INDIA@2050
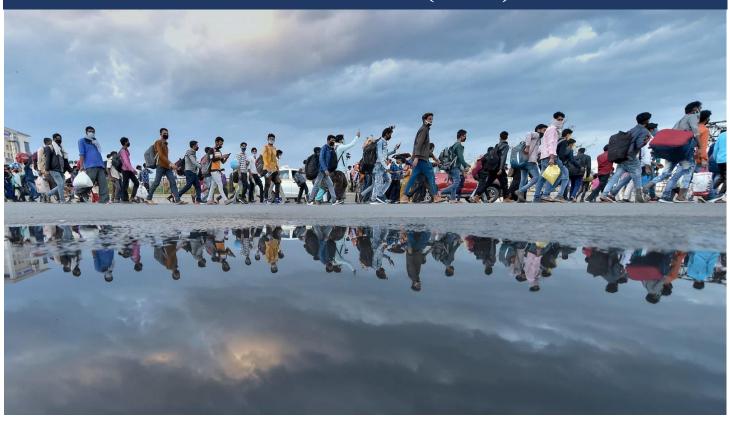# REFORMING INDIA FOR POST COVID-19 WORLD ORDER

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Founder of IADN. He has more than 10 years of experience in research and analysis. An award-winning researcher, he writes for the leading defence and security journals, think tanks and in-service publications. He has been a senior consultant to the Army Training Command (ARTRAC), Shimla and the Helicopter Training School (HTS), Indian Air Force.

The world has been successful in developing prophylactic and therapeutic measures against SARS-CoV-2 which spreads COVID-19. As we move towards the post-pandemic era, we need not only to secure the growth trajectory but also to aim to become better better-prepared nation against COVID-19 like manmade and natural disasters. To ensure that the country has improved resilience against such threats, the government will have to undertake policy reforms and initiatives in order to remain better prepared against such disasters. The paper aims to provide recommendations to ensure effective resilience and responsiveness to emerging threats of infectious and related outbreaks in worst-case scenarios which is a concern for the global economy, public safety and human security at large. Keeping in view that early planning and actions are far more important than reactive measures once the crisis is widespread. These recommendations have been devised based on analysing national and international trends to fight the COVID-19 pandemic. The paper goes beyond the interim measures which were announced by the government as part of 20 lakh Crore Stimulus Package to revive the economy. The paper will go a long way in making the country resilient to face such crises in future. The recommendations are divided based on 6 sectors- Economic, Social, Legal and Administrative, Health and Technology, Supply Chain and Environment to ensure the country's Long-term Development planning.

REFORMS FOR THE INTERNAL MIGRANT WORKFORCE (IMW)

More than 80% of India's labour force is engaged in the unorganised are not covered by labour regulations and social security net. This is the result of the complex and large number of labour laws that make compliance very costly. In 2016, there were 44 labour laws under the statute of the central government. More than 100 laws fall under the jurisdiction of state governments. The government of the day has promised to improve labour laws in India to make the labour force more mobile and assure their social security.

The state governments have been focusing on providing Direct Benefit Transfers (DBTs) to internally displaced labour during the Covid-19 crisis since the IMWs are the ones who were facing the real hit of the COVID-19 crisis. It is still unclear to what extent the DBTs from the cess would benefit migrants since neither the Labour Ministry nor the equivalent in the state governments has information on the number of migrant workers. As per the Financial Inclusion Survey on Migrants' Financial Practices, *35 per cent of migrant workers*

did not have access to a bank account in 2017-18, well after the rollout of the PMJDY.

More than 80% of India's labour force is engaged in the unorganised are not covered by labour regulations and social security net

As per the 2017 Economic Survey almost 100 million people in India are migrant workers who contribute about 10% of the GDP. In the long-term, possible means of identifying and enfranchising migrant workers could be through the amendment and strengthened implementation of the Inter-State Migrant Workmen Act, which entitles out-of-state workers to a number of welfare allowances. The recommendation of the standing committee on the amendment of the Act to issue ID cards to all migrant workers would equip them with a digital identity to access public welfare. This effort is likely to contribute towards a less disorganised migrant labour force.[i] The further labour reforms should ensure that there is no inter-state conflict regarding the matter of migrant labour.

India needs to provide special emphasis on the development of the people living in rural areas which accounts for more than 60% of the Indian population. Philosophers like Sri Aurobindo, Mahatma Gandhi and modern thinkers like Dr APJ Abdul Kalam talked about self-sufficient and autonomous villages to have a prosperous India. Promoting sustainable, self-sufficient villages can limit the great exodus of the population towards urban areas. Rural India suffers from an infrastructure deficit. Hence, improving irrigation, road, transport and storage logistics is important while improving farmer access to domestic and international markets; promotion of Township and Village Enterprises (TVEs) will help to absorb the excess labour migrating from rural areas.

The agriculture sector has a share of 49% of labour in India but contributes only 17% to the GDP; this is a sign of labour inefficiency. As many have suggested lack of skill and not a lack of a job is the real problem that India faces. India Skill

Report indicates that *only about 45.6% of the youth coming out of educational institutions are employable*. An efficient Labour Management Information System (LMIS) would help the skill training sector, by projecting the present and future demand of skills. Many Sectoral Skills Councils (industry led autonomous bodies in specific sectors) which create occupational standards, conduct skill gap studies and provide data to the LMIS are yet to reach Tier 2 and Tier 3 cities.[ii] State-wise Skill development indicators are necessary for generating jobs and future growth.[iii]
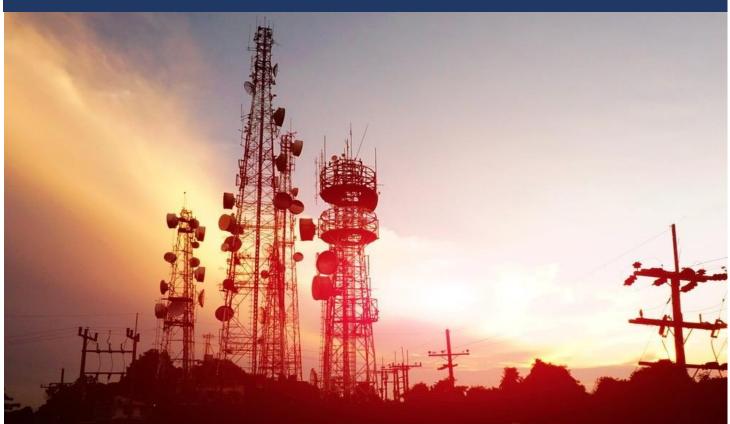
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The modern economy requires better skills at work therefore spending more and spending better on schools, training, and reskilling becomes important. The phenomena of the knowledge economy and now Industry 4.0, the industry will require new and better skills. There are long-term effects of the crisis on income and education gaps. Therefore, there is a need for more investment in the education sector—not just spending more on schools and distance-learning capacity, but also improving the quality of education and access to life-long learning and re-skilling.

Building and promoting new colleges and university is a thing of the past now the focus should shift towards building and promoting skill university which enables work-based learning/work-integrated learning, life skills and proctored/evaluated internships, integrate online learning with university programmes, recognise teachers with industry experience, including industry-based research, include industry workplaces and online classrooms as campus extensions and promote apprenticeships and further reducing labour market discrimination.

Sustainable, self-sufficient villages can limit the great exodus of the population towards urban areas

ACHIEVING LAST-MILE DIGITAL CONNECTIVITY

The Coronavirus pandemic has shown the importance of the telecom and IT sector. It is important to recognise the role that the availability of 4G and Internet bandwidth networks has played in facilitating remote working options during the lockdowns. Digital connectivity has also helped common citizens to remain connected to the rest of the world making sure they remain less anxious due to loss of physical socialising. However, as per TRAI, there are only 50% of Indians connected to the internet.

The digital divide becomes wider when we move to rural areas. The government has identified 55,619 villages with no mobile coverage and most of these villages are in the North-Eastern Region (NER).[iv] As the lockdown continues the urban child has access to digital platforms which can enable him/her to learn continuously, this luxury is not with most of the children in rural areas. Therefore, the country must aim to achieve "*last-mile digital connectivity*," especially as smartphones are becoming cheaper. The Government needs to subsidise phone data and smartphones for people in rural areas, as a significant portion

of our population does not have access to devices such as laptops, computers, smartphones, Etc.

It is important that government also focuses on achieving financial and digital literacy. Digital Literacy in India is estimated to be less than 10 per cent of the population. As per an ASSOCHAM survey, nearly 76% of the adult population in India does not understand even the basic financial concepts.[v] In order to make people self-sufficient it is important that the country achieve digital and financial literacy (or better to be called '*digital financial literacy*') so that people can be better prepared in times of such crises, focus should be on the rural sector. Promoting literacy among older adults while paying special attention to gender parity is an issue that can no longer take a backseat.

*Only **50%** of Indians connected to the **internet***

QUALITY INFRASTRUCTURE DEVELOPMENT

In India, there is an absolute deficiency in long-term city planning and revamping of existing British-era city infrastructure which doesn't allow the people to have a worthy living. It has become increasingly clear that the predominance of COVID-19 has been in dense urban centres. Mumbai, Milan, Madrid, London and New York City, all hyper-dense global megacities have accounted for the maximum number of COVID-19 cases and resultant deaths in their countries.

Till now no effort has been made to devise a strategy to address the issue of population density in urban areas. In Mumbai which has recorded the highest number of corona cases, the demographic burden can be understood by the following statistics- about 2,000 people occupied one square kilometre in 1901, increasing to 9,000 people in 1961, over 20,000 in 1991, and 28,000 per square kilometre in 2011.[vi]UN projections suggest that *India's urban population will increase from 461 million in 2018 to 877 million in 2050*, *with India contributing the largest share of global urban population growth from 2018 to 2050.*[vii]

As per a 2012 report around 49% of the population of the capital state of Delhi lives in slums and unauthorized colonies without any civic amenities.[viii] In less than 45 days, the world's largest slum Dharavi, Mumbai with a population of seven lakh people living in about 2 sq. Km. Area recorded over 1000 COVID-19 cases.[ix] It has been realised by the experts that open space, clear air are important to curb coronavirus and other pandemic and epidemic cases. The small and cramped, unsanitary dormitories or slums with low hygiene standards and shared community facilities (water taps, common toilets, etc.) provide for an easy spread of communicable diseases. Hence, the government must focus on making the country slum-free.

*The government should continue to **convert slum** structures into **apartment complexes** as part of **vertical growth** to better manage **urban stress***

The government should continue to convert slum structures into apartment complexes as part of vertical growth to better manage urban stress. The government is focusing on building 2.95 core housing units in rural areas and 1.2 crore housing units in urban areas by 2022 under PM Awas Yojana (PMAY). The New Urban Agenda needs to be tailored to the needs of the urban poor to allow them equal access to basic amenities and services. The public transport is so less that it doesn't allow for social distancing. The leading cities significantly lack in open spaces for recreation, amenities and circulation. The public transportation system must be rebounded with the real capacity of the cities. Cities such as Milan are planning ways to continue the unanticipated health advantages of reduced vehicle traffic, such as adding bike lanes and relying more on active public transport.
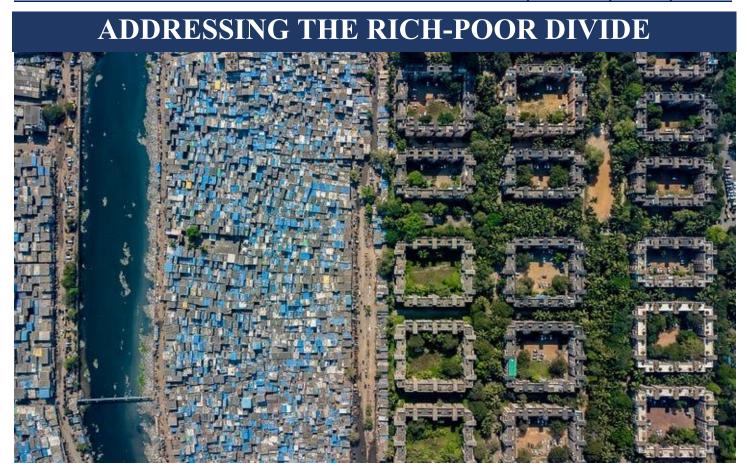
The government must ensure a more liberal **geospatial data policy** *for* **effective city planning** *and management*

The coronavirus spreading in the Western cities was partly due to the innate Western culture of socialising and outing. While Western cities enjoy quality living coupled with better health and wellness opportunities, India not only faces the challenge of hyper-dense cities but also a low-quality human lifestyle. The National Sample Survey Office (NSSO) data on Housing and Sanitation in 2018 puts light on the tense housing facilities in which the Indian population lives. It says that more than 50 per cent of households collect drinking water from common sources, including the common use of households in the building, 39 per cent of the households have to go out of their premises for drinking water and nearly 9 per cent of the households walk more than 200 metres to get drinking water, the drainage system in slum and squatter settlement is also vulnerable with 27 per cent of households having open drain and 17 per cent with no drainage system, and 21 per cent of slum and squatter settlement households are estimated to have no arrangement of collection of garbage of the households by any agency.[x]

It is believed that mass migration and urbanization make the whole world vulnerable to rapidly transmitted, deadly diseases like in case of Covid-19. India has limited urban accommodations, nearly half of India's urban population is concentrated in states such as Maharashtra, Gujarat, Delhi, Tamil Nadu, Karnataka, Punjab and West Bengal. Economic and industrial growth in these states attracted skilled and non-skilled populace from states such as Bihar, Uttar Pradesh, Odisha and Jharkhand. However, the infrastructure of the receiving states was never meant to sustain this unprecedented load. Therefore, there is a need for new urban clusters. There should be proper mechanisms to predict rural-urban reflux for advance planning of cities. India needs to get its focus on data-driven and evidence-based governance with open-source initiatives. The government must ensure a more liberal geospatial data policy for effective city planning and management.

Importance should be given to advancing City Management Practices (CMPs) as thirty municipal areas in the country account for 79% of India's coronavirus infection caseload,[xi] the fact will reinstate the need for a complete overhaul of the Municipal organisations which have become the hotbed of corruption and administrative negligence since inception. The government needs to give attention to data-driven city management such as centralised traffic control, surveillance, and drainage management, focusing on advanced city management tools ensuring quality and transparent public services. The Centralised Control Centres (CCC) form the core of the smart city initiative and are essential for surveillance, emergency and clinical command situations, Integrated Traffic Management (ITM) and Disaster Management- assuring the Real Time Governance (RTG).[xii] Hence, policymaker can use this information to formulate better-targeted policies for the populations that stand to benefit from them the most.

*India needs to get its focus on **data-driven** and **evidence-based governance** with open-source initiatives*

ADDRESSING THE RICH-POOR DIVIDE

The coronavirus pandemic has taken our attention towards the most peculiar problem of our society which is the rich and poor divide. A survey by Oxfom states that *the richest 1% in India cornered 73% of the wealth generated in the country in 2017*.[xiii] The policymakers must pledge to significantly reduce this divide. Besides increasing per capita incomes through rapid and equitable economic growth, one of the long-lasting methods to tackle this problem can be enabling the poor to avail all those basic resources which the rich avail, paving way for an egalitarian society. The citizens must have the Right to certain essential Services. Stronger labour market regulation is important as it supports earnings (e.g., with minimum wages), income security (e.g. with pensions, unemployment insurance and sick-pay benefits) and income earning abilities (e.g. with healthcare provisions, education and up-skilling).[xiv]

*Oxfam states that the richest **1%** in India cornered **73%** of the **wealth generated** in the country in **2017***

Former RBI Governor C. Rangarajan notes that *the definition of a developed country is one whose per capita income is USD 12,000. It will take 22 years for India to reach that level provided it grows at 9 per cent per annum.*[xv] The social safety net not only includes the right to food, shelter, to education but also the right to health. In the long term, measures need to be implemented in order to enhance the savings of these people to make them better secure for such crises. There have been debates in many countries, especially in India whether to implement a Universal Basic Income scheme post-COVID-19 pandemic. Critique argued that it is doubtful that such a scheme can help India in strengthening the position of those poor (the people who are in real need of such insurance) because a major part of the population remains hand to mouth which will not allow such capital to be used as saving or ensuring long-term productivity.

Provided the population density and the state of the economy, the money that will be provided under such a scheme would best be called rudimentary in nature with limited or no lasting effect. It is believed that the government should push the money for the overall development of the economy. Providing equitable opportunities and ensuring basic amenities for living will ensure people's upliftment out of poverty and make the poor more self-reliant. India should focus on winning the battle against poverty. Preparing to introduce formal unemployment insurance systems could be a step in the right direction in the long term.

If there is one lesson from this crisis, it's that our society is only as strong as its weakest member. Achievement of the UN Sustainable Development Goals is important to make people self-sufficient to manage the tough situations arising due to such crises. The coronavirus pandemic has taken our attention towards achievement of the SDG 2 (food security), SDG 3 (universal health coverage) and SDG 6 (access to clean water and sanitation) as part of developing resilience within the population to fight against such disasters. To culminate SDG 17 include "*to end poverty and hunger, in all their forms and dimension*"

Achieving these will reduce the government's efforts towards ensuring the public well-being during times of emergency and allow the government to focus on other issues of national importance. Proper hygiene and sanitation, fresh Food and water security, and accessible primary healthcare centres are the basic need to avoid people from getting into the poverty trap due to health and illness issues. Greater allocation to the public health and education sector should be seen as an investment rather than an expense therefore progressive taxation must be introduced to address widening income inequality.

*Providing **equitable opportunities** and ensuring **basic amenities** for living will ensure people's **upliftment** out of **poverty** and make the poor more **self-reliant***

CORPORATE REFORMS

Improving corporate resilience and responsiveness to emerging threats of infectious disease is a huge concern for the global economy and public safety. Billions of capital and millions of lives and livelihoods depend on the business community's collective response to such threats.[xvi] Therefore, businesses should make disaster resilience plans with clear operational objectives in advance so that they can implement these plans when required, in the face of a potential disaster.

This will make sure that they are less affected by pandemics, epidemics and related disasters and reduce corporate exposure to critical outbreak risks. The businesses also have to evolve based on the experience gained from this crisis. It is inevitable that in post-lockdowns, companies will have to focus on the reduction of business operations costs. In markets throughout the world, companies traditionally dependent on hard assets are shifting toward asset-light business models, by cutting nonessential costs.[xvii]

Businesses should make disaster resilience plans with clear operational objectives

Some experts believe that companies that rely more on technology can better manage to survive during such crises basically as it significantly reduces human-to-human interactions. As in the case of manufacturing, the 3D printers have ensured a steady supply of Personal Protective Equipment (PPEs) even while the crises continue.[xviii] Companies need to find out avenues where they can increase technology intervention to have better efficiency at work. As the crises pass and the new normal established, the companies need to become more innovative, they had to increase their spending on Research and Development (R&D).

The Economic Survey of 2018 says that *India's spending on R&D in terms of percentage of GDP has been stagnant at 0.6 to 0.7 per cent in the last two decades -- much lower than the US, China, South Korea and Israel*. While the share of the private sector in R&D investment in most technologically advanced countries is as high as 65 per cent to 75 per cent, it is only about 30 per cent in

India. About 70 per cent of R&D expenditure is incurred by the central government alone with no active participation of the state governments. In India, the link between research, higher education and industry is weak and nascent. It needs to be strengthened and put on a firm platform.[xix] Identifying and easing the regulatory frameworks for developing new medical products can help enable rapid response to COVID-19-like crises.[xx] Hence, R&D and innovation can make a significant difference in addressing urgent developmental challenges such as providing access to clean drinking water, low-cost renewable energy solutions, eradicating neglected diseases or reducing hunger Etc.[xxi]

The CERT-In quoted that "*there is an increase in the number of cyber-attacks on computers, routers and unprotected home networks used by employees who have switched to remote working due to the spread of COVID-19.*"[xxii] As we move towards a more digital world, as a backdrop the sophistication of cyber-attacks is also increasing, provided that AI and Machine learning applications are making cyber-attacks more sophisticated and devastating. As companies move towards more digitisation it is important to ensure the protection of their routine operations. Therefore, adequate funding needs to be there to ensure cybersecurity. According to *Fortinet*, a cybersecurity solutions provider conducted a survey in the year 2017 and found that *approximately 84% of India's organisations have fallen prey to security breaches from local and foreign sources in the last 2 years*. As per CISCO 2018 Annual Cybersecurity Report *Indian companies have lost $500,000 to cyber-attacks in the last 1.5 years*.

As per GAO, 85 per cent of the nation's critical infrastructure is owned by the private sector. Given the nature and scale of the threat, Indian companies are not investing enough in cybersecurity. For example, global banks spend up to 15% of their IT budget on IT security but in India, it's hardly 2-3% of the IT security budget. India must explore the legal path against such companies. One reason for Indian companies getting affected by cyber-attacks is due to rampant use of unlicensed software and, in some cases, underpaid licences which make them sitting ducks for cyber-attackers.[xxiii] Besides building India's own cybersecurity infrastructure and asking the companies to invest in cybersecurity components,

educating employees and service beneficiaries about schemes and how to avoid common scams through techniques such as phishing testing, it is also important promoting the Cybersecurity insurance industry which can help in tracking down the financial cost related to Cybersecurity breaches. [xxiv]

*AI and **Machine learning** applications are making **cyber-attacks** more sophisticated and **devastating***

Business needs to be more customer-focused and should leverage digital technology solutions such as Online Appointment Scheduler, Customer Relationship Management (CRM), Collaboration Applications, Accounting/Billing Applications, acceptance of Digital Payments, and automation of repeatable tasks. Collapsing external demand, capital outflows and falling commodity prices are witnessed across various sectors in post Covid-19 economy which requires organisations to become lean which means, there is a need to improve data-driven decision-making and data availability. Making the employee more effective with up-skilling and cross-skilling is important; employees armed with digital skills have become a necessity for corporate resilience to such threats.

As part of Industry 4.0, there is a new and fast-improving set of digital and analytic tools that can reduce the costs of operations while fostering flexibility in organisations is important. Taking advantage of the Covid-19 crisis the airlines and car-rental companies have already developed contactless consumer journeys. Post Covid-19 economy has induced the need to reduce man-in-the-loop, curtailing the expansion of third-party economy and enabling direct factory-to-customer satisfaction. The application of advanced analytics can help companies get a sense of their customer's needs without having to walk the factory floor; it can also enable contactless delivery.

HEALTH SECTOR REFORMS

COVID-19 came with disruption to the domestic health sector, the mitigation and adaptation measures should address a complete overhaul of existing health infrastructure and ensure equitable access to healthcare services at cost-effective rates, this shall include policy-related reforms and Science and Technology (S&T) initiatives For undertaking reforms in the health sector of the country to be better prepared for such disasters, focus areas can be telemedicine, diagnostic chains, achieving universal immunization, increasing the doctor-to-people ratio, addressing shortage of nurses, paramedics and support staff, enlarging hospital capacity to be able to accommodate more number of patients and increasing public healthcare efficiency to ensure equitable, affordable and timely access to health services. Some analysts believe that the countries with better public health infrastructure have performed better in containing this pandemic. India aims to achieve Universal Health Care (UHC); India has ensured free treatment and testing of 40-50% of India's population under the Ayushman Bharat, a universal healthcare scheme.[xxv]

To realise effective universal healthcare, our allocation to health as a percentage of GDP must go up substantially in order to realise effective universal healthcare coverage. India's investments in the health sector have historically been low, at no time over 1.3% of its GDP, compare this to 5% in China, 8.1% in South Korea, 10.9% in Japan. The constitution of India guarantees free healthcare for all its citizens, and yet the private healthcare sector has been the primary source of health care for 70% and 63% of households in urban and rural areas of India respectively. On the other hand, public healthcare sector has catered to only 18% of total outpatient care and 44% of total in-patient care.[xxvi]

More than 55 million Indians are pushed into poverty every year due to out-of-pocket healthcare expenses, especially towards primary healthcare. Of the 55 million who fall below the poverty line due to illness, more than 38 million do so because of medicine costs alone. As the demand for healthcare increases, ensuring universal healthcare requires cheaper and far more easily available drugs and testing facilities.[xxvii] Achieve improved availability and access to quality healthcare to people, especially for those residing in rural areas, the poor, women, and children.

*More than **55 million** Indians are pushed into poverty every **year** due to **out-of-pocket healthcare expenses***

We must comprehensively make our health systems, pandemic and economic shockproof and ensure that they serve the normal healthcare needs of people uninterrupted. The government needs to emphasis on health emergency preparedness. According to the 2019 National Health Profile, India currently has 713,986 beds—or 0.55 beds per 1,000 people—in government hospitals. Of these, only 5-8 per cent—an estimated 35,699-57,119—are ICU beds, while those with ventilators, at an optimistic estimate of 50 per cent of all ICU beds, are only about 17,850-25,556. Even if the private sector infrastructure were to be included in this capacity, India would still need 80 to 100 times the available number of ventilators if one considered a "worst-case scenario" besides the fact

many of these ventilators would already be in use for the treatment of other patients.[xxviii] Substantial R&D would be required to make the medical system and medical infrastructure cheaper. For better public health, the state must have full capacity to convert stadiums, trains, universities and hotels into hospitals on demand and quarantine beds with better coverage of Health insurance

The countries will have to carry on the fight against various non-communicable and communicable diseases as they make people more vulnerable to such pandemics by promoting healthy lifestyle practices. WHO data has attributed 61 per cent of all deaths in India to NCDs like heart disorders, cancer and diabetes, the prevalent problem of under-nutrition also needs to be controlled. We must pay attention to both the preventive and curative aspects of public health. We must address lifestyle issues and look for holistic solutions.[xxix] Lifestyle changes are essential to prevent, mitigate and treat NCDs which goes beyond the traditional health sector reforms.

*We must **comprehensively** make our **health systems**, **pandemic** and **economic shockproof***

NITI Aayog in its Strategy for New India notes that the following preventable risk factors are causes for a major proportion of diseases in the country: maternal and child malnutrition, air pollution, unhealthy diets, high blood pressure, high blood glucose, tobacco consumption, unsafe water, and poor sanitary practices; of these, nutrition, environment, water and sanitation are outside the purview of the health ministry. Despite India's 50% increase in GDP since 1991, more than one-third of the world's malnourished children live in India. Therefore, accountability for ensuring vital public health actions is spread thin. The large burden of NCDs requires lifestyle and community-level interventions. Ensuring people eat right, sleep right, maintain good hygiene, exercise, and adopt a healthy lifestyle necessitates concerted interventions at various levels of the system.

There must be an emphasis on alternative systems of medicine like Ayurveda, Homeopathy, Unani and Siddha. There has been inadequate focus on

comprehensive preventive care and primary care in the past. Government needs to identify key research areas in traditional medicine and facilitate collaborative research with modern systems of medicine. ˣˣˣ Rising Awareness through entertainment education is also important for encouraging people to adopt healthy lifestyles and habits. By some estimates, it takes at least 10-20 years to create an aware culture.

Another undone task is to build digital infrastructure for the health sector for timely reporting to promote disease surveillance with the help of Artificial Intelligence, cloud technology, and big data analytics in order to make the data secure on a real-time basis. The idea is to integrate all medical hospitals in one grid whether private or public and form a data repository about the patients including things like the type of disease they are suffering, possible reasons behind it, demography of the patients etc. This can ensure near-real-time tracking of health issues that the Indian population faces starting from the district to the national level.

Being aware of the problem the Health sector then concentrates its efforts towards the mitigation of problems that affect the majority of the citizens by concentrating effective preventive and curative measures hence making universal health coverage more effective and outcome-based. For instance, if an area witnesses a large number of cases related to typhoid. The Government then can ensure an effective resolution of the problem for example by improving the quality of water and ensuring safe water supply in the area as many of the diseases require multifaceted efforts which go beyond the Health sector, it will also ensure limited cost in managing the prevalent problem by synergizing the efforts.

precision medicine by ensuring development of customized medicines based on the demographic profile

Any area classification must include key socio-economic and demographic determinants, for example, the density of the area, number of people in dwellings with one room or less, or the fraction of people using community toilets. In fact, the adverse mortality in some areas is directly correlated with the local shortage of medical care. For most districts in Maharashtra, shortages would start biting at about 200 cases per day. Such metrics would indicate vulnerable areas. Here, decongestion measures such as out-migration may be required. This will also serve as a guide to the future of the locality or ward. Ensuring that our villages and towns are prepared to meet the disease is an important objective. One metric to measure preparedness is the number of beds, doctors and ambulances per 1,000.

To a greater extent, this can also help in forwarding the idea of precision medicine by ensuring the development of customised medicines based on the demographic profile data can provide a path towards revolution in public health. Government has already launched the Genome India Project for gene-mapping of diverse population of India. Prof. K. Vijay Raghavan, Scientific Advisor to Government of India notes that *Genetic Data Analysis can greatly help to limit the lifestyle diseases by understanding their genetic background. It has become important to make personalized medicines.*[xxxi]

Demographic profile data can provide a path towards revolution in public health

Such programme can establish real accountability on the part of Government and further help overall public health policy making. The government need to ensure transparency in publishing and sharing of health records. It is important that countries have a standard transparent disease reporting mechanism as there are cases where countries and states had hide numbers of diseased individuals. With the National Digital Health Blueprint (NDHB), the Ministry of Health and Family Welfare of India (MoHFW) has outlined an architectural framework as well as infrastructure requirements to integrate health data across the public and private sectors. [xxxii] multi-national, cross-jurisdictional data

systems and indicators of how pathogens are spreading is one of the best ways to improve pandemic responses.[xxxiii]

Making Tri-health policy, here, the focus should be on ensuring Environmental Health, Public Health and Animal Health, finding out the interlinkages in these sectors is important to develop resilience as part of 'one health' initiative. Further research needs to be done to achieve optimal health outcomes by bringing together multiple sectors and combine the expertise of health professionals, biologists, veterinarians, virologists and ecologists, among others, in designing policies and programmes.[xxxiv]

Tri-health policy with focus on ensuring Environmental Health, Public Health, Animal Health
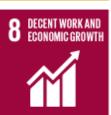
FOCUS ON FUTURISTIC MEDICAL RESEARCH
COVID-19 COMES WITH SIGNIFICANT TECHNOLOGICAL AND MEDICAL R&D CHALLENGES

❖ Immune boosters

❖ Cheaper ventilators

❖ Technologies for large-area decontamination

❖ Automatic sanitization machines for home and commercial purposes

❖ More comfortable and body-friendly PPE

❖ New anti-viral drugs

❖ Economical, generic drugs

❖ Robots to serve infected patients

❖ Nano-technology to fight alien agents in body

❖ Better disease surveillance system

❖ AI-based contact-tracing

❖ Ready to deploy hospitals

❖ Self-treatment kits to avoid burden on hospitals

❖ New anti-microbial medicines to arrest Anti-microbial Resistance

❖ Editing of viruses and bacteria to make them harmless

❖ Reduction in medical and hospitalization costs with new models and plans

❖ Further the Genome research

❖ Integrated Research in Genealogy, Anthropology and Epidemiology[xxxv]

❖ More focused research in virology, genetics, epidemiology and related subjects.

❖ Tools to reduce psychosocial burdens (E.g. loneliness)

TOWARDS DISASTER RESILIENT INDIA

India has mooted the idea of the international Coalition for Disaster Resilient Infrastructure (CDRI). Whether it's a commit hitting the earth or an earthquake, disasters will continue to challenge civilisation especially when extreme climatic events increase in its intensity. India is vulnerable to a wide range of natural hazards. Disasters cause massive human and economic losses across the world. It has been estimated that between 1995 and 2015, disasters caused between USD 2 to 2.5 trillion in economic losses.

Due to the changes in climate patterns, hydro-meteorological or climatological hazards are likely to cause even more damage in the future due to the unpredictability of their frequency, intensity and location. It is important that we remain prepared for it. The development of governance and policy arrangements is required to enable the integration of disaster and climate resilience concepts in all infrastructure creation. Expanding the availability of insurance and strengthening the sovereign's overall financial strength can lessen the impact of climatic disasters and hence reduce financial stability risks.

*Enable the **integration** of **disaster** and **climate** resilience concepts in all **infrastructure creation***

The first requirement for a disaster-resilient infrastructure is sustainable city planning and development. India's city development planning and implementation remains in an abysmal state. In order to have better-prepared cities, the average city life of any state should be considered to be up to 100 years. After which it will certainly require rejuvenation, if not hit by a disaster. Therefore, long-term city development plans must become an integral part. The government can take 50-50-year approach under which the long-term city development plans would be implemented in the first 50 years and the rest 50 years would be utilized for making-up the fiscal space and planning for rejuvenation projects once a hundred years are complete. The fund can also be utilized for emergency mitigation measures in case of a major disaster.

Countries need to prepare a comprehensive blueprint, with detailed action plans and strategies, on bio-threat preparedness, response, mitigation and restoration. New guidelines must be issues regarding making Indian Armed Forces prepared to operate in Nuclear Biological Radiological and Chemical (NBRC) environment. We must have a central database of pathogens. There should be robust surveillance mechanisms, which would include development of nanotechnology-based bio-radars with sensor arrays for pathogens. All this should be backed by comprehensive containment, decontamination and restoration strategies.[xxxvi]

Better disease surveillance mechanism needs to be searched upon; use of digital technology can help with contact tracing. Technological solutions like data on travel patterns and health symptoms, and leveraging the smartphone penetration can help countries to build contact-tracing.[xxxvii] The Galwan Valley dispute with China shows that it is better to keep armed forces untouched in times of epidemics to ensure effective strategic deterrence when required, in between an eminent health crisis like the pandemic.

*Countries need to prepare a **comprehensive blueprint**, with detailed action plans and strategies, on **bio-threat preparedness**, response, mitigation and restoration*

Supply chains in India are out-dated, it has got multiple intermediaries. The supply chain must be ready for normal as well as emergency periods. Most of the chain planning in India is conducted to meet the demand for up to month time, now the planning requires undertaking longer duration as well as operating during emergency conditions. Intermediaries and people in engaged needs to be reduced and more focus should be on digitization. The digitisation enables smooth functioning of this chain even during COVID-like disruptions. [xxxviii] It is important developing contingency plans to minimize supply-chain disruptions in times of crisis.

Improved data visibility into supply chains will considerably improve citizens' quality of life and can pave the way for future supply-chain improvements. Integrating the supply chains at the provincial level could reduce the costs of running multiple supply-chain systems and improve inventory management. The data visibility is critical to healthcare systems operating efficiently.[xxxix] The increase data visibility of specified essential commodity demand in each province and improved stock levels based on the visible demand (with help of just in time inventory management) will allow the country achieve its projected cost reductions by localising the supply chains.

There are various modes of data entry, for example, through centralized locations at the national, state, or facility level. The digitization will allow interlinking the demand by both public and private sectors, and ensure collaboration in times of emergency. The COVID-19 crises has given us the learning that the supply chains within nations need to be diversified especially those of essential commodities to ensure their availability during the crises, for this one way can be creating conditions for "reverse migration'' by setting-up

important plants in rural areas or away from city hubs this shall enhance employment avenues in the rural areas.[xl]

> ## *Digitization will allow interlinking the demand by both public and private sectors, and ensure collaboration in times of emergency*

The companies need to adopt cost-effective global supply chains and just-in-time inventory management techniques. To create long-term resilience we will likely see further Robotic Automation and more Artificial Intelligence (AI) within our supply chains. These technologies reduce manual intervention and hand-offs, cutting transmission risks, and reducing the reliance on humans to work face-to-face (e.g. promoting automatic check-ins, payment and check-outs. They can also enable production to scale and shrink in response to sudden demand.[xli]

Reducing dependency on foreign nations for essential medical commodities is important. India is highly dependent on certain goods from China, such as India imports most of the Active Pharmaceutical Ingredients (APIs) from China (around 75%). Similarly, India also imports technical textile from China which is important to manufacture PPE clothing. Ministry of Commerce and Industry notes that *India's import from China mainly dominated by electronics, telecom, electrical equipment and pharmaceuticals*.[xlii] Whether in times of emergency or not, country needs to ensure that it has adequate hospital facilities as well as required pharmaceutical and non-pharmaceutical stock to meet the need both in ordinary and extra-ordinary conditions like the disasters. Overall, India's health-related goods dependency on China is the highest in the world.

> ## *India imports most of the Active Pharmaceutical Ingredients (APIs) from China (around 75%)*

In 2017, India imported health-related goods worth US$ 10.3 billion from various countries; of these, more than one-third (39 percent) came from China. However, India ranks amongst the largest net exporters of health-related

goods in the world. India must strategize to build a robust export capacity in order to become a reliable "global health security provider".[xliii] With around 70 per cent production of global vaccines and of drugs, India is well placed to fulfil the role of "net public health security provider" for the region and the world.[xliv] India's "Pharma Vision 2020" is to make India a global leader in end-to-end manufacture.

In terms of essential commodities, more emphasis on food security policies, infrastructure to feed the majority of people during such crises and security of water supply by having piped water connections to all households in order to ensure safe water supply. Clean water is necessary for cooking, cleaning, and laundry because many people come into contact with disease causing pathogens through their food, or while bathing or washing. Majority of rural India continues to live without proper access to safe drinking water.[xlv]

The focus should be on modern ground water conservation techniques. Water Sensitive Urban Design and Planning (WSUDP) can which is the integrated design of the urban water cycle, combines water supply, wastewater, storm-water and groundwater management, urban design and environmental protection, contributing towards sustainability and livability.[xlvi]

Achieving self-sufficiency such as by enhancing agriculture productivity (achieving high crop yield) but in India nearly 40% of all fresh food produced in India perishes before it can get to customers.[xlvii] This is when India remains poor in the Global Hunger Index (GHI) besides being the second largest producer of food in the world. The COVID-19 crisis has highlighted the fragile ecosystem of food security and the need for heavy investment in this sector that is desperately wanted.[xlviii]

*In India nearly **40%** of all **fresh food** produced in India perishes before it can get to customers*

As the COVID-19 crises continue, the oil prices have seen its record low but the demand for the electricity has remained steady. This shows growing importance

of electricity in sustaining human's life on earth. As per the British Petroleum *the coal accounts for more than 58% of India's energy generation and India probably has good amount of coal reserves within country for electricity generation which can be made use of at times of crises.*[xlix]

India is the world's third largest coal-producing country and second largest coal importer. The coal would remain at the centre stage in India with its share in the energy mix as the non-renewable source of energy is yet not fully exploited. The Organisation of Economic Cooperation and Development (OECD) in *India's Energy Outlook (2015)* outlined that *India is expected to import 90% of its crude oil by 2030 from sea and its coal imports are expected to be more than double to 300 million tons by 2040.*[l] It is believed that India has the capacity to sustain the demand for hydropower with its own coal reserves. The government has also open-up the coal mines to be owned by the private sector but if the economies of scale are met with the imports then the government should continue importing the coal while ensuring effective infrastructure in place to resort to national mines when the strategic uncertainty emerges. It is important to ensure that achieving self-sufficiency doesn't undermine policy flexibility which can come with great economic cost and requires effective structural reforms. **[End]**

*India is expected to import 90% of its **crude oil** by 2030 from sea and its **coal imports** are expected to be more than double to 300 million tons by **2040***

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the country by 2022, which would be the first point of contact for a citizen to access the public health infrastructure in the country. These centres are instrumental in strengthening the primary healthcare capacity in India, a necessary condition for any healthy nation since majority of citizens do not have to access hospitals and specialists for common diseases and ailments. The scheme Provides annual health cover of Rs. 5 lakh to 10.74 crore to poor families. Saxena, Ridhima. "COVID-19 Testing, Treatment Is Now Covered under Ayushman Bharat Scheme." *Livemint*, 4 Apr. 2020, www.livemint.com/news/india/COVID-19-is-now-covered-under-ayushman-bharat-scheme-death-toll-86-so-far-11586001274077.html.

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