PUNE INTERNATIONAL CENTRE

Position Paper

National Security Preparedness in the Age of Pandemics and Disasters: Recommendations from PDNS 2021

January 2024

Abhay Vaidya and Shweta Suryawanshi

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Abhay Vaidya is Director, Pune International Centre (PIC). **Shweta Suryawanshi** worked at the PIC as a Research Assistant.

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Introduction

As of 7 June 2023, the World Health Organization's (WHO) Covid-19 Dashboard reported 6.9 million (6,941,095) deaths worldwide and more than half-a-million (5,31,884) deaths in India due to the pandemic triggered by the global spread of the novel coronavirus, SARS-CoV-2.

This pandemic has had one of the most devastating impacts on human history in terms of death, the scale of economic loss, unemployment and the rise in inequality. It also raised doubts about the future of globalisation with big, powerful nations scrambling to re-align their supply chains.

The very first outbreak of this virus was detected in Wuhan, China, in December, 2019. At the time of writing this report, it has still not been scientifically ascertained whether this virus, which paralysed most parts of the world during 2020-21, was a naturally occurring virus or originated in a laboratory.

Even as the world's most-powerful nations were brought to their knees and were powerless before this virus, the natural corollary that emerged from this devastating experience was the implication of biological warfare with such viruses as part of the 21st century arsenal.

Intense deliberations were held on the implications of the Covid-19 pandemic within the National Security research vertical of the Pune International Centre policy research think tank. These deliberations led to the formulation of the theme at the 6th Pune Dialogue on National Security (PDNS, 2021) conference: National Security Preparedness in the Age of Disasters and Pandemics.

India's capability and preparedness to deal with natural and man-made disasters was included in the theme because the grave implications of Climate Change and the pandemic on national security are inescapable. Given India's peninsular geography, the Himalayas in the north and rapid urbanisation in the world's most populous nation with 1.4 billion people, India has a high vulnerability from disasters. Further, the threat from disasters resulting from climate change are real. Alongside, what is the nature of the threats from pandemics and how should India deal with these challenges? A set of recommendations were drawn at the conference which constitute the basis for this position paper.

History of Pandemics and Disasters in India

Tirthankar Roy (2012) has recorded the socio-economic history of natural disasters that took place in India between 1770 and 1935. In India, the eighteenth century was marked by famines, most notably the 1770 famine in Bengal which affected 30 million people. A multitude of both man-made and natural disasters have occurred post-Independence. Industrial disasters include the Chasnala Mining Disaster (1975), the Bhopal Gas Tragedy (1984) and the Korba Chimney Collapse (2009). Major earthquakes include those that occurred in Uttarkashi (1991), Maharashtra (1993), Assam (1950) and Gujarat (2001). Prominent cyclones include the Andhra Pradesh Cyclone (1977) and the Odisha Super Cyclone (1999). Examples of devastating floods include the Bihar floods (1987), Assam floods (2012) and the Uttarakhand floods (2013). Also, urban floods include the Mumbai floods (2005) and the Chennai floods (2015). Major cloudbursts include those that occurred in Leh-Ladakh (2010), Kashmir Valley (2015) and Uttarakhand (2021). The Indian Ocean tsunami of 2004 affected multiple states including Tamil Nadu, Kerala and Andhra Pradesh. This tsunami would also lead to the promulgation of a new law related to disaster management in India.

Few studies have traced the history of pandemics on the Indian subcontinent including cholera (1817), bubonic plague (1896) and influenza (1918). According to Arnold (2020), epidemiologists had predicted that a century after the Spanish flu (1918-19), a pandemic was inevitable (p. 569). Furthermore, Arnold (2020) posits that due to India's population density, widespread malnutrition, and large number of migrant workers, millions of Indians were bound to suffer due to the Covid-19 pandemic (p. 570).

Every year, natural hazards such as earthquakes, droughts and storms lead to displacement of persons and loss of livelihoods. Bhardwaj (2021) examined displacement due to natural hazards in India and explained that in comparison to other South Asian countries, factors such as high population density, poverty levels, rapid urbanisation and environmental degradation puts India at a high risk of disaster displacement. In 2020, multiple natural and industrial disasters occurred concurrent to the Covid-19 pandemic. As a result, thousands were internally displaced across the country. For example, in May 2020, Northeast India was affected by cyclone Amphan. In the following month, 3 disasters struck the country - floods in Assam, the Baghjan oil fire in Assam and Cyclone Nisarga in Maharashtra and Gujarat. In August 2020, the Karnataka landslide, floods in Bihar and Maharashtra and Cyclone Nivar and Burevi in Tamil Nadu and Puducherry caused displacement of persons and loss of livelihood.

History of Disaster Management in India

The 7th Schedule of the Indian Constitution which specifies the allocation of powers and functions between the Union and states, does not mention "disaster management" in any of the lists. Traditionally, the primary responsibility for disaster management has been with the state governments with assistance from the central government. Till 2001, the Ministry of Agriculture was responsible for handling disasters.

In August 1999 a High Powered Committee (HPC) was formed by the Government of India under former Agriculture Secretary, Mr J.C. Pant, IAS, to draw up a "systematic, comprehensive, and holistic approach towards disasters." The HPC included experts from relevant fields, and members drawn from various ministries, states and NGOs. The original mandate of the HPC was confined to preparation of management plans for natural disasters only. However, it was expanded to include man-made disasters and towards developing an effective plan of action that would encompass disasters of all origins."

Just after the 2001 Gujarat earthquake, Prime Minister Atal Bihari Vajpayee convened an All-Party National Committee on Disaster Management and the HPC was converted into a Working Group of the National Committee. The All Party National Committee on Disaster Management recommended the creation of the NDMA under the Ministry of Home Affairs (MHA) and this was done in June 2002.

The Working Group in its report to the Prime Minister in June 2003 recommended a National Disaster Management Policy for adoption by the Government of India. On 26 December 2004, an undersea earthquake with its epicentre in the Bay of Bengal triggered a tsunami. Shockwaves were felt across multiple countries in South-East Asia and East Africa. In India alone, over 10,000 people lost their lives (Indian Express, 2019).

It was after the 2004 Indian Ocean Tsunami that the government took firm steps to enact a law on disaster management to provide a comprehensive framework for all activities related to disaster management. Finally, on 26 December 2005, the Disaster Management Act, 2005 was enacted and notified.

The promulgation of the Disaster Management Act envisaged the creation of a National Disaster Management Authority (NDMA). The NDMA is empowered to create disaster management plans and implement them via the respective state disaster management authorities. The Vision of the NDMA is to "build a safer and disaster resilient India by a holistic, pro-active, technology-driven and sustainable development strategy that involves

all stakeholders and fosters a culture of prevention, preparedness and mitigation." According to the NDMA (n.d.), the National Policy Framework for Disaster Management in India is "... in conformity with the International Strategy for Disaster Reduction, the Rio Declaration, the Millennium Development Goals and the Hyogo Framework 2005-2015."

Disaster Risk Reduction (DRR) as a part of National Security: Mr. KM Singh, Vice President, Policy Perspectives Foundation and Founder Member, NDMA, pointed out in his presentation on 'Disaster Risk Reduction (DRR) as a part of National Security' that DRR is the concept and practice of reducing disaster risk through:

- Systematic efforts to analyse and manage causative factors of disasters
- Reduced exposure to disasters
- Lessen vulnerability of people and property, and
- Improved preparedness for adverse events.

Under the Sendai Framework of DRR (2015-30), four main priorities were identified to mark a transition from Disaster Management to DRR:

- Understanding disaster risks
- Strengthening disaster risk governance to manage disaster risks
- Investing in DRR for resilience, and
- Enhancing disaster preparations for effective response and to 'Build Back Better'

In 2016, the Prime Minister's 10 point agenda announced in the 7th Asian Ministerial Conference primarily highlighted this new approach to DRR.

Cyclone Risk Management in Bangladesh (Cox Bazar Area) which brought down the loss of lives from 5,00,000 in 1970 to 111 in 1997 is regarded as one of the best examples of DRR.

Important initiatives in India under DM and DRR include:

- National Cyclone Risk Mitigation Project (NCRMP)
- Indian National Centre for Ocean Information Service (INCOIS)/Tsunami Early Warning System (TSEW)
- Capacity Building and Preparedness Programmes (Mock Drills), and
- Creation of the National Disaster Response Force (NDRF)

The success of Odisha's cyclone shelters and evacuation efforts as evidenced from the reduction in the loss of lives in cyclones on India's eastern coast from approximately 10,000 (Odisha cyclone, 1999) to 6 in the 2021 Cyclone Yaas has been cited as a role model globally.

Likewise, INCOIS and TSEW (established under INCOIS after 2004) have played a critical role in DRR by communicating updates on ocean state and issuing advisories to coastal communities in India and countries around Bay of Bengal, Northern Indian Ocean, Arabian sea, etc.

Covid-19 and the Indian Response

The World Health Organization (WHO) on 12 January 2020 confirmed that a novel coronavirus was the cause of a deadly respiratory illness occurring among people in Wuhan, China. Two weeks later, on 30 January 2020, India reported that its first case of Covid-19 was detected in Thrissur, Kerala, in a student returning from Wuhan. On February 4, this number rose to three with two other medical students returning to Kerala from Wuhan detected with the infection.

India's first Covid-19 fatality occurred on 12 March 2020 when a 76-year-old man who had returned from Saudi Arabia, died of the infection. The first lockdown in the country occurred in Kerala on 23 March, 2020 followed by a nationwide lockdown on 25 March 2020 which was the first of a series of lockdowns across the country. The Indian Journal of Critical Care Medicine noted that in India, the first wave began in March 2020 and lasted till nearly November 2020, while the second wave began in March 2021 lasting till the end of May 2021.

According to the European Journal of Medical & Health Sciences, the percentage share of the Omicron variant in India rose from 0.35% to 97.12% during the period November 29, 2021, to February 7, 2022. As of 7 June 2023, the World Health Organization's Covid-19 Dashboard reported 5,31,884 deaths in India due to this pandemic.

The first wave was relatively mild and the second wave, known as the Delta wave, was devastating. There was a hue and cry over the high number of deaths and acute shortage of PPE kits, essential medicines, hospital beds oxygen cylinders. Added to this was the extreme hardship suffered by thousands of poor, especially migrant casual workers, construction industry workers and labourers who began returning to their home states by whatever means available. In the absence of transport due to the lockdown, thousands of such workers, women and children were seen walking on the highways to their destination.

As with other countries, India, too, was taken by surprise by the Covid-19 pandemic and was unsure of the initial response. There was a shortage of virtually everything- ranging from

sanitizers, masks, drugs, diagnostic kits, medical equipment, hospital beds and oxygen for critical patients. The second wave, or the Delta Wave of the pandemic hit India the hardest. However, the coming together of scientists from various national and international institutions such as the WHO; Gavi, The Vaccine Alliance; Council of Scientific and Industrial Research (CSIR); National Institute of Virology (NIV); Indian Council of Medical Research (ICMR) and others; and close coordination between the government, industry, vaccine manufacturers and the medical community helped bring the situation under control.

Serum Institute of India (Covishield) and Bharat Biotech (Covaxin) led the nation in the manufacturing of vaccines, along with other pharma companies such as Dr Reddy's Laboratories, Zydus Cadila, Biological E, Gennova Biopharma and Panacea Biotech.

In October 2021, India achieved the stupendous feat of administering 1 billion Covid-19 vaccine doses. Such was the global confidence in the vaccines administered in India that they were also exported in large quantities to a number of nations under the Vaccine Maitri programme of the government.

Although India's Disaster Management mechanism was in existence since the enactment of the Disaster Management Act, 2005, it was rendered completely ineffective in dealing with the Covid-19 pandemic. This pandemic has been recognised by experts as "the biggest and worst pandemic to affect mankind since the Great Influenza Pandemic of 1918, caused by H1N1 influenza A virus, which lasted 2 years, killing over 50 million."

New Threats to National Security

The global community in the 21st century is dealing with new threats and new challenges which are of an unprecedented nature such as frequent epidemics and pandemics, disasters resulting from climate change; cyber attacks from rogue states and enemy states and bio-terrorism. Also worrisome are the implications of new technologies such as artificial intelligence (AI), advanced robotics, advanced materials, autonomous transport, and the coming together of genomics, gene editing and genetic engineering.

These challenges are new and add to the existing ones such as conflicts among and within nations and rising inequality. The focus of this paper is on dealing with challenges to India's national security from pandemics and disasters and addressing gaps in India's national security preparedness.

As was noted by Dr. Raghunath Mashelkar at the PDNS 2021, the Covid-19 pandemic was all about scale and speed. In 1331, it took the bubonic plague 16 years to move from Wuhan to Italy whereas, Covid-19 took just 16 weeks to cover the same distance. National economies and global trade was paralysed due to the pandemic and the number of lives lost exceeded six million. According to the World Health Organization's Covid-19 Dashboard, as of 7 June 2023 (12:23 pm CEST), there were 6,941,095 deaths worldwide due to this disease and 5,31,884 deaths in India.
(https://covid19.who.int/)

National Security Adviser Mr. Ajit Doval pointed out at PDNS 2021that the new areas of warfare have shifted from merely territorial frontiers to the civil society. If the common people feel threatened and terrified with an impact on their thinking, perceptions, health and physical and mental well-being and security, these cumulatively impact on the will of the nation. The security doctrines of 4th generation warfare are people-centric rather than territory-centric. The new form of warfare estimates that targeting civil society and people is a low-cost and sustainable option to beat the adversary. This new genre of security threats presents the states with a multi-layered dilemma on a massive scale and national security planning needs to factor in all these challenges.

On a similar note, Lt Gen S S Mehta pointed out that "national security is national defence and more. It has now acquired dimensions well beyond gun, tanks, and aircrafts; that unless the common man becomes the part of the system, no matter what we do, the threat looms large." In addition, peninsular India with sea coasts on both sides and with the Himalayas in the north experiences serious impact due to climate change, and all of this affects the national security architecture of the country.

Recommendations from PDNS 2021

Here are the 6 broad recommendations that emerged at the PDNS 2021:

1) Address Gaps in India's National Security with a focus on Disaster Risk Reduction
2) Invest in Healthcare
3) Strengthen Bio-defence and Bio-security
4) Achieve Deeper Integration of Science & Technology with an emphasis on Self-reliance
5) Strengthen International Cooperation
6) Deal with the Threat and Potential of New Technologies

1) Address Gaps in India's National Security with a focus on Disaster Risk Reduction

The following gaps in India's disaster preparedness were identified by Mr. K M Singh and other experts at the PDNS 2021 conference:

a) There exists administrative laxity, failure to assess risk and make plans to mitigate the impact of disasters across a variety of sectors.
b) After a disaster, efforts are made to rebuild what has been destroyed. However, there is less effort taken to develop contingency plans and invest in crisis management training so that organisations can be prepared when a crisis strikes.
c) Mechanisms for international collaboration exist but these efforts have not been maintained on a regular basis.
d) Natural disasters such as drought, floods and cyclones strike certain areas nearly every year and lead to displacement of persons and loss of livelihood. While community participation in these areas is common in the aftermath of a disaster, administrative roadblocks and financial issues need to be addressed in order to provide urgent and necessary help to displaced victims of the disaster.
e) Implementation of institutional arrangements as envisaged in the DM Act is needed: National Earthquake Risk Mitigation Project; state-specific mitigation projects for landslide preparation. Also needed are comprehensive plans for drainage, pre-monsoon cleaning to prevent urban flooding; Upgradation and inclusion of Fire and Emergency Services in the DM Framework and revamping and inclusion of Civil Defence in the DM Framework.

In sum, if national security is understood as the pursuit of freedom from threats, then addressing the gaps in disaster preparedness is critical for the wellbeing of the nation.

1b) Towards addressing the gaps: Key recommendations from the PDNS 2021 conference

a) The wise management of land and resources is necessary to prevent urban flooding, forest fires and cyclones.
b) There is a need to invest in capacity building of all stakeholders and the need to strengthen the National Disaster Management Authority (NDMA), State Disaster Management Authorities (SDMA), and District Disaster Management Authorities (DDMA).
c) Restoration of 'superintendence, direction and control' of NDRF to NDMA as provided in Section 45 of the DM Act
d) All states must have dedicated SDRFs to handle level 1 and level 2 disasters. Currently, ad hoc measures are in place. It may be worthwhile to include a provision in the DM Act for constitution of SDRFs in each state.

e) During natural disasters such as floods, cyclones and earthquakes, little to no attention is paid to rescuing livestock, which is a critical part of the rural economy. This can be addressed by making full-time appointments of experts from the animal husbandry department and agriculture department to the management authorities at all levels. Key sectors such as animal husbandry must find a mention in the Disaster Management Act.
f) Harmonisation between recommendations of the Finance Commission and provisions of the Disaster Management Act is of utmost importance, since funding is a major enabler for undertaking mitigation projects.
g) Inclusion of the private sector, academicians and researchers in the DM framework could bring in valuable resource in DRR and DM.
h) Integration of Civil Defence in the DM framework as provided in the Civil Defence (Amendment) Act, 2009.

2) Invest in Healthcare

The grossly inadequate state of the Indian Healthcare System at the primary level was exposed during the peak of the Covid-19 crisis. Thousands of patients died in vehicles and benches outside hospitals because of the inadequacy of hospital beds and emergency medical care. There was a scramble to get hold of oxygen cylinders to save the lives of near and dear ones. In some cases, oxygen was administered on the footpaths by social workers.

Recommendation: Dr. Soumya Swaminathan was among the experts at the PDNS 2021 who emphasised that investments in universal health coverage and building core capacity at the primary healthcare level is going to be critically important. This is from where the primary data will be generated and the first signals will emerge. The doctors and nurses will also need training in being able to report any unusual cluster of cases that they may be seeing. Thus, capacity building, periodic mentoring and assessment will be important.

3) Include 'Health Emergency' in the DM Act.

4) Include 'Highway Accidents' in the DM Framework with 10% of highway construction cost dedicated towards ensuring infrastructure for medical emergencies.

4) Strengthen Bio-defence and Bio-security

Across nations, the deliberate weaponisation of dangerous pathogens is a serious concern. This has heightened the need to build comprehensive national capabilities and a national strategy and legislation for biodefense, biosafety and biosecurity. Like the Disaster Management Act, 2005, a legislation on national biodefense strategy should provide for risk awareness, enclosures, biodefence preparedness, rapid response, facilitate recovery and restoration.

India will also need to create a special cadre of human resource for bio-defence and bio-security on the lines of the NDRF which has been very successful in responding to disasters.

Finally, instead of creating new institutions, existing institutions such as the NDMA, IMD, and ICMR can be re-purposed to have centres of excellence specially focused around knowledge generation, innovation, development and mitigation.

5) Achieve Deeper Integration of Science & Technology with an emphasis on Self-reliance

As with other countries, India, too, was taken by surprise by the Covid-19 pandemic and faltered in its initial response. There was a shortage of virtually everything – ranging from sanitisers, masks, PPE kits, drugs, diagnostic kits, medical equipment, hospital beds and oxygen. The second wave, or the Delta Wave of the pandemic hit India the hardest. However, the coming together of scientists from various institutions such as the Council of Scientific and Industrial Research (CSIR), Indian Council of Medical Research (ICMR) and others; industry, vaccine manufacturers and the medical community helped bring the situation under control.

This brought home the valuable lesson of achieving self-sufficiency and self-reliance in the areas mentioned above through the deeper integration of science and technology. Should India prepare for future eventualities by storing national stockpiles of medicine, devices, N95 surgical masks at regional places so that they are available within 24 hours of any bio-threat or disease outbreak?

In October 2021, India achieved the stupendous feat of administering 1 billion Covid-19 vaccine doses and this highlighted the role played by the Covid-19 vaccine manufacturers in the country, namely, Serum Institute of India (Covishield); Bharat Biotech (Covaxin), Dr Reddy's Laboratories, Zydus Cadila, Biological E, Gennova Biopharma and Panacea Biotech.

Experts at the PDNS 2021 noted that there are four different types of vaccine platforms available in the world presently – whole organism vaccine, developed by Prof. Jenner in 1796 in Oxford; the recombinant subunit vaccine; the adenovirus or plasmid DNA vaccine; and the newest platform for vaccines, namely, the mRNA (messenger RNA) vaccines which carries distinct advantages.

- The mRNA technology has been touted as the future of vaccinology. There are four independent parts of mRNA technology. Integrating all of these will help in future preparedness from the perspective of health security. Once nano lipids, enzymes, cofactors, nucleotides are secured, a national stockpile could be created. Once this platform is approved, the vaccine would be ready for any new variant in a short time.

To facilitate this, regulatory committees need to be ready to embrace new technologies. Steps have to be taken at the policy levels and at the regulatory levels to allow the use of new technologies to be better prepared for future variants and pandemics.

- Self-reliance through backward integration is required. The enzymes needed for vaccine manufacturing have to be imported and steps are necessary to start programmes to procure enzymes, which will not only shorten the supply chain, but also reduce a large chunk of manufacturing cost for vaccines.

- The CCMB (Centre for Cellular and Molecular Biology), a small lab of the Council of Scientific and Industrial Research, with the help of its students, quickly adapted to the challenges of Covid-19. CCMB reorganised its labs and became a testing centre, training centre, validation centre, and national repository for virus and patient samples for the SARS-Cov-2 in a short time. The virus was cultured to use for testing and screening of drugs, testing and validation of devices, and to develop diagnostic methods, protocols and standard operating procedures. The biology was addressed to understand the genome dynamics of spread. India's dependence on import for most components of diagnostic kits during the pandemic led the CCMB to team up with organisations to make a plan to indigenise them completely. This was done in a very corporate manner with clearly defined goals of having everything indigenous, right from sourcing components to marketing. The cost of tests, as a result, came down from ₹3000-4000 per test to ₹100 per test. This needs to be taken note of in future pandemic situations too.

- Zoonotic disease surveillance is of utmost importance, especially in places where human-wildlife interaction is increasing. The factors that need to be looked at are wildlife-people contact, cattle-people contact, and consumption of wildlife. It is necessary to be prepared for quick diagnostics, adaptation, and indigenisation.

- As noted by Dr. Swaminathan, Early Warning and Surveillance will be critically important and this would require networks of laboratories that are connected, that are at different levels doing different types of testing.

Thus, empowering vaccine manufacturers, research labs, industry and scientific establishments in achieving self-reliance in technological capabilities would go a long way in strengthening India's national security.

6) Strengthen International Cooperation: The need to strengthen international cooperation to deal with the threat of pandemics was discussed at length at the PDNS 2021. Mr. Doval pointed out that disasters and pandemics are borderless threats which cannot be combated

in isolation. Today's world of high connectivity and global opportunity also makes it a world of high vulnerability. Global and regional coordination is a key factor for which India has initiated several steps with forums like BIMSTEC, Indian Ocean Rim Association, Shanghai Cooperation Organization and QUAD. Seamless exchange of information and intelligence, sharing of experiences and lessons learned, technology transfer and coordination are important for disaster management and mitigation.

Dr. Soumya Swaminathan also emphasised this point by noting that "the next epidemic or the next pandemic is not an 'if' but a 'when', and it could be waiting to happen at any time." Pandemics, like climate change, cannot be addressed by a country at a time. Therefore, there is a need for global agreement on governance and financing, preferably with an independent financing mechanism which can come into play the moment there is a pandemic. The global response can help the worst affected nations with the supply of essentials like masks, gloves, oxygen, drugs, vaccines, diagnostics and other items of support.

- Joint development and technology transfer validation of new generation technologies are important. Prioritising the collaboration partners is necessary and India should seek collaborations with the most innovative countries.

- It would be important to build the capacity of the neighbouring countries if they don't have one and use diplomacy to monitor the labs they have, the types of pathogens they are working on and what type of pathogens they have in the country and how they have been handling them. Monetary and trade policy supply chains are very important in policy cooperation. A beginning should be made with friendly nations in the neighbourhood.

- Promote track 2 bilateral, regional and multilateral dialogues. These can later be converted into track 1 based on the inputs. Bilateral joint table top exercises have to be done.

- There should be collaboration with global organisations and NGOs. Multilateral organisations like Gavi and The Coalition for Epidemic Preparedness Innovations (CEPI) play an important role. While most of them are influenced by private players and sponsors, collaborations of all stakeholders would be of utmost importance.

Thus, managing pandemics demands multi-dimensional multi-stakeholder collaboration. It requires multi-disciplinary knowledge, and knowledge diplomacy for health security.

7) Deal with the Threat and Potential of New Technologies

As noted previously, the global community in the 21st century is dealing with new threats and new challenges from a host of new technologies. While artificial intelligence (AI) is rapidly gaining ground and the implications are being assessed, India, along with many other nations has already been a victim of cyber-attacks of various forms.

Cyberspace is increasingly driving every sector of our world, be it personal or professional and therefore, security of the cyberspace is of paramount importance.

Cyber-attacks happen with various motives, ranging from stealing data, manipulating information, engineering social behaviour, phishing, terrorism, terror financing, or locking the user's system to demanding ransom.

Adversaries have become organised criminal enterprises and use sophisticated social engineering tools to manipulate the end user to install a malware in their devices. Advanced Persistent Threats (APT) are launched from the adversaries to disrupt the functioning of the country and bring daily activities to a standstill. Disruption in Mumbai's power supply grid in 2020, Ukraine's electricity stoppage and Iran's Nuclear Power Plant dysfunction have been attributed to APT.

With two adverse neighbours, India's vulnerability and susceptibility has increased significantly. India has focused on Six Critical Information Infrastructures out of the 16 recognised world over. These include energy, health, information technology, water and waste management, transport and nuclear sectors.

While several measures are being taken to strengthen India's cybersecurity, PDNS 2021 noted that the upcoming National Cyber Security Policy is expected to bridge the gap between the security infrastructure as it stands, and the rising new threats. Additionally, the following measures were recommended:

a) Build advanced networks and resilient control structures for E-Governance.
b) Monitor outbound data traffic.
c) Create dynamic situational awareness about threats.
d) Open-source information must be constantly monitored, as 95 per cent of intelligence is gathered from open sources.
e) Investment in risk intelligence and risk management: forensic analysis and data analytics to perceive possible threats and deploy counter measures.
f) Financial Intelligence can aid in understanding the hacker's operations.

g) Tighter laws and their enforcement are necessary to secure cyberspace from adverse state and non-state actors.

Conclusion

India has come a long way in creating a Disaster Risk Reduction and Disaster Management mechanism. This has been done through the enactment and implementation of the Disaster Management Act, 2005; creation of the National Disaster Management Authority (NDMA), National Disaster Rescue Force (NDRF), the National Cyclone Risk Mitigation Project and the Indian Tsunami Early Warning System which has served India and 22 nations in the Indian Ocean region. The global community, was, however, rudely shaken up by the shock of the Covid-19 pandemic. Traditional responses in dealing with disasters proved ineffective as this disaster was driven by a deadly mutating virus against which the world had no cure.

Post Covid-19, India will need to address the gaps in disaster management and national security as identified by PDNS 2021.

Endnotes

World Health Organization's Covid-19 Dashboard. https://covid19.who.int/

PDNS 2021: The 6th Pune Dialogue on National Security 2021 convened in association with Policy Perspectives Foundation (PPF), New Delhi, The Tribune Trust, Chandigarh and Centre for Advanced Strategic Studies (CASS), Pune, was held online on October 28-29, 2021. The conference deliberations were held in four sessions:

- Session-1: Disaster Risk Reduction as Part of National Security
- Session-2: External Dimensions and Future Threats
- Session-3: Dealing with Future Challenges: Role of Science and Technology
- Session-4: Imperatives

The distinguished speakers at PDNS 2021 were: Mr. Ajit Doval, National Security Adviser, Government of India, Dr. Soumya Swaminathan, Chief Scientist, World Health Organization, Dr. Rajiv Kumar, Vice Chairman, NITI Aayog, Dr. Raghunath Mashelkar, President, Pune International Centre, Lt Gen Vinayak Patankar (Retd), Convener, PDNS 2021, Gen. N.C. VIJ (Retd), former Vice Chairman, National Disaster Management Authority, Mr. P. C. Haldar, President, Policy Perspectives Foundation (PPF), Mr. K M Singh, Vice President, Policy Perspectives Foundation (PPF), Amb. Sudhir T Devare, former Secretary, Ministry of External Affairs; Dr. S R Rao, Vice President, Sri Balaji Vidyapeeth, Col Inderjeet Singh, Chief Cyber Security officer, Vara Technology Pvt Ltd, Dr. Sangeeta Kale, Professor of Defence Institute of Advanced Technology, Dr. Sanjay Singh, CEO, Gennova Biopharmaceuticals Ltd., Dr. Rakesh Mishra, Director, Tata Institute for Genetics and Society, Lt Gen Shamsher Singh Mehta (Retd), Lt Gen Syed Ata Hasnain (Retd), Member, NDMA, Shri Kamal Kishore, Member Secretary, NDMA, Dr. Krishna Vatsa, Member, NDMA, Mr. Rajendra Singh, Member, NDMA, and Dr. Mrutyunjay Mohapatra, Director General of Meteorology, India Meteorology Department.

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ICC Trade Tower, A Wing, 5th floor, Senapati Bapat Marg, Pune 411 016
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