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Biological Weapon, Infectious Disease and India's Security Imperatives

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The deliberate germ attack unleashed against the most powerful country in the world, the United States in late 2001, made us believe that the threat of the 21st century would be human-induced disease outbreaks. Human induced or not, the subsequent SARS (Severe Acute Respiratory Syndrome) and Bird flu outbreaks underscored that infectious disease holds the real threat to humanity in the coming years. The situation would arise due to many factors, such as, environmental pollution, over population and excessive human interference in the natural process of life. A substantial portion of the threat also constitutes the misuse and abuse of naturally occurring organisms (biological agents or pathogens) for hostile purposes by humankind in general and terrorists (non state actors) in particular. Again, these situations will be involving Nations into a 'molecular arms race' consist of the development and stockpiling arsenals of measures and counter measures against the new and emerging diseases.

The argument that the transnational spread of disease poses a threat is primarily validated by recent developments, such as the HIV/AIDS epidemic, the spread and virulence of emerging and re-emerging infectious diseases that have transcended geographical boundaries, along with the threat of terrorist use of dangerous pathogen to weaken fragile state structures. A deliberate Anthrax attack in the past which caused mass disruptions, if not destruction, proved the fact that such incidence has potential to affect individual and society. While threatening the health of individual, emergence and spread of new and virulent pathogen, in other words a disease, could hamper economic growth, social order and could catalyze regional instability. The fact that transnational spread of disease does pose a threat to national security, is well entrenched now.[1]

Lately though, the increasing threats of bio-terrorism and horizontal spread of infectious diseases have paved the way for discourse on public health concerns in the face of both natural and deliberate spread of disease in India. Irrespective of their cause of occurrence, the threats of infectious diseases have increasingly become high priority security imperative. This paper seeks to discuss issues related to the infectious diseases in India, natural and deliberate (use of pathogen) while examining the nature of threat perceptions for India. Also the paper would delve into existing scenario regarding different aspects of deliberate disease spread such as through bio-warfare, bio-terrorism and biological agent use against agriculture in the region.

Natural vs. Deliberate Outbreak

There is a thin red line between a natural outbreak and a deliberate or intentional disease spread (initiated by human action,[2] including accidental release of pathogen). As a matter of fact, there is hardly any difference between a virulent pathogen and a bio weapon. Element which make a simple biological agent (virus, bacteria or toxins) into a deadly weapon, is the motive of the perpetrator who use deliberately and effectively against human, plants and animals.

It would be difficult to ascertain whether a virus or deadly bacteria has spread naturally or introduced to a vulnerable population by deliberate means, since there is no grand design for weaponization involved in it. Once introduced to a susceptible environment, the pathogen spreads though its natural channels. The inherent ambiguity involved in the BW use and spread have caused many controversial concerns in the past

1 For details on the subject, See, Andrew T Price Smith, *The Health of Nations*, MIT Press, Cambridge, 2003; and Jennifer Brower and Peter Chalk, *The Global Threat of New and Emerging Infectious Diseases*, RAND, 2003. Also another important study which carved a linkage between infectious disease and human security, See, David L Heymann, "Infectious disease Threats to National and Global Security," in Lincoln Chen, Sakiko Fukuda Parr and Ellen Seidensticker, *Human Insecurity in a Global World*, Harvard University Press, Cambridge, 2003, pp.195-213.

2 For a brief description on the difference between natural and unnatural disease outbreak, See Mark L. Wheelis, "Investigation of Suspicious outbreaks of Disease", in Raymond A Zilinskas (ed.), *Biological Warfare: Modern Offense and Defense*, Lynne Rienner, Boulder, 2000, p.108.

regarding the origin of disease. Nevertheless, it could not prove the source and subsequent epidemic. For instance, even if there were global alerts on SARS (discussed later in the paper) and Plague in India, followed by international investigations, the controversies remain unsolved with a suspicious tag attached to both. During the heights of plague outbreak in Western India (1994), there were conflicting views in professional circles and controversial reporting in the media on the source of the outbreak, whether it was a natural outbreak or an outbreak through human action. One leading Indian weekly magazine raised the issue of bio-warfare,[3] zeroing on two possibilities: enemy agents could have introduced mutated and cultured germs and someone could have experimented with newly developed organisms and their vaccines for biological warfare. The story cited various clinical reports and expert opinion, primarily focused on the activities of the United States and Russia.[4] Even the information which fueled further suspicions came from the Center for Disease Control and Prevention (CDC) when it was stated that the Surat strain of the disease was 'unique' and not related to any known variety of the plague pathogen.[5] Whether the outbreak was caused by intra-state tensions (biological war) or due to a natural phenomenon is still debatable.

Infectious Disease and State of Public Health in India

Endemic to a number of infectious diseases, India had failed miserably in the past to detect and fight periodic epidemic outbreaks. India with over 5.1 million AIDS-infected people has become the second largest number of AIDS infections after South Africa at 5.3 million.[6] According to the National AIDS Control Organization (NACO), a semi-autonomous organization within the Health Ministry, which implements various HIV related programs in the country, there are over 111 districts, where over one to four per cent of the population are AIDS stricken. This mother of all infectious disease, HIV/AIDS has spread to all of India's states and union territories since it was first discovered in the country in late 1980s. Six out of 28 states are considered high -prevalence states. They include, Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu, and north eastern states of Manipur and Nagaland.[7]

The country is considered an endemic region for animal anthrax in general and human anthrax in south India. Statistics show that there are some 40 cases of human Anthrax documented during the last decade and since 1953 some 186 cases of human anthrax were documented. Among other major diseases (biological pathogens) are plague, Japanese Encephalitis, Malaria and cholera. The most virulent Vibrio cholera invaded India in 1964 and the organism appeared in Delhi for the first time in June 1965 and became endemic thereafter.

India experienced a plague (Black Death) epidemic in 1895-96, which continued for almost two decades, killing approximately ten million people. However, it is believed that after 1950, due to the emergence of many broad-spectrum antibiotics and disinfectants like DDT and Gamaxine, the spread / transmission of plague was contained. Although up to 1993, two incidents of plague diagnosed in India but could not be confirmed as plague. Again the disease resurfaced in the decade following a period of quiescence: Surat (1994) and in Hatkoti village in Himachal Pradesh (2002). The former took a heavy toll that shook India's health infrastructure and preparedness to tackle the eventuality in the face of epidemic. The official figure put the toll at 44, though the truth was

3 R. Prasannan, "Germ War", *The Week*, October 9, 1994, p.28.

4 For a story related to the US involvement, see, R.Prasannan, "American Hand", *The Week*, October 16, 1994. Regarding Russia's role, Indian Government received information in the first week of July 1995, about a firm called 'Viva' located in Almaty in Kazakhstan selling plague microbes. It became hard to rule out the possibility of militants purchasing the organisms from the Kazak company and releasing it in Surat. For a report see, "Were Ultras Responsible for Surat Plague?", *Hindustan Times*, July 9, 1995.

5 "New Twist to Plague Story", *The Tribune*, (Chandigarh), July 10, 1995. It was stated that the strain had a chromosome with a curious extra gene. This gene contained a code for the structure of a single RNA molecule.

6 Official figure quoted by NACO , Special Secretary & Director General Dr S Y Quraishi. See, "AIDS becoming epidemic in India", *Chennai Online*, July 23, 2005.

7 Pramit Mitra, "India at the Crossroads: Battling the HIV/AIDS Pandemic", *The Washington Quarterly*, Autumn 2004, Vol. 27(4), pp. 95–107.

somewhat alarming.[8] The outbreaks caused panic and necessitated an urgent assessment of our public health apparatus vis-à-vis the nation's vulnerability towards infectious diseases.

The outbreak in Himachal Pradesh in early 2002, however, was not as controversial as the Surat outbreak. Out of 16 cases, 4 persons died of pneumonic plague. But the outbreak did expose some of the inherent lacunae in the public health apparatus.

During the last couple of months, another infectious disease, Japanese encephalitis has been invading north Indian state of Uttar Pradesh and Himalayan kingdom Nepal, killing more than 1000, mostly children.[9] The disease has already spread to more than 27 districts in Uttar Pradesh, including the state capital, Lucknow, and to neighboring Bihar state in India. One estimate shows that this mosquito-borne disease has killed at least 8,000 people in Uttar Pradesh since 1978. Many a times in the past this type of outbreaks went unreported and termed as 'mysterious' disease and "suspected to be encephalitis." During mid 2003, a similar mysterious virus played havoc in Andhra Pradesh and Maharashtra, killing more than 250 children. While the health department fumbled in the identification of the causative organism, initial reports pointed to mosquito-borne Japanese encephalitis. However, later it was identified as *Chandipura*, a rhabdovirus, as the killer.

Besides all these above mentioned diseases, outbreaks are common and regularly reported from Bihar, Orissa, Assam and Uttar Pradesh. India's public health infrastructure has been always on its toes to cope with these natural health hazards. Against such background scenario, the additional threat to public health by a possible disease spread through deliberate means might worsen the situation and pose as a major security challenge.

It is quite clear from above discussion that there is ample and visible threat from these naturally occurring diseases. In such scenario the situation would be unthinkable, if a virulent biological agent is introduced for hostile purposes to the civilian population.

Situating Biological Weapon Threat in India

Not surprisingly, biological weapon related threats have yet to gain substantial attentions within the security establishments in the subcontinent as such and has been playing second fiddle to the nuclear weapon. The South Asian region comprising seven countries with two nuclear weapon capable neighbors, is over-obsessed with nuclear weapon and related threat. However, the discourse on public health and infectious disease as a part of non-traditional security issues gained ground in the region especially after series of epidemic outbreaks in the region, (e.g., plague, JE and HIV/AIDS) and received a boost following the Anthrax attacks in US in late 2001.[10]

Although it is increasingly unlikely for a state or terrorists to use bioweapons against military, they can achieve the strategic objective through attacking civilians directly with anti personnel agents and indirectly with anti-livestock and anti-crops agents that could be used to cripple food supply and economic lifeline. While threat from non state actors is plausible and well debated, similar threats cannot be ruled out from government's secret offensive biological weapons programs.[11] Plausible or not, the focus is increasingly on State programs as terrorist could only get BW from secretive state programs. Nevertheless the whole threat of BW is now complicated after the whole Southeast Asia suffered SARS outbreaks, followed by an ongoing bird flu epidemic.

8 The fatality reports were varied from one source to other. It varied to a great extent even in official sources. The Indian government reported to the World Health Organization (WHO) that from August 26 to October 18, 1994, there were 56 deaths (48 in Surat) due to plague. See, "The Scourge: The Indian Plague Epidemic of 1994", Frontline, October 21, 1994. Also, See for a statistic, "International Notes Update: Human Plague-India, 1994", Centre for Disease Control, 43 (41), October 21, 1994, pp.761-762.

9 Animesh Roul, "Reality Bites", *The New Indian Express* (Chennai), September 22, 2005..

10 "Anthrax scares around the world ", *Guardian*, October 19, 2001. http://www.guardian.co.uk

11 The fear resurfaced after the Red Cross urged to regulate government biological weapons programs recently. "Government biological weapons programs pose biggest threat: Red Cross," *The Khaleej Times*, September 20, 2005.

Threats from State Actors

Unlike the nuclear program, New Delhi administration is secretive about its offensive (?) or defensive bio weapon program. There is an obvious suspicion that India might have stockpiled BW and according to some western intelligence sources India does possess biological weapons in its secret arsenal. India certainly using its growing biotech infrastructures and facilities to support research and development for biodefense. The country has developed defensive biological program and has been conducting active research on vaccines for countering various naturally occurring diseases with a developed biotechnology infrastructure. Alarmists believe that the country could use this advanced defensive capability to initiate an offensive program when it deem necessary. However, there is no evidence whether the country is involved in an offensive BW program.

Not long ago, the Centre for the Study of Weapons of Mass Destruction at the National Defense University in Washington, DC clubbed Pakistan and India among several Asian countries who might be working on the development of BW. Among the countries suspected of pursuing offensive biological weapons research, development, and weaponization, the Center grouped North Korea, China, and Iran. Nations that have the potential to develop offensive BW and may be conducting limited efforts include Pakistan, Israel, India, and Syria.[12] Though there have been always exaggerations when alarmists speak their mind, it is imperative to look at the questionable State capability and BW programs in countries that surround India by all side. Ironically, at least three countries which are not in very good terms with India have the capabilities to develop biological weapon. They are China, Pakistan and Myanmar. India has already fought one war with China in 1962 and four wars and numerous skirmishes with Pakistan in the last fifty Years. The bilateral relation with Military ruled Myanmar is also volatile.

China: Secretive among all, Communist China maintains that it has never manufactured nor possessed biological weapons. Various open source reports suggested in the past that the country has some elements of its offensive biological warfare programme initiated in the 1950s and Beijing is believed to possess an offensive biological warfare capability based on technology developed prior to its accession to BWC in 1984. There are allegations that in the late eighties an outbreak of hemorrhagic fever in Xingjian province was the result of Chinese offensive biological weapon research. Former Soviet intelligence sources had found two instances of epidemics of hemorrhagic fever in North-western China in the late 1980s, where these diseases were previously unknown. It was presumed that they were caused by an accident in a laboratory where Chinese scientists were weaponizing viral diseases. Also, satellite photos had detected a large fermenting plant and a bio containment lab close to a nuclear testing ground in northwest China.[13]

Most recently in 2003, during the outbreak of SARS, questions along with eyebrows had been raised on the source and host of the disease. The initial cases were reported from China, the great northern neighbor of India. The efforts to suppress reports of early outbreaks by Chinese authority fanned the suspicion to a new level. One school of thought believed in the bio-weapon theory and the outbreak may not be caused by a naturally found virus and the Chinese military is involved in the whole episode which had later undertaken a cover up operation. Although many felt that the BW theory was far-fetched and termed it as baseless, speculation hovered around a possible leak from a secret military bio-weapon program.[14] One Russian source had claimed during the heights of the pandemic that the SARS virus is a hybrid of two viruses—measles and mumps—and can only be produced in laboratory conditions. This indicates that the SARS virus could be a biological weapon developed by China.[15] Even Chinese dissident and exiled, Wei Jingsheng, without dismissing reports that SARS

12 "Israel, India and Pakistan developing biological weapons?" *Daily Times*, Pakistan, December 6, 2004.

13 Ken Alibek, with Steven Handelman, *Biohazard*, Random House, New York, 1999, p. 273

14 "SARS leaked from bio-weapon program," The Age, May 1 2003. ww. theage.com.au

15 "SARS virus could be China's bio-weapon: Russian expert", *Indian Express*, April 12, 2003.

emanated from China's biological weapons research facilities, noted that Chinese President, Hu Jintao, had conducted an inspection tour, including a visit to a Chinese Military Medical Academy, bio-military research facility, to dampen rumors of a bio weapon leak.[16] This suspicion grew stronger when WHO officials were denied access to Chinese military hospitals during a field inspection. A media story claimed that Beijing's hospital administrators ordered large numbers of SARS infected patients to be transferred from No. 309, one of the City's Military-run hospital to the No. 3 Armed Police Hospital in Fengtai before a WHO inspection team visited the former (No.309) in the last week of April 2003. Most of the cases, including severe ones, were transferred out, leaving just a small number of cases to be inspected by WHO officials. It was believed that this cover-up might have followed the Army's experimentation with this deadly bio-war weapon.[17] Undoubtedly, China has shown greater interest in studying and analysing biological weapons technology recently which is evident from growing number of research papers in military medical journals.[18]

Pakistan. *A*llegations have been levelled against India's western neighbour Pakistan for conducting research on BW since the early 1990s. Already armed to teeth with nuclear weapon, evidence of Pakistani biological weapons programme is scarce. The country with a penchant for nuclear weapons and other conventional arms, Pakistan certainly has the infrastructural potential to develop and produce offensive Chem/Bio weapon systems. Although the intention to employ BW against adversaries or rivals is not clear, Pakistan shows considerable interest in the acquisition of technology related to biological and chemical weapons programme. It has a well developed bio-technology sector that is capable of supporting limited biological warfare-related research and development. During the initial months of war on terror in Afghanistan, some sketches and calculations to make a helium powered balloon bomb filled with anthrax were found in the Kabul office headed by Bashiruddin Mehmood, one of the two Pakistani nuclear scientists detained in Islamabad for questioning on their alleged links with Osama bin Laden.[19]

Myanmar. India's Eastern most neighbours, this military junta ruled country has been a secretive society. There are reports of attack by government forces in remote areas against the dissident Karen population (spread of Cholera disease and Chemical weapon) It is likely that Myanmar has got CB weapons capability. Although there were allegations leveled in the past, they could not be confirmed. One of the initial allegations surfaced in August 1993 and in the subsequent year for cholera epidemic. In 1995, allegations continued that the Government of Myanmar was using biological weapons on the Thai–Myanmar border against the Karen ethnic minority.[20]

Non State Actors and BW Threat to India

India, a victim of cross-border terrorism and internal rebellion, has taken biological weapon threat seriously after the great powder scare in US and worldwide, though to find that it is awfully equipped to fight such an attack. When the establishment is not overtly sensitive to the natural occurring disease spread, threat of terrorists or a rogue state using biological weapons to a large population is certainly a challenge to face, if not overcome.

Much has been said about Al Qaeda and its associated/ affiliated terrorist groups and their capability to use chem/bio agents against nations. Undoubtedly, Al Qaeda has ideological and operational influence on most of the militant outfits in the region. Neighboring Bangladesh is considered to be the cocoon of Al Qaeda terror in the post Taliban and 9/11 era. It is not

16 Wei Jingsheng, SARS Tests Communist Rule in China, *International Herald Tribune*, April 29, 2003.

17 John LeBoutillier, "SARS: Chinese Biowar Accident?", *NewsMax*, May 2, 2003. http://www.newsmax.com

18 For a detailed account, See, Richard D. Fisher, Jr., "SARS Crisis: Don't Rule out Linkages to China's Biowarfare", *China Brief*, Vol.3 (8), Jamestown Foundation, Washington DC, April 22, 2003.

19 "Sketches of anthrax bomb found in Pakistani scientist's office", URL<http://www.rediff.com/us/2001/nov/28ny5.htm>

20 "Burma and Biological Weapons," *Jane's Intelligence Review*, vol. 7 (11), November 1995, p. 518.

unthinkable that someday these affiliated groups would try their evil hands in using a biowepaon or a chemical agent against the government forces or civilian populace.

As far as BW threat from Non state actors is concerned, there are instances in South Asia, though on the ground they never used bioweapons as such. In Sri Lanka, India's southern neighbor, unidentified Tamil militants issued threat to use biological materials against the native Sinhalese in the early 1980s when an unidentified Tamil militant group issued a communiqué threatening to wage bio war against the Sinhalese-dominated government of Sri Lanka. In an attempt to wage war against the Government, militants planned out a strategy to cripple the country by spreading Bilbariasis and Yellow Fever. They also laid out plans to attack rubber plantations and tea gardens using anti plant agents. Also, they planned to poison water supplies of the army.[21] However, the strategy was never implemented.

Most recently the National Aids Control Organization (NACO) of India raised the issue of deliberate disease spread among the security forces by militants. With an estimated one lakh army and paramilitary forces deployed in the northeast India, the concern is now on the priority list. It only reiterated an earlier warning from the country's Defense Minster that militants could unleash women infected with HIV virus to spread the disease to neutralize the forces. The paramilitary Assam Rifles, already in the grip of the virus, has received these threats in the past. It has been indicating that underground outfits operating in the northeastern states might spread the disease employing this novel strategy among soldiers posted in Meghalaya, Manipur, Nagaland and Tripura.[22] Presently, fear has gripped the whole defense and health establishments for this less expensive but effective ways of attack on armed forces.

Agricultural Bio-terrorism:[23] Over the years agro-terrorism has received little or no attention because terrorists have yet to employ agriculture assaults as a method of operation, though state actors have used anti crop and anti plant agents against each other in the past. Since there is little empirical data available regarding such attacks by non-state actors such as criminal syndicates, drug lords, and terrorists, analysts and policy makers have been left to discuss the threat based on assumptions about vulnerability. Since there is little evidence regarding terrorist organizations showing interest in pursuing bio-terrorism or for that matter agro-terrorism,[24] the question is now asked what if India 's vulnerable lifeline, "food and agriculture' is affected by a terror attack or sabotage?[25]

Keeping in view the modus operandi of terrorist outfits operating in Indian subcontinent to attack critical infrastructures, both civilian and military, the thinking in strategic community in India has been changing in recent times. The most vulnerable targets of agro terrorism identified are field crops, farm animals, food items in the processing or distribution chain, market-ready foods at the wholesale or retail level, and agricultural facilities, including processing plants, storage facilities, and research laboratories. When it comes to vulnerability, India has several soft targets ranging from transportation, water supplies and all through food production, processing and distribution. Although our whole agricultural industry is involved in half of these sectors, the agro-terrorism threat remains under appreciated.

21 Rohan Gunaratna, *War and Peace in Sri Lanka with a Post Accord Report from Jaffna*, Institute of Fundamental Studies (Sri Lanka) 1987, pp. 51-52. The Author didn't specify which Tamil militants group issued the threat. Lately this communiqué has been widely quoted in various texts and documentations related to BW. Most exhaustive among them, See, W. Seth Carus, "Bioterrorism and Biocrimes: The Illicit Use of Biological Agents Since 1900", (Revised Working Paper), Center for Counter proliferation Research National Defense University, Washington, D.C. 2001.

22 "N-E rebels new threat to forces: AIDS", *Times of India*, September 26, 2005.

23 Agro-terrorism is the deliberate introduction of a disease agent, either against livestock or into the food chain, for purposes of undermining stability and/or generating fear. See, Peter Chalk, *Hitting America's Soft Underbelly: The Potential Threat of Deliberate Biological Attacks Against the U.S. Agricultural and Food Industry*, Rand, Santa Monica, 2004. Fn.2, p.XI.

24 The only instance of threat of agro terrorism by Non state actors in the region came from Sri Lanka. See, Rohan Gunaratna, War and Peace in Sri Lanka, op.cit.

25 "Threat of agro-terrorism is real", *Rediif.com*, August 30, 2005 <www.rediff.com>

Although there has been no incidence of agro-terrorism in India as such, the threat is always there in the subcontinent having a number of separatist and terrorist outfits with agenda of their own. Experts believe that an attack on livestock's is more likely animals could be more effective from the agro-terrorism viewpoint than on plants. In the recent past India was charged by Pakistan for usage of agro terrorism tactics when India had offered wheat to Afghanistan. Pakistan had claimed that Indian wheat dispatched for Afghanistan was infested with seed-borne fungus like *striga* and diseases like *karnal bunt*, which could harm wheat production during germination of seeds. The Islamabad administration also blocked the transportation of the grains through its territory since it could harm Pakistani wheat.[26]

Although, the left-wing extremists (Maoists) in India had targeted Coca-Cola plant (in Guntur, Andhra Pradesh) and a milk chilling centre belonging to Heritage foods in the past, the use of biological pathogen or radiological material in food or water is remote from any Maoist groups, though not impossible.

The larger threat emanates from Pakistan based al Qaeda affiliated groups such as Lashkar e Toiba and Jaish-e Muhammad, Al Badr and Bangladesh based Jamiat-ul Mujahideen. These groups are main suspects who can unleash similar kind of attack, or may resort to bio terrorism in India in future as they target civilians too. The trends show that they resort to novel kind of attack every time against civilian populace and critical infrastructures. The easiest part is that an outfit does not need a trained agro-terrorist to infect crops with a toxin-producing fungus and contaminate the whole food chain. Even if they don't have any training, still they can inflict similar impact using available pesticide or germicide in the market. Therefore the scenario is not unthinkable at all.

Besides the militant threat, cross border smuggling of poultry-including live birds, chicks and meat would help in spreading disease, e.g. avian flu. The situation might be exploited by terrorists or crime syndicate. The border areas (especially with Myanmar and Bangladesh) are the most vulnerable entry points for biological pathogens, as it is easy to smuggle such substances from these porous borders. Even infected animals and birds (cattle, pig, chicken and other game bird) have been routinely imported /smuggled from across the border could be carriers of diseases like Foot and Mouth disease, Anthrax or flu.

Debate over Race/Ethnic Bio-weapon

In India a debate over the possible future development of ethnically or racially specific biological agents was started by some scientists in the mid 1990s, coinciding the Human Genome Diversity Project (HGDP) aimed at studying DNA from indigenous tribes and other communities from around the world. The HGDP project had failed to take off because of the fear generated against it, terming the whole issue as project 'Vampire'. Many scientists believed that the Human Genome project died because of "imaginary fears" that genetic data generated through it, could be "misused for biowarfare."[27] People including some members of indigenous communities were concerned that the HGDP data would fall into wrong hands. Now the project resurfaced as the Genographic Project and international team of scientists involved in the project already unveiled a plan in April this year (2005) to collect blood samples and extract DNA from some 100,000 people around the world, including 10,000 in India. According to them the study would help people worldwide understand their own origins better.

Growing Concern and Options for India

For states differentiating between naturally occurring outbreaks of disease and those caused purposefully by non-state actors is extremely difficult and may be impossible to judge, if there is no claim of responsibility. While a handful of analysts working in various think tanks in New Delhi and else where believe that deliberate use of bio weapons is a reality, for many, it's a futuristic threat and the non state actors in the sub continent would take more time to look at such novel options. Most of them

26 "Indian wheat gives Pakistan germ jitters, " *Times of India*, January 21, 2002.

27 "Written in Blood," *The Telegraph*, April 25, 2005.

believe that bioweapon threats have been overemphasized and unforeseen. Recently one study conducted by the Institute for Defense Studies and Analyses, a Government funded think tank in New Delhi, maintained that agriculture is one of the easiest targets and any disruption could have catastrophic consequences for India's economy. Also the threat to the country's livestock sector is even more pronounced than to crops, the study underscored.[28]

Undoubtedly, the sense of insecurity that crept into the minds of millions when hoax anthrax letters reached Indian capital too in 2001,[29] made the country awake from its complacency and started assessing the administration's preparedness to face real attacks. From Cabinet ministers to Scientists and strategic thinkers hammered out plans to handle any eventualities arising out of a biological attack. Soon after, a national disaster management agency under home ministry was set up to deal with all types of eventualities.[30] Effective surveillance mechanisms for detection and identification, physical protection and decontamination, and medical countermeasures were some of the necessary steps India had undertaken since then. Although the country has a well-developed biotechnology infrastructure with a number of pharmaceutical production facilities and bio-containment laboratories, it lacks a national preparedness agenda against biological weapons. Still somewhat oblivious about the threat, India, under the auspices of NICD (National Institute of Communicable Diseases) has started working on surveillance mechanisms. The agency has suggested evolving a national network though at present only states with international border has this surveillance system. The Defense Research and Development Establishment (DRDE), Gwalior, which is working towards the development of antibodies against anthrax, cholera, brucellosis, small pox and plague, is the only establishment that has developed chemical and biological protective gears like masks, detectors and suits. However, these protective gears are being supplied to defense personnel only. And it is a question whether a large number of masks or suits can be procured at the time of need. Another constraint is in the sphere of medical countermeasures: prophylactic and pre-treatment measures taken before exposure and therapeutic measures taken after exposure or after the development of symptoms. In the first place vaccination is the preferred treatment, but it requires some advance knowledge of the biological agent used.

At the governmental level Agriculture Ministry with its Department of Agriculture and Cooperation and Department of Animal Husbandry usually takes necessary steps like awareness campaign amongst farmers regarding various disease outbreaks and maintains a system for monitoring/surveillance of the naturally occurring diseases. Even if they issue guidelines for reporting the diseases whenever the threat is imminent there appears to be lack of awareness regarding the lurking dangers of human induced disease outbreaks, especially from bordering countries.

In reality, India does not have that level of preparedness or infrastructure to face a large scale bio-attack. Since most of the doctors (the first responders in a BW situation) of this generation have not come across any of these diseases in their career, it would be difficult for them to diagnose and treat immediately. A few doctors in their 50s or 60s might have seen a small pox or a plague patient. Moreover a disease in its epidemic form cannot be contained by inexperienced doctors and such situation could overwhelm the public health system. To avoid a chaotic condition during a bio emergency, the quality and spread-wise medical infrastructure of the country has to be totally renovated.

Hence, there is a need to develop additional response structures to address the problems involved in differentiating between natural and intentionally induced disease outbreaks. In Indian context a focused threat analyses need to be carried out to appreciate the dangers of such threat. We currently know very little about

28 Ajey Lele, “Current Trends in Agro terrorism and its Threat Potential in Indian Context”, (Draft Paper), Institute for Defense Studies and Analyses, New Delhi, July 2005..

29 "Anthrax Scare at Indian Presidential Palace," International News, October 30, 2001 and "Anthrax Scare in Russian Embassy, Textile Ministry, UPSC*," Press Trust of India*, November 9, 2001.

30 “Sarin to smallpox: Can we handle bio-terrorism?”, Times of India, OCTOBER 06, 2001.

the actual risks associated with biological terrorism or a bio warfare. It is important to have plans in place for dealing with such scenario quickly and effectively. We have no comprehensive national policy to deal with biological warfare or terrorism. However, in the wake of the great powder (anthrax and Ricin) scare, India's defense and medical establishments have been getting concerned about a future possible germ warfare and trying to contain its natural incarnation too.

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