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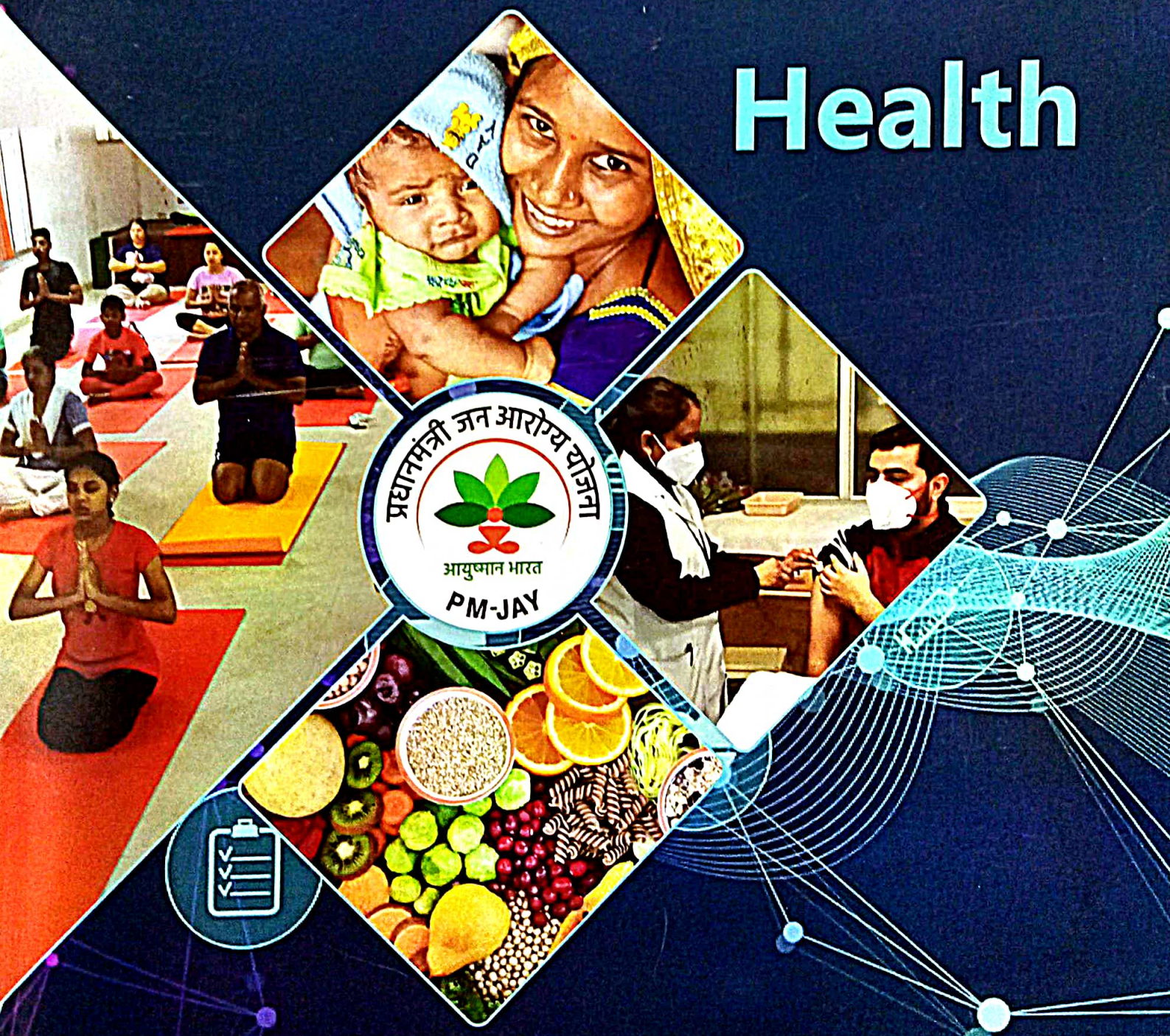

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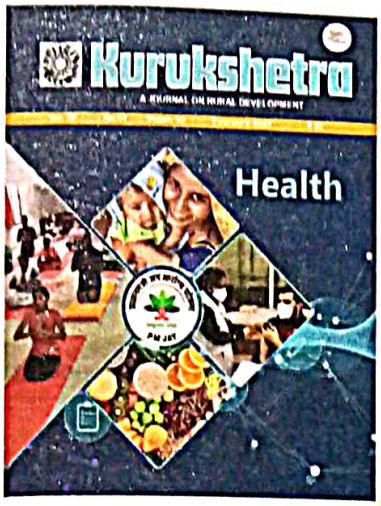

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EDITORIAL

The February issue of Kurukshetra is based on the theme 'Health'. We have chosen this topic to disseminate information as to what is happening in this sector through different topics. India has started several schemes and promoting numerous awareness programs to ensure health for all. The government has special focus on the rural India where it has pitched for providing several health facilities especially for women and children.

As the country has been courageously fighting the COVID-19 pandemic, the government is making out all efforts to provide the citizens best possible care and treatment to the infected people. The vaccination coverage is going at a rapid pace and awareness is being raised about the precautionary measures via several online and offline means of information.

In this issue, we have published articles on topics such as Ayushman Bharat, NFHS-5, Yoga for Good Health, e-Health Services and Technology Interventions, Rural Healthcare Infrastructure, Maternal and Child Nutrition, and Make in India.

The article Ayushman Bharat: Universal Health Coverage touches upon the concept of UHC and the role of Ayushman Bharat to achieve its targets. This scheme was formulated and implemented in the country based on the recommendations of National Health Policy. It is envisaged that this initiative will help India in achieving the Sustainable Development Goals (SDGs); its mandate being "leave no one behind".

The article Rural Healthcare Infrastructure focuses on the fact that with more than 70 percent of India's population living in rural areas, the importance of rural healthcare facilities cannot be over emphasised. It gives an insight on the National Rural Health Mission (as part of the National Health Mission). This article also touches upon the status of healthcare workers posted in rural areas and gives a brief about ASHA workers who are rightly called the fountainhead of community participation in public health programmes in villages.

As NFHS-5 is representative on a national and subnational (at the state and district levels) level, its findings on a range of indicators pertaining to health and nutrition, among others, from over 6 lakh sample households can assist policymakers in identifying crucial areas where better policy can provide course correction. The importance and key findings of NFHS-5 has been highlighted in the article National Family Health Survey-5.

While the COVID-19 pandemic has placed never-seen-before demands on modern healthcare systems, the industry's response has vividly demonstrated its resilience and ability to bring innovations to market quickly. Several such innovative solutions have been discussed in the article Fighting Against COVID-19. Cloudspital Pvt. Ltd, TikTalkto, Thermaissance etc, are some of the innovations contributed to the society, by start-ups of Atal Incubation Centres. Many of these solutions have helped people in their fight against the pandemic and are also continuing to do so.

This issue also features a special article on Make in India. The Make in India initiative is designed to facilitate investment and foster innovation while boosting skill development that would finally build one of world's best manufacturing infrastructure in India. This article includes major sectoral success stories of Make in India in the fields of Defence, Automobiles, Retail, etc.

We wish our readers a very happy reading. Stay Home Stay Safe.

Ayushman Bharat: Achieving Universal Health Coverage

Dr Santosh Jain Passi and Dr Sukhneet Suri

Since its inception, Ayushman Bharat has been trying to successfully meet its objectives of ensuring comprehensive coverage for catastrophic illnesses, reduce catastrophic out-of-pocket expenditure, improved access to hospitalisation/health-care, reduce unmet needs, and converging various health insurance schemes across the different states of India. Several notable achievements have been observed in various Indian states/Union Territories like Jammu and Kashmir, Madhya Pradesh to name a few.

The burden of malnutrition and ill-health is unacceptably high all over the world, including India. As per the World Health Organisation (WHO), attaining the highest possible standard of health is a fundamental right of every human being. In December 2017, the then Director General - WHO, reiterated that "The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition"; and this is much more relevant today than ever. The right to health has been central to WHO's identity and mandate since its inception.

For achieving the targets of Universal Health Coverage, the Government of India has implemented a flagship public health scheme – 'Ayushman Bharat'. Based on the recommendations of National Health Policy, this scheme was formulated and implemented in the country. It is envisaged that this initiative will help India in achieving the Sustainable Development Goals (SDGs); its mandate being "leave no one behind". Developed with the main objective of providing comprehensive need-based healthcare service delivery system under the Ministry of Health and Family Welfare, it has a budget of nearly Rs. 8,000 crore for the financial year 2021-2022. It aims to holistically address the healthcare system-covering prevention, promotion and ambulatory care at all levels - primary, secondary and tertiary. To enhance the quality, efficiency and efficacy of healthcare delivery, it draws expert services and facilities from various sectors/departments.

Ayushman Bharat has two major components namely:

- Health and Wellness Centres (HWCs), and
- Pradhan Mantri Jan Arogya Yojana (PM-JAY)

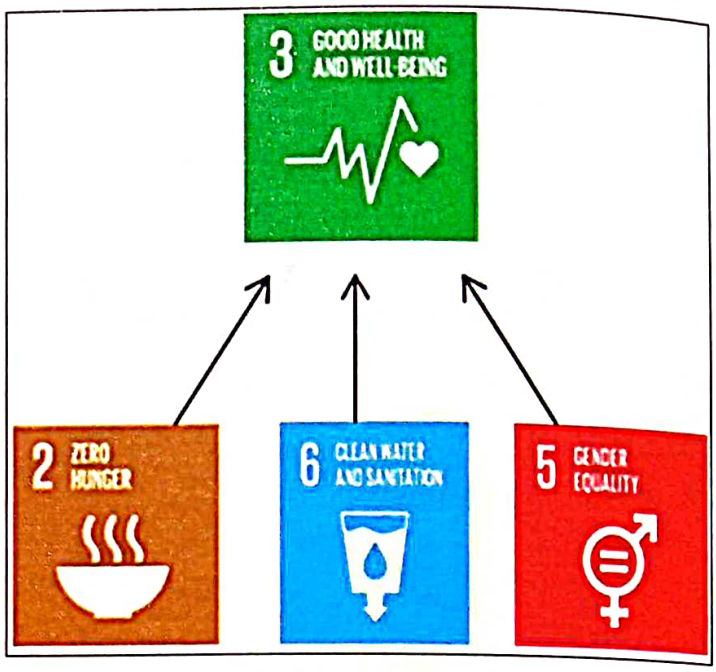
Health being a fundamental human right and healthy individuals the foundation of a strong nation, India is committed to ensuring the highest attainable level of health for all its people through the mandate of Universal Health Coverage (UHC). This would also help in meeting the targets of Sustainable Development Goals (SDGs), especially the SDG-3 (Good Health and Well Being).

The concept of universal health coverage (UHC) is not new, it was first proposed by the Bhore Committee in as early as 1946 highlighting that all individuals and communities should receive the health services they need without any economic stress. The committee recommended integration of preventive and curative services at all levels and laid out a plan for strengthening the primary healthcare.

At global level, the Alma-Ata Declaration (1978) had emerged as a major milestone in the field of public health. It had identified primary health care as the key for attaining the goal of 'Health for All' by the year 2000AD. Thereafter, commitments set in the Millennium Declaration (September 2000) led to the formulation of Millennium Development Goals (MDSs) which comprised 8 goals with 21 targets and a series of measurable health and economic indicators for each target. While all these inter-dependent MDGs influenced health; three MDGs-4, 5 and 6 directly addressed the health-related issues. In 2015, UN General Assembly launched the Sustainable Development Goals (SDGs) – a collection of 17 global goals with a total of 169 targets and a set of 232 indicators for measuring the progress. Of these, the SDG-3 addresses health directly while the SDG-2, SDG-6 and SDG-5 address health indirectly. The 40th anniversary of Alma-Ata Declaration (Alma-Ata at 40: from 1978 - 2018) came at a time when Primary Health Care is once again receiving well-deserved attention.

However, the Astana Declaration (2018) is a shift from Alma-Ata (primary health care) towards Universal Health Coverage (UHC) for attaining the

Figure 1: Health Related Direct and Indirect SDGs



sustainable development goals; and envisioned the:

- Governments and societies to prioritise, promote and protect people's health and well-being, at both population and individual levels, through strong health systems;
- Primary healthcare and health services to be of high quality, safe, comprehensive, integrated, accessible, available, and affordable for everyone and everywhere, provided with compassion, respect, and dignity by health professionals who are well-trained, skilled, motivated, and committed;
- Enabling and health-conducive environments in which individuals and communities are empowered and engaged in maintaining and enhancing their health and well-being;
- Partners and stakeholders to align in providing effective support to national health policies, strategies and plans.

WHO (2017) has highlighted that "Investments in health systems could prevent 97 million premature deaths by 2030"

According to the World Health organization (2021), Universal Health Coverage includes the full spectrum of essential quality health services - from health promotion to prevention, treatment, rehabilitation, and palliative care across the life span. It aims at reducing morbidity and mortality

by facilitating easy, economical and secure access to good quality health services to the masses.

Malnutrition arising mainly due to food/nutrition insecurity is the worst form of non-communicable disease. Inadequate food consumption heightens vulnerability to infectious diseases. Malnutrition has long been known to undermine economic growth and perpetuate poverty. It adversely affects economic productivity of the individuals and thus, their household income which in turn impacts their food availability/consumption. Poor availability of nutritious food ultimately affects their nutrition/health status, stamina, endurance and the work capacity.

Traditionally, our diets were rather healthier and nutritious; however, modern lifestyles and industrialised nutrition is a shift from 'health promoting diets' to 'disease causing diets'.

By facilitating economical access to health services, the nation can help in breaking the viscous cycle of morbidity and poverty, especially among the vulnerable resource-poor population groups. It is aimed at supporting the economically weaker and deprived population groups who often have to sell their assets, take loans and/or compromise on their basic amenities in trying to meet the illness-linked medical expenses. As a result, such population groups often remain away from being able to maintain good health and well-being. Therefore, it is recommended that Universal Health Coverage (UHC) should particularly focus on:

- The proportion of population (among the general and the most disadvantaged groups) that can access essential quality health services (SDG 3.8.1)
- The proportion of population that spends a large amount of household income on health (SDG 3.8.2)

Universal Health Coverage – The Framework of Action

To meet the SDGs targets, nations across the globe are trying to achieve UHC with a focus on its three major pillars:

- Service Delivery
- Health Financing
- Governance

Since different nations have their own unique health concerns, resource pool and challenges, they need to develop their need-specific framework of action keeping in mind the following aspects:

1. Finance

- Expand financial pool by promoting public-private partnerships and corporate-social responsibility
- Increase domestic resource mobilisation and budget re-allocation at frequent intervals
- Enhance affordability of health services, infrastructure, medicines and related items
- Provide financial protection to each citizen if the country
- Facilitate efficient and judicious time-bound utilisation of financial resources

2. Health Services

- Establish people-centric health services
- Ensure equity and bias-free health service
- Prioritise health services which are of most significance to reducing mortality and morbidity
- Promote partnerships between the civil society (community) with public/private sector so as to enhance access to key preventive, rehabilitative and curative health services
- Invest in pre-service medical and para-medical education
- Engage in multi-sectoral partnerships to address determinants of health

3. Equity

- Target vulnerable populations so to develop and implement health/nutrition programs tailored to their needs
- Expand service delivery for marginalised and vulnerable groups (age, gender, demography, etc.)
- Scale-up safety net approaches including

vouchers and conditional cash-transfers which directly or indirectly support good health and well being

- Ensure fulfilment of basic rights especially of women, children and elderly

4. **Preparedness**
   - Prepare and regularly improve National preparedness plans especially for natural disasters
   - Promote adherence to the International Health Regulations
   - Refer to international framework for monitoring and evaluation of policies and program which are directly or indirectly related to the health sector
   - Enhance State level and international collaborations to prepare for and respond to public health emergencies such as epidemics/pandemics

5. **Governance**
   - Establish platforms and processes which facilitate dialogue between various stakeholders (service providers and receivers)
   - Ensure workable effective mechanisms for inter-sectoral dialogue and work
   - Establish transparent monitoring and reporting on progress towards UHC and make it available on public domains
   - Strengthen national institutions and organisations through capacity building
   - Ensure that all citizens have access to data and information on UHC

The World Health Organisation and World Bank have provided indicators which can help in measuring as well as keeping a track on the progress overtime. They have given 16 essential health services (grouped under four 4 categories) as the indicators of level and equity of coverage in the country (figure 2).

Many countries have been making progress towards UHC; however, the COVID-19 pandemic has adversely impacted the ability of health systems to provide undisrupted health services. Even in countries where health services have traditionally been accessible and affordable, governments are finding it increasingly difficult to respond to the ever-growing health needs of the populations and the increasing costs of health services.

Figure 2: Universal Health Coverage - Indicators for tracking the progress

Reproductive, maternal, newborn and child health
• family planning • antenatal and delivery care • full child immunization • health-seeking behaviour for pneumonia.
Infectious diseases
• tuberculosis treatment • HIV antiretroviral treatment • use of insecticide-treated bed nets for malaria prevention • adequate sanitation.
Non-communicable diseases
• prevention and treatment of raised blood pressure • prevention and treatment of raised blood glucose • cervical cancer screening • tobacco (non-) smoking.
Service capacity and access
• basic hospital access • health worker density • access to essential medicines • health security: compliance with the International Health Regulations

Indian Scenario and the Progress So Far

India's health related policies and programmes have witnessed several challenges, successes and failures during its 74 years old journey. The earlier strategies - prior to 1947, were based on the health system inherited from the British. During the post-independence to pre-pandemic period, India was making a good progress in terms of scaling up of its national health and nutrition services. The COVID-19 has tested the strengths and weakness of our health sector including risk-identification, risk-assessment and risk-alertness which are important components of a surveillance system.

Infant Mortality Rate is an important key indicator for a country's healthcare and standard of living; lower infant mortality rate indicates a higher standard of healthcare.

A comparison of the data pertaining to some salient health indicators over a period of 70 years (1950-2021; Table 1) indicates that the life expectancy at birth has nearly doubled; and that there is reduction in the fertility rate (by ~2.7 folds), birth rate (by>2.5 folds), infant mortality (by~6.6 folds) and all-cause mortality rate (by~3.8 folds). Despite the favourable trends, a lot more has yet to be achieved by our country to improve the health status of our people.

Ayushman Bharat for Universal Health Coverage

As already mentioned, Ayushman Bharat has two major components namely - Health and Wellness Centres (HWCs) and the Pradhan Mantri Jan Arogya Yojana (PM-JAY). Both these components work in tandem for supporting the objectives of prevention, treatment, management and over all well-being of the population with special emphasis on the vulnerable and resource-poor segments.

Health and Wellness Centres (HWCs): It is envisaged that 1,50,000 Health and Wellness Centres (HWCs) would be created under Ayushman Bharat which would also involve the transformation of existing Sub-centres and the Primary Health Centres (PHCs). The major objective of HWCs would be to provide Comprehensive Primary Health Care (CPHC) closer to the residence/vicinity of the people. These centres would particularly aim at providing maternal and child health services along with delivery of health services for major non-communicable diseases. In addition, these centres will also provide free essential drugs and diagnostic services.

It is envisaged that the HWCs would improve availability, accessibility and equity regarding health services to the community. Emphasis would be laid on health promotion along with prevention of diseases by engaging and empowering the individuals/communities for choosing healthy behaviours and making changes that reduce the risk of developing chronic diseases and other morbidities.

Pradhan Mantri Jan Arogya Yojana (PM-JAY): popularly known PM-JAY, it is the other equally important component of Ayushman Bharat. Launched in 2018, it is the largest government funded health assurance scheme in the world which aims at providing a health cover of Rs. 5 lakhs per family per year for secondary and tertiary care hospitalisation to over 10.74 crore poor and vulnerable families (approximately a

Table 1: Time Trends in Salient Health Indicators (1950-2021)

Year	Life Expectancy at Birth (years)	Fertility rate	Birth rate	Infant Mortality rate	All-cause Mortality rate
1950	35.21	5.91	44.18	189.63	28.16
1960	41.13	5.89	42.07	161.74	22.48
1970	47.41	5.6	39.23	141.82	17.45
1980	53.47	4.86	36.22	114.74	13.5
1990	57.66	4.09	31.82	88.79	11.01
2000	62.28	3.35	26.64	66.73	8.80
2010	66.43	2.64	21.51	45.31	7.59
2020	69.73	2.2	17.59	29.85	7.31
2021	69.96	2.18	17.38	28.77	7.34

Source: https://population.un.org/wpp/Download/Standard/Population/

Note: Life Expectancy at Birth (in years) refers to the average number of years a newborn is expected to live under the prevailing mortality rates; Fertility rate is the average number of live children born per woman; Birth rate is number of children born per thousand persons in a year; Infant Mortality Rate refers to the number of children dying under one year of age per 1,000 live births; All-cause Mortality rate refers to the number of persons dying from all causes of death per thousand persons in a year.

total of 50 crore beneficiaries) form the bottom 40 percent of the Indian population. The inclusion of households, both from the rural and urban areas, is based on the deprivation and occupational criteria of Socio-Economic Caste Census-2011 (SECC 2011) which have been listed in figure-3. In addition, it would provide cover to the beneficiaries earlier covered under Rashtriya Swasthya Bima Yojana but currently not included in the SECC 2011 database. It also provides support to the beneficiaries of Employees State Insurance Corporation (ESIC/ ESI).

Figure 3: List of Eligible Beneficiaries: Rural and Urban Households

RURAL BENEFICIARIES
The rural beneficiaries that will be included have been classified as: • D1- The families residing in only one room with *kutcha* walls and *kutcha* roof • D2- The families having no adult member aged between 16 to 59 years • D3- The households with no adult male member aged between 16 to 59 years • D4- The families having disabled member and no able-bodied adult member • D5- SC/ST households • D7- Landless households deriving a major part of their income from manual casual labour
URBAN BENEFICIARIES
The urban beneficiaries will include: • Ragpickers • Beggars • Domestic workers • Street vendors/Cobblers/Hawkers/other service providers working on the streets • Construction workers/Plumbers/Masons/ Labours/ Painters/ Welders/ Security guards/ Coolie sand other head-load workers • Sweepers/ Sanitation workers/ Mali • Home-based workers/ Artisans/ Handicrafts workers/ Tailors • Transport workers/ Drivers/ Conductors/ Helper to drivers and conductors/ Cart pullers/ Rickshaw pullers • Shop workers/ Assistants/ Peons in small establishments/ Helpers/Delivery assistants/ Attendants/Waiters • Electricians/ Mechanics/ Assemblers/ Repair workers • Washer-men/Chowkidars

The annual benefits of Rs. 5 Lakh can be used by any one or more members of the family covering up to all the members. There is no capping on family size or age of the family members. In addition, pre-existing diseases are also covered from the very first day. This means that the eligible individuals suffering from any medical condition even before enrolling under the PM-JAY will be able to get treatment for all those medical conditions right from the day of enrolment. The key features of PM-JAY, thus, include:

- It is the world's largest health insurance/ assurance scheme fully financed by the government which provides a cover of Rs. 5 lakhs per family per year for secondary and tertiary care hospitalisation across public and the empanelled private hospitals in India.
- Over 10.74 crore poor and vulnerable entitled families (approximately 50 crore beneficiaries) are eligible for these benefits. There is no restriction on the family size, age or gender.
- PM-JAY provides cashless access to healthcare services for the beneficiary at the point of service i.e. the hospitals. Thus, it envisions to help mitigate catastrophic expenditure on medical treatment which pushes nearly 6 crore Indians into poverty each year.
- It covers up to 3 days of pre-hospitalisation and 15 days post-hospitalisation expenses incurred on diagnostics and medicines. All pre–existing conditions are covered from day one.
- Benefits of the scheme are portable across the country i.e. a beneficiary can visit any empanelled public or private hospital in India to avail cashless treatment.
- Services include approximately 1,393 procedures covering all the costs related to treatment - including but not limited to drugs, supplies, diagnostic services, physician's fees, room charges, surgeon charges, OT and ICU charges, etc.
- Public hospitals are reimbursed for the healthcare services at par with the private hospitals.

Salient components covered under PM-JAY - the health assurance scheme:

- Medical examination, treatment and consultation
- Pre-hospitalisation
- Medicine and medical consumables
- Non-intensive and intensive care services
- Diagnostic and laboratory investigations
- Medical implantation services (where necessary)
- Accommodation benefits and Food services
- Complications arising during treatment
- Post-hospitalisation follow-up care up to 15 days

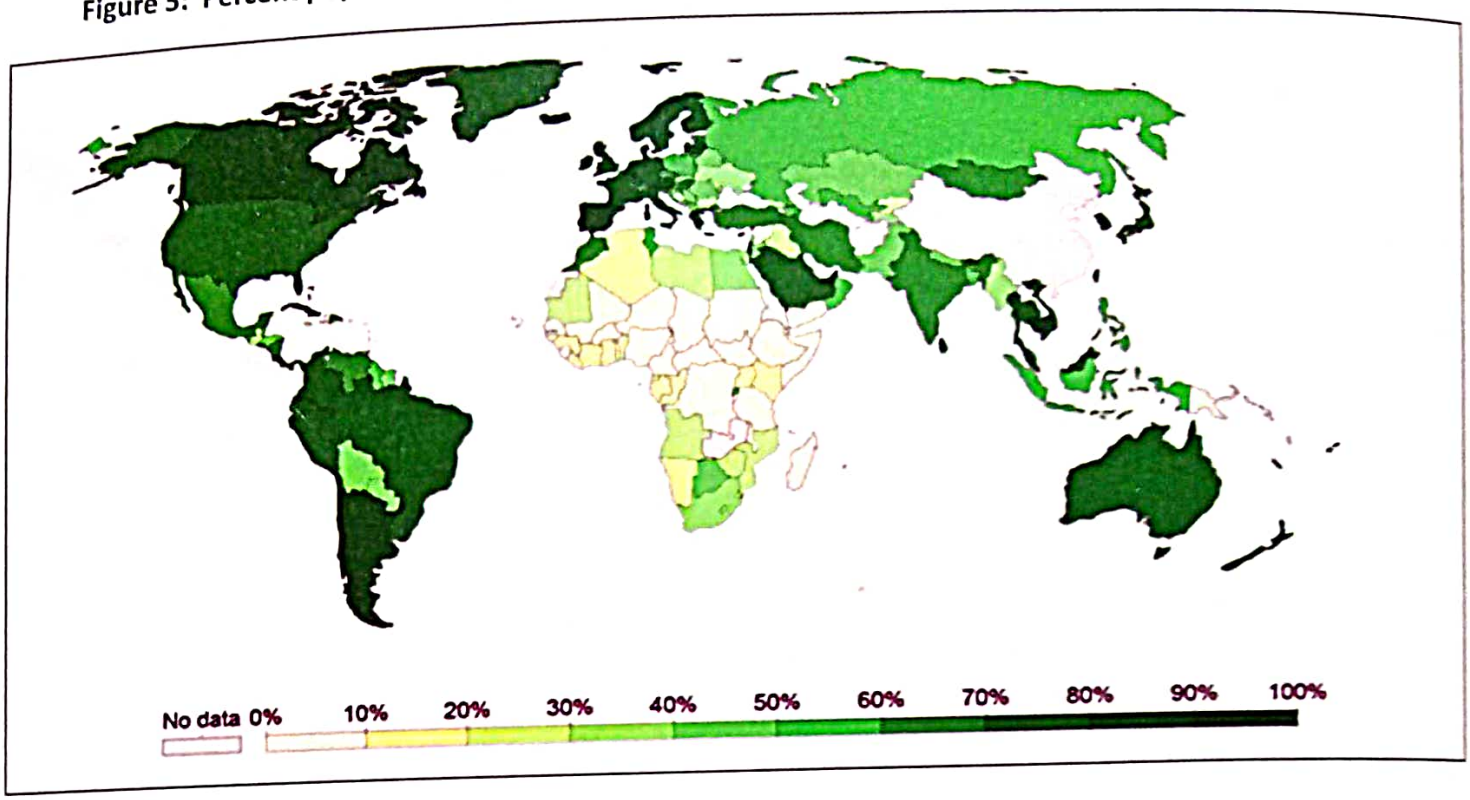
PM-JAY has played a significant role since its launch – a little more than three years back. By December 2021, more than 17.3 crore (17,35,71,234) Ayushman Cards had been issued to the beneficiaries. Data indicate that of these, more than 2.6 crore (2,61,36,725) individuals were admitted in the hospitals and 8.3 lakh COVID-19 cases have been treated successfully. Salient Milestones of PM-JAY (from 1st February 2018 to 10th August, 2020) are given in Figure 4.

Further, Ayushman Bharat has facilitated successful implementation of the COVID-19 vaccination drive; and for this in addition to the Government hospitals, 10,000 private hospitals have also been looped in. Online registration, geo-reference maps with GPS coordinates, mapping of COVID-19 vaccination centres (for cold chain) were some of the characteristics of this largest vaccination drive in the world. Comparing the world vaccination status, the progress made by India in vaccinating its people has been rather appreciable, particularly viewing the large population size. The share of India's population in the world who have been administered at least one dose of COVID-19 vaccine is depicted in figure 5.

Since its inception, Ayushman Bharat has been trying to successfully meet its objectives of ensuring comprehensive coverage for catastrophic illnesses, reduce catastrophic out-of-pocket expenditure, improved access to hospitalisation/health-care, reduce unmet needs, and converging various health insurance schemes across the different states of India. Several notable achievements have been observed in various Indian states/Union Territories like Jammu & Kashmir, Madhya Pradesh to name a few. To quote the Additional Chief Secretary of Jammu & Kashmir "After two years of successful implementation, the Government of Jammu & Kashmir decided to extend the benefits of AB PM-JAY to the entire population through 100 percent government funding mechanism and launched Universal Health Coverage (AB PM-JAY SEHAT) on 26th December, 2020. The response has been overwhelming; more than 50 Lakh beneficiaries have been registered under the scheme(s); and under the scheme's portability feature, more than

Figure 4: Salient Milestones of PM-JAY (from 1st February 2018 to 10th August 2020)

Figure 5: Percent population (Global & Indian) administered at least one Dose of COVID-19 Vaccine



3000 J&K residents have received treatment from reputed health care providers outside Jammu & Kashmir".

Data indicate that despite the current pandemic, during the last five years, there is a slight improvement in the health indicators (Table-2).

Table 2: Data Pertaining to Some Select Health Indicators during the Preceding Five Years (2017-2021)

Year	Life Expectancy at Birth (years)	Fertility rate	Infant Mortality Rate
2017	68.97	2.27	33.42
2018	69.27	2.24	32
2019	69.5	2.22	30.9
2020	69.73	2.2	29.85
2021	69.96	2.18	28.77

Note: Life Expectancy at Birth (in years) refers to the average number of years a newborn is expected to live under the prevailing mortality rates; Fertility rate is the average number of live children born per woman; Infant Mortality Rate refers to the number of children dying under one year of age per 1,000 live births. It is envisaged that Ayushman Bharat will continue to build up several success stories even during the tough and turbulent times of COVID-19 pandemic. Its true impact in achieving Universal Health Coverage will become visible only after a few years of post-pandemic period.

Healthy people are the back-bone of a strong nation

Let's make India strong by ensuring good health of our people irrespective of their class, creed, gender and socio-economic status!!

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Kurukshetra

FORTHCOMING ISSUE

March 2022 : Budget

Fighting Against COVID-19

Neeraj Sinha and Naman Agrawal

With a vision to establish India as a global hub for start-ups on the world map, Atal Innovation Mission since its inception is working to become a powerhouse of innovation and entrepreneurship. Till today, Atal Innovation Mission has established a total of 68 Atal Incubation Centres. Spread across the length and breadth of the country, these business incubators are supporting start-ups by providing technological facilities and advice, initial growth funds, network and linkages, co-working spaces, lab facilities, mentoring, and advisory support. Many of these solutions have helped people in their fight against the pandemic and are also continuing to do so. These torchbearers are also inspiring other entrepreneurs and young minds across the country to create new, disruptive and innovative products, services and solutions which can pave a path for a sustainable future.

The global COVID-19 crisis, which descended upon the world with unimaginable swiftness, quickly escalated and deeply disrupted lives, livelihoods, and economies everywhere. Its infectious spread has affected people from all walks of life in all countries, accelerated by the complex interconnected world in which we all live in, where the movement of people is essential to the economy of almost all countries. The COVID-19 crisis has left countries gasping in search of immediate solutions, even as the best scientists and researchers in the area of health and biotechnology in the world are diligently looking for a solution or a vaccine to end this crisis.

A crisis of this magnitude spreading rapidly requires urgent, preventive, and curative solutions in several categories—these ranges from high-quality reliable masks, PPE, disinfectants, contact tracking, etc. There is an urgent need to test, deploy, and evolve these solutions quickly over the next months. Not only does this require significant innovation appetite, but it also requires incredible agility on the part of businesses and government institutions to effectively capture and eliminate the threat of COVID-19.

Along with the fight against COVID-19 on the health front, India needs to keep its expansionary economic policy as a priority in 2022. However, the room for action is limited and further complicated by the COVID-19 outbreak. In 2019, India implemented an expansionary economic policy to support the slowing economic growth.

In spite of the limited available opportunities, the Government of India would likely spend more on key projects as a counter-cyclical measure. Specifically, there are priority areas. The first one is poverty alleviation projects. 68.8 percent of the Indian population lives on less than $2 a day. Over 30 percent even have less than $1.25 per day available - they are considered extremely poor. This makes the Indian subcontinent one of the poorest countries in the world; women and children, the weakest members of Indian society, suffers the most.

Against this background, Government announced an economic stimulus package of Rs. 20 lakh crores to support economic activity in the production sector in a bid to ensure the supply of medicines and daily necessities. The effort is further targeted at encouraging enterprises and people to donate money and goods and at easing the tax and fee burden on industries that are heavily hit by the virus outbreak.

With the difficult task of protecting more than 1.3 billion people from the clutches of corona virus, the Government of India is pursuing several initiatives in parallel to ensuring the safety of the country from the global pandemic with multiple challenges. Despite the diversity that one can imagine being part of it, the benefit of its population is its innovative and emerging ecosystem with more than 30,000 new active companies.

In fact, it is not surprising that the government wants to take advantage of its active system as India is one of the fastest-growing ecosystems in the world. For many reasons that go beyond the COVID-19 crisis, the ecosystem of start-ups, benefited by its demographic dividend, is essential to the future of the nation.

NITI Aayog Spearheading the Fight against the Pandemic

The last decade has witnessed a tremendous growth in Indian start-up and innovation ecosystem. Today, India stands with third largest group of scientists and technicians in the world and is predicted to be the world's largest supplier of university graduates by next decade. In the recent times, India has prioritised fostering innovation and encouraging technology development by engaging research and development institutes, academia, industries, start-ups and even individual innovators.

By 2030, India aims to become one of the largest economies, by focusing on the innovation ecosystem in the country. Entrepreneurial boost to the Indian economy has helped hundreds of start-ups in pinning huge success by attracting global investors and creating successful business models. The adaptation to user centred innovation processes by start-ups, penetration of internet and infrastructure connectivity has complemented the growth of new businesses and innovative solutions.

With a vision to establish India as a global hub for start-ups on the world map, Atal Innovation Mission since its inception is working to become a powerhouse of innovation and entrepreneurship. Till today, Atal Innovation Mission has established a total of 68 Atal Incubation Centres. Spread across the length and breadth of the country, these business incubators are supporting start-ups by providing technological facilities and advice, initial growth funds, network and linkages, co-working spaces, lab facilities, mentoring, and advisory support.

These incubators are working in sectors like Healthcare, AI, Deep-Tech, EdTech, Agriculture and allied, Renewable energy, Electric Vehicles and Cleantech among others. These incubators are fostering the next generation of innovators and entrepreneurs who will be influencers of tomorrow.

Following are some of the innovations contributed to the society, by start-ups of Atal Incubation Centres. Many of these solutions have helped people in their fight against the pandemic and are also continuing to do so. These torchbearers are also inspiring other entrepreneurs and young minds across the country to create new, disruptive and innovative products, services and solutions which can pave a path for a sustainable future.

Cloudspital Private Limited

CloudSpital Pvt. Ltd. is a platform manufacturer which aggregates doctors and hospitals. The platform also provides 24 types of body details through self check up, it also provides free workout, diet and lifestyle plans. Cloudspital mainly focuses over school health and hygiene management. Cloudspital is also aiming to generate employment for 4 lakh+ Trained Nursing Staffs in different schools. Cloudspital also filed a patent with All India Institute of Medical Sciences, Patna over a specialised product for COVID-19 patients. The recent PICU digitalisation project of Bihar Government is done by Cloudspital in association with AIIMS.

Cloudspital telemedicine project is running under the guidance of a trusted government hospital of India - All India Institute of Medical Science, Patna. In 2020, they reached a milestone in developing a remote stethoscope which can operate in real-time scenario, and it can be connected to a normal mobile device. Even in areas with no internet connectivity the heart oscillation can be heard on a voice call.

Thermaissance

Thermaissance's mission is to reduce the healthcare-associated and community-acquired infections. The start-up has developed nanotechnology-based textiles that can successfully inactivate various viruses, bacteria and fungi. The fabric technology has been scientifically tested in various ISO certified laboratories and has been proven to deactivate over 99.99 percent Corona virus, *Staphylococcus aureus, Klebsiella pneumoniae*, *E-coli*, MRSA, VRE, CRE and Mucor species. The technology works 24/7 by disrupting the membrane of viruses and bacteria, eventually killing them by hindering their ability to thrive.

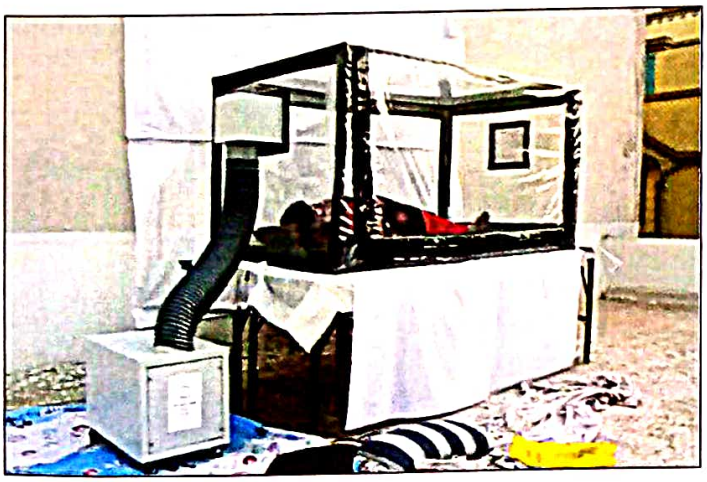
The start-up uses these fabrics to make various medical textiles such as scrubs, gowns, patient clothing, lab-coats, masks, gloves, head caps, reusable PPEs, reusable coveralls, etc. These textiles are reusable for 100+ washes, making it long lasting and super cost effective. Further, their textiles are certified as non-toxic, fire resistant and safe to use. At the same time, Thermaissance

textiles are extremely skin friendly and provide day-long comfort to the wearer.

By reducing the infections, the start-up aims to ensure that people stay fit, mortality is reduced, and their work is not impacted. Their products for healthcare workers provide them adequate protection as well as comfort and reduce the various heat-related illnesses that disposable textiles cause. Their products are reusable, recyclable and non-toxic. These can reduce the solid waste generation by over 99 percent and carbon emission by over 63 percent vis-a-vis disposables. The Start-up has adopted 9 out of 17 UN's Sustainable Development Goals in their business model.

Edith Robotics Solutions LLP

The start-up has developed isolation pods for infection control. Patients infected with infectious diseases or immunocompromised patients can be isolated within negative/ positive pressure chamber, patients' exhale can't directly mix-up in the environment, it is filtered and sterilised before mixing up with the air in the environment. With an aim to prevent the spread of any airborne virus/bacteria/fungi, it can save millions of lives who can be infected by providing biosafety level 4 protection at healthcare facilities. Its advantages include treatment of multiple infection patients at same place, low cost and portable negative pressure chamber with filtration and sterilisation to provide healthcare facilities in rural area. It is India's first individual patient isolation solution for healthcare facilities.



TickTalkTo

For people facing emotional difficulties, TickTalkTo is a mobile-based platform that connects

them with mental health experts who can help them lead happier and healthier lives. Mental health is three-pronged challenge. Firstly, there is a huge mental illness burden. In India, more than 150 million people suffer from mental disorders. TickTalkTo leverages technology to provide a telepsychology platform which can improve access to mental healthcare at scale. Secondly, there is a grossly inadequate mental healthcare support structure. India has just about 1,000 clinical psychologists and 4,000 psychiatrists. TickTalkTo is able to increase efficiency of existing practitioners by automating mechanical tasks. In addition, the platform also generates flexible livelihood opportunities for skilled mental healthcare workers and hence pulling the existing passive but skilled workforce into the active workforce. Finally, the uptake of mental health services is very low on account of lack of awareness, lack of access, lack of affordability and stigma. TickTalkTo improves access and affordability to mental healthcare in a stigma-free safe space.

The outbreak of the COVID-19 pandemic in 2020 led to an incidental significant rise in mental health concerns. This increasing need for mental health services was further worsened due to the social containment measures that limited the physical access to existing mental healthcare facilities. This rising problem gave this start-up a major opportunity to rise up to the occasion and participate in integrating psychological crisis intervention into the overall deployment of epidemic prevention and control. They have been

able to extend mental health services to various strata of society - frontline workers, countrymen directly and indirectly impacted by COVID-19.

Rises Analytics Solutions Private Limited

RISES is working on high-tech healthcare AI solutions at scale. It has a vision to bridge the gap between patients and timely medical intervention and to extend diagnostic decision support to healthcare professionals to serve patients with efficacy, accuracies and insights, with innovative technology-TRAP (Treatment Response Assessment and Predictions).

Rises's Chronic and Critical Care solutions for "Cancer and Pulmonary conditions including Covid-19" are getting traction worldwide. It works as Clinical Decision Support Software for healthcare professionals, Deep Learning analysis of primarily medical imaging data. For India, the main issue is extending the healthcare service at scale, especially the treatment effectiveness. In case of COVID-19, it helps in finding the co-morbidity, risk score and other pulmonary disorders using patient data along with modalities like x-ray and CT scan. Healthcare system worldwide is facing challenges, as large number of patients impacted due to pandemic situation, prevention and starting of treatment requires automation on medical workflows and system which is mapped on the disease specific medical protocol. In some cases of patients identified as COVID positive, the tracking and the response to the treatment is not easy, there will be danger of spreading the disease if not done systematically. In case of cancer, like breast cancer evidence based management, timely and accurate assessment of response to treatment would bring in efficiency and saves valuation time of oncologist, effectively benefitting the patients. The solution is delivered on premise as well as cloud via Rises's AI platform.

Acupace Technologies Private Limited

Acupace Technologies is indulged in the development of IoT healthcare-based IT services and applications. Acupace deals in multiple ranges of upgraded technology products, which aim at improving lifestyle with technology, but to initiate with, they have launched a brand-new product (acuCLEAN) which will turn out to be a saviour in this pandemic; it's an addition to the 'NEW NORMAL' (Mask, Gloves, hand sanitizers). acuCLEAN focuses on sanitization by inactivating the microorganisms such as viruses, moulds, bacteria, and various other pathogens. Thus, this product not only aims to safeguard people from COVID-19 but also from other dangerous microorganisms and gives overall complete protection against any type of germs resulting in a healthy and happy long life.

Their smart insole is digital and provides peace-of-mind for family members and those caring for the millions of people suffering from memory impairment and wandering which can be caused by Alzheimer's disease, Dementia, Autism, Traumatic Brain Injury, or other cognitive memory disability.

Perkant Tech Private Limited

Perkant Tech is an Innovative Med-Tech solutions provider company. It has developed and designed a revolutionary patented medical product "Abhay Parimiti", that can detect many diseases with just a 20 second finger placement

including Hypertension, Diabetes, COVID-19, COPD, CKD and many other respiratory and cardiac diseases. This IoT enabled technology can bring healthcare accessibility to fingertips of all and introduce affordability for mass adoption.

Perkant Tech has created an invention that is 'Made in India' and can massively impact the healthcare of the nation. Abhay Parimiti: the complete health screening system has made healthcare easier, quicker and efficient. It is a first ever multi-diseases prognosis system that in just 20 seconds of finger scan alerts and suggests for various diseases including COVID-19. This non-invasive IoT device takes complete health graph in just 20 seconds and with highly intelligent ML models ensures the early identification of COVID-19, helps stop cluster formation and even helps in alerting the subject about stage of diseases (severe or non-severe).

In hospitals Abhay Parimiti helps doctors with contactless OPD options and tools, introduces digital health management for patients and enables tracking of all patients easily and quickly. Not just this, the product has helped various vaccination centers across the state to some extent to identify any COVID subject who might be availing the vaccination shot. In such cases, Abhay has helped identifying COVID carriers/ Asymptomatic patients and has made vaccination safe for all.

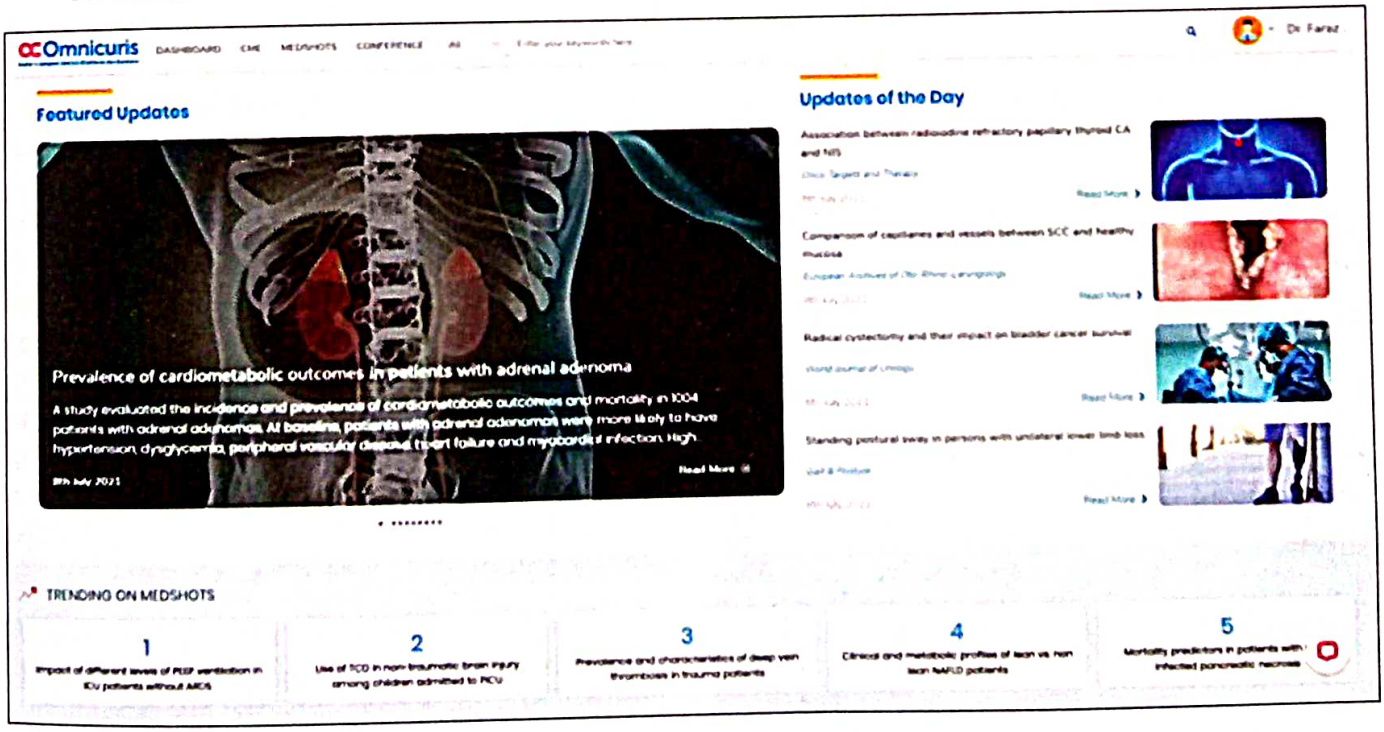
Omnicuris Healthcare Private Limited

Omnicuris believes in 'Health for all' and 'Information for Action'. Omnicuris is addressing unmet needs in the healthcare sector to increase both horizontal and vertical accountability of the health systems. Omnicuris achieves it by providing greater connectivity and participation to rural doctors with the latest CMEs and encouraging community learning and evaluation, thereby ensuring better health outcomes for the public health. Omnicuris enables training for healthcare professionals, by co-creating courses with important stakeholders and monitoring impact at all levels. This is especially important for those belonging to underserved communities since access to appropriate treatment is constrained by low mobility and affordability.

Agatsa Software Private Limited

Agatsa is a leading solution provider for comprehensive digital health monitoring for both doctors and non-doctors using its AI and IoT driven platform called "SanketLife". SanketLife Series of devices are affordable, made in India, pocket-sized devices that can perform complete medical grade 12-Lead ECG tests and also offer multi-parameter monitoring range of devices (BP, SpO2, temperature). These devices are integration-ready, for easy data transfer and compilation for any kind of technology solution offering.

Agatsa has been able to expand its portfolio from handheld ECG devices to multi-parameter monitoring devices that helped users during COVID times to monitor their parameters when



the country was facing scarcity of monitoring options at home.

Ubiqare Health

Ubiqare Health is a Bengaluru based healthcare tech start-up that pursues a vision of making healthcare ubiquitous, easily accessible, collaborative, and smart. Ubiqare offers specially mobility-Healthcare-as-a-Service (m-HaaS) platform that enables specialists and hospitals to deliver specially follow-up care to post-acute and chronically ill patients at home with complex supportive, rehabilitative, and palliative care needs. This is a collaborative care platform that enables specially hospitals and healthcare organisations to extend their care (protocols, workflows, therapies, diagnostics) to remote patients. The m-HaaS combines with a last-mile clinical network for co-ordinated physical interventions and is driven by a team of doctors working in collaboration with specialists in a hospital.

Redspectra Instruments Private Limited

Redspectra Instruments Pvt. Ltd. is involved in research, development and manufacturing of AI based Spectroscopic Analysers and Process Controllers to measure, analyse and optimise Probiotic Beverage Fermentation, reducing the time of fermentation without compromising quality. It is also involved in manufacturing of Pro-Biotic Beverages and Intelligent Tapping System, to dispense the beverage with antioxidants, vitamins, living good bacteria, yeast and without any preservatives. Taping System has built in Spectroscopy to detect microbial contamination and shuts off the beverage, if any contaminant is detected. Thus, it ensures that, only quality beverage is dispensed to customers

It is an affordable (in price of tender coconut) probiotic drink with rich probiotics (good bacteria and yeast), antioxidants, vitamins and essential acids to improve immunity naturally, which is very essential during COVID-19 pandemic. These Spectroscopic Analysers will make a tectonic shift in the fundamental behaviour of beverages industries globally. That is because the start-up made the 1st move to sell beverages, without any preservatives. With no preservatives, any drink tends to have microbial contamination issues, however with their Intelligent Taping System (Beverage Dispenser + spectroscopy + AI), the contaminating bacteria will be identified and eliminated, and the microbial contamination problem will be successfully overcome.

Conclusion and Way Forward

It is encouraging to find new Indian companies responsive to the special needs of COVID-19. The overwhelming support received from the Indian start-up ecosystem, despite the survival challenges faced by new start-ups due to the corona virus crisis. Over 1200+ innovative solutions ready to be deployed have been received from the Indian start-up community for review. These are currently being assessed and evaluated by a network of national experts. Some solutions mentioned above have already been implemented and include contact tracking, low-cost oxygenators, ventilators, masks, etc.

Challenging times and a crisis of this nature require significant government support. It also require great cooperation among all the ecosystem stakeholders, including universities, government, and industry. While nobody could have imagined a crisis of such unexpected proportions, the continued support of Government of India for its start-ups and incubator ecosystem in recent years has been a silver lining in retrospect. The crisis has also brought industry, academia, start-ups collaborating together in a manner not seen before, which augurs tremendously well for the future. It is time for Indian start-ups to rise up to the challenge. Our immediate goals are to overcome the COVID-19 crisis with innovative entrepreneurial thinking - Yes, we can!

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Yoga for Good Health

Tripti Nath

From the time the pandemic began, the community of Yoga practitioners has grown manifold. Many people took to Yoga during the pandemic to deal effectively with respiratory problems, obesity, stress, anxiety and overcome depression which were common problems during lockdown.

From the time Prime Minister Shri Narendra Modi led the nation in doing Yoga, it has come to be recognised as India's most effective soft power. Yoga captured the imagination of the world when Shri Modi, a Yoga practitioner, performed more than two dozen *asanas* in Rajpath in New Delhi on June 21, 2015. Many Cabinet ministers, Yoga Gurus, bureaucrats, ambassadors, defence personnel, NCC cadets and students joined the Prime Minster at the spectacular event to celebrate the first International Day of Yoga. Addressing the mammoth gathering, Shri Modi said, "Yoga is more than only physical fitness. We are not only celebrating a day but we are training the human mind to begin a new era of peace."

Shri Modi who believes that Yoga is health assurance in zero budget, mooted the idea of International Yoga Day during his maiden speech at the United Nations General Assembly on 27 September 2014. He stated, "Yoga is an invaluable gift of India's ancient tradition. It embodies unity of mind and body; thought and action; restraint and fulfilment; harmony between man and nature; a holistic approach to health and well-being. It is not about exercise but to discover the sense of oneness with yourself, the world and the nature. By changing our lifestyle and creating consciousness, it can help in well-being. Let us work towards adopting an International Yoga Day."

Recognising the global appeal of Yoga, the United Nations on December 11, 2014 by resolution 69/131 proclaimed June 21 as International Yoga Day. June 21 has special significance in many parts of the world. It is the Summer Solstice and is the longest day of the year in the Northern Hemisphere.

International Yoga Day aims to raise awareness worldwide of the many benefits of practicing yoga. The day is observed every year by 190 countries. Many countries have included yoga in preventive and promotive health strategies. Yoga is being practiced in various forms around the world and continues to grow in popularity.

The practice of Yoga is believed to have started with the very dawn of civilisation. It was revealed by Patanjali, a great Indian sage, over 2000 years ago in the classic text known as *Yoga Sutras*. Patanjali defined Yoga as "the cessation of the movements of consciousness."

Yoga originated in ancient India. The late B.K.S. Iyengar defined Yoga as 'meditation in action.' He started Yoga after suffering various diseases in his childhood.

India is blessed to have had many inspiring Yoga Gurus including Tirumalai Krishnamacharya, Swami Sivananda Saraswati, Swami Kavalayananda, Paramahansa Yogananda, Maharishi Mahesh Yogi, Swami Rama, Krishna Pattabhi Jois, Sadhguru Jaggi Vasudev, Sri Sri Ravi Shankar and Baba Ramdev. All Yoga Gurus have played a meaningful role in keeping the tradition of Yoga alive.

Baba Ramdev's mass Yoga camps brought Yoga back to the mainstream. His 'watch and practice'

television programmes have encouraged the masses to practice Yoga in the comfort zone of their home.

From the time the pandemic began, the community of Yoga practitioners has grown manifold. Many people took to Yoga during the pandemic to deal effectively with respiratory problems, obesity, stress, anxiety and overcome depression which were common problems during lockdown. As India is now facing the third wave of the pandemic, the relevance of Yoga has increased even more as it is known to boost immunity.

In his Man ki Baat address on May 30, 2020, Mr Modi said that "during the present COVID-19 pandemic, it is being observed from Hollywood to Haridwar that, while staying at home, people are paying serious attention to 'Yoga'. People everywhere want to know more about 'Yoga' and along with it '*Ayurveda*' and adopt it as a way of life. Many people, who have never practiced yoga, have either joined online yoga classes or are also learning yoga through online videos. Truly , 'Yoga' is good for community, immunity and unity!''

More than one crore people around the world took part in the Global *Surya Namaskar* programme on *Makar Sankranti* on January 14. The *Surya Namaskar* or sun salutation is a set of 12 *asanas* performed with coordination of the body and mind. Those who participated in the demonstration virtually, shared their experience under the hashtag *'Surya Namaskar* for Vitality'

The Ministry of AYUSH launched 75 crore *Surya Namaskar* Initiative. Launched in line with the commemoration of 75 years of India's independence, also known as 'Azadi ka Amrit Mahotsav', the 75 crore *Surya Namaskar* challenge also aims at creating the largest congregational *Surya Namaskar* event. The project will last till February 20, 2022. As many as 30 states are participating in the grand *Surya Namaskar* initiative.

Union AYUSH Minister Sarbanand Sonowal performed *Surya Namaskar* with Yoga Guru Baba Ramdev while launching the initiative. He said that sun worship is done to improve physical and mental well-being.

In his message on International Day of Yoga in 2021, Prime Minister Narendra Modi said that Yoga has became a source of inner strength for people and a medium to transform negativity to creativity amid the corona virus pandemic. Reminding the world about the curative value of Yoga, the Prime Minister said, "Today, when the entire world is fighting against the COVID-19 pandemic, Yoga has become a ray of hope. Today, even medical science lays emphasis on the healing process, besides medical treatment. Yoga helps in the healing process. Doctors have used Yoga as armour to treat patients.''

In 2021, the theme of International Yoga Day was "Yoga for Wellness"

There are many documented examples of effective healing by Yoga. Yoga and relaxation have been successfully used to check high blood pressure and coronary artery disease. Dr R Nagarathna, from the SVYASA (Swami Vivekanand Yoga Anusandhan Sansthan) in Bengaluru (Karnataka) has achieved remarkable success in curing hundreds of patients of cardiovascular and chest related problems with the help of yogic *asanas* and *kriyas*. She has also healed asthma patients by helping them practice specific *pranayamas* and breathing exercises. *Asanas* like *Vrikshasana, Tadasana, Vajrasana, Shashankasana, Shavasana, Uttan padasana, Makarasana* coupled with *pranayama* like *anulom-vilom*, on a regular basis, helps to flush out all the negative thoughts and mental fatigue.

A study conducted by doctors of AIIMS in 2020 found that yoga can reduce not just migraine but even lower treatment cost of the disease. The

study, 'Effect of Yoga as Add-on Therapy in Migraine', was published in the online issue of Neurology, the medical journal of the American Academy of Neurology.

A lesser known fact is that Yoga can also contribute to treatment of epilepsy. Peptic ulcer can be efficiently managed with naturopathy and Yoga, without any side-effects. Performing *asanas* can help in improving blood circulation to the digestive organs, which leads to the increase in the recovery. *Pranayamas* like *Nadhishuddhi pranayama* (alternate nostril breathing), *Shitali, Shitakari* (cooling *pranayamas*) can help to reduce the abdominal burning sensation, pain and enhance the recovery by relieving acute and chronic stress.

Dr Poonam Khetrapal Singh, Regional Director, WHO South-East Asia Region, Asia, in her statement on International Yoga Day, enumerated the health benefits of Yoga. "Yoga is a powerful way for people of all ages and incomes, whatever their gender or ethnicity, to prevent and control NCDs (non-communicable diseases), increase overall physical and mental health, and reduce individual and public health expenditure"

She said that regular yoga practice can help people of all ages prevent and control non-communicable diseases (NCDs), which kill 41 million people globally every year, more than a third of them prematurely. The four major NCDs – cardiovascular diseases, cancer, chronic respiratory diseases and diabetes – account for more than 80 percent of all premature NCD deaths, of which 85 percent occur in low- and middle-income countries.

Dr Priyanka Sood, Senior Ayurvedic medical officer posted in Government Ayurvedic Health Centre in Madhyana, in Solan district of Himachal Pradesh, says that her centre, acting on the directions of the AYUSH Ministry has been propagating Yoga as an effective way of combating COVID-19. She further says, "Yoga is known to boost immunity and improve mental and physical health. Even before the pandemic began, we had designated Friday as Yoga Day. We have been encouraging our patients to come every Friday to learn and practice Yoga. Apart from this, we are reaching out to all schools near our centre and spreading awareness about the benefits of Yoga."

Dr Sood believes in a holistic approach towards treating her patients, "For years, many Ayurvedic doctors have been recommending various Yoga *Asanas* for treating many chronic ailments like diabetes, thyroid and gynaecological problems. I encourage my patients who come with Thyroid problems to do *Kapalbhati, Sarvaangasan, Ujjai Pranayam* and *Bhujangasan*. Those with Diabetes are asked to do *Mandook Aasan, Shashakasan, Yogmudrasan, gomukhasan, anulom-vilom, kapalbahati* among others while women with gynaecological problems are asked to do *Shashakasan, Kandrasan, Naukasan, Dhanurasan, Kapalbhati, anulom vilom, Bhastrika* among others. Patients with back ache are prescribed *Markatasan* and *Bhujangasan*. Patients with vision related problems can benefit from *Tratak*. *Surya Namaskar* is beneficial for everybody. *Taar Aasan* is recommended to children for increasing height and *Vrikshasana* is for strengthening mental balance, improving neuro-mascular coordination, alertness and concentration and strengthening legs and helping those who suffer from sciatica (nerve pain in the leg). I have found that many patients with depression and anxiety disorders have benefitted enormously from *Dhyan* (Meditation) and *Pranamayam*. I must say that our Prime Minister has played a leading role in promoting Yoga and Ayurveda and taking them to the international level.''

Yoga experts recommend that the concept of yogic diet— '*Ahara*' should be therefore merged well with the current set of practices.

The AYUSH Ministry has been coming up with innovative ways to propagate Yoga. It has launched the 'Namaste Yoga' App to help people find Yoga teachers. The App is an information platform for those looking for Yoga centres, events and trainers. The App also provides a platform for Yoga centres and trainers to promote themselves. Certified trainers can register themselves and their business address on the App that is geo tagged to the location. This enables people to find yoga centres or classes in their neighbourhood. Last September, the Union Minister of AYUSH, launched the 'Yoga break' App, a mobile app to enable professionals de-stress at workplace.

(The author is a senior Delhi based journalist. Email:tripnath@outlook.com. Views expressed are personal)

National Family Health Survey-5

Urvashi Prasad and Sanyam Kapur

Data from NFHS provides a great opportunity to assess the contribution of Pradhan Mantri Ujjwala Yojana (PMUY) as the scheme was implemented between the rounds of NFHS-4 and NFHS-5. The fieldwork for NFHS-4 was completed by December, 2016 providing a baseline to the program and NFHS-5 fieldwork conducted over two phases, was completed in January, 2020 (Phase-1) and April, 2021(Phase-2). NFHS-5 findings released in November, 2021 highlight the improvement in the use of clean cooking fuel by Indian households. NFHS considers electricity, LPG/natural gas and biogas as 'clean cooking fuels', the use of which increased by 18.3 percent in the 10 years between 2005-06 to 2015-16 and witnessed an accelerated 14.8 percent increase between 2015-16 and 2019-20.

The National Family Health Survey-5 (NFHS-5) provides data on a range of indicators pertaining to health and nutrition, among others, from over 6 lakh sample households. The data is disaggregated to the level of districts to enable identification of areas where progress has been made as well as provide direction for future policy action. Availability of disaggregated data on a regular basis can enable the development of specific plans for districts that have a disproportionate burden of diseases.

Across most states in the country, the Total Fertility Rate (TFR) has declined since NFHS-4. Replacement fertility levels have been achieved in 19 out of 22 States and UTs, with only Manipur (2.2), Meghalaya (2.9) and Bihar (3.0) having a TFR above replacement levels. The prevalence rate of contraceptives has also increased considerably in the majority of States/UTs and unmet family planning needs have witnessed a declining trend in many of the States/UTs. Further, full immunisation coverage among children between 12-23 months has improved substantially, driven to a great extent by the success of the Government's flagship 'Mission Indradhanush' programme. Various indicators pertaining to antenatal care have also progressed in the right direction. For instance, the percentage of women receiving the recommended four or more Antenatal Care visits by health providers has improved in many States/UTs. Similarly, institutional births have increased significantly.

With respect to child nutrition indicators, the progress is mixed. This is also to be expected partly because changes in outcome indicators like wasting and stunting often take place over longer periods of time. Nevertheless, States/UTs where progress has been slow must intensify efforts to promote

Factsheet of key indicators on population, reproductive and child health, family welfare, nutrition and others for 14 States/UTs of India (clubbed under Phase-II) of the 2019-21 National Family Health Survey (NFHS-5)

The key results from India and Phase-II States/UTs NFHS-5 Factsheets are as below:

- The Total Fertility Rates (TFR), an average number of children per women has further declined from 2.2 to 2.0 at the national level and all 14 States/UT's ranging from 1.4 in Chandigarh to 2.4 in Uttar Pradesh. All Phase-II States have achieved replacement level of fertility (2.1) except Madhya Pradesh, Rajasthan, Jharkhand and Uttar Pradesh.

- Overall Contraceptive Prevalence Rate (CPR) has increased substantially from 54 percent to 67 percent at all-India level and in almost all Phase-II States/UTs with an exception of Punjab. Use of modern methods of contraceptives has also increased in almost all States/UTs.

- Unmet needs of family Planning have witnessed a significant decline from 13 percent to 9 percent at all-India level and in most of the Phase-II States/UTs. The unmet need for spacing which remained a major issue in India in the past has come down to less than 10 percent in all the States except Jharkhand (12 percent), Arunachal Pradesh (13 percent) and Uttar Pradesh (13 percent)..

- Full immunisation drive among children aged 12-23 months has recorded substantial improvement from 62 percent to 76 percent at all-India level. Eleven out of fourteen States/UTs has more than three-fourth of children aged 12-23 months with fully immunization and it is highest (90 percent) for Odisha.

  On comparing NFHS-4 and NFHS-5 data, the increase in full immunisation coverage is observed to be expeditious in many states and UTs; more than 50 percent of Phase-II States/ UTs are sharing over 10 percentage points during the short span of 4 years. This can be attributed to the flagship initiative of 'Mission Indradhanush' launched by the government since 2015.

- There is an increase from 51 percent to 58 percent of women receiving the recommended four or more ANC visits by health providers at all-India level.

  Also, all the Phase-II States/UTs have shown improvement except Punjab between 2015-16 to 2019-20.

- Institutional births have increased substantially from 79 percent to 89 percent at all-India Level. Institutional delivery is 100 percent in Puducherry and Tamil Nadu and more than 90 percent in 7 States/ UTs out of 12 Phase-II States/UTs.

  Along with an increase in institutional births, there has also been a substantial increase in C-section deliveries in many States/UTs especially in private health facilities.

- Child Nutrition indicators show a slight improvement at all-India level as Stunting has declined from 38 percent to 36 per cent, wasting from 21 percent to 19 percent and underweight from 36 per cent to 32 percent at all India level. In all phase-II States/UTs situation has improved in respect of child nutrition but the change is not significant as drastic changes in respect of these indicators are unlikely in short span period.

- Anaemia among children and women continues to be a cause of concern. More than half of the children and women (including pregnant women) are anaemic in all the phase-II States/UTs and all-India level compared to NFHS4, in spite of substantial increase in the composition of iron folic acid (IFA) tablets by pregnant women for 180 days or more.

- Exclusive breastfeeding to children under age 6 months has shown an improvement in all-India level from 55 percent in 2015-16 to 64 per cent in 2019-21. All the phase-II States/UTs are also showing a considerable progress.

- Women empowerment indicators portray considerable improvement at all India level and across all the phase-II States/UTs. Significant progress has been recorded between NFHS-4 and NFHS-5 in regard to women operating bank accounts from 53 percent to 79 percent at all-India level. For instance, in the case of Madhya Pradesh the increase was to the tune of 37 percentage point from 37 percent to 75 percent. More than 70 percent of women in every state and UTs in the second phase have operational bank accounts.

(Source: PIB release dated Nov.24, 2021)

both supply and demand side interventions in the nutrition sector. This is also important for mitigating the adverse impact of the COVID-19 pandemic.

The NFHS-5 results have also highlighted some important public health concerns including high blood glucose levels, hypertension, obesity and tobacco use. It is estimated that nearly a fourth of all men and women are overweight or obese (BMI > 25.0 kg/m^2). Additionally, 38 percent of men in the Survey have been reported to be using some kind of tobacco. Data illustrates that men are likely to have slightly higher blood glucose levels and hypertension, compared to women.

Curbing Household Air Pollution: A Case Study

The ongoing health situation in the form of the COVID-19 pandemic has exacerbated stress especially for those with pre-existing conditions. The presence of co-morbidities is correlated with an increased need for hospitalisation, medical complications as well as higher risk of mortality. The World Health Organisation (WHO) identifies chronic respiratory diseases and ischaemic heart diseases as co-morbid conditions that can worsen the impact of COVID.

It is estimated that there are more than 300 million cases of chronic obstructive pulmonary disease (COPD) in the community worldwide that are more vulnerable to not only catching the infection but also developing a more severe form of COVID-19.Extensive research has shown that household air pollution from the widespread use of inefficient cooking fuels produces a range of health-damaging pollutants and is a major contributor to COPD and ischaemic heart diseases.

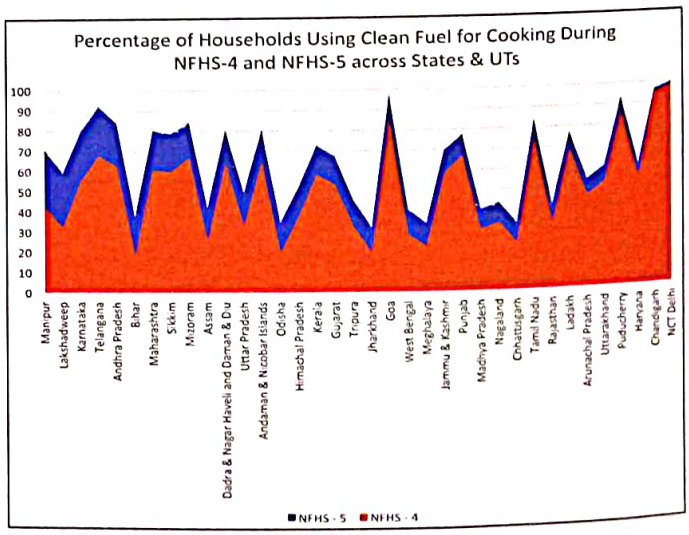
Globally, 3.8 million deaths every year can be attributed to household air pollution. Data from the Global Burden of Disease Study, 2019 published in the Lancet, suggests that 37 percent of 1.67 million deaths in India in 2019 due to air pollution were attributable to household air pollution.

Recognising the need to promote the use of clean cooking fuels, the Government of India has implemented a variety of initiatives that includes providing fiscal relief such as tax credits, subsidies, and other incentives to encourage the growth of alternative energy sources. In 2016, the Pradhan Mantri Ujjwala Yojana (PMUY) was launched to provide LPG connections to the entire nation by 2019. The scheme also complemented the Prime Minister's 'Give It Up' campaign which encourages voluntary surrender of the cooking gas subsidy by those who can afford to pay the market price for LPG. PMUY achieved its target of providing 8 crore LPG connections to deprived households and enhanced LPG coverage from 62 percent in 2016 to 99.8 percent in 2021.

Now that the PMUY has achieved its outputs, it is critical to assess the outcomes of the scheme which include promoting regular use of clean fuel for cooking, reduction in household pollution and ultimately a reduction in the incidence of respiratory diseases. Data from NFHS provides a great opportunity to assess the contribution of PMUY as the scheme was implemented between the rounds of NFHS-4 and NFHS-5. The fieldwork for NFHS-4 was completed by December, 2016 providing a baseline to the program and NFHS-5 fieldwork conducted over two phases, was completed in January, 2020 (Phase-1) and April, 2021 (Phase-2).

NFHS-5 findings released in November, 2021 highlight the improvement in the use of clean cooking fuel by Indian households. NFHS considers electricity, LPG/natural gas and biogas as 'clean cooking fuels', the use of which increased by 18.3 percent in the 10 years between 2005-06 to 2015-16 and witnessed an accelerated 14.8 percent increase between 2015-16 and 2019-20.

Regional variations in NFHS-5 results indicate the highest delta change from NFHS-4 to NFHS-5in use of clean cooking fuel in Manipur (28.3 Percent), Lakshadweep (27.6 Percent), Karnataka (25 Percent), Andhra Pradesh (21 Percent), Maharashtra (19.8

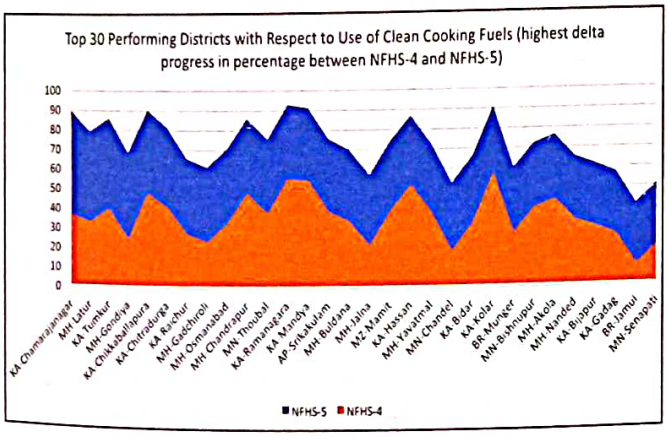


Percent), Sikkim (19.3 Percent), Mizoram (17.7 Percent) and Assam (17 Percent). Also, States like Delhi, Goa, Chandigarh, Puducherry and Telangana have more than 90 percent of households using clean cooking fuel.

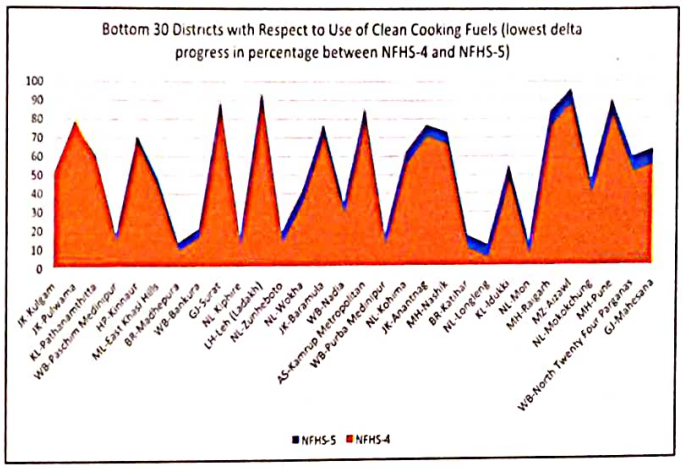
However, 14 States/UTs have less than 50 percent of the households using clean fuel for cooking including Jharkhand (31.9 Percent), Chhattisgarh (33 Percent), Meghalaya (33.7 Percent), Odisha (34.7 Percent), Bihar (37.8 Percent), Madhya Pradesh (40.1 Percent), West Bengal (40.2 Percent), Rajasthan, Assam, Nagaland, Tripura, Uttar Pradesh (49.5 Percent).

The growth trajectories for Bihar and Assam are particularly interesting with significant delta change of 20 percent and 17 percent respectively in NFHS-5 compared to NFHS-4. While, significant improvements have been observed in these two States, there is a long path ahead to fully achieve the vision of PMUY. The 5 least performing districts with respect to delta change in Bihar are Madhepura, Katihar, Supaul, Kishanganj and Araria; while the corresponding districts which have witnessed the lowest delta change in usage of clean cooking fuel between NFHS-4 and NFHS-5 in Assam are Kamprup Metropolitan, Dhemaji, Darrang, Tinsukia, Cachar.

When we analyse the data at the district-level, NFHS-5 results indicate that 12 (of 30 districts) from Karnataka and 10 (of 36 districts) from Maharashtra are among the top 30 performing districts in the country which have made the highest delta progress in NFHS-5 compared to the previous Survey. Districts with a larger proportion of urban population were closer to the frontier in terms of achieving 100 percent clean fuel usage. Mumbai, North and South Goa, Nagpur (Maharashtra) and Aizwal (Mizoram), for instance, have achieved greater than 95 percent clean cooking fuel usage.



Least performing districts for this analysis were considered to be districts with the lowest delta change in the percentage of households using clean cooking fuel in NFHS-5 in comparison with NFHS-4. Districts with greater than 90 percent households using clean cooking fuel during NFHS-4were excluded in from this analysis. Among the 30 least performing districts, 7 (of 11) are from Nagaland, 4 (of 20) are from Jammu & Kashmir and 5 (of 20) are from West Bengal. Only 11 percent households in Longleng district in Nagaland, 13.4 percent in Madherpur, Bihar and 17 percent in Purba Medinipur, West Bengal reported primarily using clean fuel for cooking purposes.



While access to clean cooking fuels is critical, consistent usage is imperative for addressing household pollution and decreasing the associated disease burden. Scaling up LPG through PMUY can be complemented with strategies for enhancing awareness about the health impact of traditional biomass *chulhas*, deploying agri-and forest-based biomass in a clean and efficient manner, focusing on aspects of kitchen design and ventilation, streamlining subsidies for cooking energy with better targeting of consumers and leveraging alternate financing solutions.

Analysis of district-level data from NFHS can pave the way for the development of targeted strategies for further increasing the coverage of clean cooking across the country. The implementation of such interventions, in turn, will have a significant impact on checking household air pollution and minimising morbidity as well as mortality due to household air pollution linked diseases.

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Rural Healthcare Infrastructure

B S Purkayastha

In the 15 years of implementation, the National Health Mission has enabled achievement of the Millennium Development Goals (MDGs) for health. It has also led to significant improvements in maternal, new-born, and child health indicators, particularly for maternal mortality ratio, infant and under five mortality rates, wherein the rates of decline in India are much higher than the global averages and these declines have accelerated during the period of implementation of NHM.

The health of its citizens has been of paramount importance for every nation since the COVID-19 pandemic struck the world two years back. Assessment of healthcare facilities, upgradation of hospitals, modernisation of diagnostic facilities, increased availability and accessibility to medicines and medical equipment and rapid on-the-go skilling of health workers have been the pillars on which the fight against the pandemic rests. However, the state of healthcare infrastructure differs from country to country, and between urban centres and rural areas within each country, and this is true for India too.

With more than 70 percent of India's population living in rural areas, the importance of rural healthcare facilities cannot be overemphasised. The healthcare facilities in rural areas under the National Rural Health Mission (as part of the National Health Mission) have been developed as a three-tier system – Sub-Centres, Primary Health Centres (PHC) and Community Health Centres (CHC). As per Rural Health Statistics 2019-20, there are 1,55,404 Rural Sub-Centres including 18,610 Ayushman Bharat Health and Wellness Centres – Sub Centres (AB-HWC-SCs), 24,918 Rural Primary Health Centres (PHCs) including 16,635 AB-HWC-PHCs and 5,183 Community Health Centres (CHCs). Under Ayushman Bharat, the existing Sub-health Centres (SHCs) and Primary Health Centres (PHCs) are being transformed into AB-HWCs to deliver 12 packages of Comprehensive Primary Health Care (CPHC) that includes preventive, promotive, curative, palliative and rehabilitative services which is universal, free and close to the community.

Table 1: Average rural population covered by health facility (based on the mid-year population as on July 1, 2020)

Health Facility	Norm	Average Rural Population Covered
Sub Centre	300 – 5000	5729
Primary Health Centre (PHC)	20000 – 30000	35730
Community Health Centre (CHC)	80000 – 120000	171779

Source: Rural Health Statistics, 2019-20

As part of Ayushman Bharat, the government is supporting the States for transformation of Sub Health Centres and Primary Health Centres into 1.5 lakh Health and Wellness Centres across the country by December, 2022 for provision of Comprehensive Primary Health Care (CPHC) that includes preventive healthcare and health promotion at the community level with continuum

of care approach. Under this programme, CPHC services of an expanded range of services that are universal and free to users, with a focus on wellness, are provided to the community. Further, Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana (AB-PMJAY) provides health coverage up to Rs. 5 lakh per family per year to around 10.74 crore poor and vulnerable families as per Socio Economic Caste Census (SECC).

With more than 70 percent of India's population living in rural areas, the importance of rural healthcare facilities cannot be overemphasised. The healthcare facilities in rural areas under the National Rural Health Mission (as part of the National Health Mission) have been developed as a three-tier system – Sub-Centres, Primary Health Centres (PHC) and Community Health Centres (CHC).

Further, PM Ayushman Bharat Health Infrastructure Mission (PM-ABHIM) with an outlay of Rs. 64,180 crore till 2025-26 envisages increased investments in public health and other health reforms to provide better access to health in rural areas by:

- Strengthening of Health and Wellness Centres in villages and cities for early detection of diseases.
- Addition of new critical care-related beds at district level hospitals.
- Supporting Block Public Health Units (BPHU) in 11 high focus states.
- Integrating district public health laboratories in all districts.

Table 2: Population norm for public health facilities through Indian Public Health Standards (IPHS) in rural areas

S. No.	Public Health Facilities	Plain Area	Hilly/Tribal/ Difficult Area
1	SC	5000	3000
2	PHC	30000	20000
3	Non FRU CHC	1,20000	80000
4	FRU CHC	500000	NA

Source: Rural Health Statistics, 2019-20

In the 15 years of implementation, the National Health Mission has enabled achievement of the Millennium Development Goals (MDGs) for health. It has also led to significant improvements in maternal, new-born, and child health indicators, particularly for maternal mortality ratio, infant and under five mortality rates, wherein the rates of decline in India are much higher than the global averages and these declines have accelerated during the period of implementation of NHM.

Since public health is a State subject, the responsibility of strengthening public healthcare system especially in rural areas, including setting up of new hospitals, dissemination of information regarding COVID-19, upgradation and strengthening of existing health facilities lies with the respective State/UT governments.

NHM support is provided to the States for ensuring a range of free services related to maternal health, child health, adolescent health, family planning, universal immunisation programme, and for major diseases such as Tuberculosis, vector borne diseases such as Malaria, Dengue and Kala Azar, Leprosy, etc. Other major initiatives supported under NHM include Janani Shishu Suraksha Karyakram (JSSK) (under which free drugs, free diagnostics, free blood and diet, free transport from home to institution, between facilities in case of a referral and drop back home is provided to pregnant women), Rashtriya Bal Swasthya Karyakram (RBSK) (which provides newborn and child health screening and early interventions services free of cost for birth defects, diseases, deficiencies and developmental delays to improve the quality of survival), implementation of Free Drugs and Free Diagnostics Service Initiatives, PM National Dialysis Programme and implementation of National Quality Assurance Framework in all public health facilities including in rural areas. Mobile Medical Units (MMUs) and Tele-consultation services are also being implemented to improve access to healthcare, particularly in rural areas.

Some of the important areas of NHM support are:

- Providing financial support in the form of untied funds, annual maintenance grants and

Rogi Kalyan Samiti (RKS) funds for development of health facilities and ensuring services.

- Providing infrastructural support to State/ UTs for constructing new health facilities and/ or for upgradation of infrastructure, Mother and Child Health (MCH) wings, upgradation of the trauma centres and First Referral Units, proper operation of the blood banks, etc.
- Operationalising health facilities in rural areas (through placement of human resources in difficult areas, supply of equipment, drugs and diagnostics).
- In addition, certain new initiatives have been undertaken like the Screening for Non-communicable Diseases (NCDs), Mothers Absolute Affection (to promote exclusive breast feeding), Pradhan Mantri Shurakshit Matratva Abhiyan (to improve access to specialist maternal care through voluntary participation of private providers), Pradhan Mantri National Dialysis Program, Ayushman Bharat programme (which include Health and Wellness Centres (HWC) and Pradhan Mantri Jan Arogya Yojana (PMJAY), Mission Indradhanush (to immunise partially or uncovered population), Rashtriya Swasthya Bal Karyakram (RBSK), Kayakalp (to promote cleanliness, hygiene and infection control practices in public healthcare facilities), Labour room quality improvement initiative-LaQshya (Initiative to reduce preventable maternal and new-born mortality, morbidity and still births associated with the care around delivery in Labour room and Maternity OT and ensure respectful maternity care), Surakshit Matritva Aashwasan (SUMAN) (to end all preventable maternal and neonatal deaths), etc.

Under NHM, allocations to State/ UTs are made in flexible pools. Approvals under NHM are given activity-wise to provide greater flexibility to States/ UTs to utilise the funds as per their need and priorities.

Healthcare Workers Posted in Rural Areas

According to Rural Health Statistics, 2019-20 data, the number of ANMs (auxiliary nurse midwife) at Sub Centres and PHCs has increased from 1,33,194 in 2005 to 2,12,593 in 2020

Table 3: Approvals under "Hospital Strengthening and New Construction/ Renovation and Setting up" under NRHM for FY 2020-21 and 2021-22

Rs. in lakh

S. No.	State	2020-21	2021-22
A. High Focus States			
1	Bihar	36045.62	37358.39
2	Chhattisgarh	14343.63	14665.83
3	Himachal Pradesh	8731.00	3070.39
4	Jammu & Kashmir	4363.21	3368.53
5	Jharkhand	10493.20	2352.00
6	Madhya Pradesh	53115.51	22886.44
7	Odisha	20665.69	32219.80
8	Rajasthan	94252.62	36932.16
9	Uttar Pradesh	144397.66	122429.96
10	Uttarakhand	10428.68	12955.74
B. NE States			
11	Arunachal Pradesh	2828.89	5634.45
12	Assam	32971.23	23372.48
13	Manipur	2602.17	2858.45
14	Meghalaya	1282.00	1609.04
15	Mizoram	557.00	18.00
16	Nagaland	3855.33	1005.04
17	Sikkim	376.68	371.20
18	Tripura	4491.00	4874.00
C. Non-High Focus States			
19	Andhra Pradesh	14399.00	2332.75
20	Goa	115.80	124.75
21	Gujarat	1075.17	675.30
22	Haryana	16762.37	12613.30
23	Karnataka	16083.05	15103.25
24	Kerala	10734.71	5837.16
25	Maharashtra	47508.02	53943.69
26	Punjab	8925.00	5141.90
27	Tamil Nadu	32950.88	24531.73
28	Telangana	13970.07	7512.13
29	West Bengal	17727.50	7848.49
D. Small States/UTs			
30	Andaman & Nicobar Islands	133.00	159.00
31	Dadra & Nagar Haveli	5.76	2.88
32	Daman & Diu	-	-
33	Delhi	0.00	500.00
34	Lakshadweep	0.00	0.00
35	Puducherry	4.00	22.80
36	Ladakh	3240.67	3125.00

Source: http://164.100.24.220/loksabhaquestions/annex/ 177/ AU984.pdf

Note:

1. The above data comprises of inter alia Hospital Strengthening -- Upgradation of CHCs, PHCs, District Hospitals, Rent and Contingencies, Etc, and New Constructions/Renovation and Setting up of Chcs, Phcs, Shcs/Sub Centres, Setting Up Infrastructure wing for civil works, facility Improvement, Civil Works for Operationalising Infection Management and Environment Plan at health facilities, Infrastructure of Training Institutions, SDH, DH and Civil work of DEIC (RBSK), etc.
2. The above data is as per the available Financial Management Report (FMR) submitted by the States/UTs.

which amounts to an increase of about 59.6 percent. The number of allopathic doctors at PHCs has increased from 20,308 in 2005 to 28,516 in 2020, which is about 40.4 percent increase. However, there remains a shortfall of 6.8 percent of allopathic doctors at PHCs, out of the total requirement at all-India level. The specialist doctors at CHCs have increased from 3,550 in 2005 to 4,957 in 2020. As compared to requirement for existing infrastructure, there is a shortfall of 78.9 percent of surgeons, 69.7 percent of obstetricians and gynecologists, 78.2 percent of physicians and 78.2 percent of pediatricians. Overall, there is a shortfall of 76.1 percent specialists at the CHCs as compared to the requirement for existing CHCs. Altogether, 56,581 positions of doctors and other health staff are vacant in rural areas.

Given the continuing gap in health personnel required in rural areas, the governments at the Centre and individual States have been trying to incentivise rural postings. Financial support is provided to States for providing hard area allowance, performance-based incentives, providing accommodation and transport facilities in rural and remote areas including tribal areas, sponsoring training programmes, etc. to address the issue of shortage of doctors and specialists in the public health facilities.

States/UT are also encouraged to adopt flexible norms for engaging healthcare workers for public health facilities by various mechanisms like 'contracting in' and 'contracting out' of specialist services under NHM. State/UTs have also been allowed to offer negotiable salaries to attract specialists including flexibility in strategies such as "You quote, we pay".

ASHA Workers: The Crucial Link in the Rural Healthcare System

One of the key components of the National Rural Health Mission is to provide every village in the country with a trained female community health activist – ASHA (Accredited Social Health Activist). The ASHA worker acts as the interface between the community and the public health system in rural India, and is empowered with knowledge and a drug-kit to deliver first-contact healthcare, ASHA workers are the fountainhead of community participation in public health programmes in villages. As per as NHM-MIS report, the total number of ASHAs under National Health Mission (NHM) stand at 10.7 lakh.

As community health volunteers, ASHA workers receive a fixed monthly incentive of Rs. 2,000 per month for undertaking routine and recurring activities. However, in view of their significant contribution towards COVID-19 pandemic related work, States are paying an additional incentive of Rs. 1,000 per month for those ASHAs engaged in COVID-19 related work using the resources of COVID-19 Health System Preparedness and Emergency Response Package. Under the Pradhan Mantri Garib Kalyan Package, an insurance scheme has been introduced for all health workers, including ASHAs. This insurance scheme provides an insurance cover of Rs. 50 lakh in case of loss of life on account of COVID-19 related duty. After the launch of the Ayushman Bharat scheme with operationalisation of Ayushman Bharat-Health and Wellness Centres (AB-HWCs), ASHAs are now additionally eligible for Team Based Incentives (TBIs) along with Auxiliary Nurse Midwives based on monitored performance indicators (up to Rs. 1000 per month). In the year 2018, the ASHA benefit package was introduced acknowledging significant contribution and commitment of ASHAs. The package providing coverage for:

- Pradhan Mantri Jeevan Jyoti Beema Yojana (PMJJBY) with a benefit Rs. 2 lakh in case of death of the insured (annual premium of Rs. 330 contributed by Government of India).
- Pradhan Mantri Suraksha Beema Yojana (PMSBY) with a benefit of Rs. 2 lakh for accidental death or permanent disability, Rs.1 lakh for partial disability (annual premium of Rs. 12 contributed by Government of India).
- Pradhan Mantri Shram Yogi Maan-dhan (PM-SYM) with pension benefit of Rs. 3000 per month after age of 60 years (50 percent contribution of premium by Government of India and 50 percent by beneficiaries).

A cash award of Rs. 20,000 and a citation is given to ASHAs who leave the programme after working for minimum of 10 years, as acknowledgement of their contribution.

Strengthening Rural Infrastructure during COVID-19 Pandemic

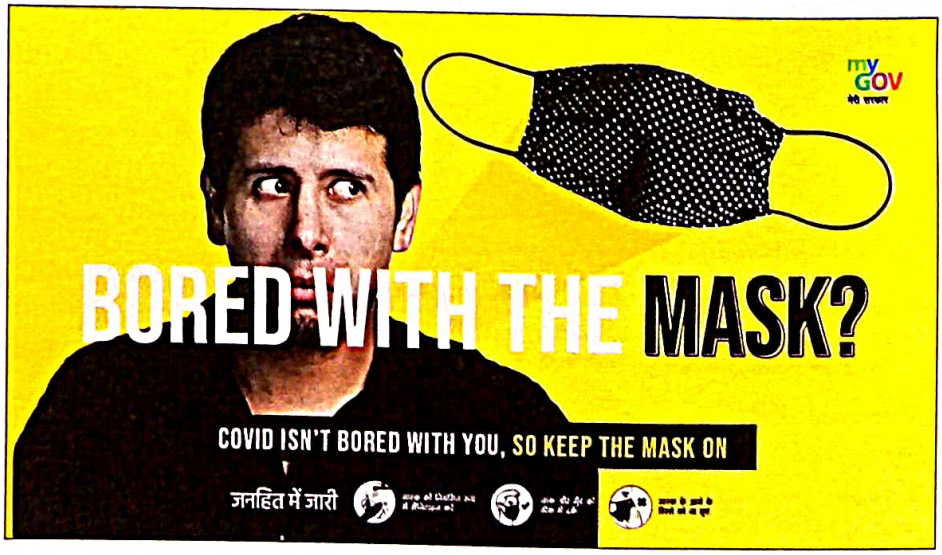
The Government of India has been providing support to States/UTs under the 'India COVID-19 Emergency Response and Health System Preparedness Package' for the containment and management of pandemic, including for augmentation of infrastructure, oxygen supported beds, isolation beds, ICUs and Human Resources, supply of drugs, etc. During the financial year 2020-21, Rs. 8147.28 crore has been released to States till the month of July under this package. In addition, Rs. 110.60 crore has been made available for insurance of healthcare workers. Thus, a total amount of Rs. 8257.88 crore has been provisioned for the States/UTs. The Ministry of Health and Family Welfare has also provided in-kind support to the States/UTs, by procuring and distributing oxygen cylinders, TruNat COVID Test Cartridges, X-pert COVID cartridges, N-95 masks, PPE kits, Remdesivir and ventilators, including for rural healthcare facilities.

The Ministry of Health and Family Welfare has been holding consultations with all the concerned ministries on regular basis, including for effective management in view of spread of COVID-19 in rural areas. An SOP on COVID-19 Containment and Management in Peri-urban, Rural and Tribal areas to ensure that community-based services and primary level health infrastructure in rural, peri-urban and tribal areas are equipped and oriented to manage COVID-19 cases has been shared with all the States/UTs. This document also outlines the containment and clinical management practices to be put in place in these areas with respect to COVID-19 management.

The 'India COVID-19 Emergency Response and Health Systems Preparedness Package -Phase-II' (ECRP-Phase-II) amounting to Rs. 23,123 crore is under implementation from July 1, 2021 to March 31, 2022. It aims to prevent, detect and respond to the continuing threat posed by COVID-19 and strengthen national health systems for preparedness in India. Under the Centrally Sponsored Scheme (CSS) component of ECRP-II, support is being provided to the States/UTs for provision for establishing District Paediatric Units (42 or 32 bedded units including Oxygen Supported beds and ICU beds) in all the districts of the country. Besides, support is also provided to increase the availability of ICU beds in government health facilities and to create pre -fabricated structures for augmenting beds at Sub Health Centres, Primary Health Centres and Community Health Centres in rural, peri-urban and tribal areas. Maintaining buffer stock for essential medicines required for effective COVID-19 management, in addition to provision for required drugs and diagnostics, is also being supported. Support is also available for establishing field hospitals (100 bedded or 50 bedded units) wherever required. In order to ensure implementation of critical activities at the State/District levels to prepare the public healthcare system in response to the evolving pandemic, 15 percent of Central Share of Resource Envelope of the State/UT, has been released in-advance to the States/UTs.

For making oxygen available in healthcare facilities, the government has sanctioned 1573 Pressure Swing Adsorption Oxygen generation plants, including in rural areas. Out of these, as on 20th July, 2021, 316 plants have been commissioned. 1,14,000 oxygen concentrators are also being supplied to the States/UTs for deployment in rural, peri-urban and tribal areas.

(The author is a senior journalist. Email: ideainksreply@gmail.com. Views expressed are personal)



Maternal and Child Health

Dr Shweta Khandelwal and Dr Preeti Khanna

POSHAN Abhiyaan, India's flagship National Nutrition Mission, aims to enhance maternal nutrition by employing technology, behaviour change communication, community engagement, and cross-sectoral convergence. In India, there are a variety of programmes and policies in place to improve maternal diets, including take-home rations and hot cooked meals for pregnant and lactating women, micronutrient supplements, food fortification, and delivery of subsidised staples through the Public Distribution System, cash transfers, nutrition-sensitive agriculture, diet education and counseling.

Maternal malnutrition has been linked to an increased risk of maternal morbidity, premature birth, and newborns that are too small for their gestational age. Because of the negative repercussions for both women and their children, poor maternal nutrition during and throughout pregnancy is a major public health concern. Maternal malnutrition is still a global problem, with 24 percent of mothers in South Asia having a low BMI. Furthermore, anaemia affects 30 percent of reproductive-age women and 37 percent of pregnant women. Women's overweight/obesity is a growing problem in most low-middle-income nations. According to National Nutrition Monitoring Bureau (NNMB) surveys in 10 Indian states, cereals and millets make up the majority of rural diets, with only approximately half of pregnant women getting enough protein and calories. The NNMB also revealed that most pregnant women's iron, vitamin A and C, and folic acid consumption were less than half of what was advised.

Poor maternal nutrition in India is caused by a combination of variables such as early and repeated pregnancies, poverty, caste discrimination, and gender inequality, as described in the Global Burden of Disease Study (2017). The World Health Organization (WHO) recommends 49 interventions for Antenatal care (ANC), 14 of which are dietary interventions. India's national standards are based on global recommendations for key nutrition treatments for pregnant women, including better diets. POSHAN Abhiyaan – India's flagship National Nutrition Mission – aims to enhance maternal nutrition by employing technology, behaviour change communication, community engagement, and cross-sectoral convergence. In India, there are a variety of programs and policies in place to improve maternal diets, including take-home rations and hot cooked meals for pregnant and lactating women, micronutrient supplements, food fortification, and delivery of subsidised staples through the Public Distribution System, cash transfers, nutrition-sensitive agriculture, diet education and counseling.

In India, schemes for maternal and child health are mostly implemented through the flagship programmes of two ministries:

(1) The Ministry of Women and Child Development's Integrated Child Development Services (ICDS) programme provides micronutrient-fortified supplementary food and/or energy-dense take-home meals for pregnant women and mothers who are breast-feeding.

(2) The Ministry of Health and Family Welfare provides micronutrient supplements (IFA and Calcium), deworming tablets, weight gain

monitoring, and nutrition advice to pregnant women as part of their antenatal care.

Some programs aiming to improve maternal and child health indicators are discussed below.

The Integrated Child Development Services (ICDS)

ICDS scheme is one of a number of programs being implemented by the Government of India to enhance the nutritional status of children in the country. The programme is aimed towards children under the age of six, as well as pregnant and breastfeeding women. Take-Home Rations (THR) comprising micronutrient fortified blended food and/or energy dense food are supplied to children aged 0-6 years as well as pregnant and lactating women for consumption at home under the scheme. THR is provided with the goal of bridging the nutrition gap and improving infant and young child feeding (IYCF) practices. Recommendations for energy, protein, and micronutrient requirements under ICDS, Supplementary Nutrition Programme (SNP) have been developed as per ICMR's Recommended Dietary Allowance (RDA) (Table 2). ICDS guidelines recommend that 50 percent RDA of the nine micronutrients (iron, calcium, folic acid, zinc and Vitamins A, B1, B2, B3 and C) should be included in THR.

Table 2: ICDS nutritional norms and budgetary allocation for supplementary nutrition for children (6-72 months old), pregnant women and lactating mothers

Target Beneficiaries	Calories (kcal)	Protein (g)	Budget per Beneficiary
Children (6-72 months)	500	12-15	Rs. 6
Severely under-nourished children (6-72 months)	800	20-25	Rs. 9
Pregnant and lactating women	600	18-20	Rs. 7

Source: Ministry of Women and Child Development, GOI, 2021

THRs that are distributed are ready to cook and eat and are made up of a cereal-pulse-nut mixture with or without added sugar and oil. The complementary nature of the cereal-pulse combination for improving the protein quality of the meal is the guiding principle for deciding the combination. In some parts of the country milk powder (skim/whole) and eggs are also provided.

Pradhan Mantri Matru Vandana Yojana (PMMVY)

As a part of the National Food Security Act

Table 1: Timeline summary of policies and programs catering to maternal and child health nutrition

Year	Policies and Programs Catering to Maternal and Child Health
1975	Integrated Child Health Services Program – includes provisions of nutritious meals, preschool education, primary healthcare, immunisation and healthcare to children under 6 years of age and their mothers.
1993	National Nutrition Policy – includes nutrition specific and sensitive interventions.
2005	National Health Rural Mission – provides accessible, affordable and quality healthcare including nutrition to rural population, especially vulnerable groups.
2007	National Food Security Mission – includes increased production of rice, wheat and pulses through area expansion, productivity enhancement, restoring soil fertility, enhancing farm level economy.
2013	National Urban Health Mission – provides healthcare needs including nutrition to the urban population with a focus on urban –poor.
2013	National Food Security Act – provides subsidised food grains to approximately two thirds of the country's 1.2 billion people.
2017	Pradhan Mantri Matru Vandana Yojana – is a maternity cash incentive scheme to provide conditions for safe delivery and nutrition practices.
2018	POSHAN Abhiyaan – India's flagship program to improve nutrition through inter sectoral convergence – technology and community mobilisation. *Anemia Mukht Bharat* strategy launched.
2020	POSHAN 2.0 – POSHAN Abhiyaan was merged with existing supplementary nutrition program. Region specific diet charts were introduced for pregnant women by National Institute of Nutrition.

Source: Compiled by Authors

of 2013, the Maternity Benefit Program has been implemented in all regions of the country starting January 1, 2017 titled as Pradhan Mantri Matru Vandana Yojana (PMMVY). This scheme is covered under the ICDS umbrella.

Special features of PMMVY are as follows:

- The beneficiary can only apply for the plan if the scheme eligibility standards are met within 730 days of the recipient's last menstrual period (LMP). The Date of Pregnancy to be considered will be the LMP indicated in the MCP Card. In circumstances where the LMP date is not recorded in the MCP Card, such as when a beneficiary is submitting a claim for the third instalment under the plan, the claim must be presented within 460 days after the child's birth date, beyond which no claim will be considered.
- After institutional delivery, the eligible beneficiaries would receive the remaining cash incentive as per approved norms towards the Maternity Benefit under Janani Suraksha Yojana (JSY) by the Health Department on an annual basis. Pregnant Women and Lactating Mothers (PW&LM) shall receive a cash benefit of Rs. 5,000 in three instalments at the following stages as specified in the Table 3 given below.

Janani Suraksha Yojana (JSY)

The National Rural Health Mission's Janani Suraksha Yojana (JSY) is a safe motherhood intervention. It is being adopted with the goal of lowering maternal and infant mortality by encouraging pregnant women to give birth in a hospital. The system is being implemented in all states and Union Territories (UTs), with a special focus on states that are under performing (LPS). In April 2005, the Janani Suraksha Yojana was started by amending the National Maternity Benefit Scheme (NMBS). Pregnant women who have reached the age of 19 and live in BPL households were eligible for financial support of Rs. 500 per birth up to two live births under the NMBS. When JSY was launched, the financial help of Rs. 500, which was accessible to BPL pregnant women across the country under NMBS, was replaced by a tiered scale of aid based on state classification and whether the beneficiary was from a rural or urban region. States were classified as Low Performing States (LPS) or High Performing States (HPS) based on their institutional delivery rate. States with an institutional delivery rate of 25 percent or less were classified as LPS, while those with an institutional delivery rate of more than 25 percent were classified as HPS.

Objectives of Janani Suraksha Yojana are as follows:

Table 3: Conditionalities and instalments for cash benefit of Rs. 5,000 in three instalments for PLW

Installment	Conditions*	Documents Required	Amount (in Rs.)
Registration/First Instalment	1. Register her pregnancy at any Anganwadi center along with required document. 2. Register her pregnancy within 150 days from LMP date.	1. Duly Filled Application Form 1-A. 2. Copy of MCP Card 3. Identity Proof. (Beneficiary & Spouse) 4. Bank/Post Office Account Pass-book (Name, Bank, Branch, Account Number, IFSC, MICR) of Beneficiary only. Joint Accounts not acceptable.	1,000/-
Second Instal-ment	1. Received at least one ANC. 2. Can be claimed after 6 months (180 days) of LMP 3. (If 1 ANC is received, can be applied by a beneficiary before completion of 180 days from LMP but claim will only be processed after 180 days of LMP date)	1. Application Form, Form 1B. 2. Copy of MCP card	2,000/-
Third Instalment	1. Child Birth is registered 2. Child has received first cycle of BCG, OPV, DPT and Hepatitis-B or its equivalent/substitute	1. Application Form, Form 1B. 2. Copy of MCP Card 3. Copy of Aadhaar ID (Beneficiary and Spouse) 4. Child Birth Registration Certificate	2,000/-

Source: Department of Women and child Development http://www.wcddel.in/PMMVY.html

JSY aims to reduce maternal and infant mortality by promoting institutional delivery among pregnant women. The programme also offers performance-based incentives to ASHA (Accredited Social Health Activist) who promote institutional delivery among pregnant women. Eligible pregnant women can get JSY benefits straight into their bank accounts under this initiative. The cash entitlements for different types of mothers are discussed in Table 4 below.

Table 4: Cash Assistance for Institutional Delivery (in Rs.)

Category	Rural Area		Urban Area	
	Mother's package	ASHA's package*	Mother's package	ASHA's package**
LPS	1400	600	1000	200
HPS	700	200	600	200
In both LPS and HPS, BPL/SC/ST women are entitled for cash assistance in accredited private institutions *ASHA package of Rs. 600 in rural areas include Rs. 300 for ANC component and Rs. 300 for facilitating institutional delivery **ASHA package of Rs. 400 in urban areas include Rs. 200 for ANC component and Rs. 200 for facilitating institutional delivery				

Source: National Health Mission https://nhm.gov.in/index1.php?lang=1&level=3&sublinkid=841&lid=309

Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) – Janani-Shishu Suraksha Karyakaram (JSSK)

The Janani-Shishu Suraksha Karyakaram (JSSK) was established with the goal of eliminating out-of-pocket payments for pregnant women and unwell newborns seeking treatment at a public health facility and was launched in June 2011. Every year, more than 1 crore pregnant women in both urban and rural areas use public health facilities, according to the project. The entitlements for pregnant women and sick infants under JSSK are discussed in Table-5.

While prenatal care is commonly provided to pregnant women, PMSMA requires OB&GYN specialists, radiologists, and physicians to provide particular ANC services at government health institutions.

Pregnant women in their second and third trimesters are provided with a minimum package of antenatal care services at Government health facilities (PHCs/CHCs, DHs/urban health facilities, etc.) in both urban and rural areas as part of the campaign. All pregnant women attending PMSMA clinics will receive a minimal package of investigations and medicines, such as IFA and calcium supplements, based on the principles of a single window system. One of the most important aspects of the POSHAN Abhiyan is the identification and follow-up of high-risk pregnancies, which is why red stickers have been included to the Mother and Child Protection Card of high risk women under this programme. A mobile/ web-based application has been designed to help pregnant women find their nearest PMSMA facility. In order to access this service, pregnant women can visit https://pmsma.nhp.gov.in/or download the 'PMSMA' mobile application.

Rashtriya Bal Swasthya Karkyakram (RBSK)

The Rashtriya Bal Swasthya Karyakram (RBSK) is a significant effort aimed at early detection

Table 5: Entitlements for pregnant women and sick infants under JSSK

Entitlements for Pregnant Women under JSSK	Entitlements for Sick Infants under JSSK till One Year After Birth
Free Delivery and Caesarean Section	Free treatment
Free Drugs and Consumables	Free Drugs and Consumables
Free Essential Diagnostics (Blood, Urine tests and Ultra sonography, etc.)	Free Essential Diagnostics
Free Provision of Blood	Free Provision of Blood
Free Transport from Home to Health institutions	Free Transport from Home to Health institutions
Free Transport between facilities in case of referral	Free Transport between facilities in case of referral
Exemption from all kinds of User Charges	Exemption from all kinds of User Charges
Free Diet during stay in the health institutions (up to 3 days for normal delivery and 7 days for caesarean section)	

Source: National Health Mission https://nhm.gov.in/index1.php?lang=1&level=3&sublinkid=842&lid=308

and intervention for children aged newborn to 18 years, covering the four 'D's: Birth Defects, Deficiencies, Diseases, and Developmental Delays including Disability (Table 6).

The first stage of screening is carried out by current Medical Officers, Staff Nurses, and ANMs at all delivery points. ASHA will screen newborns at home after 48 hours and up to 6 weeks as part of the Home Based New-born Care (HBNC) programme. Dedicated Mobile Health teams will conduct outreach screenings for children aged 6 weeks to 6 years at Anganwadi Centres and for children aged 6 to 18 years at schools. Once the child has been examined and referred from any of these points of identification, the necessary treatment/intervention will be provided to the family at no cost.

Current Situation of Maternal and Child Health Indicators in India

India has the world's one of the highest number of malnourished children, it is worth looking at what latest national surveys like National Family Health Survey (NFHS)-5 have to say about India's progress toward achieving UN Sustainable Development Goal (SDG) 2.2, which calls for "ending all forms of malnutrition for children under the age of five by 2030." This becomes a greater concern in recent challenging pandemic times. Several projections indicate that the malnutrition is all set to exacerbate in the coming years due to a massive negative impact of COVID-19 on food and nutrition security. The Government tried its best to provide interim relief via programs like Garib Kalyan Yojana. Because NFHS-5 and Comprehensive National Nutrition Survey (CNNS) are representative on a national and subnational (at the state and district levels) level, its findings on children's nutritional status can assist policymakers in identifying crucial areas where better policy can provide course correction.

As per NFHS-5 findings, only 11 percent of children aged 6 to 23 months had an adequate dietary intake. Overall, 67 percent children in the age group of 6 to 59 months; 53 percent of pregnant women (15-49 years) and 57 percent of adolescents (15-19 years were anaemic (NFHS, 2021). The increase in the percentage of children suffering from anaemia – from 59 percent in NFHS-4 to 67 percent in NFHS-5 – is even more concerning. While progress has been made, India is still falling short of meeting SDG 2.2, as the percentage of stunted, wasted, underweight, and anaemic children in India is 36 percent, 19 percent, 32 percent, and 67 percent, respectively.

According to the CNNS, 41 percent preschoolers (1–4 years), 24 percent school age children (5-9 years) and 28 percent adolescents (10–19 years) were anaemic, with greater prevalence

Table 6: Selected Health Conditions for Child Health Screening & Early Intervention Services

Defects at Birth Neural tube defects Down syndrome Cleft lip and palate Talipes (club foot) Developmental dysplasia of the hip Congenital cataract Congenital deafness Congenital heart diseases Retinopathy of Prematurity	**Deficiencies** Anemia Vitamin A (Bitot spot) Vitamin D (Rickets) Severe Acute Malnutrition Goitre
Diseases of Childhood Skin conditions (scabies, fungal infection, eczema) Otitis Media Rheumatic heart disease Reactive airway disease Dental conditions Convulsive disorders	**Development Delays and Disabilities** Vision impairment Hearing impairment Neuro-motor impairment Motor delay Cognitive delay Language delay Behavioural disorder Learning disorder Attention Deficit Hyperactivity disorder

Source: National Health Mission https://nhm.gov.in/images/pdf/programmes/RBSK/For_more_information.pdf

among children below two years of age. Thirty-two percent of preschoolers, 17 percent of school-age children and 22 percent of adolescents had iron deficiency (low serum ferritin). Female adolescents had a higher prevalence of iron deficiency (31 percent) compared to male adolescents (12 percent). Eighteen percent pre-school children, 22 percent school-age children and 16 percent adolescents were vitamin A deficient. About one-quarter (23 percent) of preschool children had folate deficiency. Prevalence was higher among school age children (28 percent) and adolescents (37 percent). Overall, 14 percent of pre-school children aged 1–4 years, 17 percent of school-age children aged 5–9 years and 31 percent of adolescents aged 10–19 years had vitamin B12 deficiency. Approximately, one-fifth (19 percent) of pre-school children aged 1–4 years and 17 percent of school-age children aged 5–9 years had zinc deficiency. One-third (32 percent) of adolescents aged 10–19 years were zinc deficient (NFHS 5, 2021).

What can India do to improve the nutrition and wellbeing of mothers and children in our society?

There is a need to re-energise the 'Jan Andolan' component by accelerating momentum and action from every person in this battle against malnutrition. Let's take *'Har ghar poshan tyohar'* to ensure that *'kuposhan par ho mazboot prahar'* (Malnutrition should be robustly tackled). Three main areas have been identified and some examples as pointers for action in the space of public health nutrition in India are provided below.

Policy Strengthening

a. Adopting and adapting evidence-based success stories in regions that need more support: The government must open up opportunities for innovation where more action is needed. For example; home-based newborn care program, ideas to promote exclusive breastfeeding for 6 months, maximise deworming and immunisation, reduce consumption of unhealthy ultra-processed foods high in fats, sugars and salt.

b. Using financial levers for maximum impact: Enable access to healthy and sustainably-produced foods to all sections of society through the alignment of subsidies, taxes, incentives and reviewing policies targeting food environments, food procurement, public distribution schemes and related infrastructure. For example, Mexico's increased taxation on sugar sweetened beverages led to 5.5 percent drop in consumption in the first year, followed by a 9.7 percent decline in the second year, averaging 7.6 percent over the two-year period. These reductions in consumption are bound to have positive impacts on health outcomes (especially obesity and type 2 diabetes) and reductions in healthcare expenses in Mexico.

c. Restricting advertising and marketing of unhealthy and unsustainable foods targeted towards children, youth and other vulnerable groups: The World Health Organization warned that governments should be protecting children from targeted junk food advertisements in apps, social media and video blogs. The Global Nutrition report 2018 reported that globally a third (30 percent) of school-aged children do not eat any fruit daily, yet 44 percent consume soft drinks every day. This effect is increasingly being reported in India too.

d. Applying effective and efficient food labelling laws and regulations: Usually, people do not have time and specific capacity to process all the confusing information provided on labels. It is imperative that a simplified pro-health positive labelling mechanism is implemented. Recent analysis of over 23,000 packaged food products conducted by researchers found that about 70 percent were of relatively poor nutrient quality. Packaged food in India has been ranked lowest in terms of its healthiness in a major global survey of packaged foods and drinks. India's packaged foods and drinks were found to be the most energy dense (kilojoule content 1515 kJ/100 g) and number two in added sugar content (7.3 grams per 100 g).

e. Push for agricultural policies emphasising quality, nutritious and sustainable food production practices rather than concentrating only on producing greater quantities of food: Lack of dietary diversity, scarce consumption of locally produced nutritious foods are increasingly seen as risk factors for rising malnutrition in all its forms as well as for a sustainable planet. A lot of tribal populations have switched majorly to wheat and rice from the public distribution system (PDS) and rate of non-communicable diseases (like diabetes,

hypertension, heart problems) have gone up in these populations too.

f. Urgently investing in public policies and innovations that will reduce food loss and food waste: Food production is responsible for up to 30 percent of global greenhouse gas emissions and 70 percent of freshwater use. Land conversion for food production is the single most important driver of biodiversity loss. Important international conventions and organisations such as the Convention on Biological Diversity (CBD), the Ramsar Convention on Wetlands and the World Health Organization (WHO) have all endorsed that policy agendas of health promotion, climate change adaptation and biodiversity conservation need to be aligned for effective action.

g. Demonstrating leadership and commitment to ensure coherent food system actions: Engaging with multiple stakeholders for policy action, devising accountability mechanisms where absent and strengthen where present, empowering local committees and stakeholders for better action and enable cross-departmental collaboration – all these can come handy in moving ahead against the malnutrition battle.

Address Logistic Challenges

a. Convergence and coordination still remains a huge challenge: For 'Poshan Maah', almost 18 Union Ministries and departments have been listed as participants in the initiative spearheaded by the Ministry of Women and Child Development. However, the role and action plans of the other ministries need to be better articulated.

b. Vacancies and manpower: India's vast immunisation programme, Mission Indradhanush, reaches around 26 million children countrywide with vaccines covering 12 diseases. It is aimed to rapidly increase India's full immunisation coverage to 90 percent by 2020, targeting the most vulnerable and underserved communities. However, problems in vaccine supplies, cold chain maintenance, manpower, reaching migrant workers, etc. are often reported. Malnourished children may benefit hugely from vaccination and thus efforts to strengthen the immunisation drive will also reduce malnutrition.

c. Fund utilisation: The irony of the situation is that while many States report under-utilisation of funds under designated nutrition activities, there has been a shortage of supplies, poor quality of testing kits etc. reported from others. Better fund management and reviewing periodic progress rather than once in a year may be helpful.

d. Better planning and maximal use of data being collected under national programs and schemes: Proper standard operating procedures on what is being collected, what further needs to be added and why, how will all these data be used, how will it feed into policy shaping is critical to think through before rolling out ambitious plans using advanced technology.

e. Improved monitoring and surveillance with use of technology must be effectively implemented.

Improve Education, Research and their Dissemination

a. Encourage research on the determinants and actions to create an evidence base of systemic drivers and actions, including indigenous and traditional approaches to health and wellbeing.

b. Youth ambassadors and messengers can be India's strong and influential advocates across the country and globally too.

c. Champion advocacy and educative efforts by embedding healthy and sustainable food education into national school curricula.

d. Ensure capacity building mechanisms. All certified nutrition and health professionals working in the field must have a demonstrable level of competence in public nutrition.

e. Harmonise silos of thinking and action to create platforms to work collaboratively on all forms of malnutrition. This can be promoted by multi-disciplinary teams working on a common nutrition problems like anaemia, poor breastfeeding rates, sub-optimal IYCF practices etc.

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Azadi Ka Amrit Mahotsav

Progressing Nation through Make in India

Rajiv Theodore

In its effort to make India a manufacturing hub, the government is developing industrial corridors and smart cities to provide infrastructure based on state-of-the-art technology with modern high-speed communication and integrated logistic arrangements. Innovation and research activities are being supported through fast paced registration systems and accordingly, the Intellectual Property Rights registration set-up has been upgraded. A number of new initiatives have been launched in order to streamline and rationalise licensing rules at the States level, aligning them with global best practices. Since the launch of this landmark programme, the government has taken several reform initiatives to create an enabling environment for providing an impetus to manufacturing, design, innovation and startups. India has emerged as the fastest growing economy globally.

India, in September 2021, marked the seventh year of the 'Make in India' initiative-one of the key flagship projects initiated by Prime Minister Narendra Modi. Today, the programme is transforming India and making it a business hub for global manufacturers across a variety of sectors like automobiles, electronic consumer goods, pharmaceuticals, defence systems, aviation among others who have turned to India as their destination to disrupt the existing global supply chains. In other words, this initiative is about making Indian companies excel in a globalised workspace. In the same breath, India has vigorously opened up its economy – Defence, Railways, Construction, Insurance, Pension Funds, Medical Devices to Foreign Direct Investment (FDI). Needless to say, India's economy needs a strong manufacturing push as the nation's dominant services sector is combating the aftershocks of pandemic waves. It is pertinent to note that the country has huge untapped potential to become a global manufacturing hub, but economic growth has been primarily driven by the services sector growth for decades. In contrast, growth in manufacturing has not been to expected levels despite the availability of cheap labour and other resources. While the rapid growth of the services sector has served the nation well right from the 1990s, the pandemic has shown why the nation needs to shift its focus on boosting this sector. Hence, the upscaling of the 'Make in India' Project would go a long way to make India self-reliant and create critical job opportunities.

The Make in India initiative is designed to facilitate investment and foster innovation while boosting skill development that would finally build one of world's best manufacturing infrastructure in India. This initiative is also aimed at attracting global investments and make India a global manufacturing hub. Spearheaded by the Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry the programme is the key to the growth of India's economy as it would create employment opportunities while eliminating the unnecessary laws and regulations, making bureaucratic processes easier, government process more transparent, responsive and accountable. Prime Minister Narendra Modi said while introducing the programme on August 15, 2014, "I want to tell the people of the whole world: Come, make in India. Come and manufacture in India. Go and sell in any country of the world, but manufacture here. We have skill, talent, discipline and the desire to do something. We want to give the world an opportunity to come make in India." The initiative was formally introduced on September 25, 2014 by Mr Modi at Vigyan Bhawan, New Delhi, in the presence of business giants of India. The focus of Make in India programme encompasses 25 sectors including automobiles, automobile components, aviation, biotechnology, chemicals, construction, defence manufacturing, electrical machinery, electronic systems, food processing, IT & BPM, leather, media and entertainment, mining, oil and gas, pharmaceuticals, ports and shipping, railways, renewable energy, roads and highways, space, textile and garments, thermal power, tourism and hospitality and wellness.

A keystone of Make India is the Production Linked Incentive (PLI) scheme. Make in India and PLI scheme make for the single largest manufacturing initiative undertaken by a nation in recent history.

It is important for Indian sectors to leverage this opportunity with vitality and optimism, and a global quality mindset to usher in a new economic era. It is also a call-out to global enterprises to sit up and take notice of India as an attractive destination for manufacturing. The initiatives provide a much-needed push to India's manufacturing sector and when cumulative efforts combine, will also make India a superior domestic manufacturer and a favourable investment centre. This will create positive traction for the overall economic growth of the nation for a long time to come. The aim is to create a robust manufacturing sector by not only inviting foreign companies to set up operations in India but also enhance India's exports and manufacturing capabilities for high-quality, competitive products. In the Union Budget 2021-22, an outlay of Rs 1.97 lakh crore for the PLI Schemes for 13 key sectors was announced, to create national manufacturing champions and generate employment opportunities for the country's youth. This means that minimum production in India as a result of these schemes is expected to be over USD 500 billion in 5 years. Both these initiatives also aim to improve India's rank on the Ease of Doing Business index by eliminating unnecessary laws and regulations, making bureaucratic processes easier, and making the government more transparent, responsive and accountable. India already has a massive domestic market, the largest pool of workers across diverse skill categories, and its industrial ecosystem is maturing which makes it a viable option for investment and growth.

In its effort to make India a manufacturing hub, the government is developing industrial corridors and smart cities to provide infrastructure based on state-of-the-art technology with modern high-speed communication and integrated logistic arrangements. Innovation and research activities are being supported through fast paced registration systems and accordingly, the Intellectual Property Rights registration set-up has been upgraded. A number of new initiatives have been launched in order to streamline and rationalise licensing rules at the States level, aligning them with global best practices. Since the launch of this landmark programme, the government has taken several reform initiatives to create an enabling environment for providing an impetus to manufacturing, design, innovation and startups. India has emerged as the fastest growing economy globally. India's rate of growth of 7.5 percent is accelerating and it remains an oasis of growth in the midst of a subdued economic landscape across the world. The Make in India initiative aims to make India an integral part of the global supply chain. It is about making Indian companies excel in a globalised workspace. Make in India has already created a strong impact in form of improved business environment and economic growth. Some of the recent highlights include:

- India is now 4th amongst the world's most attractive investment destinations
- According to UN, India is forecast to grow at 10.1 percent in 2022, becoming the fastest-growing major economy in the world
- India remains an attractive destination for FDI on account of healthy prospects of economic growth and its skilled workforce
- India ranks among the top 50 nations in the latest 2021 edition of the Global Innovation Index (GII)
- India has held onto its position as the world's 7th most valuable nation brand
- India maintained 43rd rank on an annual World Competitiveness Index compiled by the Institute for Management Development (IMD) that examined the impact of COVID-19 on economies around the world this year.

Major Sectoral Success Stories of Make in India

Defence

Under the Aatma Nirbhar Bharat campaign, the defence sector has been identified as one of the core areas to boost 'Make in India'. Big-ticket defence projects currently being pursued under Make in India include the Light Combat Aircraft Tejas (83 of which have been ordered), transport aircraft C-295 (to be manufactured by Tata-Airbus, deal with the government in final stages), and the AK-203 rifles (to be made in India as part of a joint venture between the Ordnance Factory Board, Kalashnikov Concern, and Rosoboron export, the Russian state agency for military exports.). In 2021-22, the Army has been allocated a capital outlay — for acquisitions, repair, etc — of Rs. 36,000 crore, the Navy Rs. 33,000 crore, and the IAF Rs. 58,000 crore. The 64 percent allocation for domestic vendors in 2021-22 means the import legroom has shrunk to 36 percent.

Defence Minister Rajnath Singh said that the ministry plans to channelise about Rs. 1,000 crore in 2021-22 for procurement from iDEX, a defence ministry initiative to encourage start-ups. The government's push to promote indigenous defence equipment is evident in the Defence Acquisition Procedure 2020, which prioritises capital acquisitions from domestic players over foreign ones. The government has taken several initiatives like de-licensing, de-regulation, export promotion, and foreign investment liberalisation, to give the defence manufacturing sector a boost. Some of the recent highlights include:

- The production plan of over 500,000 AK-203 assault rifles goes on stream.
- 108 military weapons and systems including next-generation corvettes, airborne early warning systems, tank engines and radars are to be made in India.
- South Korean major Hyundai Heavy Industries (HHI) and public sector Hindustan Shipyard Limited, Visakhapatnam, joining hands to build warships. Another Korean firm, Samsung, will be collaborating with Kochi Shipyard to make liquefied natural gas (LNG) tankers.
- The INS Visakhapatnam, one of the four stealth guided-missile destroyer ships under Project 15B, has been indigenously manufactured by the Mazagon Dock Shipbuilders.
- Moving ahead on its Rs 6,000-crore 'Make in India' project for military helicopters, Russia has informed the Ministry of Defence about a partnership with Reliance Defence to manufacture Kamov 226T choppers locally.
- Bullish on India as a market place as well as a manufacturing hub, leading aircraft maker Airbus said it has begun sourcing components for almost all its jets from the country and aims to take its cumulative sourcing from there to USD 2 billion in the next five years.
- Global aviation major Pratt and Whitney, has committed to set up its R&D facilities in Haryana.
- French drone manufacturer LH Aviation has announced a manufacturing plant in India to produce drones.
- Boeing announced setting up a factory to assemble fighter planes, either the Apache or Chinook defence helicopter in India, as well as the manufacture of the F/A-18 Super Hornet.

Manufacturing Sector

With the help of Make in India drive, India is on a path of becoming the hub for hi-tech manufacturing as global giants such as GE, Siemens, HTC, Toshiba, and Boeing have either set up or are in process of setting up manufacturing plants in India, attracted by India's market of more than a billion consumers and an increasing purchasing power. According to Department for Promotion of Industry and Internal Trade (DPIIT), cumulative FDI inflows in the manufacturing subsectors amounted to USD 100.35 billion between April 2000 and June 2021. The manufacturing sector is expected to reach USD 1 trillion by 2025 and contribute about 25 percent to India's GDP. Under the Make in India programme, indigenous manufacturing is expected to increase by 12-14 percent per annum over the medium term. As per the World Bank, manufacturing contributed about 16 percent to the country's GDP in 2016. This is on the higher side when compared with the global average of about 15 percent in 2015. Some of the recent highlights in the sector include:

- Information technology major Zoho, announced that it will invest Rs. 50–100 crore (USD 6.7–13.4 million) and form a new company that will focus on research and development (R&D) in the manufacturing sector.
- Wistron Corp. collaborated with India's Optiemus Electronics to manufacture products such as laptops and smartphones, giving a major boost to the 'Make in India' initiative and electronics manufacturing in the country.
- Amazon India announced to start manufacturing electronic products in India, starting first with Amazon Fire TV stick manufacturing. The company plans to start manufacturing with contract manufacturer Cloud Network Technology, a subsidiary of Foxconn in Chennai by end-2021.
- Samsung started manufacturing mobile display panels at its Noida plant and plans to ramp up manufacturing IT display panels soon. Samsung Display Noida, which has invested Rs. 4,825 crore (USD 650.42 million) to move its mobile and IT display manufacturing plant from China to Uttar Pradesh, has received special incentives from the state government.
- Bharti Enterprises Ltd. and Dixon Technologies (India) Ltd., formed a joint venture to take

advantage of the government's PLI scheme for the manufacturing of telecom and networking products.

- Godrej Appliances launched a range of Made-in-India air conditioners (AC). The company plans to invest Rs. 100 crore (USD 13.48 million) in its manufacturing units (located in Shirwal and Mohali) to increase its AC production capacity to 8 lakh units by 2025.
- American manufacturing major Flex (previously Flextronics) that raked in over $25 billion in revenue last year has been operating in India now trails only the Taiwanese giant Foxconn in terms of scale in India - is now pulling up its socks to double its manufacturing revenue in five years.
- Taiwanese Apple supplier Foxconn will start to assemble the iPhone 12 in India, marking the first time the flagship device has been made outside of China.

Automobiles

Global car majors have been ramping up investments in India to cater to growing domestic demand. These manufacturers plan to leverage India's competitive advantage to set up export-oriented production hubs. Private players such as Hyundai, Suzuki, and General Motors are keen to set up an R&D base in India. The Indian automotive industry is the fifth largest in the world and is slated to be the third largest by 2030. Catering to a vast domestic market, reliance on the conventional modes of fuel intensive mobility will not be sustainable. In an effort to address this, federal policymakers are developing a mobility option that is "Shared, Connected, and Electric" and have projected an ambitious target of achieving 100 percent electrification by 2030. The EV market in India will be a USD206 billion opportunity by 2030, if India maintains steady progress to meet its ambitious 2030 target. This would require a cumulative investment of over USD180 billion in vehicle production and charging infrastructure. Another report by India Energy Storage Alliance (IESA) projects that the Indian EV market will grow at a CAGR of 36 percent till 2026. The EV battery market is also projected to grow at a CAGR of 30 percent during the same period.

To boost Electric Vehicles in India, the FAME India Scheme II is proposed to be implemented over a period of 3 years with a financial outlay of Rs. 10,000 Crore, for faster adoption of electric mobility and growth of electric and hybrid technology to improve the eco-system in the country. The electric vehicle industry in India is picking pace with 100 percent FDI possible, new manufacturing hubs, and increased push to improve charging infrastructure. Federal subsidies and policy favoring deeper discounts for Indian-made electric two-wheelers as well as a boost for localised ACC battery storage production are other growth drivers for the Indian EV industry. Moreover, in September 2021, a production-linked incentive scheme for the automotive sector was approved by Cabinet to boost the manufacturing of electric vehicles and hydrogen fuel cell vehicles. Some of the recent highlights in the sector include:

- Nissan and Volkswagen, which all have manufacturing units in India, are exporting more and more cars out of the country
- Daimler AG, the German parent of Mercedes Benz India, infused Rs. 1,750 crore into its unit. The company is planning to launch 15 new and updated models in the country and expects sales to expand at more than 40 percent during the next two years.
- In support of Make in India, BMW has increased 50 percent localisation. BMW has invested another Rs. 130 crore in India to enhance operations, taking its total investment in the country to Rs. 1,250 crore.
- Kia invested over $1.1 billion to build a car manufacturing plant in Anantapur, Andhra Pradesh. The facility is the company's first manufacturing plant in India. Kia is aiming at 30 percent year-on-year growth next year as it plans to increase production by over 75,000 units.
- Hyundai also plans to invest Rs. 4,000 crore in India as the Korean auto giant aims to bring in six EVs in the country by 2028.
- American electric vehicle and clean energy company Tesla Inc. marked its entry into India by incorporating its subsidiary, Tesla India Motors and Energy Pvt Ltd, in Bengaluru.
- In February 2021, Ather Energy, India's first intelligence EV manufacturer moved its USD 86.5 million factory from Bengaluru (Karnataka)

to Hosur (Tamil Nadu). Ather Energy's factory is said to have an annual production capacity of 0.11 million two-wheelers.

- In March 2021, Ola Electric, the subsidiary of the unicorn Indian ride-hailing start-up, also announced that it would be setting up the world's largest electric scooter plant in Hosur (which is a two and a half-hour drive from Bengaluru) over the next 12 weeks, at a cost of USD 330 million, and aiming to produce 2 million units a year. By 2022, Ola Electric wants to scale up production to pump out 10 million vehicles annually or 15 percent of the world's e-scooters.
- Sterling and Wilson Pvt Ltd (SWPL), India's leading engineering, procurement, and construction company announced its entry into the electric mobility segment in India. It has signed a 50-50 joint venture with Enel X, to be incorporated on April 1, 2021, to launch and create innovative charging infrastructure in India.
- Hitachi had set-up an auto-component plant in Chennai which increased their employees count from 10,000 to 13,000. Last month, Hitachi Air Conditioning India, manufacturer of the largest selling air-conditioner brand 'Hitachi Cooling and Heating' announced its aggressive expansion plans to capture the promising residential and commercial air conditioning market in Gujarat.

Retail

Indian retail industry has emerged as one of the most dynamic and fast-paced industries due to the entry of several new players. It accounts for over 10 percent of the country's gross domestic product (GDP) and around eight percent of the employment. India is the world's fifth-largest global destination in the retail space. India ranked 73 in the United Nations Conference on Trade and Development's Business-to-Consumer (B2C) E-commerce Index 2019. India is the world's fifth-largest global destination in the retail space and ranked 63 in World Bank's Doing Business 2020. In FDI Confidence Index, India ranked 16 (after US, Canada, Germany, United Kingdom, China, Japan, France, Australia, Switzerland, and Italy).Online retail market in India is projected to reach USD 350 billion by 2030 from an estimated USD 55 billion in 2021, due to rising online shoppers in the country. Some of the recent highlights in the sector include:

- Walmart is increasing its majority-stake in Flipkart by leading a new $1.2 billion financing round in the Indian e-commerce giant. The fresh equity round led by Walmart, which acquired majority stake in Flipkart for $16 billion in 2018, values Flipkart at $37.6 billion post-money.
- Amazon.com, Inc. has invested about Rs. 2,310 crore into Amazon Seller Services Pvt Ltd, its marketplace unit in India. Earlier, the company infused over Rs 2,500 crore into Amazon Seller Services and Amazon Data Services India
- Realme launched nearly 300 new exclusive stores across India to expand and strengthen its footprint in the country.
- Reliance Retail introduced Freshpik, a new experiential gourmet food store in India, to expand its grocery segment in the ultra-premium category.
- Plum, the direct-to-consumer beauty and personal care brand, announced plan to launch >50 offline stores across India (by 2023) to expand its customer base.
- Dyson announced to increase its retail presence to 12 stores.
- In 2021, Lenskart received US$ 315 million funding from Falcon Edge Capital, Temasek Holdings, KKR. The company plans to use the proceeds to expand its retail footprint in Southern India.

Renewables

India aims to achieve 40 percent of installed power generation capacity from non-fossil fuel sources and reduce emission intensity of GDP by 33-35 percent by 2030 from 2005 level. With the accomplishment of these ambitious targets, India will become one of the largest Green Energy producers in the world, surpassing several developed countries. Solar Power tariff is reduced by more than 75 percent using plug and play model. India submitted its Intended Nationally Determined Contribution (INDC) to the UNFCCC, on its goal of installing 175 gigawatts (GW) of renewable power capacity by 2022 by setting a new target to increase the country's share of non-fossil-based installed electric capacity to 40

percent by 2030. A total of 150 GW renewable energy capacity (including large hydro) has been installed in the country till November 2021. Projects of 63.64 GW capacity are under various stages of implementation and 32.06 GW capacity are under various stages of bidding. According to the data released by Department for Promotion of Industry and Internal Trade (DPIIT), FDI inflow in the Indian non-conventional energy sector stood at USD 10.28 billion between April 2000 and June 2021. More than USD 42 billion has been invested in India's renewable energy sector since 2014. New investment in clean energy in the country reached USD 11.1 billion in 2018. Some of the recent highlights in the sector include:

- Reliance New Energy Solar Ltd. (RNESL) announced two acquisitions to build more capabilities. Both acquisitions – REC Solar Holdings AS (REC Group), a Norway-based firm, and Sterling & Wilson Solar, based in India – exceeded USD 1 billion and are expected to contribute to Reliance's target of achieving the capacity of 100 GW of solar energy at Jamnagar by 2030.
- Adani Green Energy Ltd. (AGEL) acquired SB Energy India for USD 3.5 billion to strengthen its position in the renewable energy sector in India.
- Copenhagen Infrastructure Partners (CIP) signed an investment agreement with Amp Energy India Private Limited to facilitate joint equity investments of >USD 200 million across Indian renewable energy projects.
- Reliance Industries announced to invest Rs. 750,00 crore (USD 10.07 billion) the green energy segment.
- Suzlon secured a contract for 252 MW wind power project from CLP India. The project is expected to be commissioned in 2022.
- Tata Power Solar secured a contract worth Rs. 686 crore (USD 93.58 million) from the NTPC to build 210 MW projects in Gujarat.
- Adani Green Energy Ltd. (AGEL), signed share purchase agreements for the acquisition of 100 percent interest in SB Energy India from Soft Bank Group (SBG) and Bharti Group. The total renewable portfolio is 4,954 MW spread across four states in India.
- Virescent Infrastructure, a renewable energy platform, acquired 76 percent of India's solar asset portfolio of Singapore-based Sindicatum Renewable Energy Company Pte Ltd.
- GE Power India's approved the acquisition of 50 percent stake in NTPC GE Power Services Pvt. Ltd. for Rs 7.2 crore (USD 0.96 million).
- The US Agency for International Development (USAID) and the US International Development Finance Corporation (DFC) reported a loan guarantee programme worth USD 41 million to support Indian SME investments in renewable energy.
- Adani Green Energy announced plan to acquire a 250 MW solar power project in the northern state of Rajasthan (commissioned by Hero Future Energies). The expected deal value stands at ~Rs.10 billion (USD 136.20 million).
- Adani Green Energy Ltd. (AGEL) signed a contract to acquire a 100 percent stake in SkyPower Global's 50 MW solar power project in Telangana. This would increase its operational renewable capacity to 3,395 MW, with a total renewable portfolio of 14,865 MW.
- JICA (Japan International Cooperation Agency) entered a loan agreement with Tata Cleantech Capital Limited (TCCL) for JPY 10 billion (USD 90.31 million) to enable the firm provide loans to companies in India for renewable energy production, e-mobility solutions and energy conservation in order to help offset the effects of climate change by reducing greenhouse gas (GHG) emissions (in line with the Green Loan Principles).
- First Solar, an American solar panel company, plans to invest Rs. 4,800 crore (USD 645.7 million) in its new 3.3-gigawatt (GW) manufacturing facility in Tamil Nadu.

Pharmaceuticals

India is the largest provider of generic drugs globally. Indian pharmaceutical sector supplies over 50 percent of global demand for various vaccines, 40 percent of generic demand in the US and 25 percent of all medicine in the UK. Globally, India ranks 3rd in terms of pharmaceutical production by volume and 14th by value. The domestic pharmaceutical industry includes a network of 3,000 drug companies and

~10,500 manufacturing units. According to the Indian Economic Survey 2021, the domestic market is expected to grow 3X in the next decade. India's domestic pharmaceutical market is estimated at USD 42 billion in 2021 and likely to reach USD 65 billion by 2024 and further expand to reach ~USD 120-130 billion by 2030. India's biotechnology industry comprises biopharmaceuticals, bio-services, bio-agriculture, bio-industry, and bioinformatics. The Indian biotechnology industry was valued at USD 64 billion in 2019 and is expected to reach USD 150 billion by 2025. India's medical devices market stood at USD 10.36 billion in FY20. The market is expected to increase at a CAGR of 37 percent from 2020 to 2025 to reach USD 50 billion. As of August 2021, CARE Ratings expect India's pharmaceutical business to develop at an annual rate of 11 percent over the next two years to reach more than USD 60 billion in value. In the global pharmaceuticals sector, India is a significant and rising player. India is the world's largest supplier of generic medications, accounting for 20 percent of the worldwide supply by volume and supplying about 60 percent of the global vaccination demand.Some of the recent highlights in the sector include:

- US-based Akston Biosciences announced that it will start the clinical trial of its second-generation COVID-19 vaccine 'AKS-452' in India soon.
- Astra Zeneca India launched a Clinical Data and Insights (CDI) division to further strengthen its global presence and manage data-related aspects of its clinical trials.
- Glenmark collaborated with SaNOtize to introduce spray for COVID-19 treatment in India and other Asian markets.
- Uniza Group, an Ahmedabad-based pharmaceutical firm, signed an agreement with Lysulin Inc. (an US-based firm) to introduce Lysulin, a nutritional product for Indian consumers.
- Alkem Laboratories introduced Famotidine and Ibuprofen tablets to treat osteoarthritis and rheumatoid arthritis symptoms in the US.
- Generic Health (an Australia-based subsidiary of Lupin Limited) signed an agreement with Southern Cross Pharma Pty Ltd. (SCP). Under this deal, Lupin will acquire 100 percent shares of SCP. The acquisition is expected to further strengthen Lupin's foothold in Australia.
- Sun Pharmaceuticals acquired the patent license for Dapagliflozin from AstraZeneca.
- Lupin Ltd. announced its intention to enter the digital healthcare space in India. It incorporated Lupin Digital Health Ltd., a wholly owned subsidiary, to provide a digital therapeutics platform for medical practitioners and patients in the country.
- Cipla launched a real-time COVID-19 detection kit 'ViraGen' that is based on multiplex polymerase chain reaction (PCR) technology.
- Eli Lilly & Company issued non-exclusive voluntary licenses to pharmaceutical companies—Cipla Ltd., Lupin Ltd., Natco Pharma and Sun Pharmaceutical Industries Ltd.—to produce and distribute Baricitinib, a drug for treating COVID-19.
- Glenmark Pharmaceuticals Limited launched SUTIB, a generic version of Sunitinib oral capsules, for the treatment of kidney cancer in India.

As India is near its 75th anniversary of independence from imperial rule, the 'make in India' project assumes the role of a philosophy - of creating an Aatmanirbhar Bharat or a self-reliant India - a vision of Prime Minister Modi. It is a vision of making India a self-reliant nation and does not aim to be protectionist in nature or to cut off the country from rest of the world. It is a vision for India to play a larger role as part of the world economy, a mission towards drastic reduction on import reliance by focusing on replacement via domestic manufacturing. Today, India has come a long way since its independence in 1947 to achieve the goal of a self-dependent and self-reliant nation. The vision of Atmanirbhar Bharat comes from the realisation that we first need to focus on innovation, capability building, and skilling. Aatmanirbharta seeks to enhance existing capabilities through focus, instead of playing in areas where the global competition is intense. The aim is to invest in local companies that will be the competitors of global companies, for domestic as well as export purposes.

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e-Health Services and Technology Interventions

Kanika Verma and Aarushi Aggarwal

To facilitate greater adoption of telemedicine, the government has undertaken the implementation of the National Telemedicine Network (NTN) that provides telemedicine services to the country's most remote areas by upgrading existing government healthcare facilities in all states. This service aims to overcome existing challenges like the lack of specialists and inaccessibility of doctors in rural areas by using information technology in delivering healthcare services. The Government of India also manages the eSanjeevani portal, a doctor-to-patient telemedicine system under Ayushman Bharat Scheme. Through e-Sanjeevani OPD (Outpatient Delivery), any individual may seek medical advice and medication through audio and video.

E-Health is an ever-evolving field at the juncture of medicine, public health, business and modern technology. e-Health can be described as the delivery of healthcare services using electronic information and communication technologies. e-health services are provided in a setting where healthcare providers and patients are not directly in contact, and the interaction is mediated through electronic means. It consists of different electronic health data exchange such as:

1. Telemedicine: Telemedicine also referred to as telehealth, can be described as the remote delivery of healthcare services including medical examinations and consultations using telecommunication services. It provides healthcare providers the opportunity to evaluate and treat patients without being physically present.

2. mHealth (mobile health): mHealth refers to the practice of medicine and welfare using mobile smart devices.

3. Electronic Health Records (EHR): EHR is a systemised collection of patient history stored electronically that can be accessed across multiple formats.

4. Wearable Sensors: Wearable sensors refer to the health monitors which help in tracking an individual's body functions like heart rate, sleep quality, oxygen levels, etc.

The World Health Organisation defines three key areas of e-Health as:

- Delivery of health information and records, for both the professionals as well as the consumers.

- Using the power of information technology and e-commerce platforms to improve the public health infrastructure.
- Use of e-commerce and e-business practices in health management systems.

After the advent of the COVID-19 pandemic across the world, e-health services have become increasingly useful. The onslaught of the pandemic bought upon us an increased need of healthcare services in times when the entire world was in lockdown. Such situations led to an increased demand for dispensing healthcare services using internet and telecommunication services. Many governments across the world have supported the critical imperative of enabling private companies to produce innovative tools which enable authorities to identify suspected patients and carriers, identify their trail and contain any people they may have come in contact with. These technologies involve facial

recognition cameras, drones and sensors which enable gauging a person's body temperature as well as their medical condition.

Experts suggest a massive increase in the global digital health or e-health market both from the demand and supply side. The digital health market is expected to experience a 29.6 percent compounded annual growth rate from 2019 to 2025. In 2018, the digital health market stood at USD 86.4 billion and is expected to reach approximately over USD 500 billion by 2025. According to Research and Markets, the global digital healthmarket would be worth USD 223.7 billion by 2023. Global Market Insights predicts the digital health market to reach USD 379 billion by 2024 and Transparency Market Research foresees by 2025 the digital healthmarket worth USD 536.6 billion.

Digital health or e-health provides a variety of advantages, such as:

- Efficiency: Using modern technology within healthcare enables professionals to reduce inefficiency, save time and accurately diagnose and treat diseases.
- Reduction in cost: More efficient treatments lead to reduction in cost. One potential way is by dodging duplicative assessment through improved communications between healthcare providers and electronic medical records.
- Empowerment: e-Health services enable both the consumers and healthcare providers to feel more empowered by making available the knowledge base of medical data and health records over the internet.
- Better relations: e-Health services can enable better relations between the patient and the expert since it provides clear and easier channels of communication.
- Equity: e-Health is a great concept for reducing the gap between the haves and the have nots. It enables equitable healthcare access irrespective of age, race, gender, ethnicity, geography, etc. Digital health also enables access of better healthcare facilities to remote locations.
- Education: e-Health services are beneficial for educating healthcare professionals of any medical advancements. These services can also be beneficial for consumers to educate themselves about personalised preventive healthcare.
- Faster decision making: With the advent of decision-making software and increased automation, decision making in medical situations have become much faster and more efficient.

As the world begins to recover from the COVID-19 pandemic, there is going to be an emphasis on digitisation of public health services. Most global technology firms are likely to capture the increasing global appetite towards public health. It is anticipated that this space shall become a booming industry for investors with a great return on investments and massive potential for social welfare. Some major trends in digital health in the post COVID-19 world are:

1. Smartphones: With the increasing number of smartphones consumers, these devices can be used to effectively operate digital technology to support healthcare facilities, address the growing health concerns and support the use of m-health services.
2. Big Data: Big data is expected to be a game changer in this space by providing lower rate of medication errors.
3. Virtual Reality: Virtual Reality has already started making its mark in the digital health world by providing support in treating anxiety, post-traumatic stress and stroke, among others. Virtual Reality is stated to play a major role in complicated surgeries.
4. Wearables: In the age of smart watches, fitness bands, sugar monitors etc, wearables are playing an important role in making patients aware of the likelihood of a health emergency. With wearables tracking heart rate, exercise levels, sleep quality etc, these can play a key role in providing up to date monitoring of high-risk patients.
5. Artificial Intelligence (AI): The power of artificial intelligence can be seen in areas such as precision medicine, medical imaging, drug discovery and genomics. Additionally, the use of chatbots and virtual assistants shall see a sharp increase in the times to come.

6. Blockchain: Blockchain technology has already been deployed to create digital versions of medical charts.

In India, the digital health market was valued at Rs. 116.61 billion (USD 1.57 billion) in 2018. The market is estimated to reach Rs. 485.43 billion (USD 6.53 billion) by 2024, expanding at a compound annual growth rate of approximately 27.41 percent during the 2019-2024 period. According to India's e-Health Market Opportunity Report 2021, the e-health market is projected to hit USD 10.6 billion in revenue by 2025. The telemedicine market has the maximum potential within e- health in India and is expected to touch USD 5.4 billion by 2025, growing at a compound annual growth rate of 31 percent. Emerging as a strong market for wearables, India has sold approximately 2 million units in 2017 and is expected to reach 129 million units by 2030. India's surgical robotics market is estimated to expand at a compounded annual growth rate of 20 percent between 2017 and 2025 and achieve a size of USD 350 million by 2025. According to a recent report it is estimated that even though e-pharmacy is at a nascent stage in India, it is expected to reach USD 4.2 billion by 2025. The overall health tech market in India is stated to reach USD 21.3 billion by 2025 acquiring 3.2 percent of the global health tech market pie. India is now also home to 133 health tech start-ups that have seen increased demand during the lockdown.

In addition to health tech start-ups cropping up in India during this time, healthcare services were also offered on social media platforms. During the peak of COVID-19, many people received aid by sharing their requirements through WhatsApp, Instagram, Twitter and Facebook. Messages regarding availability of oxygen cylinder, hospital beds, lifesaving drugs, home cooked meals and other essential equipment were often seen circulating on social media platforms. It was during this time that many mental health applications and online therapy sessions were introduced to provide people with safe spaces to talk about anxiety, loss, loneliness and other mental health issues bought on by the pandemic. During this time, state governments also released dashboards outlining the contact information for various hospitals and live status updates for hospital beds.

Under the guidance of Prime Minister Shri Narendra Modi, India has made long strides in advancing digitisation of the economy to harness India's collective entrepreneurial capabilities. Highlighting the importance and potential of telemedicine in India, Prime Minister Narendra Modi commented, "We are already seeing several consultations without actually going to the clinic or hospital. Again, this is a positive sign. Can we think of business models to help further telemedicine across the world?"

Healthcare services in India remain unevenly distributed. Rural India, in particular, has unreliable access to medical and healthcare services. In the absence of an organised modern healthcare system, traditional practices remained widely prevalent, often posing a fatal risk to patients who tend to be unaware of potential diseases and cures. In order to extend the delivery of healthcare services and expand the public healthcare system to all corners of the country, the Ministry of Health and Family Welfare (MoHFW) has undertaken measures to promote digital healthcare with a view to empower citizens through the dissemination of crucial information. Among the first steps taken by the Government of India was establishing the National eHealth Authority (NeHA) in 2015 that would serve as a promotional, regulatory and standards-setting organisation in the health sector. NeHA has a goal to ensure development and promotion of eHealth ecosystem in India and enable the organisation, management and provision of effective people-centred health services to all in an efficient, cost-effective and transparent manner.

In view of the risks posed by the lack of penetration of health services, the MoHFW, through a comprehensive nation-wide e-health programme, hopes to address the gap in human resource and ensure efficiency, improve patient safety through access to medical records, reduce healthcare cost, improve training and capacity building, and aid in evidence-based planning and decision making. To this end, the ministry outlined various initiatives in the National Health Policy, 2017 that aim to deploy digital tools to improve the efficiency and outcome of the healthcare system in India.

The first aspect of digitising health services in India is the Interoperable Electronic Health Records (EHRs). EHRs are an online repository of medical records of citizens that facilitate continuity among different healthcare providers, ensure affordability of service, and promote a better decision support system. Standards for EHR have been determined and notified in December 2016. A key element of electronic records is interoperability, or the ability of computer systems to use and exchange information. The guidelines for this were determined and notified by the Ministry of Electronics and Information Technology in August 2018 under which all public and private health facilities have been issued a National Identification Number (NIN). So far, 99 percent of public health facilities in India have been allocated an NIN.

Furthermore, a Hospital Information System (HIS) is being implemented for computerised registration and capturing of patients' EHRs. The HIS improves efficiency and leads to better delivery of services to patients. These digital repositories are also accessible to individual patients themselves on a single online personal medical record storage platform. This centralised platform improves accessibility and sharing of personal health data, making it easier for patients to track their medical histories and share with physicians at ease.

The MoHFW has also implemented a framework for the National Health Stack (NHS) that has recommended a National Digital Health Blueprint. The blueprint details a pathway for the holistic adoption of digital technologies based on global best practices. Key features of the blueprint include a Federated Architecture, a set of architectural principles, a 5-layered system of architectural building blocks, Unique Health ID (UHID), privacy and consent management, national portability, EHR, applicable standards and regulations, health analytics and above all, multiple access channels like call centre, Digital Health India portal and MyHealth App.

Indeed, India's experience with the tremendously successful AarogyaSetu app is a testament to the growing public ease with e-health services. Developed in a record 21 days, the AarogyaSetu app quickly became the most downloaded COVID-19 tracking app in the world. However, the app continued to serve the Indian people in another crucial matter: checking for the availability of and registering for COVID-19 vaccines. India's vaccine rollout, aided in large part by the AarogyaSetu app, has been internationally acclaimed. The evidence of its success is apparent in the number of people vaccinated in India. As of 5 January 2022, we have administered nearly 1.5 billion vaccines with the drive just opening to children below 18 years of age.

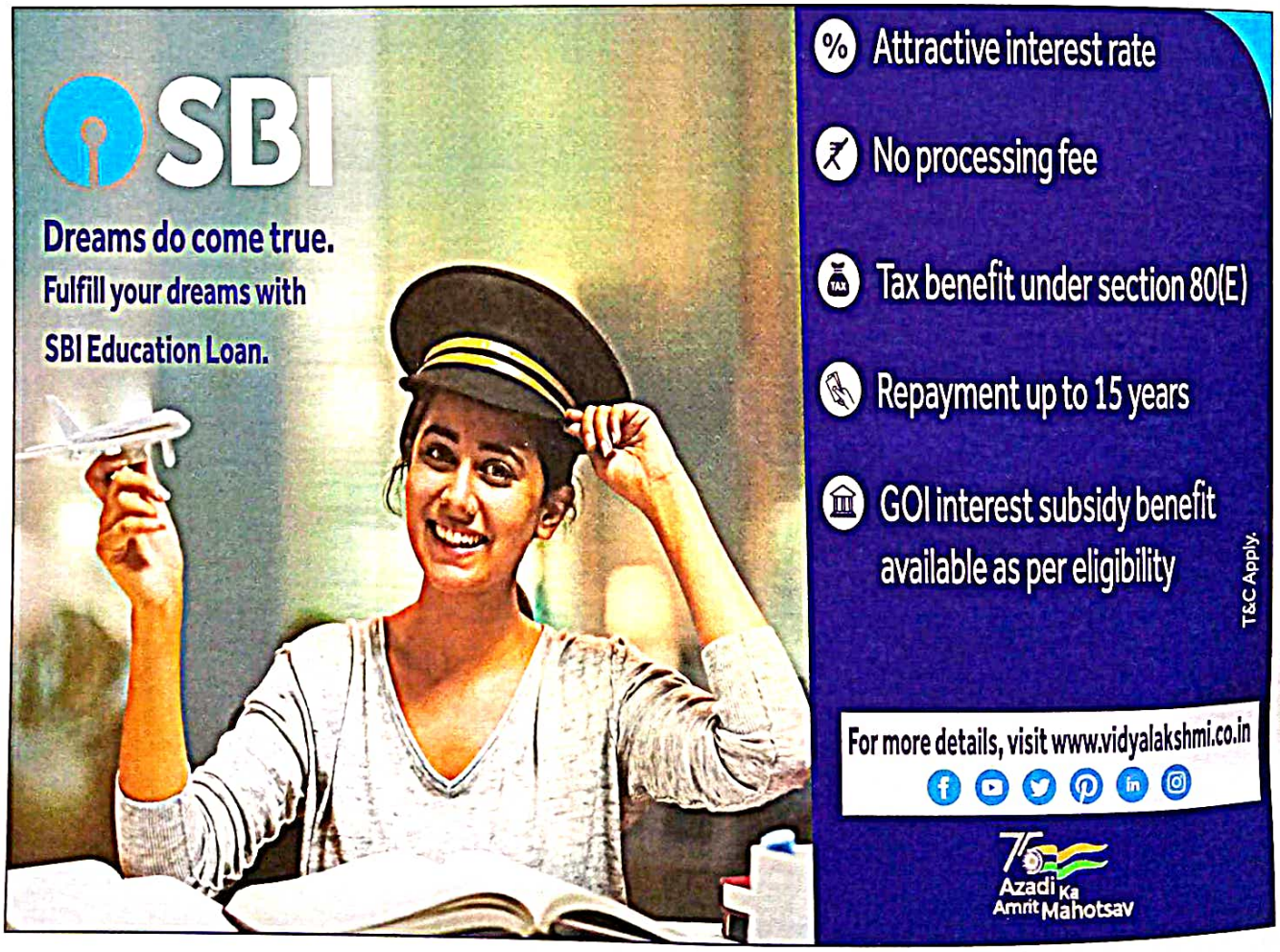
Telemedicine is a key component of digital healthcare especially as telephone (and smart phone) subscribers in India are growing at a rapid pace. More Indians have easier access to healthcare facilities on the phone than in person. The COVID-19 pandemic also enhanced the adoption of telemedicine as country-wide lockdowns made access to non-Covid patients difficult. A survey by Indian health-tech company Practo revealed that India witnessed a 67 percent decline in in-person doctor visits and a 500 percent growth in online medical consultations just between 1 March 2020 and 31 May 2020. Befittingly, the government released the Telemedicine Practice Guidelines (TPG) in March 2020 prescribing rules regarding physician-patient relationships, issues of liability and negligence, evaluation, management and treatment, informed consent, continuity of care, among others.

To facilitate greater adoption of telemedicine, the government has undertaken the implementation of the National Telemedicine Network (NTN) that provides telemedicine services to the country's most remote areas by upgrading existing government healthcare facilities in all states. This service aims to overcome existing challenges like the lack of specialists and inaccessibility of doctors in rural areas by using information technology in delivering healthcare services. The Government of India also manages the eSanjeevani portal, a doctor-to-patient telemedicine system under Ayushman Bharat Scheme. Through eSanjeevaniOPD (Outpatient Delivery), any individual may seek medical advice and medication through audio and video.

A number of new portals and websites have also been introduced to promote better

penetration of health services and related information. The MoHFW has launched a website to monitor Health and Wellness Centres (HWCs) under the Ayushman Bharat Scheme. HWCs deliver comprehensive primary healthcare by upgrading existing health facilities like Sub Health Centres (SHCs) and Primary Health Centres (PHCs) or aid in relevant infrastructure development. To improve the quality of care in labour rooms and maternity operation theatres, a dashboard called LaQshya has also been launched, the data for which is updated by states. An application that prevents, controls and screens for non-communicable diseases (NCDs) is also maintaining by the MoHFW.

Other ministry initiatives include a programme that makes informative calls about safe motherhood and natal care to beneficiaries, a website dedicated to mental health awareness, an emergency medical response website, and a website that facilitates the collection, collation, transmission, analysis and feedback of India's vaccine safe data from the country's peripheries. The National Health Portal (NHP) is perhaps the most popular such undertaking that aims to improve health literacy, improve access to health services, decrease burden of diseases through awareness and serve as a single point of access for consolidated healthcare related information for Indian citizens.

The pandemic has presented our country with a myriad of opportunities towards boosting technological advancements in the healthcare sector. India's advancements in this sector with a strong push from the government has proven well to the country's advancements. Given India's vast diversity and population size the sector presents tremendous opportunities and scope in the future. Extending the idea of the age old saying of 'Health is Wealth', we can safely say that new technology will be a great investment in Indian healthcare system.

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