Institute and the University of Missouri, Columbia. It has recently
started its international research division, with collaborations in Africa and China. (Caroline Arbanas, The Mednews website 2009)

Preparing public information and communication

A potential plan for providing information to the public and thus clarifying the subject of bioweapon attack needs to be drawn up well before an incident occurs. If this is to be effective, people need to know how they are expected to act if an attack takes place, long before any such attack occurs.

The communication plan may include radio and television broadcasts, or the distribution of brochures to the public describing the potential threat. Clear advice could be given on how the alarm will be raised, and what to do if that happens. A well constructed media plan is essential, both as part of the pre-incident education process, and to avoid overreaction after an incident. It must contain holistic instructions on channels of communication and clearance procedures for potentially sensitive information. Any public preparedness or information program needs to be evaluated in the context of the specific local circumstances, including the possibility that too much information may be counterproductive, or dangerous.

Protection of responders and health-care workers

The protection of responders and health-care workers is also essential. In addition to the ability to manage the incident, the occurrence of infection in health-care workers may lead to the perception among the population that health centres and hospitals themselves constitute a high-risk source of infection. This may discourage potentially infected persons from seeking treatment from the local health-care providers, and lead them to travel to other health-care facilities, thereby increasing the risk of secondary transmission if the infection is contagious.

Vaccination or antibiotic treatment of those involved in response could be considered. This is also useful in the management of any secondary spread of the infection than for the primary manifestations of the attack. Pre-attack vaccination of
health-care providers may be considered if appropriate vaccines are available like for smallpox, plague and anthrax.

Events since September 11 have made clear the threat posed by terrorist use of non-conventional weapons, including chemical and biological agents. While conventional weapons such as explosive devices pose a more immediate threat in many areas overseas, use of biological agents cannot be excluded and must be considered a growing threat.

Early detection and response to the use of bio weapon are crucial. Without special preparation at the local and state levels, a large-scale attack with variola virus, aerosolized anthrax spores, a nerve gas, or a food born bio agent could overwhelm the local and perhaps national public health infrastructure. Large numbers of patients would seek medical attention, with a corresponding need for medical supplies, diagnostic tests, and hospital beds. Emergency responders, health-care workers, and public health officials could be at special risk, and everyday life would be disrupted as a result of widespread fear of contagion. Therefore, it becomes really important for countries to provide substantial funding and other resources to enhance biodefence using latest technologies.

In the light of 9/11 terrorist attack, US government has increased funding and cooperation to enhance civil defence against bw attack as the vulnerability of bw use by terrorists has increased. 18 Homeland Security Presidential Directives (HSPDs) have been passed since 2001. Three of these directives, HSPD-8 on National Preparedness (December 2003), HSPD-10 on Biodefence for the 21st Century (April 2004) and HSPD-18 on Medical Countermeasures against Weapons of Mass Destruction (January 2007) are aimed to develop a comprehensive national civil biodefence against BW attacks. These directives include all measures to prepare and enhance civil defence. The HSPD -10 exclusively provides a framework and four essential factors of US biodefence program for civil defence against BW use as follows:
1. To enhance awareness regarding BW attacks, intelligence and assessing threats in future.

2. Prevention and Protection through prohibition and critical infrastructure protection

3. Surveillance and Detection, which includes BW attack warning and attribution to ascertain the perpetrator and method of attack

4. Response and Recovery with response planning, mass casualty care, risk communication, medical countermeasures, and decontamination. (The Federation of American Scientists Website III)

Containment of the threat of bioterrorism requires a strategy that includes the strengthening of civil defence systems against the potential use of bio agents by states and non-state actors. From the perspective of public health and health care delivery, the main obstacles for sufficient domestic preparedness come from an insufficient public-service infrastructure. We are clearly vulnerable to new, emerging, and genetically modified bio agents that can have a major disastrous effect on our communities. Sufficient funds are needed to ensure optimal local, state, and national preparedness in the context of preparing a powerful defence against today's recognized diseases and bioterrorist activities, as well as for the unknown threats of tomorrow and role of non-state actors become significant to achieve it.