

# LIFE STREAM

ANNUAL ISSUE- 2020

## THE CORONA CHALLENGE



*"The ultimate measure of a man is not where he stands in moments of comfort and convenience, but where he stands in times of challenge and controversy."*

*- Martin Luther King Jr.*

**THEME: THE CORONA CHALLENGE**

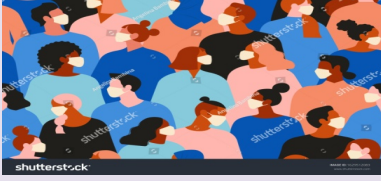
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*COVER: MEASURES FOR PREVENTION OF COVID-19: Image Credit: Shutterstock*

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“There have been as many plagues as wars in history. Yet plagues and wars always take people equally by surprise.”-**Albert Camu, The Plague**



## ***WE PRESENT***

***"Making peace with nature is a defining task of the twenty first century. It must be the top, the top priority of everyone, everywhere--" Prince Charles***

*The State of the Planet address on 2nd December, 2020 by Prince Charles was noteworthy, both for its substance and vision. Like many others, he too pointed out that human activities are at the root of 'our descent towards chaos'. The corona pandemic was the result of 'a breakdown in the link between humanity and nature.' But unlike others who predicted doom, he pointed out that it could be corrected by recognizing "the interdependence of all living things." -**"We have a golden opportunity to seize something good from this crisis.** Its unprecedented shockwaves may well make people more receptive to big visions of change." We are in complete agreement with these views and believe that nothing more needs to be said by us on this subject.*

*In this issue of Life Stream we have outlined the global response to the crisis, what we have learned and what needs to be done. **We reiterate our faith in science** while detailing the global efforts being made to contain the virus. The pandemic has exposed deep deficiencies/dysfunctions in our health care systems. Must we not move towards Universal Health Coverage (UHC)?*

*We discuss how technology could aid economies to recover from the current crisis. We gratefully recall the services of those who are in the fore front of fight against the corona virus.*

*Only poets are able to give expression to our collective thoughts and emotions, especially in challenging times. Ms Sudha Shrotria brings it out in a beautiful poem '**When the world came to a standstill**'-.*

*The corona pandemic has a direct impact on how we live and conduct our businesses in future. We discuss how the pandemic will affect our building designs and architecture in future.*

*In the Travel section we discuss the fate of 'Diamond Princess', a cruise ship, which caught global attention in the early days of the pandemic. We also discuss how **Gandhiji's dietary experiments** are helping us to cope with the corona crisis. Lastly, we outline how satellite technology is helping us track the impact of the virus on our planet.*

*As usual, we have compiled information on the theme from electronic and print media, reports, books, speeches and other sources so as to make it all available at one place, for the convenience of readers. We invite suggestions and criticisms from our readers.*

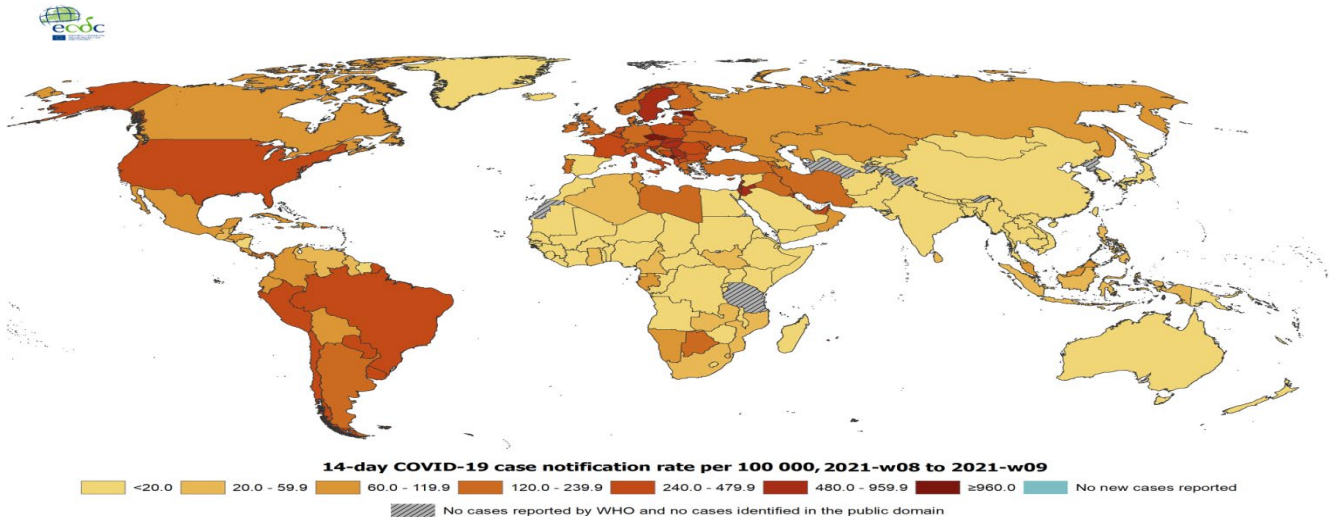
*We present here the **Annual Issue of Life Stream, 2020.***

***Life Science Team***

**"To lose patience is to lose the battle" -**

## THE CORONA CHALLENGE

" The tsunami has entered the building, it's a disaster"



Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat. The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. Date of production: 11/03/2021

**Geographic distribution of 14-day cumulative number of reported COVID-19 cases per 100000 populations, as of March 11, 2021 (Source: European Center for Disease Prevention & Control (ECDC 2021).**

*The novel coronavirus pandemic continues to devastate countries across the world. The World Health Organization (WHO) declared the outbreak a Public Health Emergency of International Concern on 30 January 2020, and a pandemic on 11 March, 2020. The virus has now spread to over 200 countries in six continents across the globe. As of 15/16-3-2021 (time of publication of this issue of LifeStream), 117,164,167 confirmed cases of COVID-19 infections have been reported globally, with 2,600,504 mortalities (WHO). Faced with an unprecedented crisis, countries adopted different strategies to contain the spread of the virus. In this article we examine how the countries across the world, handled the pandemic so far, starting with China.*

**China (the country of origin)** China reported 101,100 confirmed cases and 4838 deaths as of 8 March 2021. The world watched with shock and fear the spread of the fast moving and deadly virus, the ghost towns and the deserted streets, after a complete lockdown in Wuhan, where the outbreak started (for timeline of events see box). The majority (64.1%) of the outbreak in its early stages were reported from China and others blamed China for down-playing its severity. But how did China control the pandemic within a short time, when other countries were still struggling to cope with it?

"Pain is inevitable. Suffering is optional."

- Haruki Murakami





**How it happened- The Timeline** The first Corona virus case reported in Wuhan city (Population 11 million), Hubei province in December, 2019 - suspected origin at the Huanan Seafood market , a wet market that sold live animals next to sea food and meat.

**1 December, 2019** - The first onset of symptoms believed to have first appeared sometime in November, 2019.

**27 December, 2019** - Chinese authorities informed about a SARS-like (Severe Acute Respiratory Syndrome) disease by a doctor in a provincial hospital in Hubei province. Cases multiply.

**30 December, 2019** - The Health Commission, Wuhan notifies local hospitals of a "pneumonia of unclear cause;" seeking reports on suspicious cases.

**31 December, 2019** - A team of health experts visit the region. The World Health Organization (WHO) alerted. The Wuhan Public Security Bureau detains eight people for spreading rumors about the virus

**7 January, 2020** - Chinese politburo discusses the situation .

**8 January, 2020** - A team of experts from the National Health Committee identifies a new Corona virus *SARS-CoV-2* as the cause of the epidemic.

**9 January, 2020** - China makes public the genome of the corona virus, proving its link to SARS and MERS viruses. Scientists develop tests for the virus

**20 January, 2020** - China's National Health Commission confirm human-to-human transmission of the virus .

**21 January, 2020** - China's state-run newspaper, People's Daily, refers to corona virus for the first time.

**23 January, 2020** - Wuhan and nearby cities are put under lockdown.

**23-25 January, 2020** - Started building two new hospitals from scratch.

**24-30 January 2020** - Lunar New Year holiday celebrated in China- millions of people travel across the country.

**25 January, 2020** - All travelers leaving the country to declare their health status.

**26 January, 2020** - A temporary ban on the trade in wild animals throughout the country

**28 January, 2020** - Director General of the WHO, discusses the outbreak with President Xi

**30 January, 2020-** Covid-19 declared a Public Health Emergency of Global Concern by WHO (Ref: [www. bbc.com](http://www.bbc.com))

## The Chinese response



A wet market in Wuhan, China from where the virus is said to have originated (Credit [www.businessinsider.com](http://www.businessinsider.com))

### How did China control the virus quickly and efficiently?

- Surveillance and investigation of food markets to identify the source of infection. Identified the virus within one week (compared to SARS in 2 months)
- Improved laboratory capacities
- Compilation of massive data by Chinese scientists that gave the best available picture of the disease .
- More than 1,800 teams of epidemiologists assigned to trace tens of thousands of people a day in Wuhan.
- Community-wide temperature screening - infra-red thermometers in airports, railway stations, long-distance bus stations, and ferry terminals.
- Thousands of health and quarantine stations set up in national service areas and in entrances and exits for passengers at stations
- Screening people at work, in shops and on streets.
- Aggressive health checking by officials in residential houses and forcing the ill to be isolated.
- Investing in new high technology tracking systems e.g.

the smart phone application with a health code color system to determine whether they need to be quarantined.

- Street camera system for disease surveillance to catch and fine those who violated the restrictions



Lockdown in Wuhan city (Photo credit: Aljazeera)

- Imposed lockdown in Wuhan and Hubei province cities on January 24, with very tight restrictions to enforce quarantine.
- Shops shut, except those providing food and medicine
- Closed airports, suspended all public transportations, declared measures to prevent anyone from entering and leaving one day before the Spring Festival in China.
- Very tight restrictions on people to enforce quarantine.
- Cancelled activities with large crowds and postponed the reopening of schools and colleges
- Massive disinfection campaigns in public facilities
- Built fully equipped Huoshenshan Hospital in Wuhan city (capacity 1,000 beds) within 10 days (January 24-February 3rd, 2020). During the same period, the Leishenshan Hospital with 1,500-bed capacity also built .

“Nothing in life is to be feared; it is only to be understood. Now is the time to understand more, so that we may fear less.” — **Marie Curie**

- Focused on building special centers to treat old and critically ill patients
- More than 40,000 healthcare workers deployed and medical resources mobilized from across the country
- The National Health Commission, China worked on surveillance of COVID-19 among healthcare workers, revision of protection standards and specifications, and strengthening prevention and control measures against the disease in hospitals.
- Development of indigenous vaccines and early start of country-wide vaccination program

**Impact:** A decline in the number of new cases and deaths was observed by the end of February, 2020 with recovery rate of more than 95% of the infected cases. All temporary corona virus hospitals were closed, and lockdowns slowly lifted. China announced the removal of the lockdown and the travel restrictions on Wuhan, restarting of the economy on April 8, 2020 though sporadic cases were still being reported.

**Chinese success:** Chinese government was quick to claim success. Sceptics would say that this might seem easy in a society or political system as that in China. The advance team of the WHO-China Joint Mission, however, observed thus- “China’s bold approach to contain the rapid spread of this new respiratory pathogen has changed the course of a rapidly escalating and deadly epidemic. This decline in COVID-19 cases across China is real.” Still the health officials warned of a relapse of the pandemic.

The pandemic stretched China’s healthcare system further than the 2003 SARS epidemic (SARS reduced China's GDP by approximately RMB 100 billion; corona virus is estimated to cost as much as

RMB 500 billion.



Partygoers at the Wuhan Maya Beach Water Park after the recovery (Credit: BBC.com)

### Southeast Asia

Taiwan, Singapore and Hong Kong took a leadership role in fighting the corona virus. The outbreak of SARS in 2003 had prepared Asia for Covid-19, unlike the Western countries. Although located in close proximity to China, Taiwan reported only 990 cases (10 deaths, 956 recoveries as on 17 March, 2021). Taiwan’s government had a proper plan in place since the SARS epidemic of 2003. All citizens have a health-care record in their name, which allows their doctors and nurses to access their medical information online. Taiwan government provided leadership for a centralized response. The country's Vice President being an epidemiologist was an advantage.

Due to its efficient management of the resources, Taiwan was also able to send hard hit countries much-needed medical supplies that it could spare. New cases are still being reported.

**Hong Kong:** Hong Kong was one of the first countries that reported covid-19 cases, after China

“If we make the right decisions now- informed by science, data and the experience of medical professionals we can save lives and get the country back to work.”

- Bill Gates



(11,341 confirmed cases and 203 deaths; 10,808 recoveries as on 17 March, 2021). Now it is faced with a second wave of infections.



Students taking lunch in protected enclosures in Taiwan (Credit: Getty Images)

**Singapore:** (No. of confirmed cases: 60,137; 30 deaths and 59,984 recoveries as on 17 March, 2021). Tourists from mainland China passed on the virus to Singapore residents in the initial stages of the global outbreak, before it imposed any travel restrictions.



Travellers and Returning residents (Credit: aa.com.tr)

Singapore was well-positioned to outperform others in its pandemic response, as it has one of the best healthcare systems in the world. Its small size also helped. Despite the efforts

made, however, a second wave of infections from returning residents and local transmissions saw cases spike. New cases were centered around overcrowded migrant habitations, highlighting the poor living conditions of thousands of migrant workers and the deep inequality within the Singaporean society.

**South Korea:** (96,849 confirmed cases; 1686 deaths and 88,814 recoveries as on 18 March, 2021). The country has considerable economic and technological resources at its disposal. It also has experience gained from tackling the 2015 MERS epidemic. Its aggressive early response helped the country maintain a low fatality count and a low overall case-count (just under 12,000 around .02% of the population). South Korea was able to suppress transmission with minimal economic fallout by employing a more targeted strategy.

*There has been no lockdown, instead, it followed a radically decentralized approach - the population shouldered collective responsibility, mobilized itself and the businesses shut themselves down. Churches delivered sermons online.*



Social distancing- Job applicants sit for outdoor test in South Korea (Credit: Korea Herald)

We are in this together-and we will get through this together. - **United Nations**



Country-wise data on COVID-19 pandemic as on 15/16 March, 2021			
Country	No. of confirmed cases	Fatalities	Number Recovered
World	120,745,792	2,61,764	68,481,161
USA	29,788,154	5,42,304	NA
Brazil	11,609,601	2,82,400	10,204,541
India	11,400,831	1,58,856	11,027,543
Russia	4,418,436	93,364	4,024,975
UK	4,268, 821	1,25,690	NA
France	4,078,133	90,762	NA
Italy	3,238,394	1,02,499	2,605,538
Spain	3,200,024	72,565	NA
Turkey	2,911,642	29,623	2,734,862
Germany	2,585,385	74,115	2,365,081
Mexico	2,169,007	1,95,119	1,716,135
Iran	1,754,933	61,330	1,499,301

(Source: en.wikipedia.org) NA:Not Available

Relief measures announced included cash payments to most citizens. It helped export tests and medical supplies abroad to over 20 countries, in the critical early days of the global pandemic.

**India** (11,400,831 confirmed cases; 158,856 deaths and 11,027,543 recoveries as on 16 March, 2021). The first confirmed case of COVID-19 in India, which originated from China, was reported on 30 January, 2020. Despite a month-long country-wide complete lockdown imposed on 24th March 2020 flattening of curve could not be achieved. India had reported 519 confirmed cases and



Healthworkers in India (Credit; scroll. in)

10 deaths before the lockdown. It has now overtaken all other countries, except the US and Brazil.

“That which does not kill us, makes us stronger”-  
- Friedrich Nietzsche

With a population of 1.3 billion, only about 20,000 doctors are trained in key areas such as critical care, emergency medicine and pulmonology.

Maharashtra alone accounts for more than a third of India's active cases. Other states affected include Kerala, Tamil Nadu, Karnataka, Gujarat, Delhi, Punjab, Madhya Pradesh and Rajasthan. In India, with a huge population, social distancing is not possible in joint family homes or one-room hovels packed together in slums, or in the crowded markets, busy streets, in temples, mosques, weddings or religious processions.

India's lockdown came at a huge cost, especially since so many of its people live on a daily wage or close to it. Millions of informal workers, largely migrants, were left jobless overnight. Scared and unsure, many tried to return home, often desperate enough to walk, cycle or hitchhike across hundreds of kilo meters.



Fighting covid-19-India (Credit: indiatimes.com)

Unemployment rose, and India's growth forecast tumbled to a 30-year-low. However, in India the southern state of Kerala showed that with targeted testing, contact tracing, and isolation measures, it is possible to reduce mortality rates significantly.



Testing for Covid-19 in Kerala (Credit: Indianexpress.com)

The pandemic revealed structural problems in healthcare- too many ill-equipped smaller facilities for critical care; A bureaucratic approach in dealing with the pandemic; compulsory hospitalization of Covid-19 patients in the initial stages wherein beds were filled up with barely symptomatic patients, insisting on two negative tests for their release resulted in the patients occupying those beds for more than a month.

**Japan:** (448,688 confirmed cases and 8622 deaths and 427,582 recoveries as on 16 March, 2021). First reported by passengers from the cruise ship *Diamond Princess* in February, 2020, infections spread inside 54 facilities across the country.

**Australia:** (29,154 Covid cases; 909 deaths and 26,333 recoveries as on 8 March, 2021). In mid-March, 2700 passengers from *Diamond Princess*, a cruise ship (see the Travel Section in this issue of Life Stream) were allowed to freely disembark in Sydney, with several passengers having symptoms of the corona virus. This failure to properly screen passengers led to around 10 percent of Australia's total cases.

A person in public without a mask during a pandemic is a walking septic tank -Abhijit Sarkar



Opera House, Sydney during lockdown (Credit: Indiatoday.com)

Advantageous geography, a unified response, public trust in institutions, sealing itself off from the world to prevent new sources of the virus entering, travel ban, restrictions on gatherings, social distancing and the closure of many businesses helped to limit the virus' impact.

**New Zealand:** (2434 confirmed cases; 26 deaths; 2311 recoveries as on 16 March, 2021). On March 23, 2020 New Zealand announced harsh lockdown measures. New Zealand's low population density also helped. New Zealand claimed to have succeeded in wiping out COVID-19 completely. Nevertheless, cases are still being reported.

**IRAN** (1,754,933 confirmed cases; 61,330 deaths and 1,499,301 recoveries as on 16 March, 2021). Initially, there was rapid spread of the disease throughout Iran in a short span



During Covid-19 outbreak in Iran Credit:aljazeera.com and it mismanaged COVID-19 outbreak- "from the disinformation at the beginning, to

the inability to deal with travelers coming back from China, to everything that followed." There was severe shortage of resources.

Iran, however, has a good net work of primary healthcare system. The use of high-capacity primary health care, improved coordination between government agencies and municipal bodies, increased awareness of preventive methods, conversion of production capacity, including some military capacity to produce locally-made personal protection equipment, helped the control of COVID-19 in Iran. Fortunately for Iran, the US Treasury clarified that its sanctions do not prohibit humanitarian contributions, which eased the corona virus pressure on Iran.

According to the WHO, the actual toll in Iran could be five times higher, as testing was restricted to severe cases. *Around 15% of those who died were under the age of 40, which was unprecedented.*

**Saudi Arabia:** (383,000 confirmed cases; 6585 deaths and 373,000 recoveries as on 17 March, 2021).



A deserted pilgrimage site Credit:m.economicstimes.com

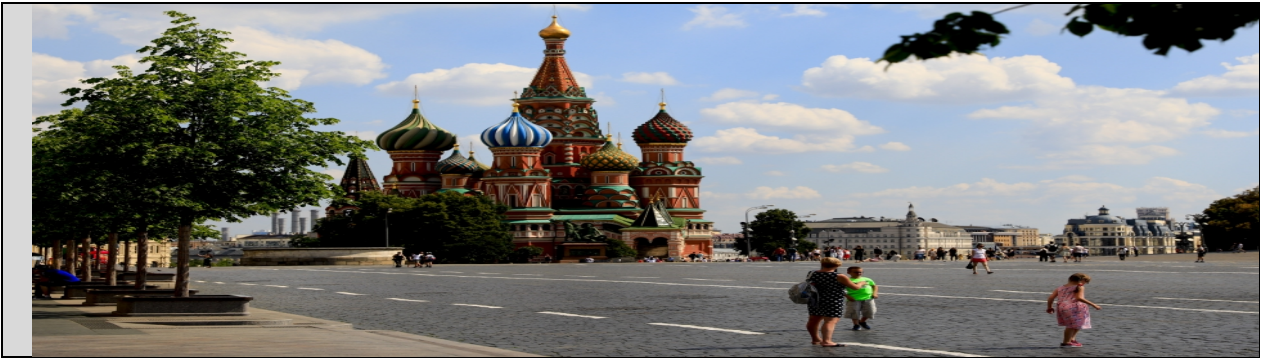
Saudi Arabia took early measures against the virus shortly after the disease was detected in China, resulting in relative containment and a low mortality rate. Measures like digitizing healthcare, increased production of PPE and

When 'I' is replaced with 'We' even illness becomes wellness." - Malcolm X



medical supplies, creating monitoring dashboards and awareness platforms, telecommunication strategies to educate the citizens, a series of webinars to educate the health professionals, reducing physicians' exposure to the virus, the use of robots, tele-rounds and drive-through testing bays, were effective. Travel ban, restrictions on gatherings, social distancing and the closure of many businesses, digital transformation of the workforce, supplies and infrastructure led to a mortality rate significantly below the world average.

**A view of Red Square Moscow during lockdown**



(Credit:aljazeera.com)

The Kingdom pledged \$10 million to the WHO to support their effort against the pandemic and announced economic stimulus measures worth over 120 billion riyals (\$32 billion).

**Russia:** (4,418,436 cases; 93,364 deaths as on 16 March, 2021). Russia had at one time the world's second-highest number of corona virus cases but registered 10 times fewer deaths than Britain, France, Italy and Spain. Critics accused Russian authorities of under-counting the number of deaths to downplay the scale of the crisis, the government in Russia initially felt that it would be 'impossible' for Russians to get the virus.

The rapid spread of the pandemic

"Shallow men believe in luck; wise and strong men in cause and effect"-Ralph Waldo Emerson

in Russia highlighted the strengths and weaknesses of the health system. The 2615-mile Chinese–Russian border was shut early, on 30 January, 2020; population density in the country is low; the public health system in Russia has long experience in the control of infectious diseases such as plague. Testing capacity in Russia, is vast, and was scaled up quickly with more than 200 laboratories providing same-day test results that partly explains the high number of cases. Relatively low mortality rate depends on how the cause of death is attributed. Russia has far fewer elderly people, who are especially vulnerable

to the virus. On the negative side, conspicuous shortages of personal protective equipment (PPE) and ventilators, (which were of old and poor quality) were reported. Russian health workers were 16 times more likely to die from COVID-19 than their counterparts in other countries, accounting for an estimated 7% of all COVID-19 deaths in Russia. Quality of health care differs greatly across Russia's many regions.

Russia is still dealing with "a big legacy of the planned economy that it had in the Soviet Union"

**Turkey:** (2,911,,642 cases; 29,523 deaths and 2,734,862 recoveries as on 16 March, 2021). Turkey had the highest number of corona virus cases outside of Europe and the US in April, 2020. It





Social distancing while praying at a mosque in Istanbul

allowed pilgrimage to Mecca in Saudi Arabia, but had failed to quarantine those who returned in time. Due to incomplete lock down, workers, particularly construction workers, continued going to work.

More than a month later, Turkey could contain the pandemic, claiming a mortality rate of just 2.8% – which was lower than neighbours Greece (6%), Iran (5.4%) and Iraq (3.5%). The country's public health care system withstood the challenge. Turkey, for almost 20 years, had strengthened the country's health system, investing heavily in healthcare infrastructure. On the negative side, more transparency was needed in reporting the figures following the WHO's reporting standards.



www.shutterstock.com · 1695505762

**United Kingdom:** (4,68,821 confirmed cases and 125,690 deaths; recoveries - NA as on 16 March, 2021). Britain, had the highest



Queen Elizabeth addresses the nation during the pandemic (Credit:dw.com)

death toll from the corona virus after the United States. UK was ill prepared for Corona virus. Initially, the government was complacent and underestimated the pandemic. Ventilators were in short supply. Intensive care beds were already overflowing. There was massive shortage of masks and PPEs. Being more vigilant, the government could have perhaps prevented many deaths. The NHS did not play its leadership role in dealing with the pandemic. Instead, a host of private players took over.



Image: London during lockdown (Credit: gettyimages.co.uk)

It chose to **abandon contact tracing** at the height of the pandemic in March, 2020 and failed to provide adequate protective equipment for front-line workers.

The handling of the pandemic revealed gross inequalities as ethnic minorities were disproportionately affected in UK. A study found that **thirty-three percent** of critically ill corona virus

“Do what you can, with what you have, where you are.”  
- Theodore Roosevelt



**Empty Dumo Square, Milan during lockdown**

patients are from ethnic minorities. They mostly live in households where social distancing is not possible. Not only are people of color more likely to become infected and severely ill, they also receive a lower standard of treatment.

National Health Service (NHS) is heavily dependent on the skills of ethnic minorities (27% of NHS workers many of whom are immigrants). They accounted for a staggering proportion of deaths from Covid-19 in the NHS - 94 percent of doctors, 76 percent of nurses and more than half of all health care support workers.



**Image: Infection centers in Europe.**

**European countries:**

**Italy:** (3,238,394 confirmed cases and 102,499 deaths; 2,605,538 recoveries as on 16 March, 2021). The first case of COVID-19 was recorded in Italy on February 21, 2020. Although Northern Italy has one of the best public health

systems in the Western world with well trained doctors and medical professionals; Lombardy region had the heaviest burden of the COVID-19. The public system could not cope with the high number of cases. It could do nothing to prevent what happened. Due to the high number of patients needing hospitalization, hotels and sports pavilions were converted into care facilities.



**Pope Francis delivers his blessing to an empty St. Peter's Square at the Vatican on March 15, 2020. (Credit cnn.com)**

Italy was the first country to be hit hard by COVID-19. It implemented Europe's first nation-wide lockdown. Nevertheless, critics point out its systematic failure to absorb and act upon existing information rapidly and effectively.

**SPAIN:** (3,200,024 confirmed cases and 72,565 deaths; recoveries - NA as on 16 March, 2021). Spain, deemed as the healthiest nation in the world by the World Economic Forum had both- one of the world's highest corona virus mortality rates, and the highest rate of infected health care workers. The government's delayed response to the pandemic, an aging population, lack of social distancing, the austerity measures, a reduction in the

Losing your head in a crisis is a good way to become the crisis.

- C.J. Redwine



number of doctors and hospital beds in recent years weakened the response to the pandemic, Spain became an epicenter of the pandemic.

A report published recently by the European Centre for Disease Prevention and Control (ECDC) pointed out that 20% of registered corona virus cases in Spain are healthcare workers, compared to 10% in Italy, 3% in United States, 3.8 % in China. Public health in Spain has been sustained for over a decade



Spain- Nursing staff mourning (Credit; The hindu.com)

by low-paid professionals with temporary contract. There is a chronic shortage of nurses in the country. Since the health care cuts began, more than 8,000 nurses have migrated to the United Kingdom, France or Germany in search of work.

**Germany:** (2,585,385 confirmed cases; 74,115 deaths; recoveries-2,365,081 as on 16 March, 2021). Compared to other European countries, Germany has managed the COVID-19 crisis better, owing to its well funded health system, technological edge, and decisive leadership. It successfully prevented the overburdening of its health system. So far, the number of deaths from COVID-19 has been much lower in Germany than in other countries. Germany has adequate number of hospitals and intensive care beds.

**France:** (4,078,133 confirmed cases and 90,762 deaths; recoveries: No data as on 16

March, 2021). Although the first case of the corona virus infection was reported on the 24<sup>th</sup> January, 2020 it was not until 3<sup>rd</sup> March 2020 that France took any real action. The borders were closed very late. The country was not prepared for the COVID-19 crisis as a clear picture of the pandemic outbreak was unavailable, due to a lack of extensive testing. France was seeing an exponential rise in cases since March, 2020.



Paris in corona times (Credit:businessinsider.com)

" If any country should have been able to handle a corona virus outbreak, it would have been France. One of Europe’s most powerful countries, France has a world-renowned health care system, immense wealth, ample social welfare, a centralized government, and a strong presidency. Yet the country currently has the fourth-highest number of confirmed corona virus cases and third-most deaths in the world. France has experienced shortages of hospital beds, masks, and other critical products'.



Anti-lockdown protest as cases soar in France

“I find it astonishing that in 2020, a smile or a hug has become an act of revolution.”  
— Kara D. Spain

Despite the sharp rise, hospital numbers and daily deaths became relatively stable, as young people less vulnerable to the disease make up most of the new infections. However, cases are continued being reported.

**Sweden:** (725,289 confirmed cases- death toll 13,172; recoveries NA-as on 16 March 2021). Sweden resisted a lockdown and kept more of society open unlike its Scandinavian neighbors. Public Health Agency in Sweden opted for mostly advisory measures,



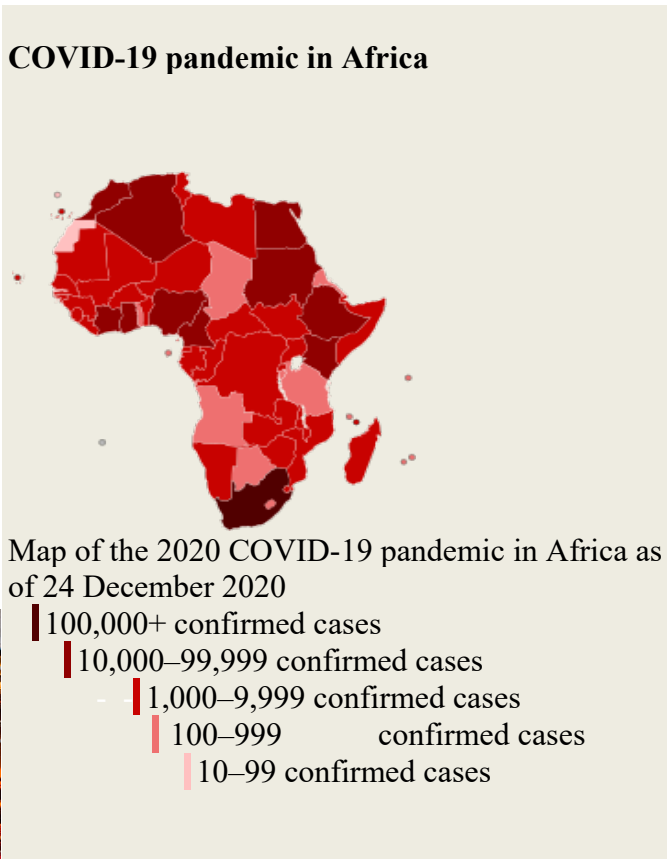
Sweden defies global trends (Credit:nbc.com)

as it believes that "The citizen has the responsibility not to spread a disease." The ruling concept relies on a bedrock of trust between the state and the citizens .."

Care home residents accounted for nearly half of deaths linked to Covid-19 in Sweden. Critics pointed out that an institutional reluctance to admit patients to hospital cost lives.

Protocols prevented care home and nursing staff from administering oxygen as part of acute or palliative services, without a doctor's approval. *Most of the people who died from corona virus in Sweden so far were over 70.* Deaths were also due to other causes- shortage of protective clothing and staff infections. Cases are continuing to be reported from

**COVID-19 pandemic in Africa**



ters.com). Africa accounts for five per cent of all global cases and three per cent of deaths. Maximum number of cases were reported from South africa (1,530,966 cases; 51,560 deaths;1,458,001 recoveries as on 17 March, 2021).



Credit: gettyimages

The first confirmed case in sub-Saharan Africa was in Nigeria. The outbreak of the corona virus has reached every nation in Africa, a continent of 1.2 billion people. By 26 May, 2020 more than half of all African countries were experiencing

across Sweden.

Countries across Europe grapple with new infections. They face the problem of travellers moving across the continent for the summer holidays

**Africa** (4,003,008 confirmed cases; 108,000 deaths as on March 17, 2021, www.worldme

“Corona virus has proved that everything around us is temporary.” - Sara Michelle Cartier



community transmission, although testing capacity remains limited.

Many African countries are faced with shortages.

- 41 countries had only 2,000 ventilators between them, and ten countries had no ventilators at all. United Nations estimated that 74 million test kits and 30,000 ventilators would be needed by the continent's 1.3 billion people in 2020.
- Shortage of basic supplies like soap and water in some parts of the continent.
- Hand washing and physical distancing could be challenging in some places in Africa as lockdown may not be possible.
- Insufficient training of healthcare workers.
- Inefficient data transmission.
- Prevalence of diseases such as malaria, AIDS, tuberculosis, and cholera.
- Other health issues being neglected.
- An increased risk of famine in several African nations.
- Serious economic impact of the pandemic in African countries.
- Preventive measures implemented in different countries in Africa.

WHO helped many countries in the continent and set up laboratories for COVID-19 testing. Experts say that experience of battling Ebola helped some countries prepare for COVID-19 . The mortality rates of African countries, however, are relatively low compared to Europe, due to the younger age of their populations.

In general Africa seems to have weathered the pandemic relatively well so far, with fewer than one confirmed case for

‘Not all storms come to disrupt your life, some come to clear your path.’

every thousand people.

**United States:** (29,788,154 confirmed cases; 542,304 deaths as on 15/16 March, 2021 (Wikipedia). This pandemic was the worst healthcare crisis in modern American history. US outpaced all other countries and became a major hotspot for the corona virus pandemic.



USA - the highest number of Covid-19 deaths in the world Photo;hindustantimes.com

American health care infrastructure was not ready for the pandemic — at first incapable of conducting testing and later short on the workforce required to carry out the contact-tracing of tens of thousands of new COVID-19 cases per day; and insufficient number of ventilators. With thousands of doctors and nurses and other medical personnel becoming infected and even dying, hospitals and clinics, for financial reasons, were forced to lay off thousands of medical workers at a time when they are needed most. Cities, states and hospitals fought over scarce gloves, gowns, mask and ventilators. Four out of five frontline



(Paper cut-outs of customers sit at Eltana café in Seattle Image credit : REUTERS)



nurses did not have enough protective equipment. Rural hospitals and community health clinics, which often treat the poor, were on the verge of going bankrupt and shutting down. New York city became the national epi-centre of the disease, putting its hospitals under extreme pressure. The second wave reported an increasing number of locally transmitted infections and cases with no known links to confirmed patients. In response, the city state introduced stricter social distancing measures, barring the entry of all travelers. The US National Guard was

attempts to exploit the crisis for political gain.

**Racial disparities-** The handling of the pandemic revealed gross inequalities. COVID-19 is disproportionately killing people of color-Black, Hispanic, Native American and undocumented communities, as well as the incarcerated and the homeless. State and local data show that more than 30% of reported deaths have been African American, even though they only make up less than 15% of the population.



Unemployment in the US- A banner against renters eviction (gettyimages)



President Trump tested positive for covid-19 (credit: businessinsider.com)

brought into action and a stimulus package worth \$2.2 trillion was announced. Ex-President Donald Trump has been widely criticized for the lack of testing in the US., his incoherent messaging on the disease, and his



New York city Mayor Andrew Cuomo who provided leadership during the crisis. (Credit: businessinsider.in).

**Canada:** (915,868 confirmed cases; 22,519 deaths-17 March, 2021: worldmeters.info). The travel history among the first 118 cases reportedly related to the Middle East, the United States, and Europe; only 7.6% of those cases

“It is going to disappear. It's like a miracle, it will disappear.” - Donald Trump, US President



were related to travelers from China. The two most populous provinces, Ontario and Quebec, reported the majority of the infections.

The provincial public health authorities worked closely with regional public health officers and local governments to implement services such as testing and contact tracing, while the federal government focused on national level issues. Health care systems in Canada were able to manage patient volumes without being overwhelmed. "The upfront barriers that stop millions of Americans from seeking medical aid are simply not part of the equation".

There has been significant involvement of not-for-profit virtual health-care systems as part of a push towards further privatization, Further, there is far less underlying distrust of science and public health in Canada. *The pandemic was not politicized in Canada.*



**Protest against lockdown: Toronto, Canada-November, 2020** *Canada has opted for universal health coverage.*

The Canadian public health system too is not without shortcomings. The universal health care does not include pharma-care, which would give low-income Canadians better access to expensive medicines. Canadians do not have paid workplace leave provisions. If workers are encouraged to self-quarantine, they need the financial support to make this possible. Difficulties gathering federal data on the spread of COVID-19 is another issue. All provinces and territories do not have a common triage protocol. Canada’s lack race-based COVID-19 data.

**Brazil:** (11,609,601 confirmed cases and 282,400 deaths and 10,204,541 recoveries as on 16 March, 2021), Brazil continued as the second worst Corona-affected country in the world, till it was replaced by India in September, 2020. "Brazil’s populist President Jair Bolsonaro played down the outbreak and dismissed the deadly virus as a “little flu”. He railed against lockdowns, shook hands at rallies, and encouraged people to return to normal life. This attitude of the government had a huge impact on how the outbreak played out in Brazil.

Since the end of August, 2020 Brazil has averaged around 870 Covid-19 fatalities with 40,000 new infections a day. It’s two biggest cities, Sao Paulo and Rio de Janeiro were the most affected.

- Indigenous communities have been among the worst affected by the virus.
- Poverty and malnutrition made tackling the virus in the heart of the Amazon rainforest a major challenge.
- Brazil was one of the few countries in the world which did not implement a nationwide lockdown, although states and cities like Sao Paulo imposed their own lockdowns.

This pandemic is truly a global challenge. And not just because every country in every corner of the world has been affected: because there is no part of society, no industry, no aspect of daily life that has not changed!- **Justin Trudeau, Canadian PM**





(Credit: Getty images) Brazil

- Data showed the number of people complying with social isolation in São Paulo fell from a peak of nearly 70 percent on 22 March, 2020 to just 47 percent on 15 April, 2020 undermining efforts to slow the spread of the virus and ease pressure on the health system.

For the millions of Brazilians working in the informal sector the lockdowns have been very painful.



A newly built corona patient's hospital, Brazil  
Credit: Getty Images

- The country's public hospital capacity is already strained.



Brazilian President Jair Bolsonaro tested Covid-positive (Credit Reuters).

- In Latin America, overburdened health care systems are plagued by deep inequality. About half of all ICU beds in Brazil are in urban areas.
- Brazil's health system was not ready for the Corona virus.
- Private hospitals serve just a quarter of the population.
- According to Brazil's Federal Council of Medicine, public hospitals have just 0.8 beds per 10,000 people in the northeast.
- Disparities are stark between rural and urban settings and between the poorer northern states and the wealthier southern ones.
- Public hospitals are already overburdened by hospitalizations for other illnesses like dengue fever and influenza.

### Economic packages

Many countries announced relief measures as well as economic stimulus packages in dealing with the fall out of the the COVID-19 pandemic. Some instances are listed below.

**United States** While the U.S. health response to the

“We the poor are immune to the Coronavirus.”  
- Miguel Angel Barbosa, Governor of Puebla, Mexico



coronavirus pandemic has faced criticism, the economic response has been among the best in the world. The Biden administration sanctioned a relief package costing \$1.9 trillion. Earlier, in December, 2020 the Congress passed a \$900 billion relief bill, on top of more than \$2.5 trillion of aid authorized during President Donald Trump's final year in office.

**Brazil** put in place an income transfer program - 30% of the population has been getting 600 reais (\$110) a month, the widest anti-poverty program of any emerging market country.

**New Zealand** set up a fund roughly equivalent to 17 percent of GDP to keep jobs and reduce the unemployment rate over the next two years.

**Australia** announced an economic stimulus package of more than 10 percent of GDP—going towards wage subsidies, doubling unemployment benefits and free childcare for all. USA and UK too announced economic packages.

**In UK** Over £100 billion is being spent on support for jobs in 2021. Government also announced tax relief measures, economic stimulus package and support to NHS.

**Canada** More than 10 percent of GDP was going towards wage subsidies, doubling unemployment benefits and free childcare for all.

**Argentina** offered low-paid workers a 10,000-peso lump sum to help weather the crisis.

**India** announced multiple stimulus packages to help the revival of the economy.

**Singapore**  
Multiple  
and

sizeable stimulus packages (totaling 20 percent of the country's GDP) were announced to keep its economy afloat.

## Lessons Learned & Conclusions



According to WHO no country has acquired "herd immunity" so far. The pandemic has shown why an interconnected world needs **global-level crisis management**. No single country can manage a pandemic alone. Countries have to learn from each other, and, make course corrections, wherever needed.

- A report by the Sustainable Development Solutions Network recently ranked the 37 member countries of the OECD (Organization for Economic Co-operation and Development) based on their ability to contain COVID-19 and also minimize damage to their economies. **South Korea topped the list, followed by Baltic countries and countries in the Asia-Pacific region. The U.S. and several Western European countries rank on the bottom of the list.**
- **China, Russia, Turkey and Iran,** countries with strong centralized leaderships, have been able to contain the spread of the virus quickly, after the initial set backs. However, there is no way of knowing whether the claims made by their governments are to be believed.
  - The success claimed by China in fighting the virus is attributed to its **preparedness,**

"Covid is not the first pandemic and it won't be the last."  
-Norman Swan

### **response, and service availability.**

(One could say that this could be due to rigid discipline imposed by an authoritarian regime). Nevertheless, it was able to integrate infection prevention and control as a routine part of daily life for everyone, across all settings.

- South Korea showed the world how leadership, discipline and preparedness matter in a crisis.
- The **UK's** high death toll is the result of a late lockdown, and an administration that was slow to grasp the seriousness of the pandemic.
- **Italy and Spain** were unprepared to face the pandemic.
- **Germany** was swift, effective and decisive in its actions, a model within Europe.
- **The two countries- USA and Brazil** - suffered most- Lack of trust in their leaders, science and public health cost them dearly. They showed that playing politics at the time of the pandemic can be dangerous.
- Reports suggest that countries led by women 'systematically and significantly better-reacted quickly and decisively'  
(For details see page under Corona Warriors)
- **Global Health Security Index** developed by the Economic Intelligence Unit found that 70 per cent of 195 countries scored poorly when it came to having a **national plan** for dealing with epidemics or pandemics.
- Although a stronger national coordination should be in place, **decentralization**

**of health services** has merit in dispersing the health services as the situation in each country – sometimes even within countries – is different.

- **Responses** must be tailored carefully to the **local context**. What has worked in China, in Singapore, in Korea, may not be directly transferable to countries of the European Region.
- **Universal Health Coverage**  
A universal public healthcare system proved to be an asset in handling the virus, as in the case of Canada. (See the next article in this issue)
- UK and most of the European countries have systematically cut health allocations and dismantled their public health systems.
- **Health-care system's** capacity and financing need to be more flexible to take into account exceptional emergencies.
- Most health care systems have been built around the concept of patient-centered care, but a pandemic requires "**community-centered**" care.
- **Recruitment of human resources** must be planned and financed with a long-term vision.
- The corona virus crisis has prompted an unprecedented **collaboration between public and private sectors**. Partnerships between the private and public sector should be institutionalized in response to emergencies.
- In countries like Italy, Spain, Germany, UK and Korea it was found that 20 per cent of infected patients are **healthcare workers**.
- Discrimination against health workers could affect both their performance and motivation.

"The pandemic has really hammered down the concept of hygiene and that will make a huge impact."  
- Pritesh Asher

**The Role of WHO:** *The World Health Organization (WHO), the UN's health agency, has played a crucial role in the management of the Covid-19 pandemic, despite criticisms about its delayed response to the pandemic, and alleged support provided to China in the initial days of the pandemic. The WHO's handling of the initial outbreak of the pandemic has required a "diplomatic balancing act" between member states, in particular between the United States and China.*

*During the pandemic, the WHO has spearheaded several initiatives like the COVID-19 Solidarity Response Fund to raise money for the pandemic response, the UN COVID-19 Supply Chain Task Force, and the solidarity trial for investigating potential treatment options for the disease. With donations from governments, the private sector and individuals, more than \$800 million has been pledged or received for the response so far. The WHO's COVAX vaccine-sharing program aims to distribute 2 billion doses of COVID-19 vaccine for free or at a reduced cost by the end of 2021, and has begun distributing them. Besides, it provides health information and issues advisories on matters of public health, despatches personal protective equipment and other necessities to different countries, trains and mobilizes health workers. It aids and supports world's poorer nations. There is no doubt that despite all its shortcomings, we need a world body to coordinate global efforts in the management of pandemics (ref: [en.wikipedia.org](https://en.wikipedia.org))*

- Long hours and a lack of protective equipment are hampering health care workers across the world, leading many to fall sick themselves.
- **Discrimination-** Countries ought to ensure that their systems are equitable and non-discriminately towards their citizens.

- **Care of the elderly-** Access, affordability, timeliness of care and the coordination of care need to be ensured for elderly patients are concerned.
- **Impact on normal health-** Hospital and health-care workers have been overwhelmed with testing and treatment. There has been an impact on routine services, such as childhood immunizations, chronic disease care, and the like.



Health care of the elderly-Credit: [newindianexpress.com](https://www.newindianexpress.com)

It will be essential to resume reliable management of chronic diseases, such as tuberculosis, diabetes and cancer.

- **Mental health** needs to be focused, as people start to rebuild lives and cope with the impact of the disease on their communities and livelihoods.
- **Promoting healthy behaviors** and living should become a collective public health priority.
- **Homecare-** There's going to be a major shift in terms of support for the nursing care industry, especially in America, and towards home care. People do not want to be in nursing-home prisons, as some have called it, because they are locked up, they cannot leave, and no one can visit them. Only about 5 per cent of Covid-19 patients need intensive care in hospitals and most of them are elderly people or would have co-morbidities.

“Without equity, we cannot end COVID-19, HIV or any other pandemic.”

- Peter Sands, Global Fund



**Social containment-** Experts point out that “if the strictest measures of social distancing were practiced for the entire population, there would be a **three-fold reduction** in mortality rate. The requirement of intensive care units could also be reduced by two-fold. Current policies reduce this number by approximately 15%, while even more aggressive social distancing measures, such as adding household isolation or mandated social distancing can reduce this number by more than 50%.” Scientific studies show that roughly 70 percent compliance is needed for social distancing to be effective.

ed in home isolation or quarantine.

- **Information, Education and communication (IEC).** In pursuing a coordinated, collective response, transparency and accurate information is far more effective than coercion. Communication with people about the risks and how they can protect themselves is critical.
- **Protocols** For life-and-death decisions regarding treatment of patients need to be determined by a carefully drafted, world-class protocol.
- **Data saves lives-** Healthcare professionals are seeing how data can make a difference between life and death. It helps doctors compare clinical data, plan resources, classify patients and help in decision-making.
- **Technical tools-** A new study by researchers at the University of Oxford suggests that tracing apps can be effective in reducing infection rates, even when just 60% of the population adopts them. Other countries, therefore, need to learn from the successes of China and South Korea.

**Virtual care** provides internet-based options for diagnosis and treatment. It in

volves integration of big data, artificial intelligence, telemedicine, online pharma retail and more. It has the potential to significantly reduce the risk of exposure to coronavirus for patients seeking regular, ongoing health care. COVID-19 has accelerated telemedicine by a decade. It has become a life-saving tool for healthcare systems almost overnight. Trapped indoors, many patients are turning to tele-medicine.



Tele-health Credit: Healthleadersmedia.com

The industry is predicted to be worth almost \$30 billion this year in China alone.

- **Digital revolution-** Healthcare still lags behind other industries in the digital revolution. Widespread adoption of electronic medical records, could improve the system’s efficiency and transparency in times of crisis along with progress in regulation, digital tools and consumer options
- **Sharing experience** Countries ought to work together, share information and resources to help each other.
- **Economic Measures** All countries must strike a fine balance between protecting health, minimizing economic and social disruption, and respecting human rights.

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“Health cannot be question of income; it is a fundamental human right.”

## How do children visualize the Corona pandemic?



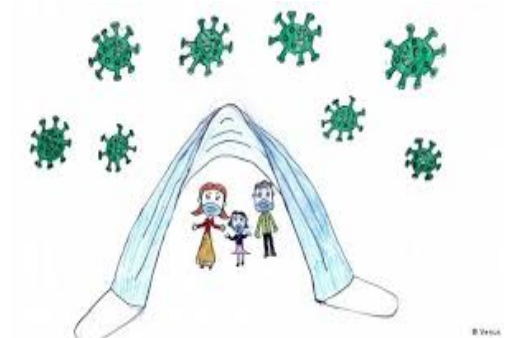
thebulletin.com



Stop Coronavirus (Credit: thehindu.com)



Family in self isolation (Credit: stock photos)



Protection against corona (Credit: dw.com)



(Credit: jhsph.edu)

**First time in human history**

"We can save the human race by lying in front of the TV and doing nothing—

"-Ref: lookgradenthis (instagram)

**HEALTH:  
TOWARDS UNIVERSAL  
HEALTH COVERAGE**



*(Credit: afro.who.int)*

*Fighting and containing a pandemic with person-to-person transmission, especially in this highly connected world, is indeed a challenging task. In the preceding article we saw how the virus can overwhelm even the most robust of health systems in countries across the world, including the world's most sophisticated European healthcare systems, to the world's largest spending healthcare system in the US,. It is clear that our healthcare systems are not designed or built to handle this kind of crisis.*

*Data collected from across the globe show that the pandemic is far from over. While some countries report more and more new cases every day, others are adapting to a "new normal." Then how are we going to meet the corona pandemic and other such pandemics which cannot be ruled out in future? Surely, there is the need to reconfigure our health care systems in response. **Universal Health Coverage (UHC) has been identified as a priority for the global health agenda.***

"Epidemics are a stress test for a system....the issue is how much resilience is built into those systems. Our hospital systems are designed to deliver at 99% efficiency. There's no space for them to deliver anymore." - WHO

*This article discusses how we ought to strive to have efficient and effective healthcare systems to handle health crises better .*

Today nations throughout the world are facing a deep crisis on account of the Covid-19 pandemic. The growing demands on health systems and nation's inability to meet the spiraling costs have put severe constraints on their health care systems.

According to experts, the type of system and the resources a country devotes to health care depend on factors such as its focus on health, its social ethos, and its economics and politics. In order to illustrate this view two widely varying systems- the US and the UK are discussed here.

**Health Care in the US** - Health care in United States is considered world-class in terms of several parameters - focus on individual patients, confidentiality, choice of provider and quality of services. It is ranked first amongst the nations rated by the WHO.



Health services in the US are provided almost exclusively by the private sector. Many hospitals are owned and operated by 'for-profit' companies; others are 'not-for-profit' or charitable institutions. Physicians and other health care workers are either independent practitioners or work for private-sector health care institutions.

For most Americans, access to health care providers is





Depositphotos.com

At least half of the world’s population still do not have full coverage of essential health services.

About 100 million people are still being pushed into extreme poverty (defined as living on 1.90 USD or less a day) because they have to pay for health care.

Over 930 million people (around 12% of the world’s population) spend at least 10% of their household budgets to pay for health care (Source: WHO)

organized through employment-based private health insurance. Medicaid for the poor (jointly funded by state and federal governments) and Medicare for the retired population (funded by a federal payroll tax and general revenue) are two government-funded social insurance programs which cover about 84% of the population. The remaining 16% of the population, composed mainly of the working poor and their families, are forced to depend on their own financial resources or charity for their medical care.

*Although the U.S. health care system is considered world-class, it actually ranks low in overall performance.* It is by far the most expensive in the world, ranking first in cost as per the WHO. It costs almost twice as much as the UK system (based on percentage of GDP). It exhibits significant variation in quality across its population, ranks very low in equity and is inaccessible to those without health insurance. According to ‘The Guardian,’ before the pandemic, 87 million people were uninsured or underinsured in the US, and more than 30,000 people died every year due to lack of access to medical care. More than half a million families declared bankruptcy each year due to health related debt. One out of five Americans

could not afford the prescription drugs which are exorbitantly priced. Healthcare outcomes in the US, from maternal deaths to life expectancy to infant mortality, lagged behind most other industrialized nations. "There is actually a Third-World health care system buried deep within the United States".

**Healthcare in the UK** - The National Health Service (NHS) is the publicly funded health care system of England, created under the National Health Service Act, 1946 (NHS) by the post-war Labor government of Clement Attlee. All UK citizens have the right to avail free health care. Hospitals are owned and operated by the government. physicians and health staff are salaried employees of the NHS. The funds spent on health are budgeted by the government and passed by Parliament.



British PM Boris Johnson on a visit to a hospital under NHS. (Credit: telegraph.co.uk)

“America's health care system is neither healthy, caring, nor a system.”  
- Walter Cronkite

The U.K. system has far less variation in health out-comes across its population; it ranks much higher than the U.S. system with respect to fairness and equity, and is comparatively low cost.

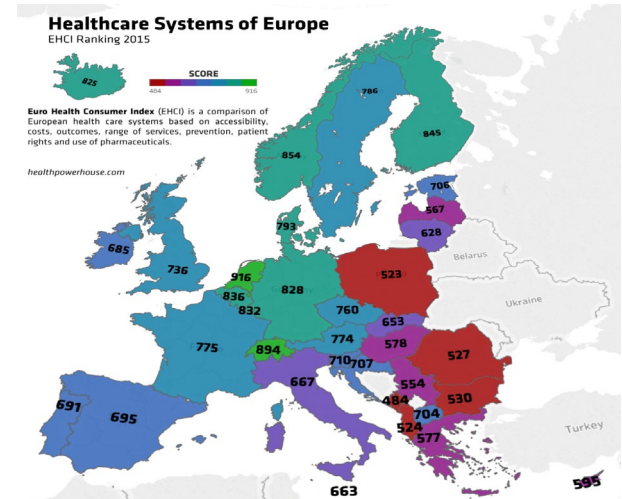
The NHS has been ranked the number one health system in comparison to health systems in 11 countries. This is mainly due to the UK federal tax-based system versus the private risk-based financing in the US system. The U.K. system, however, is considered to be slow in its responsiveness.

In real terms the UK spends a lower proportion on health than some other EU countries; spending has slowed in recent times and the use of private companies has increased; the number of vacancies in NHS is high; shortage of staff is acute; waiting times are getting worse; the population is ageing and care for older people costs much more. According to the European Union, Britain has shed roughly 160,000 hospital beds since the late 1980s and now has the second-fewest hospital beds per capita in Europe. And a 2011 study suggested that it had one-seventh the number of intensive care beds per person that the United States did.

Having seen two of the healthcare systems which are based on two different world views, let's see a third system that is prevalent in the European Union.

**Healthcare in Europe** is provided through a wide range of systems run at individual national levels. Health outcomes vary greatly by country. Most European nations have some type of universal healthcare (UHC) and is largely funded by taxes collected from employers and the public. In many cases, this is through a simple payroll tax or else is collected from other sources including federal funds received through income tax, additional taxes on tobacco and alcohol. European Union countries offer their

citizens a European Health Insurance Card, which, on a reciprocal basis, provides insurance for emergency medical treatment when visiting other participating European countries. Only those who can afford the high cost of membership can avail the facilities.



(Credit: Pinterest.com)

Voluntary (private) Health Insurance (VHI) though has not played a big role in most EU nations. Adopting and following common policies have resulted in many discrepancies. Problems with the single currency, and overcrowding due to immigration, are other issues.

**Why did the world-class systems fail?**

Why did the three world-class healthcare systems fail to rise up to the challenge of the corona pandemic? As ‘The Guardian’ news paper April 2, 2020 aptly described it, '- our public health system (s) are incredibly weak, in part because of *consistent federal disinvestment and austerity that have decimated too many public health agencies.* Due to years of fragmentation and decades of finance cuts, privatization, and deprivation of human and technical resources the health systems in countries like Italy and Spain were close to collapse during the corona pandemic. As far as the US public care system is

concerned "-the waste, cruelty and dysfunction was glaringly obvious

“I've been asked a lot for my view on American health care. Well, 'it would be a good idea,' to quote Gandhi.”  
- Paul Farmer

even before the horrific pandemic we are now experiencing”. Today, as millions of Americans lose their jobs and their healthcare benefits that come with them, it is now virtually impossible for any rational person to defend a system – unique among wealthy countries – that ties healthcare to employment, and is designed only to make huge profits for the insurance industry and drug companies, while ignoring the needs of ordinary Americans”.



Mbathi district hospital, Kenya (Credit:iseeafrica.co.za)

**Designing a public health care system**

Having seen the drawbacks of some of the world-class systems we need to have a broad understanding on the basic principles on which health care ought to be organized. According to an article published in the North American Journal (Vol.7 No.2) (www.actuaires.org) a health care system must perform four high level functions- delivering services, creating resources through investment and training; arranging financing and stewardship by government responsive to citizen's needs. The important factors that are necessary for ensuring better performance by

health care systems are discussed below.

**Commitment** The first necessary condition for universal health care is a collective commitment to achieving it. Countries like Taiwan, Australia, the Netherlands, and the United Kingdom have shown such a commitment.

**Health profile** of a nation has significant influence in designing a public care system. The burden of disease in developed nations is chiefly due to chronic diseases, whereas, low- and middle-income nations bear a heavy burden of infectious disease and diseases of childbirth. Basic health care and public health spending can control infectious disease and the problems associated with childbirth through appropriate interventions. In countries in Africa much of the current focus of health care delivery is on diseases like HIV and Malaria. However, changes in lifestyle and a growing middle class are making non communicable diseases like cardiovascular disease, cancer, and diabetes big issues among populations. A report by WHO stresses that Africa can move forward on recent progress only by strengthening its fragile health systems. Rapid urbanization and increased westernization of lifestyles among the middle classes in developing countries are causing an increase in the risk factors that cause non communicable diseases.

**Access, affordability, equity and quality-** To ensure performance, health care system in a country ought to be easily accessible, affordable and equitable.

**Access** is still the greatest challenge to health care delivery in many countries, including, Asia, Africa and Latin America. Fewer than

50% of Africans have access to modern

Communities and countries and ultimately the world are only as strong as the health of their women.” — Michelle Obama



health facilities. In developing nations like India, health care system is weak due to low investment, poor infrastructure, inadequate human resources that result in high out of

*Experts point out that regardless of whether a nation's health care system is public or private total spending of about \$1,000 per capita (1997) is enough to provide a "world-class" health out-come of 70.0 years Disability Adjusted Life Expectancy (DALE). Spending more than \$1,000 per capita does not continue to improve a population's health.*

pocket expenditure. Vulnerable sections of the population, especially those living in far-flung areas, have little or no access to quality care.

**The Cost of Treatment-** Designing an ideal world-class health care system is not only difficult, but is also expensive as investments needed in health care increase faster than economic growth. In an advanced country like the US 'one out of five Americans cannot afford prescription drugs which are exorbitantly priced'. In the latest report by Fair Health, treatment costs could increase to up to \$73,000 for an uninsured Covid-19 patient. For a Covid-19 patient having an insurance, the amount ranges between \$9,000-20,000. There are 27 million uninsured people in the US. Among those, there are many US citizens who avoid doctors, even if they are ill, due to the fear of exorbitant bills.

**Investments in health care -** In many countries, allocation for health is low within the overall budget. Most developed nations have imposed cuts in the name of austerity. In Germany spending on health care is relatively high, just over 11% of its wealth, compared to 9.8% in the UK. The BBC reported that, in the UK, last year more than £156 bn was spent on health across the UK - about 12 times the figure that was spent 70 years ago (after adjusting inflation). *It means today about 30p out of every £1*

*spent on public services goes on health.* Many African countries spend less than 10% of their GDP on health care. In India, the second most populous country in the world, the value of public health expenditure (2018) by states and union territories together was around 1.58 trillion Indian rupees-- around 1.28 percent of the country's GDP.

**Fairness and equity-** Health care systems everywhere, especially in countries in Southeast Asia, Sub-Saharan Africa, Latin America are heavily skewed against the poor and vulnerable. The handling of the pandemic revealed gross inequalities within their health systems. In USA, UK and other advanced countries Covid-19 is disproportionately killing people of color- Black, Hispanic, Native American and undocumented communities, as well as the incarcerated and the homeless.

**Quality-** The performance of health care systems is measured not only in terms of coverage, but also based on quality of services. While advanced countries are able to offer high quality services to its citizens, poorer countries lag behind due to many factors, including inadequate infrastructure and critical shortage of doctors and health workers, lack of medicines, equipment etc.

**Health determinants-** Health determinants like nutrition, drinking water, sanitation impact health outcomes. Climate change too affects the life and health of millions of people. These factors also need to be given the same attention that is given to healthcare while planning for UHC.

**Preventive health-** Focus on preventive health helps not only in enhancing the health and happiness of the population, but can also save costs and efforts in treating the ill.

**Health performance-** Health Performance is a

"Health care is vital to all of us some of the time, but public health is vital to all of us all of the time."— C. Everett Koop

measure of health attainment—Disability Adjusted Life Expectancy (DALE). Governments need to endeavor to maximize DALE of their population by better health care.



**Nutrition-Waiting for free food in a school, India (ref: npr.org)**

Japan, with 74.5 years DALE has the world’s healthiest overall population. The United States, with 70.0 years DALE, reports 44.1% of total health care by public sector; the United Kingdom with 71.7 DALE reports 82.6% public spending; and Luxembourg with 71.1DALE records 91.4% public spending. For those with DALEs between 55.0 years and 70.0 years, public-spending ranges between 99.9% (Kiribati) to 20.3% (Uruguay) and 24.9% (China).

**Material and human resources** - A health care system ought to have adequate resources - financial, material and human. As far as human resources are concerned, there is acute shortage of doctors and trained health professionals in developing countries because many of them prefer to live and work in places like the US, UK or the Middle East.

**Decentralization and delegation-** In government funded public health systems decentralization and delegation to the lowest level units, close to the people, are important.

**Flexibility** -  
Public health

systems must be flexible enough to deal with issues in time. They ought to be able to adapt to new health care technologies and new medical care needs. They require continuous innovation to meet the needs of patients and providers and incorporate user needs and feedback.

**Technology-(Tele-health)**



(Credit: intouchhealth.com)

As medical research continues to drive new technology, and as countries grow richer and their citizens value more and more medical care, so too will their "wants' increase. Developing countries have to embrace technology to close the health care gap for which private-public partnerships could be helpful. Maintenance is usually one of the major problems with technology in the public sector, as no one takes responsibility for keeping its upkeep and maintenance.

'As government funded health care systems are forced to contract relative to a goal of providing all services for everyone, the private sector increasingly plays an important role in providing for citizens' health'.

**Corruption-** Much-needed resources are diverted away from health care delivery due to corruption which reduces access of patients to services.

“Half the costs of illness are wasted on conditions that could be prevented.” —**Dr. Joseph Pizzorno**

Only by *minimizing chances of corruption*-for example, the use of technology-can a good public care system function effectively.

**Stewardship-** We saw how leadership by Governments was a critical factor in containing the corona virus pandemic. Health care systems need enlightened steward-ship by governments. Even in completely privatized systems, governments are ultimately responsible to its citizens .

**Trusteeship-** A socio-economic philosophy propounded by Mahatma Gandhi, advocates sharing of knowledge and wealth, which according to him, are held in trust by the rich and enlightened individuals. Of course, in many countries we have philanthropists giving away donations liberally to run schools/colleges/public works etc. In all countries, especially developing nations, a large share of the expenditure on health care could be met, if they come forward to share their riches.

**Health reforms-** For any health system to be effective, periodic health reforms are needed. Experts cite the dramatic transformation of the Veterans Association's (VA) health care in the US. Several academic studies have shown that VA care outperforms non-VA care on various factors, due to timely reforms carried out by it.

**Monitoring & evaluation-** The importance of constant monitoring of healthcare systems by Governments and periodic independent evaluation of their functioning need not be emphasized here.

**Health Insurance-** All effective health care systems are generally a mix of public-private systems. In many cases the basic minimum care program is supplemented by private health insurance for non-essential care. Models include a public-mandatory market structure with tax-based and/or employment-based

funding, or a government regulated private-



mandatory market structure in which the purchase of private insurance coverage is made legally mandatory for all citizens. It is expected to reduce the burden on public sector healthcare facilities and create opportunities for the private sector. According to IBIS World, the market share of health and medical insurance measured by revenue in the US is \$1.1 trillion.

Let us now examine some examples of health insurance programs introduced by some of the governments, especially USA, Thailand and India.

**a) USA- The Affordable Care (Obamacare)**

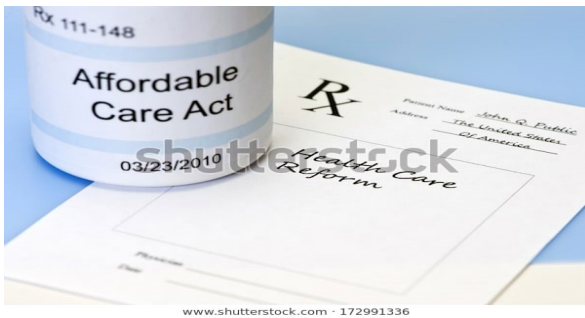
The Affordable Care Act, 2010 (ACA) is considered to be 'the most consequential and comprehensive health care reform enacted in the US since the passage of Medicaid and Medicare in 1965'. ACA has three primary goals -- 1) increasing insurance coverage 2) improving the quality of care, and 3) reducing the costs of health care.



Credit: vanmag.co

“Countries that decide to give up on fundamental public health measures may end up with a larger problem, and a heavier burden on the health system.” - WHO





The ACA has gained a net increase of 20 million with insurance, primarily through Medicaid expansion. The law created private insurance markets, with federal subsidies to help people afford a plan, and encouraged states to expand Medicaid for people in or near poverty. Those provisions, especially Medicaid expansion, led to a significant reduction in the number of people becoming uninsured on losing their job. Researchers from Harvard confirmed that overall, there was a 6.0 percentage point net reduction in loss of coverage after a job loss in the post-ACA period as compared with the pre-ACA period.

Critics, however, point out that the ACA has widened the gap between providing patients the means of paying for healthcare and actually receiving it. 6 million have lost their insurance. The working and middle class receive much less support, particularly those who earn more than 400% of the federal poverty level, who constitute 40% of the population. Criticisms include rapidly rising cost of premiums and deductibles, narrow networks, limits of coverage imposed by health insurance companies, limited patient choice etc. High costs restrict patients with high-risk conditions from going to the doctors and hospitals they need. Further, access to health care has been uneven, with those on Medicaid hampered by narrow networks, while those on the exchanges or getting employer benefits have faced high out-of-pocket costs. The claim of significant cost saving also stand contradicted in not taking into account factors

such as the recession, increased out-of-pocket costs, increasing drug prices, and reduced coverage by insurers. Increase in number of government entities increases the cost of management and regulatory compliance costs. Costs of hospital employment, has gone up. Only 3% of health care expenditures have been spent on preventive services, while the costs of managing chronic disease continue to escalate.

Contrary to the above held views, a study conducted in the three states of Texas, Arkansas, Kentucky (published in JAMA Intern Med. 2016, October 1) reported that Kentucky's Medicaid program and Arkansas's private option were associated with significant increases in outpatient utilization, preventive care, and improved health care quality; reductions in emergency department use; and improved self-reported health.

The Affordable Care Act faced its first big test as a safety net during Covid-19. *The ban on insurers using preexisting conditions to deny coverage is a key part of ACA without which COVID-19 patients could have been deemed as "uninsurable."* Individual health insurance policy could be refused, charged higher premiums or have follow-up care excluded from coverage. According to an estimate by the consulting firm Health Management Associates,-- 'from nearly 12 million to 35 million people could lose their workplace coverage due to layoffs in the coronavirus shutdown and few will be able to sign up temporary workplace insurance, known as COBRA plans, which is costly without employer subsidies. They now have more options because of the Obama-era law'.

A Study by the Kaiser Family Foundation found insurers serving Obamacare patients continued to make profits last year. (www.politico.com)

"I loved clinical practice, but in public health, you can impact more than one person at a time. The whole society is your patient. **-Tom Friedman**



Health insurers who refused to accept the Affordable Care Act in the early years of the law, fearing losses from covering too many sick people eating away their profits, now increasingly participate in Obamacare as job-based health coverage showed a sharp decline. Obamacare plans are now more attractive to insurers than Medicaid because they can charge high deductibles and co-pays and count on paying out less in claims for all but the sickest patients. Further, *people seeking an individual health insurance policy "would have been very much at risk in today's pandemic" were it not for the ACA.'*

US President-elect Joseph R. Biden Jr., continues to support improving and expanding the ACA with an option to buy a public plan, rather than replacing it with a “Medicare for all” system preferred by many in the left wing of the party. As pointed out by New York Times 'How it (the ACA) performs as a safety net now may help determine its future'.

**Thailand** introduced universal coverage reforms in 2001, one of the lower-middle income countries to do so. According to the World Bank, 99.5 percent of the population in Thailand have health coverage. Thailand's network of public hospitals provide universal healthcare to all.

The bulk of health financing comes from public revenues, with funding allocated for primary care annually on a population basis. *As a result of Thailand's universal health insurance, the number of uninsured fell from 24 percent in 2001 to three percent in 2005* and health service patterns changed. Health service utilization has shifted from tertiary towards primary health care facilities, an intended impact of the Universal Coverage Scheme. It's the only country in the world where migrants who account for more than 6 percent of the country's 67.1 million population residing there illegally have the same health care rights as the nationals.



Healthcare in Thailand (credit : who.int)

Thailand achieved universal coverage with relatively low levels of spending on health. But its challenges include rising costs, inequalities, and duplication of resources.

**India** As per the Indian Constitution healthcare in India is the responsibility of the state governments and not the central government. In practice, however, the private sector is responsible for the majority of healthcare in India. Approximately 63% of India's population still pays for health and hospitalization expenses out of their own pocket.

“The power of community to create health is far greater than any physical, clinic or hospital.”

- Mark Hyman



A large part of the population use income, savings, borrow money or sell their assets to meet their healthcare expenses.

Government health policy has thus far largely encouraged private-sector expansion in conjunction with limited public health programs. According to the World Bank, the total expenditure on health care as a proportion of GDP in 2015 was 3.89% of which the government share is just 1%, and the out-of-pocket expenditure as a proportion of the current health expenditure was 65.06% in 2015.

COVID-19 pandemic has put significant stress on India's already limited healthcare resources. In the 2019 Global Health Security Index, which measures pandemic preparedness for countries based on their ability to handle the crisis, India ranked 57, lower than the US at 1, the UK at 2, Brazil at 22, and Italy at 31, suggesting it is more vulnerable to the pandemic than countries that have seen a high number of fatalities so far.

*AYUSHMAN BHARAT* is the flagship health insurance scheme by the Central Government for the poor people in India.



shutterstock.com • 1711778281

The program is a part of the Indian government's National Health Policy. It was launched in September 2018. The central government later established the National Health Authority as an organization to administer the program. National Health Protection Scheme, which is expected to cover over 10 crore (one hundred million) poor and vulnerable families (approximately 50 crore (five hundred million) beneficiaries) providing coverage upto 5 lakh rupees (\$7,100) per family per year for secondary and tertiary care hospitalization. The Government of India claims that it is the world's largest government-sponsored healthcare program. It is still too early to say whether the scheme is successful.

**European countries** As already mentioned, European countries have a variety of basic universal coverage supplemented by private health insurance. Every citizen is enrolled in the national healthcare system and most of medical services are provided free of charge by doctors who are employed by the government. They could also purchase supplemental policies or pay to see doctors not employed by the government. Most European countries have a system of tightly regulated, competing private health insurance companies, with government subsidies available for citizens who cannot afford coverage. In twenty five European countries, universal healthcare entails a government-regulated network of private insurance companies.

“Public health is all around us; the water we drink, the immunizations we receive and the environment in which we live.” - **Source unknown**



**Universal health care** guarantees basic health care to all citizens. According to WHO, it means that everyone has equal access to quality healthcare.



Credit: [healthaffairs.org](http://healthaffairs.org)

*But the challenge lies in providing health care for each and every citizen.* For most countries, especially developing countries, rising cost of healthcare is a deterrent in adapting UHC.

Against the above definition of Universal health care where do the countries stand? A single-payer health-care system is considered to be much better equipped to deal with any public health emergency. It could not only enable the countries to face the current crisis, but also help them to be better prepared for future health crises. The UK's NH and the US Medicare program are two examples of successful public-mandated systems. A poll conducted recently in the US, indicated that 69% of all Americans – including 68% of independents and 88% of Democrats – support providing Medicare to every American. "But the healthcare industry, which made more than \$100 bn in profits last year will do everything possible to maintain the status quo".

**THE KERALA MODEL:** Kerala is a state located in the southern tip of India, with an estimated population of 35 million (2020). Kerala has a long history of public health, spread over two centuries. Vaccination was introduced in the state as early as in 1811. Enlightened rulers, Christian missionaries, dedicated medical practitioners and social reformers played important roles in the evolution of a robust public health system in the state. Besides, every successive government invested in social sector programs-especially in health and education. Traditional systems of medicine have also made significant contribution by promoting a healthy way of life. It is no surprise that the health indicators of Kerala are close to those in developed countries. All these factors have led to development of a model unique to Kerala-the Kerala Model .



Credit: Getty images

Canada has a single player system with universal access to healthcare. In 2009, the Chinese government launched a new round of healthcare reform towards UHC, aiming to provide universal coverage of basic healthcare by the end of 2020. Studies carried out show that China appears to be well on the path to UHC and achieving 'Healthy China 2030'. According to WHO, wealthier nations took twice that long to achieve China's milestones in public health care. *But there are identifiable gaps such as service quality, need for strengthening of financial protections, the fragmented and inequitable health delivery*

"The greatest medicine of all is to teach people how not to need it." -Unknown

system, and increasing demand for high-quality and value-based service delivery. South Korea has opted for universal care, along with insurance to cover non-essential services. Taiwan has health care for all its citizens. Singapore too has government-run health care along with private care, supplemented by private insurance. Whereas Japan has universal public insurance, Australia has opted for a government funded public health system.

All Russians have access to free healthcare under a compulsory insurance system funded by the government. Private hospitals are reimbursed if they take patients who cannot pay for themselves.

Middle-East countries too have well funded health care systems. Saudi Arabia has public health care supplemented by health insurance.



Healthcare in Latin America (credit 3blmedia.co)

Among the Latin American countries Brazil has one of the largest free universal health care systems in the world, which operates alongside a vast private sector accessible to Brazilians with insurance plans or those willing to pay out of pocket.

Fewer than 50% of Africans have

Universal coverage, not medical technology, is the foundation of any caring health care system."  
- Richard Lamm

access to modern health facilities. 84% of South Africans do not have health insurance and they are forced to depend on or are forced to turn to a public sector overstretched and understaffed.

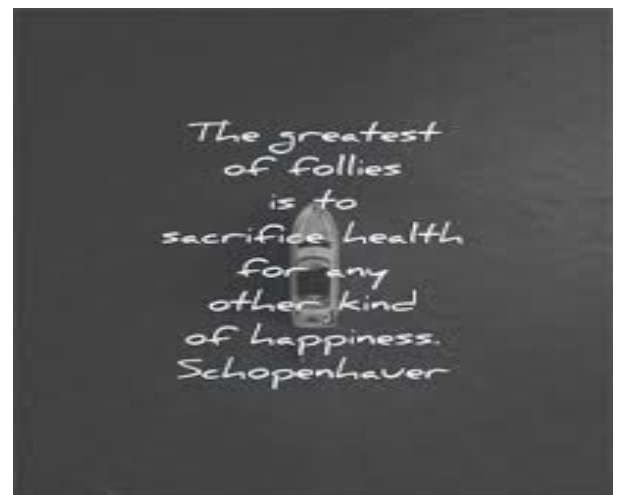


Natalspruit Hospital in Katlehong, South Africa

But the good news is that the SA government is planning to introduce universal health insurance on the pattern of Obamacare.

### The way forward

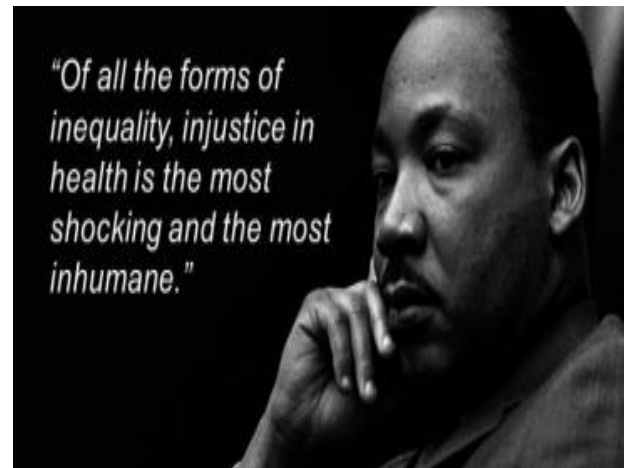
All UN Member States have agreed to try to achieve Universal Health Coverage (UHC) by 2030, as part of the Sustainable Development Goals. The success, of course, lies in its implementation.



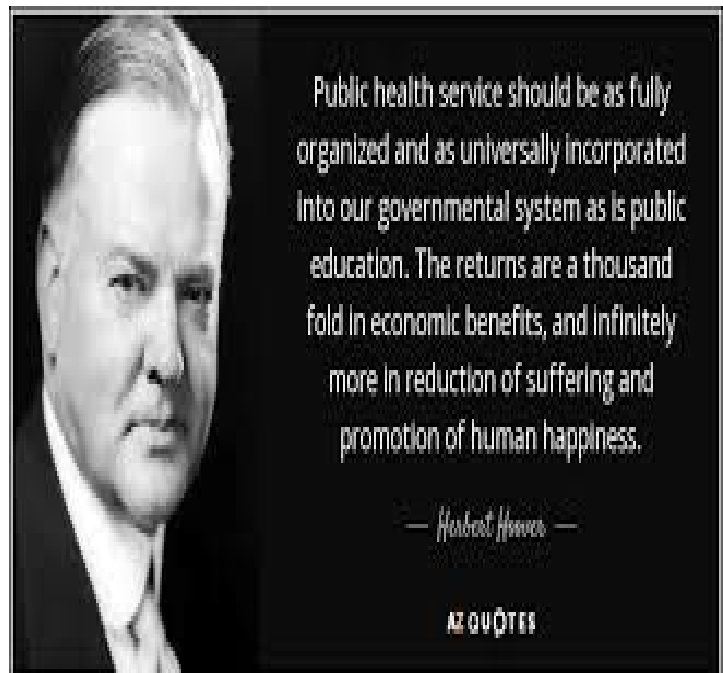
### Action points

- A re-look at health systems by respective countries
- Chart a course to attain UHC
- Correct distortions / under funding
- **Focus on preventive health**
- Create public awareness/ media campaigns/ public health education
- Invest in health care
- Plan for human resources
- Cut costs
- Carefully design public/private insurance
- Public funded healthcare-provide flexibility
- Decentralization to local units
- Empower counties/panchayats
- Quick response to public needs
- Focus on health determinants
- Take up health reforms
- Strict oversight/close monitoring at central/ Federal levels
- Regular feedback
- Independent evaluation

Ref: [en.wikipedia.org](http://en.wikipedia.org); North American journal vol.7 No.2;  
[www.actuaires.org](http://www.actuaires.org); [www.modernhealthcare.com](http://www.modernhealthcare.com);  
[pubmed.ncbi.nlm.nih.gov](http://pubmed.ncbi.nlm.nih.gov); [www.gsb.stanford.edu](http://www.gsb.stanford.edu); [www.who.int](http://www.who.int); [www.vox.com](http://www.vox.com);  
[www.nytimes.com](http://www.nytimes.com); [www.weforum.org](http://www.weforum.org);  
[www.thelancet.com](http://www.thelancet.com)



Martin Luther King jr.Quote



Public health service should be as fully organized and as universally incorporated into our governmental system as is public education. The returns are a thousand fold in economic benefits, and infinitely more in reduction of suffering and promotion of human happiness.

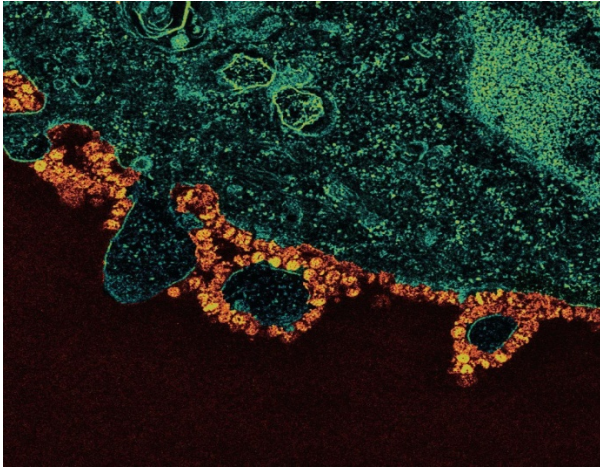
— Herbert Hoover —

AZ QUOTES



**SCIENCE:**

**THE SCIENCE OF CORONA VIRUS**



Pseudo-color thin-section electron micrographs of the 2019 novel corona virus grown in cells at the University of Hong Kong. The image shows part of a virus infected cell grown in culture with multiple virus particles being released from the cell surface. Each infected cell produces thousands of new infectious virus particles which can go on to infect new cells

*'This was an organism unknown to science an year ago. Today it is the subject of study on an unprecedented scale,'- Mike Skinner, Virologist*

*"Science continues to tell us the truth about this virus. How to contain it, suppress it and stop it from returning, and how to save lives among those it reaches,"-DG, WHO*

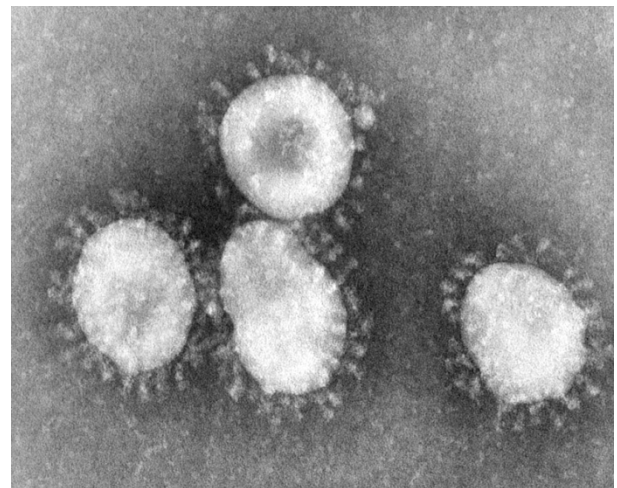
**What is COVID-19?** The first known case of severe illness caused by a coronavirus was the Severe Acute Respiratory Syndrome (SARS) epidemic in China. A second type of outbreak- the Middle East Respiratory Syndrome (MERS)-was reported in 2012 in Saudi Arabia. A novel coronavirus, named Severe Acute Respiratory Syndrome

coronavirus 2 (SARS-CoV-2), was identified as the cause of an outbreak of respiratory illness first detected in Wuhan, China in 2019. The illness caused by this virus has been named coronavirus disease 2019 (COVID-19).

**What are corona viruses?** SARS-CoV-2 belongs to a family of single-stranded RNA viruses known as *coronaviridae*, a common type of virus which affects mammals, birds and reptiles. In humans, it commonly causes mild infections, similar to the common cold, and accounts for 10–30% of upper respiratory tract infections in adults.

Coronaviruses are a large family of viruses so named, due to the crown-like protein spikes on their outer surfaces. They can cause illnesses ranging widely in severity.

Coronaviruses are large, roughly spherical particles with an average diameter of 120 nm with unique surface projections. They are enclosed in an envelope embedded with a number of protein molecules.



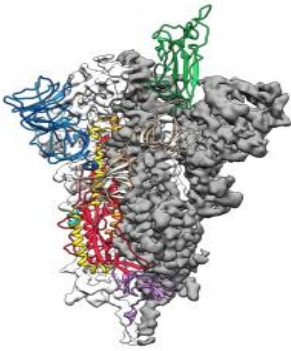
An electron microscopic image of the 2019 novel coronavirus (credit: newerope.eu)

The spike protein has two important features- the receptor-binding domain (RBD), a hook that grips onto host cells, and the cleavage site, that allows the virus to break open and

*"This is a historic moment in global public health, demonstrating the international will to tackle a threat to health head on."*

enter host cells. The RBD of the spike proteins can effectively target a receptor outside human cells called ACE2, involved in regulating blood pressure.

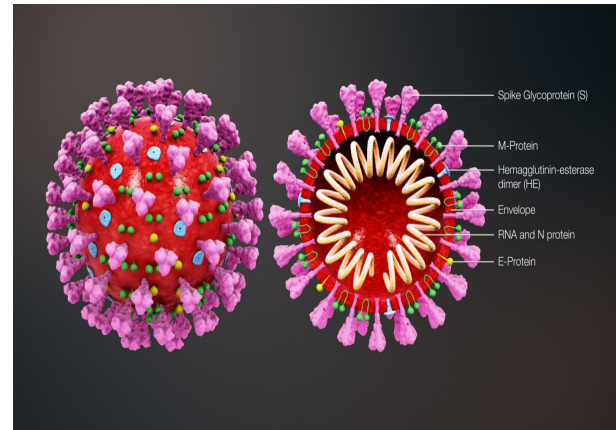
The lipid bi-layer envelope, membrane proteins, and nucleocapsid, protect the virus when it is outside the host cell.



The atomic-level structure of the SARS-CoV-2 spike protein in its prefusion conformation. The receptor binding domain, the part of the spike that binds to the host cell, is colored green. (credit: UT Austin, McLellan Lab)

**Genetic make-up:** It is remarkable that the Chinese scientists could sequence the genome of SARS-CoV-2 soon after the outbreak and make the data available to researchers worldwide. This helped the Chinese authorities to rapidly detect the epidemic and to study human to human transmission.

Coronaviruses consist of a single strand of RNA bound by protein and wrapped in an “envelope” of lipid molecules, which measures 80 billionths of a meter in diameter. They have the largest continuous genome, (about 30,000 nucleotides long) among known viruses that use RNA, (instead of DNA), as their genetic material. A longer genome gives them more opportunity for mutations during replication. “Viruses with large RNA genomes typically



Cross-sectional model of a coronavirus (en.wikipedia.org)

have mechanisms that help them to survive, despite having lots of individual members of the virus population with deleterious errors in their genomes”.

Coronaviruses also have high rates of natural recombination. When more than one coronavirus strain infects the same cell, and they exchange genes during replication, they give rise to a new viral strain. Recent genomic analysis reveals that COVID-19 may have resulted from recombination between two different existing viruses.

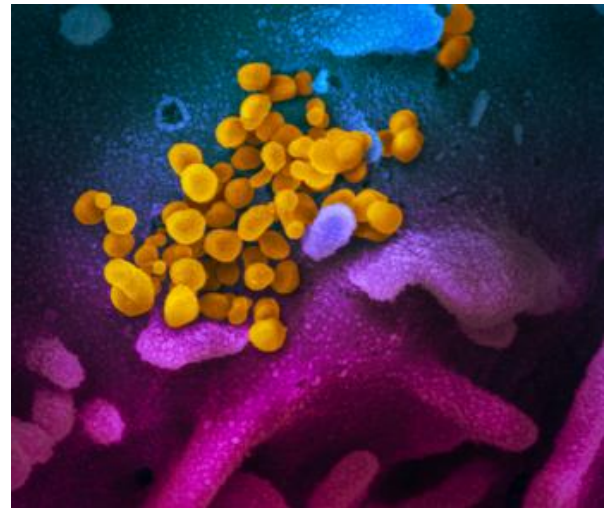
**Origin:** Understanding the link between wild and domestic animals and COVID-19 is important for managing the current pandemic and future outbreaks of infectious diseases. Due to the destruction of natural forests people and wildlife are brought into intimate contact. This can promote the spread of zoonotic diseases (e.g. Nipah virus infection which is carried by fruit-eating bats in Asia). Further, nearly half of all the infectious zoonotic diseases that have emerged in humans since 1940 have come directly from domestic livestock, although having originated in wild animals (e.g. swine flu pandemic from domestic pigs). 'International food supply chains, the movement of people globally, and unprecedented changes in pathogen life cycles due to climate change, further facilitate the conditions for emergence and spread of diseases'.

“What will save lives is science, solutions and solidarity” -DG, WHO

Reports suggest that even dead animals can pass on diseases to people and other animals if their carcasses are fresh, and, if people consume the meat, or handle the dead animals in an unhygienic way. More stringent bio-safety rules relating to the sale and trade of live animals, as well as calls to stop wildlife being traded in markets altogether are necessary. The Chinese government has now banned farming and trade of almost all terrestrial wild animals for human consumption, with very few exceptions. Further, research is needed to be sure of how the virus got into humans, and to understand the role of wildlife and markets in transmission.

**Research:** A Research study led by Columbia University, analyzed data from China and found that the epidemic was driven by “undocumented infections.” Sickesses were so mild that they were not recorded as COVID-19 cases, and were the source in nearly 80% of the recorded cases. This explains the rapid geographic spread of the virus and why it is hard to contain. Research, led by the WHO Collaborating Centre for Infectious Disease Epidemiology and Control estimated that the overall symptomatic case-fatality risk of COVID-19 in Wuhan was 1.4%. That is, people with COVID-19 who develop symptoms have a 1.4% chance of dying.

The novel SARS-CoV-2 is the product of natural evolution, according to findings published in the journal Nature Medicine. The analysis of public



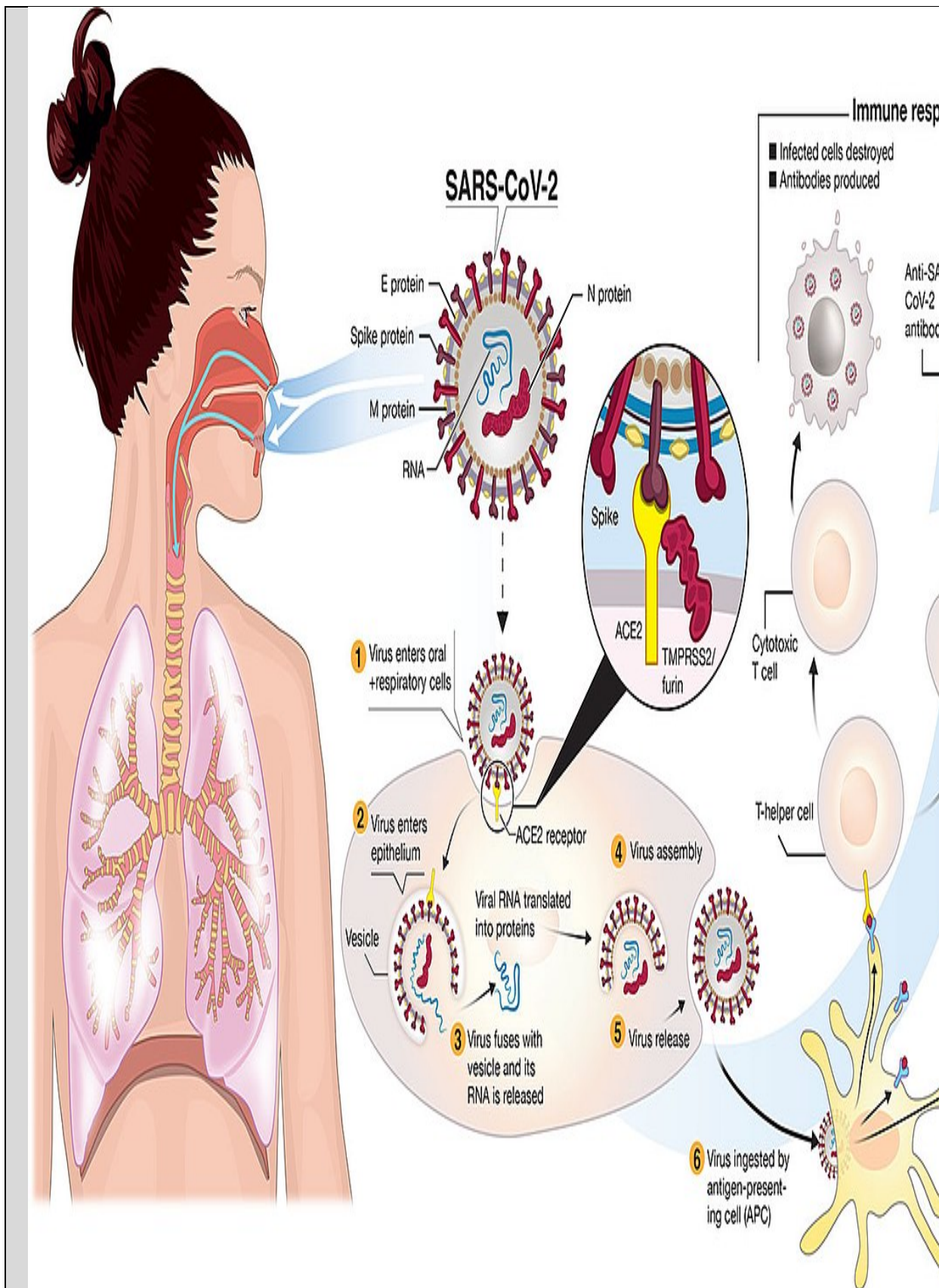
This scanning electron microscope image shows the virus that causes COVID-19—isolated from a patient in the U.S., emerging from the surface of cells (blue/pink) cultured in the lab. (credit: NIAID-RML)

genome sequence data from SARS-CoV-2 and related viruses found no evidence that the virus was made in a laboratory or otherwise engineered. "By comparing the available genome sequence data for known coronavirus strains, we can firmly determine that SARS-CoV-2 originated through natural processes," The SARS-CoV-2 spike protein was so effective at binding the human cells, in fact, that the scientists concluded it was the result of natural selection and not the product of genetic engineering. These two features of the virus, the mutations in the RBD portion of the spike protein and its distinct backbone, rules out laboratory manipulation as a potential origin for SARS-CoV-2 (Ref: [www.sciencedaily.com](http://www.sciencedaily.com)). But the debate is still going on.

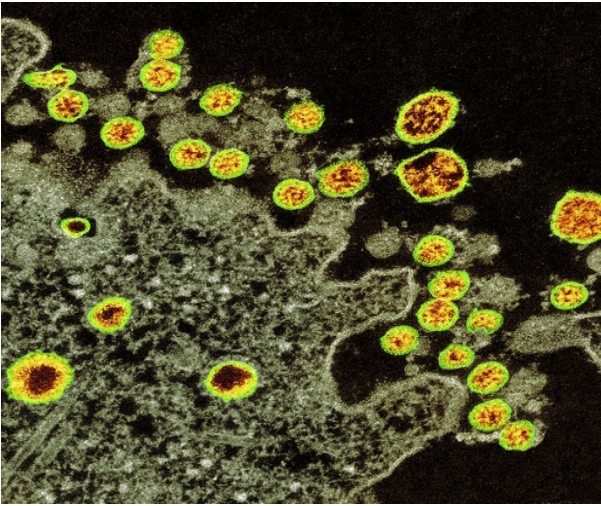
**Transmission & infection:** All coronaviruses use these outer spike proteins to invade cells. Transmission of Sars-CoV-2, occurs through droplets of water containing the virus from an infected person are passed on to another during a cough or sneeze. Virus-ridden particles thus inhaled by others come into contact with cells lining the throat and larynx. These cells

“Research is formalized curiosity. It is poking and prying with a purpose,” - Zora Neale Hurston





Transmission of coronavirus (Credit: en.wikipedia.org)



This electron micrograph shows particles of the coronavirus that causes COVID-19, called SARS-CoV-2. (credit: CDC/Science Photo Library).

have large numbers of Ace-2 receptors on their surfaces. The virus then fuses its oily membrane with the membrane of the host cell and releases its genetic material. The RNA inserts itself into the cell's own replication machinery and makes multiple copies of the virus to make proteins that help it replicate. This causes the cells to burst and the infection spreads. The body's immune system then start targeting the virus, and in most cases halt its progress.

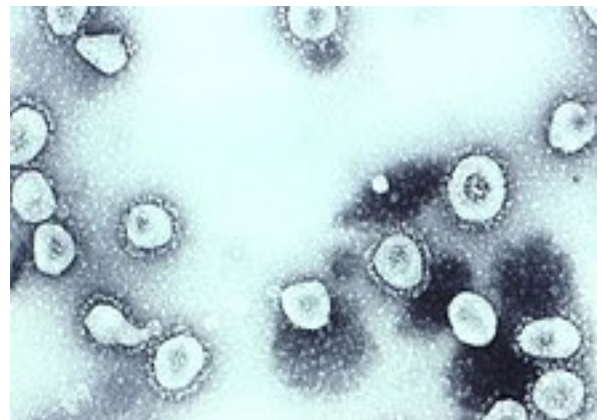
A COVID-19 infection is generally mild and that is stated to be the secret of the success of the virus. Many people do not realize that they are infected and move around freely, infecting others.

**Symptoms:** The symptoms of virus infection range from mild illness to pneumonia. Symptoms include fever, cough, sore throat and headaches. In severe cases difficulty in breathing and death can occur. More serious infections are rare, although coronaviruses can cause enteric and neurological disease.

People with COVID-19 generally develop signs of mild respiratory symptoms and fever, on an average of 5-6 days after infection (mean incubation period 5-6 days, range 1-14 days). Most people infected with COVID-19 virus have mild illness and recover.

**Severe infections:** ([www.sciencemag.org](http://www.sciencemag.org)) ScienceMag mentions that occasionally, the virus can cause severe problems, especially when it moves down the respiratory tract and infects the lungs, which are even richer in cells with Ace-2 receptors. When these cells are destroyed, the lungs become congested. In these cases, patients will require treatment in intensive care. In some cases, a person's immune system goes into overdrive, resulting in inflammation. When this process goes out of control, more and more immune cells are released, and the inflammation gets worse. This is known as a *cytokine storm*. In some cases, the patient dies.

Just why cytokine storms occur in some patients but not in the vast majority is unclear. "One possibility is that some people have versions of Ace-2 receptors that are slightly more vulnerable to attacks from the coronavirus than are those of most people. And the antibodies created by that response will provide protection against future infections – but we should note that it is unlikely this protection will be for life."



Transmission electron micrograph of organ cultured coronavirus OC43. ([en.wikipedia.org](http://en.wikipedia.org))

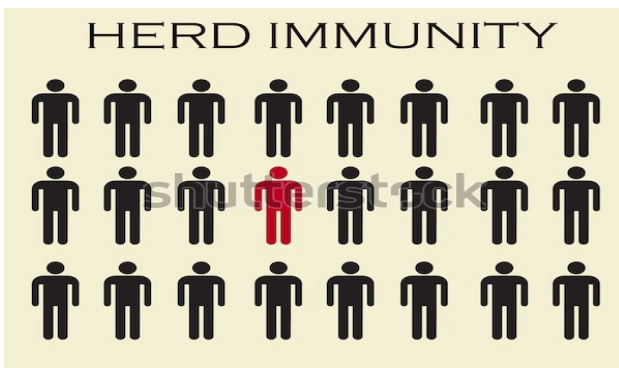
“Research is to see what everybody else has seen, and to think what nobody else has thought.”

– Albert Szent-Györgyi

Although the lungs are the main target, the virus can affect many organs including the heart and blood vessels, kidneys, gut, and brain. The website points out that --“[The disease] can attack almost anything in the body with devastating consequences. Its ferocity is breathtaking and humbling. A dangerous, newly observed tendency to blood clotting transform some mild cases into life-threatening emergencies. Roughly, 5% of patients become critically ill. The virus acts like no pathogen humanity has ever seen--”. Larger, controlled studies are needed in this area. So far, around 20 per cent of confirmed cases of Covid-19 have been classed as severe or critical, and the current death rate stands at about two per cent.

**Recovery:** The incubation period of a coronavirus varies, but is generally up to two weeks. Using available preliminary data, the median time from onset to clinical recovery for mild cases is approximately 2 weeks, and is 3-6 weeks for patients with severe or critical disease.

**Herd Immunity:** “If many people have been infected for each of the cases of illness that we are observing now, herd immunity will build up more quickly,



curtailing the virus spread. If only a few people are infected for every case of illness, we’ll have further to go before herd immunity starts to slow the spread.” If immunity is

not durable, recurrent outbreaks of severe disease in older adults are more likely.

**Protection** (Pl see the page 41 illustration )

**Treatment:** WHO does not recommend self-medication with any medicines, including antibiotics, as a prevention or cure for COVID-19. Some western, traditional or home remedies may provide comfort and alleviate symptoms of mild COVID-19, but there are no medicines that have been shown to prevent or cure the disease. A study by teams of researchers in China provided early evidence that

**Government Advisory (India)**

To prevent the spread of COVID-19:

Clean your hands often. Use soap and water, or an alcohol-based hand rub.

Maintain a safe distance - atleast 6 ft-from anyone who is coughing or sneezing.

Wear a mask when physical distancing is not possible.

Don’t touch your eyes, nose or mouth.

Cover your nose and mouth with your bent elbow or a tissue when you cough or sneeze.

Stay home if you feel unwell.

If you have a fever, cough and difficulty breathing, seek medical attention.

Calling in advance allows your healthcare provider to quickly direct you to the right health facility. This protects you, and prevents the spread of viruses and other infections.

COVID-19 patients might benefit from infusions of purified antibody-containing plasma from the blood of patients who had

“In India, scientists confirmed that if you don't take a picture or selfie while injecting vaccination it will not work!”  
 - Sheikh GULZAR



Seasonal flu kills 291,000 to 646,000 people worldwide each year, according to a new estimate that's higher than the previous one of 250,000 to 500,000 deaths a year. The new figures from the U.S. Centers for Disease Control and Prevention and other groups were published on Dec. 13, 2017 in the medical journal 'The Lancet', further confirmed by a study reported in the Journal of Global Health, 2019.

recovered from the disease. This has been tried in several hospitals in India and abroad. The number of cases is too small to predict any tangible outcome.

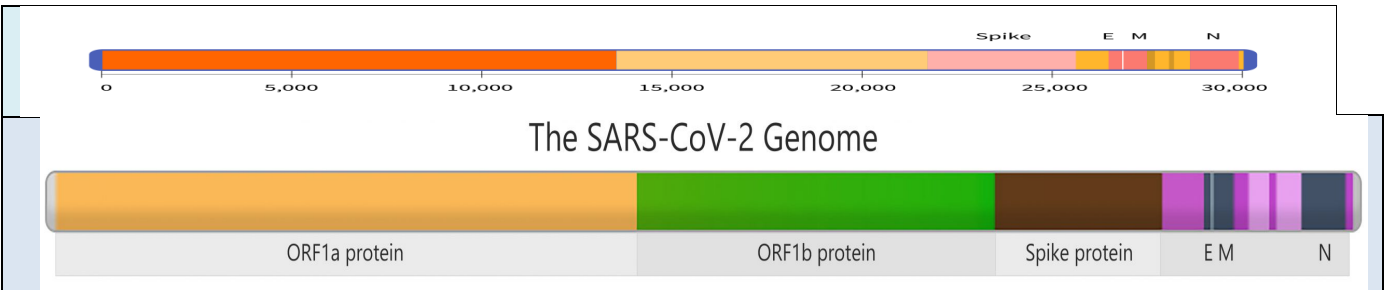
Below: 1.Genome of SARS COV2 RNA virus (credit: CDC unplash)

2. An illustration showing the full set of genetic instructions, or genome, of SARS-CoV-2RNA virus(single-stranded, positive-sense)♣Linear genome = ~30,000 nucleotides♣11 coding-regions (genes)♣12 potential gene

*“The amazing progress in advancing a vaccine through to use in humans surely sets a new standard for what can be achieved when sufficient resource and scientific focus is applied to global health.” -- Quote from Stephen Griffin of Leeds University Medical School.*

Thereafter, bio-pharmaceutical industry units are working around the clock to identify and develop safe and effective vaccines to prevent infections and develop safe and effective vaccines to prevent infection. Never before has such pressure been placed on drug companies to develop, at a breakneck speed treatments and vaccines for protection against the novel corona virus.

The industry has also taken up research to















products—e.g., Spike proteins. (credit: N. Hanacek/NIST)

**Vaccines:** Vaccines form the most important public health measure to protect people from COVID-19 worldwide. Soon after the coronavirus outbreak was reported from Wuhan, China, Yong-Zhen Zhang of the Shanghai Public Health Clinical Center & School of Public Health posted the sequence on an open-access site, virological.org.

develop new therapies to treat infections. There are currently more

*It remains an extraordinary and unprecedented feat to have built such a vaccine, and show it to be safe and effective, before the disease it protects against it is one year old---and before the pandemic is over. The Guardian, 22-Nov-2020*

“Everything is theoretically impossible, until it is done.” – **Robert A. Heinlein.**

How some of the Covid-19 vaccines compare				
Company	Type	Doses	How effective*	Storage
 <b>Oxford Uni-AstraZeneca</b>	Viral vector (genetically modified virus)	 x2	62-90%	 Regular fridge temperature
 <b>Moderna</b>	RNA (part of virus genetic code)	 x2	95%	 -20C up to 6 months
 <b>Pfizer-BioNTech</b>	RNA	 x2	95%	 -70C
 <b>Gamaleya (Sputnik V)</b>	Viral vector	 x2	92%	 Regular fridge temperature (in dry form)

\*preliminary phase three results, not yet peer-reviewed

Source: Respective companies, WHO

**BBC**

vaccine candidates under development, with a number of these in the human trial phase. To go from the discovery of a deadly new virus to the creation of a tested vaccine that can block its effects in less than a year is unprecedented in scientific history.

To develop a vaccine, the spike antigen in the vaccine should be able to match the spikes on circulating coronavirus strains, as the viruses use their outer spike proteins to invade cells. There are several ongoing clinical trials of both western and traditional medicines. Some have already been cleared (see box), with many planning to begin human trials this year. However, we are likely to need several COVID-19 vaccines to cover everyone.



Stock photos

**SPUTNIK-V**



A health worker drawing the Sputnik vaccine from a vial (Bloomberg)

**Sputnik V**, is named after the space satellite launched by Moscow in 1957. Russia has already started mass vaccination program in the country.



(credit: theconversation.com)

“Unfortunately, it took a pandemic for immunity to become a buzzword.”

- Luke Coutinho

The **Oxford-AstraZeneca vaccine** developed



by Oxford University and UK-based pharmaceutical major AstraZeneca. It has signed contracts to boost capacity and build a global supply chain of the vaccine with Serum Institute of India and South Korea's SK Bioscience.

The Oxford vaccine contains the genetic sequence of the surface spike protein. When the vaccine enters cells inside the body, it uses this genetic code to produce the surface spike protein of the coronavirus. This induces an immune response, priming the immune system to attack the coronavirus if it later infects the body.

**COVAXIN**



**COVAXIN®**, India's indigenous **COVID-19 vaccine** by Bharat Biotech is developed in collaboration with the Indian Council of Medical Research (ICMR) - National Institute of Virology (NIV). The vaccine is developed and manufactured in Bharat Biotech's BSL-3 (Bio-Safety Level 3) high

containment facility. The vaccine is developed using Whole-Virion Inactivated Vero Cell derived platform technology. It is a 2-dose vaccination regimen given 28 days apart. *It is a vaccine with no sub-zero storage, no reconstitution requirement, and ready to use liquid presentation in multi-dose vials, stable at 2-8°C.* COVAXIN® demonstrated **81% interim efficacy** in preventing COVID-19 in those without prior infection, after the second dose. Bharat Biotech has been approached by several countries across the world for the procurement of COVAXIN.

**China's** pharmaceutical industry has developed at least five vaccines which are being tested in more than a dozen countries



**Credit: (Getty Images)**

including Russia, Egypt and Mexico.

**BCG Vaccination:** There is no evidence so far that the Bacille Calmette-Guérin vaccine (BCG) protects people against infection with COVID-19 virus.

**Vaccine prices:** Pfizer and BioNTech have set the initial price at \$19.50 a dose, which comes to \$39 per patient (since each vaccine requires a two-dose regimen). Moderna vaccine costs around \$50 per patient or \$25 a dose.

According to sources, in India, the cost of two doses of coronavirus vaccine could be around Rs

"It's all going to be about the [COVID-19] variants and the vaccine, and that will determine where we're going to be next year, the year after, and the year after that- CBS, March 12, 2021



700-2,000 (supply agreement with the four European countries \$6 to \$8 per two doses) for AstraZeneca, manufactured by Serum Institute of India (SII), the world’s largest vaccine maker. Similarly, Johnson & Johnson, Sanofi and GSK have come in at about \$20 for two doses of their potential vaccine in Europe. China’s vaccine frontrunner, Sinovac, have started selling its vaccine in selected cities at \$60 for two shots under the emergency use program. Russia's Health Ministry has set the wholesale price for Sputnik V, at Rs 1,942 (\$26) for two doses, according to a report.

Bruce Y. Lee, professor at the City University of New York stated that " **What stands out with the Covid-19 vaccine is that even at really, really high prices, it's still net positive value.**"

To make vaccines accessible to low and middle-income countries, the WHO, along with other partners, namely, GAVI (the Global Alliance for Vaccines and Immunization), and Coalition for Epidemic Preparedness Innovations (CEPI), has launched a platform - COVID-19 Vaccines Global Access Facility (COVAX) in April 2020.



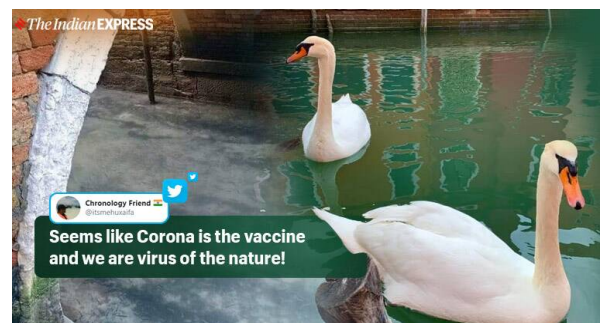
Margaret Keenan (L), who turned 91 in December, 2020, at University Hospital in Coventry, England, the first person to be vaccinated against COVID-19 (Getty Images)

**Concerns** Some concerns raised about Covid-19 vaccines include questions on the use of M-RNA, long-term immunity, probable mutations of the virus, affordability and rich nations cornering vaccines.

**Other Therapies**

**Interferons:** Apart from immunity induced through vaccination there is also innate immunity within us, that is activated as soon as an infection starts, but is not tailored to any specific pathogen. **Interferons** are proteins that are made and released by our bodies in response to pathogens like viruses, bacteria, parasites, and cancer cells. They play an important role as the first line of defense against infections. The reason bats are able to harbor these viruses in such large numbers is that they have such a strong interferon response. Synairgen, a University of Southampton sponsored company has been testing inhaled interferon-beta that stops viral replication, as a treatment for Covid-19. A major international study backed by the WHO showed that interferon-beta was not effective in treating hospitalized patients. Synairgen is now testing whether interferon-beta can prevent hospitalization in patients who inhale it soon after testing positive, at home. If this works it can be effective even if the virus mutates, since action of interferon is not dependent on the structure of the virus.

**T-cells:** Another immune response that has received a lot of attention in the context of COVID-19 is that of T-cells. Along with B-cells, which generate antibodies, T-cells form part of the adaptive immune system. They help B-cells do their job and they kill infected cells. Previous exposure to different corona



viruses such as those that cause the common cold, might be sufficient to prime (prepare) T-cells, and, raised hopes that they could

“Leveraging science to manage the virus is the only reliable way forward.”  
- Unknown

potentially reduce the severity of the disease, even if they cannot stop its transmission between people.

**Mucosal immunity:** The main anti-body present in the upper respiratory tract, essentially the nose and throat, called IgA makes the coronavirus unable to replicate and penetrate deeper into the body's tissues. The virus is prevented from causing not only disease, but also transmission and infection. Most COVID-19 vaccines in development focus on IgG antibodies in the blood. According to The Guardian, "A French group detected IgA antibodies in the blood of Covid-19 patients as early as a day after the onset of their symptoms. IgA levels peaked three weeks later, a week before IgG peaked. The IgA response comes up early and dissipates quickly, whereas the IgG response persists. The adaptive immune system kicks in if that innate response fails – it's the second line of defense – but if you could enhance that early IgA response you could still block infection and prevent the person from feeling ill ". An inhaled vaccine against flu that can cause a local immune response in the airways already exists. Covid-19 vaccines in the same line are in development, but they are a long way from clinical trials.

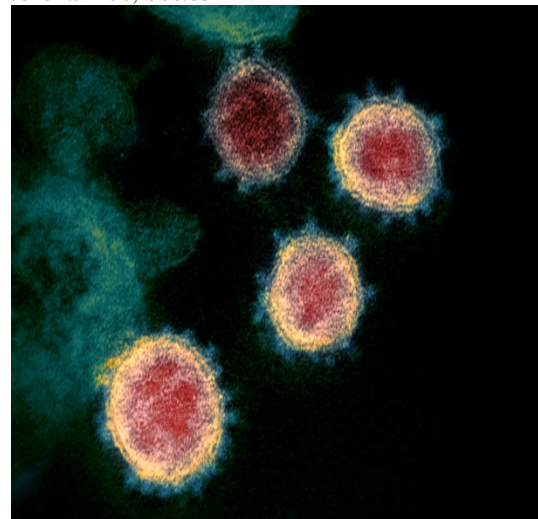
The logistical effort of actually vaccinating, potentially billions of people, around the world is gargantuan. "The effectiveness of any one intervention in isolation is likely to be limited, requiring multiple interventions to be combined, to have a substantial impact on transmission." interventions like social distancing could impact infection rates.

**Long term:** People across the world are relieved that the positive results from Pfizer, Moderna and Russian vaccines have transformed the chances of ending the pandemic. Some experts have claimed normality by spring 2021, others by next winter; some others think that there is a long journey ahead.

Most virologists believe that immunity against COVID-19 will last only a year or two. "That is in line with other coronaviruses that infect humans," stated Michael Skinner, Faculty of Medicine, Imperial college, London. "That means that even if most people do eventually become exposed to the virus, it is still likely to become endemic – which means we would see seasonal peaks of infection of this disease. We will have reached a steady state with regard to Covid-19". Currently seven coronaviruses have infected humans with most causing cold-like symptoms. Covid-19 may well become a seasonal virus returning each winter.

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Ref: [www.pharmaceutical-journal.com](http://www.pharmaceutical-journal.com);  
[www.theguardian.com](http://www.theguardian.com); [www.sciencedaily.com](http://www.sciencedaily.com); [ukri.org](http://ukri.org) ;  
[www.fredhutch.org](http://www.fredhutch.org) ; [www.science focus.com](http://www.sciencefocus.com); [phrma.org](http://phrma.org).  
[coronavirus](http://coronavirus); [bbc.com](http://bbc.com)



SARS corona virus (image source; CDC)

"The good thing about science is that it's true whether or not you believe in it."

– Neil deGrasse Tyson

**ECONOMICS:  
START-UPS & INNOVATION**

*"-This will be a before moment and an after moment for the world. There's incredible innovation coming" -*



A food delivery robot (credit:robotics.org)

*In this write up we discuss how the disruptions in the economy caused by the Covid-19 pandemic are giving rise to innovations in business and technology and how start-ups are showing the way. But can they survive post-pandemic?*

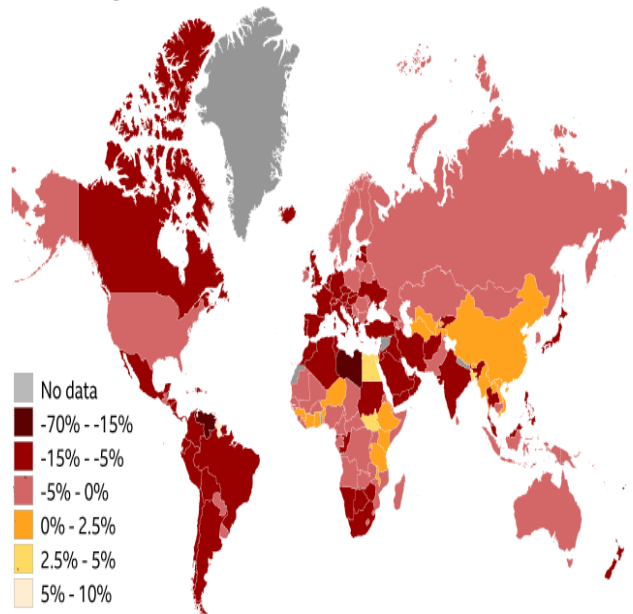
The Covid pandemic has disrupted the global economy in multiple ways, causing significant social and economic dislocation. The road to recovery seems long and arduous. According to the International Monetary Fund (IMF), the pandemic has plunged the world into a "crisis like no other" and that 'the crisis could knock \$9 trillion (£7.2 trillion) off global GDP over the next two years'. Further, it predicted that the global economy will contract by 3% this year (see box).

**Developing countries** are hard hit by the pandemic. According to the United Nations Development Program (UNDP) they could see income losses in excess of \$220 billion (25-Jun-2020)

**Change can be scary, but it can also be inspiring.**

**Majority of countries in recession**

Real GDP growth



Source: International Monetary Fund  
January, 2021



**New models:** Conventional wisdom says that every crisis is also an opportunity. Economists point out that new business models emerge out of the disruptions caused to the economy by external factors, often 'causing barriers that once took years to overcome to evaporate in a matter of days'. In this context the role of start-ups becomes valuable.



(credit; economic times.indiatimes.com)

The World Economic Forum pointed out that while the pandemic has brought many challenges, restrictions like social distancing rules and staff shortages are

“An entrepreneur is someone who has a vision for something and a want to create.”

– **David Karp**, Tumblr founder and CEO



driving considerable innovation.

**Start-ups and innovations:** Nasscom's definition of 'start-up' includes any technology product/platform venture inception in the last five years. Experts point out that although Big Tech is an industry of companies that are dominant now, startups are the next generation. Google, Facebook, and Apple are the current dominant employers, but in today's world



start-ups have emerged as key drivers of economic growth and job creation for the reason that they-

- Act as catalysts for innovation. The range of products developed is mind-boggling.
- Engage in high-risk activities compared to SMEs.
- Have good relations with suppliers and customers.
- Are better structured to benefit sudden behavioral changes, unlike large corporations which often have to spend a lot of time on it.
- Provide competition to virtually every industry.
- Support technology, finance, healthcare, and other fields which would be stagnant without start-ups.
- Have an important role to play in energizing larger industries; although start-ups alone may not help the revival of the global economy, they

help unemployed seek self employment, and in finding solutions to traditional problems.

- As growth engines contribute meaningfully to both local communities and to the global startup economy.
- Without startups, there would be less innovation at larger corporations and at SMBs.
- Help the public sector move forward by providing huge efficiency gains in governmental organizations and public services.
- Help establish competitive regulatory environments.
- Help governments to actually gain by investing in start-ups.
- Even with a negative 10% return on equity, the cost per job saved is 41% lower for startups than for SMBs
- Technology- startups often pay high wages, many are export oriented, and attract foreign direct investment (FDI) from international investors.
- Manage future changes better when economy changes to more digital service.

**For start-ups working in negatively affected industries, this is an unprecedented time to innovate or face extinction**

The only thing worse than starting something and failing... is not starting something.

– Seth Godin, Squidoo founder

### India's Start-up ecosystem



slideshare.net *The beginning of 2016 witnessed the launch of the Start-up India initiative and a number of policies were announced to help accelerate the growth of India's startup ecosystem.*

*India continues to be the third largest tech start-up ecosystem in the world, with around 9,300 entities, providing direct employment to over 4 lakh people.*

*A report by National Association of Software and Services COMPANIES (NASSCOM), on the India's tech start-up ecosystem points out that both funding and investment are on a recovery path and start-up base is growing at 8-10% year-on-year. Calendar year 2020 saw over 1,600 tech start-ups and a record 12 Unicorns (a startup company with a value of over \$1 billion) emerging -the highest ever added in a single calendar year. --"While the investments in 2020 were significantly lower than in 2019, recovery in deal pace and investments is expected to return to 2019 levels, if not exceed in 2021. In terms of total Unicorns, India is on track to have a 50-plus strong Unicorn club in 2021".*

*The 12 startups which joined the coveted Unicorn club in 2010 , ( 58% of them being B2B tech startups), include Razorpay, PineLabs, Zerodha and Postman. At \$16 billion, Paytm is India's most valuable Unicorn, followed by edtech startup byju's app (Ref: businesstoday.com-7th January, 2021).*

**INDIA:** In India businesses have survived many shocks in the past, including the dotcom bubble burst, the financial crisis of 2007-08, demonetization and introduction of the Goods and Services Tax (GST). Today entrepreneurs are developing technology innovations to deal with the pandemic. Some start-ups are involved in non-medical activities like 3D printing, digitalization of school text books/learning apparatus etc. Many have switched over to production of medical supplies such as face masks and face shields, PPE Kits, Sanitizers etc. Several start-ups have launched a wide array of 'Make in India' brands and are developing technology innovations to deal with the pandemic.



www.shutterstock.com · 1251338956

A group of young entrepreneurs in India (credit: shutterstock)



A worker of the Greenvolt mobility startup assembles 'G Band' a wearable and refillable sanitizer band, at a workshop in Changodar, some 20 km from Ahmedabad on July 19, 2020.

“True innovation is coming up with a product that the customers didn't even know they needed.”

## Indian Start-ups: Examples

### 1. Milagrow Seagull



bhaskar.com

Milagrow Seagull is a cleaning robot innovated by Indian consumer brand Milagrow which can display real-time progress and map while cleaning on the user's device.

2. **Dozee**, a device created by Turtle Shell Technologies helps in the preliminary diagnosis of various illnesses. It reduces the time spent in making decisions to visit hospitals and go through

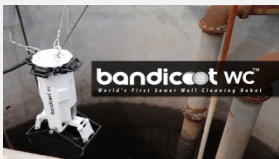


multiple tests.

India's first contactless health tracker (dozee.io)

'It is a smart contact-free health monitor that one can slip under their mattress'.

### 3. Bandicoot-World's first robotic scavenger



A start-up from Kerala, Thiruvananthapuram-based Genrobotics, is among the winners of the National Startup Awards 2020 announced by the central government. **Genrobotics Innovations Pvt Ltd.** developed manhole-cleaning robot **Bandicoot**, that is now widely used in six states. It won the award in the 'campus-initiated startups' segment.

**"Genrobotics offers human-controlled robots as an alternative to manual scavenging,"** the award citation said process has been patented in 28 countries, covering more than 90 per cent of coconut growing area in the world.

**Concerns** Reports based on the most recent data confirm that –

Registration of firms dropped significantly across many countries in March and April, 2020, with 70% decline in Portugal, 46% in Hungary, 54% France, and 58% Turkey. Australia, the US, and Spain also reported some decline.

Global venture capital funding has dropped roughly 20% since the onset of the pandemic in December 2019, creating ripple effects.

- Many start-ups are finding it difficult to manage as cash reserves run low and venture capital dries up. According to surveys by Start-up Genome Research, as of mid-2020, more than 40% of startups globally are in the "red zone". Unless their cash flow situation changes and they raise additional funds soon, they may face closure.

**Addressing start-up needs:** Research also shows, the larger the start-up community, the higher the performance and average value of each start-up. Because of network effects, the economic impact of each additional start-up

### Start-up needs in states-Example

*In India, the state of Kerala is ranked at the bottom in 'ease of doing' business' while it is at the top in the startup sector. Kerala has 2,900 startups with an external funding of Rs 1,500 crore (\$15 million) since 2016. As data connectivity, human resource and electricity are vital for technological startups, there is a huge scope for them in Kerala. Today, while based in Kerala, it is possible to sell software products all over the world. With many Keralites investing in startups after returning from abroad during the corona pandemic, the prospects for start-ups appear to be good..*

*The kerala example show that start-ups need hand-holding, less bureaucracy, simple procedures, an independent agency to assist them, and timely financial support (Courtesy: indainexpress.com)*

"The best startups generally come from somebody needing to scratch an itch."

- Michael Arrington,



grows as the system grows.

The above mentioned survey points out that start-ups funded during recessions, including those in 2008, fare better than those funded during normal times. One example is that of Uber. Governments and funding agencies, therefore, need to provide adequate capital quickly to save at least 80% of startups that are at risk of closure. Capital is needed for new start-ups too. There is also need to re-orient their funding schedules, resources and staff to operate as efficiently as possible.

Many countries, announced measures to sustain short-term liquidity needs, such as loan guarantees, direct lending, grants or subsidies for SMEs. There is need to introduce measures in the same way, *specific to start-ups*. It is reported that France has set up a €4 billion fund to support start-up liquidity; Germany has announced a start-up aid program and the UK has announced a co-financing fund for innovative companies facing financial difficulties. How these measures are able to meet the needs of start-ups, only time will tell.

Apart from funding issues, start-ups also face many other problems. Starting from registration to infrastructure for doing business, meeting material requirements, selection of personnel, developing models, marketing, dealing with customers, start-ups need sensitive handling and handholding. Very few governments have been able to provide an enabling environment for their growth and survival. A new generation of entrepreneurs ought to be motivated and trained to lead the next wave of innovations. Specialized non-bureaucratic agencies that work in a mission mode ought to assist the start-ups. Incentives such as tax-breaks and direct assistance need to be provided. Government regulations and compliance are proving to be

challenging for mid-sized and smaller start-ups in many countries, including India.. Many start-ups are based on covid-19 mitigation measures. Once the intensity and spread of the pandemic recedes, the consumer demand is likely to change. Then, these start-ups need to reinvent themselves. Variations in technology changes everything- from investments, to material and human resources.

**Future prospects:** Experts predict that if the after effects of the pandemic continue well into the future, not only will it create high demand for mitigation, but may also lead to long-lasting changes in consumer behavior. Learning from their experience in developing new technologies during the pandemic, technology firms could become smarter and more flexible. At the same time old model with physical interaction with customers may also continue with some changes. Workers continuing to work from their homes may lead to increased productivity, due to reduced commuting time, worker satisfaction and a lower quit rate.

**Greater use of robotics,** artificial intelligence, and automation will make regulatory and liability systems difficult to manage. They will also affect employment, wages, and union negotiations.

**Widespread screening** and tracking of people's physical movement and health status will lead to concerns about privacy and data protection



(credit: myfrugalbusiness.co)

“All humans are entrepreneurs not because they should start companies, but because the will to create is encoded in human DNA.” - Reid Hoffman

**Climate change-** One positive outcome would be that these innovations may help in climate change mitigation, due to reduced travel and expansion of virtual work infrastructure.

**Technology-** As mentioned above, due to mass vaccinations, herd immunity or natural causes, the threat of the pandemic could wane, at least after sometime. Even then the pace of technological progress, and innovations speeded up during the pandemic are likely to further accelerate. The only difference will be a new set of innovations will take place in areas other than mitigation.

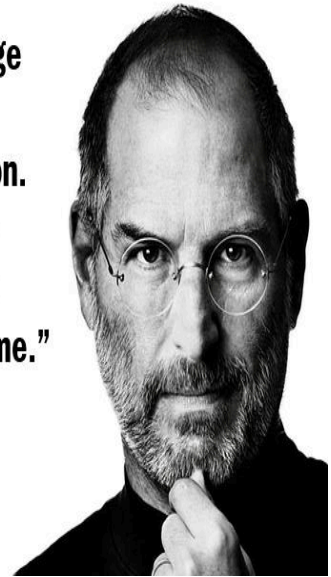
"As the world emerges from the crisis, employees will find new ways to interact, entrepreneurs will realize previously untenable business opportunities, managers can reassess innovation strategies, consumers will be able to take advantage of new environments, and policy and regulation will adapt to keep everyone safer in the future." It is, however, up to governments, communities and businesses to decide whether they should opt for an economy driven by innovations.

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Ref: [www.mckinsey.com](http://www.mckinsey.com); [www.weforum.com](http://www.weforum.com);  
[www.strategie-business.com](http://www.strategie-business.com); [www.un.org](http://www.un.org);  
[www.thehindubusinessline.com](http://www.thehindubusinessline.com); [www.cnbc.com](http://www.cnbc.com)  
[hbswk.hbs.edu](http://hbswk.hbs.edu); [www.sciencemag.org](http://www.sciencemag.org); [www.weforum.org](http://www.weforum.org);  
[economictimes.indiatimes.com](http://economictimes.indiatimes.com); [www.sciencemag.org](http://www.sciencemag.org);  
[hbswk.hbs.edu](http://hbswk.hbs.edu).

**“Have the courage to follow your heart and intuition. They somehow know what you truly want to become.”**

**- Steve Jobs**



(credit: message for theday.com)

**“the most powerful and enduring brands are built from the heart.”**

Howard Schultz, CEO Starbucks



(credit: message for theday.com)

“Fortunes are built during the down market and collected in the up market.”

– **Jason Calacanis, LAUNCH Ticker founder**

**PERSONALITIES: THOSE WHO MADE A DIFFERENCE**

*In difficult corona times when the people across the world are fighting their negative emotions like anger, frustration, depression and xenophobia, there are some, who through their inspiring examples, gave them hope and instilled in them the confidence to move forward. Although they hail from different backgrounds, they are united by their sense of dedication and commitment to work and an unshakable faith in science. In this write up we have cited inspiring examples of those who are providing leadership in the time of the Covid pandemic.*

**1. Political leaders**

We have already discussed the role of the women political leaders in combating the coronavirus in the very first article of this issue. The four political leaders mentioned here, led their nations/states with courage, conviction and confidence.



**1. Angela Merkel, Chancellor, Germany** -Strong leadership-unshakable faith in science. Under her leadership, Germany fared better than neighbouring countries like Italy, Spain and France and has less number of fatalities. (Photo/ AP)



**2. Leading from front---** Taiwanese President Tsai-ing Wen

Despite being located close to China, Taiwan was able to contain the spread of the Pandemic, with very few fatalities, within a short time (Photo-credit: thehindustantimes.com)



**3. Jacinda Ardern -New Zealand Prime Minister.** Her handling of the pandemic with efficiency and empathy won appreciation. She subsequently won the general elections in Newzealand (Photo: AP)

“Leadership is not a person or a position. It is a complex moral relationship between people based on trust, obligation, commitment, emotion, and a shared vision of the good.”  
 - Joanne Ciulla (Author and Educator)





**4. K. K. Shailaja, Health Minister, Kerala** - In the forefront of public health (Image credit: thehindu.com). She leads the efforts of the State Government of Kerala, India in containing the Covid-19 pandemic. Although State Government as a whole is responsible for the outcomes, her sincerity, personal commitment and leadership qualities were widely appreciated.

**2. Scientists**

**(i) "Sequencing the Covid-19 genome" - Professor Zhang Yong Zhen**

Professor Zhang Yongzhen is credited with publishing the first complete genome of Sars-CoV-2 in January, 2020.



**Professor Zhang Yongzhen**

(Credit: PHOTO: CHINACDC.CN)

'He made it at some personal risk, considering the political sensitivity of information surrounding the coronavirus at the time'. According to a fellow researcher who assisted Zhang "From late January to April, we screened more than 30,000 viral samples". In an exclusive interview to the Time magazine he said "It took us less than 40 hours, so very, very fast. Then I realized that this virus is closely related to SARS, probably 80%. So certainly, it was very dangerous." "I had two suggestions (to top public health officials): that we should take some emergency public measures to protect against this disease; also, clinics should develop anti-viral treatments."



**IMAGE: Professor Zhang Yongzhen (center) is presented the 3rd GigaScience Award for Data Sharing by ICG-15 Chair Professor Yang Huanming (left) and GigaScience Editor Dr. Zhang Hongling (right).**

After a 20-year plus stint at the National Institute for Communicable Disease Control and Prevention of China CDC, Prof. Zhang, 55 has currently moved to Shanghai Public Health Clinical Center & School of Life Science & Institute of Biomedical Sciences of Fudan University wherein Prof Zhang Yong-Zhen does research in infectious disease, virology and evolutionary biology. While the scientific community was relieved over Zhang's decoding of the corona virus genome, the events that followed the

“ Science is not only a discipline of reason, but also one of romance and passion.”  
**-Stephen Hawking**

identification of the pathogen in China became mired in controversy. President Donald Trump and his Administration sought to allege the blame onto China by calling it "Chinese virus" and the disease "Kung Flu".

The availability of data within weeks of the first identified COVID-19 patient undoubtedly saved many lives and will be highlighted for many years to come. Prof. Zhang has been lauded for his bravery and professionalism by the international media, and was included as one of Time's 100 most influential people of this year. He also won the 2020 ICG-15 Giga Science Prize for Outstanding Data Sharing during the COVID-19 pandemic.

According to Prof. Zhang, rapid urbanization brings unknown pathogens and people without natural defenses into close proximity. As urbanization intensifies, outbreaks of pathogenic diseases will only become more common. Mitigation can come only from a deeper understanding of viruses. Creating a world-wide infectious disease genetic monitoring system can aid early warning system to stop or mitigate potential pandemics. Just as satellites have made forecasting weather patterns reliable, Zhang believes science holds the key to predicting viral outbreaks with similar accuracy. "If we don't learn lessons from this disease, humankind will suffer another."

Ref: [www.straitstimes.com](http://www.straitstimes.com) > [The Guardian/time.com](http://The Guardian/time.com)

**(ii) Dr. Ozlem Turechi & Dr Ugur Sahin--- 'Frontrunners in the race to invent a vaccine for coronavirus'**

Several countries, including the UK, approved for mass vaccination, the 'Pfizer vaccine' jointly developed by German biotech company BioNTech

and US pharmaceutical company Pfizer. Dr Özlem

"Leadership is hard to define, and good leadership even harder. But if you can get people to follow you to the ends of the earth, you are a great leader." - **Indra Nooyi (Former CEO, PepsiCo)**

Türeci (Chief Medical Officer of BioNTech), along with her husband Dr Uğur Şahin, (Chief executive Officer, BioNTech) is credited with the development of the first vaccine against the coronavirus. Both scientists are the offspring of Turkish migrants who moved to Germany in the late 1960s. Sahin worked as a doctor for internal medicine and haematology and oncology at the University of Cologne for several years. Türeci, 53, BioNTech's chief medical officer, is considered a pioneer in cancer immunotherapy. The couple have dedicated their lives to finding cures for infectious diseases and cancer.



Scientists Dr Özlem Türeci and Dr Uğur Şahin  
Photograph: Biontech

Türeci met her future husband, Uğur Şahin, while he was working at Saarland University Hospital in Homburg, where she was completing her final year of studies. The couple married In 2002



(credit:indianexpress.com)

Although they founded a company in 2001, which pioneered precision antibody therapies against cancer, it was sold to Japanese pharma

company Astellas in 2016. They founded their second company BioNTech in 2008. BioNTech, is currently valued at \$21.9 bn (£16.6bn).

BioNTech believes that patients need treatment tailored to their unique needs. They use the human body's ability to defend itself from bacteria and viruses. They aim to develop an immunotherapy that stimulates the self-healing mechanisms. They set to develop immunotherapy for cancer treatments, using genetic material called mRNA to induce the

*"To go from the discovery of a deadly new virus to the creation of a tested vaccine that can block its effects in less than a year is unprecedented in scientific history"-  
(The Guardian)*

human body to produce its own antigen.

Years of experience with the mRNA technology came in handy when the scientist couple came to know about the pandemic at the start of the year. US pharmaceutical company Pfizer, which has previously collaborated with BioNTech on a flu vaccine, quickly stepped in offering to meet the development and distribution costs. They named the project to develop the vaccine "Lightspeed" and launched it in mid-January. The breakthrough came in early November, 2020 after an interim analysis showed their vaccine candidate to be 90% effective in protecting people from transmission of the virus in global trials.

Vaccines usually take eight to 10 years to develop, but it took the researchers only about a year to get theirs recommended for approval in the United States. It is their scientific rigour, unrelenting work ethic and appetite for entrepreneurship that has seen

“In science the credit goes to the man who convinces the world, not to the man to whom the idea first occurs.”

- Sir William Osler

Sahin and Türeci’s company outpace more well-established competitors in the race for a Covid-19 vaccine

Ref:[www.guardian.com](http://www.guardian.com)/[www.newyorktimes.com](http://www.newyorktimes.com)/[www.news18.com](http://www.news18.com)/[www.dw.com](http://www.dw.com)

**(iii) Dr. Anthony Fauci- "The Trusted face of America's fight against covid-19 pandemic"**

Anthony Stephen Fauci is an American physician and immunologist and is the Director of the National Institute of Allergy and Infectious Diseases (NIAID), a position he



**Dr. Anthony . S. Fauci (Photo credit: NIAID)**

has been holding since 1984. He has been one of the lead members of the Task force appointed by the Trump administration for addressing the Corona pandemic, since January 2020. He is now designated as the Chief Medical Advisor in the Biden administration.

**Dr. Fauci and US Covid-19 response** Dr. Fauci tried to correct much-criticized federal response to the pandemic. Many a time Fauci clarified or corrected President Trump's public response to Covid-19 treatments and vaccines. According to US media reports, President Trump once said about the pandemic "-- People are saying, 'Whatever -- just leave us alone. They're



tired of it'. People are tired of hearing Fauci and all these idiots", but was later on, forced to clarify that "Tony" was doing a great job'. The White House had accused Dr. Fauci of playing politics about the pandemic days before the election in an interview. But some like Republican Senator Lamar Alexander came to his



Photo credit : AFP

defense -"If more Americans paid attention to his advice, we'd have fewer cases of COVID-19 and it would be safer to go back to school and back to work and out to eat."

The TIME magazine included his name in the list of **100 most influential people (2020)**

The citation said *"He delivers the truth, as difficult as it may be to hear, earnestly and with one goal: to save lives. His courage and candor have earned our trust. We are all fortunate to have a man of his wisdom, experience and integrity to help us navigate these difficult waters."*

Ref:en.wikipedia.com/www.niaid.com/www.sciencemag.org/www.bbc.com



(Photo:PTI)

### ON THE CALL OF DUTY



A bill board in Chilliwack, Canada

“The best way to find yourself is to lose yourself in the service of others.”  
**-Mahatma Gandhi**



Village-level Health workers (ASHA) India  
(Credit: Indian Express)



Public health frontline workers- garbage collectors in South Africa



A physician attending to a patient  
(credit: getty images)



Police personnel guard outside a locality during restrictions amid spike in coronavirus cases, in Thane district.



Nurses and key workers are inspiring admirations around the world.  
(Image: REUTERS)

“Vaccines and antibiotics have made many infectious diseases a thing of the past; we’ve come to expect that public health and modern science can conquer all microbes. But nature is a formidable adversary.” -Tom Friedman



**POEM:****WHEN THE WORLD CAME TO A STANDSTILL****- Sudha Shrotria**

*The world stood still  
 Against everyone's will;  
 The enemy so sly no one could see  
 Attacking mortals like you and me;  
 Ruthlessly taking lives,  
 Without bullets or knives;  
 A war without ammunition  
 Sparing not a single nation;  
 Threatening every human life  
 Lavish rich and poor who strive;  
 Young and old alike  
 Faced with the dilemma of how to survive;  
 No one could predict  
 Who next would be hit;  
 Neighbours living in fear  
 Skirting near and dear;  
 Conversations stopped,*

*Borders blocked,  
 People living in dread  
 Of the virus spread;  
 Forced into a bubble  
 Not knowing if there was an end to their  
 trouble;  
 And as the pandemic grew,  
 Except the frontline warriors few  
 Putting their lives on line  
 Helping the sick to survive;  
 People made to stay home  
 Compelled not to step out or roam;  
 Be it a mighty nation or a small town  
 All forced into a lock-down,  
 In an endeavour  
 To prevent people from the kill;  
 And the world came to a standstill.*



“I don't think of all the misery, but of the beauty  
 that still remains.”  
 - Anne Frank



*In the quiet of nothingness  
 Amid the silence of the streets,  
 A stage was set to witness  
 And greet,  
 Our other partners on planet earth  
 Who began to reclaim their worth;  
 The winged ones joyful and free  
 Spring from tree to tree  
 Sing fearlessly and tweet;  
 Peacocks dance in the street;  
 And eight little geese in a row  
 On an otherwise busy road,  
 Follow their mother with her partner in tow.  
 The deer family at the intersection basks,  
 No longer afraid of the officials in masks  
 No sound of passing trains or planes,  
 The big cat freely strolls in the lanes;  
 An elephant on the road chases a man,  
 Who in lock-down dares to be out in his Van*

*As humans retreat and activities stop,  
 The polluted air ever so hard to endure  
 Is now fresh and pure like on the mountain top.  
 And as the rivers begin to breathe again  
 And become blue once more  
 Dolphins playfully appear near the shore.  
 Nature starts to regain  
 What humans long managed to tame  
 How long will this recuperation last?  
 Will humans take this opportunity rare?  
 Stop to reason and to others be fair?  
 Give up their desire to acquire,  
 And learn to care and share?  
 Recognize the true worth  
 Of living in harmony  
 On this bountiful planet earth.*

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“And when your body has become still, reach out with your heart. Know that we are connected in ways that are terrifying and beautiful.” -Lynn Ungar

## TRAVEL: DIAMOND PRINCESS



*Diamond princess (Courtesy: www.princess.com)*

*“Despite the fact that they are a giant piece of metal, every ship has a soul” - Captain Gennaro Arma*

*In this write-up we discuss how the luxury cruise ship 'Diamond Princess' proved to be 'a microcosm of the world's battle with the novel coronavirus'.*

*Diamond Princess* is a British-registered cruise ship owned and operated by Princess Cruises, which began its operation in March, 2020. According to [www.webmd.com](http://www.webmd.com) *Diamond Princess* and her sister ship, *Sapphire Princess*, are classified as *Grand-class* ships and are the widest (length 290 m and width 37.5m). The ship primarily cruises in Asia during summer in the northern hemisphere and Australia during the summer in southern hemisphere.

On January 20, 2020 the *Diamond Princess* sailed southwest from Yokohama for a 14-day cruise to China, Vietnam, and Taiwan, then back to Japan. The *Princess* was moored on February 4, 2020 after its return to Yokohama, a city 30 km south of Tokyo.

### *Covid-19*

*Diamond Princess* attracted world-wide attention in the early weeks of the coronavirus pandemic in 2020. The first known case of coronavirus infection on the *Diamond Princess* was reported on 1<sup>st</sup> February, 2020 by a 80-year-old passenger who left the ship in Hong Kong on January 25, 2020. On February 13, 2020 a total of 218 people on board the *Diamond* had tested positive for the coronavirus, and the *WHO* declared the ship to be the largest *Covid* cluster outside of *Wuhan*. The outbreak eventually led to nearly 700 infections and fourteen deaths. Returned passengers also spread outbreaks in different countries, including the United States.



A view inside the ship--  
[travel.usnews.com](http://travel.usnews.com)

“The sea, once it casts its spell, holds one its net of wonder for ever.”

**-Joseph Conrad**



The Itinerary of Diamond Princess ship from January 2020 to February 4, 2020 (Source: Nakazawa et al. 2020)

By February 4, 2020 a quarantine was in place throughout the ship and passengers were largely restricted to their cabins.

The infected included at least 138 from India (including 132 crew and 6 passengers), 35 Filipinos, 32 Canadians, 24 Australians, 13 Americans, 4 Indonesians, 4 Malaysians, and 2 British citizens. The COVID-19 outbreak on the Diamond Princess cruise ship (2666 passengers, 1045 crew; total 3711) resulted in 712 infected persons, or about 20% of the ship's population. Since the outbreak first began, fourteen deaths (case fatality rate, 1.8%) associated with the COVID-19 outbreak on the ship were reported.

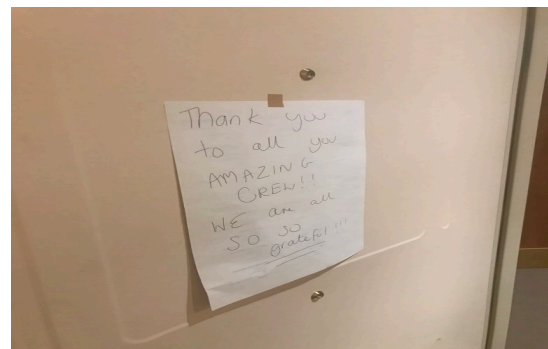
**Quarantine** All 3,711 people who travelled in the ship' became subjects 'in a life-and-death quarantine experiment'. From 5 February, 2020 passengers on the ship were confined to their cabins for two weeks or more. The day the quarantine was introduced, one person could go on to infect more than 7 others. The quarantine of *Diamond Princess* cruise ship led to the start of several online communities, with passengers forming groups on WhatsApp and Facebook to break through the isolation and share information. The ship also has its own official hashtag: #HangInThereDiamondPrincess to share their experience.



Italian captain Gennaro Arma (Credit: crew-center.com)

Wrote a passenger-

"Delicious desserts twice a day chases the quarantine blues away."



A thank you note from a passenger to crew members

Many observers felt that quarantine measures on the *Diamond Princess*, were inadequate to control a COVID-19 outbreak.

"Dance with the waves, Move with the sea.  
Let the rhythm of the water, Set your soul free."

- Chrisy Ann Martin



Interviews with 12 healthcare providers (Ref:onlineibrary.wily.com July 29, 2020) who were involved in quarantine activities revealed that-

- The crew continued working on the ship during the quarantine, even after identification of close contact between some of these crew and the passenger, who disembarked in Hong Kong on January 25 and was subsequently tested positive for SARS/COVID-2.
- Several crew members, later identified as infected, continued providing services and meals to passengers during the quarantine.
- Neither infectious disease specialists nor infection control personnel were consistently available during the entire quarantine period
- Quarantine officers from the Japanese Government wore surgical masks inside the ship. Subsequently, at least five officers developed COVID-19 disease. Wearing surgical masks alone offers limited preventive benefit.
- Most were likely to have been infected in the poorly ventilated and crowded dining room area of the ship.
- Disaster Medical Assistance Team (DMAT), mostly comprised of emergency medicine providers.
- DMAT members were unable to transport infected patients in a timely fashion to nearby hospitals Only a limited number of the DMAT members were available for taking care of a large number of sick people.
- Clinical conditions of several patients initially triaged as mild cases worsened during the period of quarantine.
- Because of the large size of the ship, levels of cooperation, communication, and command management were inadequate among multiple agencies responding to the crisis. The triage had to be performed by telephone in many cases.
- The ship control center was likely in confusion with incoming orders from multiple agencies

**COVID-19 and the Tourism sector**

*The travel and tourism industry was badly hit by the corona pandemic. Between April and May 2020, 100% of all worldwide destinations introduced travel restrictions in response to the COVID-19 pandemic.*

*The World Travel and Tourism Council predicted that it could leave as many as 50 million jobs at risk. Airlines, hotels, and travel agencies slashed their budgets, and companies, big and small issued layoffs. A set of professional travelers including bloggers, photographers, and video producers who document their travels and share their experiences through online blogs or social media posts to thousands already face a serious setback. Although the start of mass vaccination may bring some relief, 'travel experts predict that people's travel habits are likely to change as well as how much they are willing to spend.' "-We could even be looking at virtual reality becoming a feasible alternative to hopping on a plane"- (Ref: UNWTO, 2020)*



Passengers quarantined on the cruise ship *Diamond Princess*. Credit: Eugene Hoshiko/P/Shutterstock

**Evacuation** Home countries arranged to evacuate their citizens and quarantine them further in their own countries.

“The cure for anything is salt water-sweat, tears or the sea.”  
- Isak Dinesen



A group of Indian workers  
([economictimes.indiatimes.com](http://economictimes.indiatimes.com))

Since the *Diamond Princess*, at least 25 other cruise ships have confirmed COVID-19 cases — including 78 cases on the *Grand Princess*, off the coast of California.

All cruises throughout 2020 remained cancelled and the ship is bunkering in Malaysia and the outer port limit (OPL) area of Singapore Port. Princess refunded everyone's cruise expenses and offered each passenger a free cruise in the future.

**Research Studies** Being an epicenter for Covid-19 infections, *Diamond Princess* has been the subject of several studies on how the virus spreads. [www.nature.com](http://www.nature.com) points out that 'cruise ships are like an ideal experiment of a closed population'. You can measure everyone. Further, The studies carried out in the ship are different from those involving the spread in a wider population, where only some people, typically those with severe symptoms, are tested and monitored'. *The Diamond Princess has been pointed out by academics as the only cruise ship in which the origin and evolution of the contagion could be mapped.*

Studies by a team showed that by 20 February, 18% of all infected people on the ship had no symptoms. Another team used data from the ship to estimate the case fatality rate (CFR) in China. The studies reported in *Nature* showed that the restriction of

movement within the ship was highly successful in greatly reducing the number of secondary transmissions.

A study published in the June edition of the journal *Emerging Infectious Diseases* concluded that the numbers of those who were infected with virus were---712 (19.2%); no symptoms when tested positive 410 (57.6%); remained asymptomatic-331 (45.5%); cases admitted to intensive care:40 (5.6%) Deaths:12 (1.7%). Another set of studies (ref:pubmed.ncbi.nlm.nih.gov) revealed that basic reproduction rate of coronavirus was initially 4 times higher on-board compared to that in Wuhan, but strict Isolation and quarantine prevented 2307 cases, and lowered the Case Fatality Rate (CFR) to 1.78.



Emergency workers in protective gear exit the *DIAMOND PRINCESS* on February 10. As the ship was parked at the port, supplies were brought in and sick passengers taken away to isolation on shore. (Credit: Getty Images)

**Impact** As noted earlier, tourism is one sector wherein the impact of the Covid-19 pandemic was greatly felt. Within the tourism sector cruise industry was one of the worst affected (see box).

“Man cannot discover new oceans unless he has the courage to lose sight of the shore.”

- Andre Gide

### WORLDWIDE ECONOMIC IMPACT:

According to Cruise Lines international Association (CLIA)

- The cruise industry generates over **\$150 billion USD** in worldwide economic activity and supports nearly **2 million** jobs.
- Every **1%** drop in cruising that occurs worldwide results in up to 9,100 lost jobs.
- Each day of the suspension results in the loss of up to 2,500 jobs worldwide.
- From mid-March, when the suspension of cruise operations began, through the end of September, the worldwide impact will be a loss of **\$50 billion USD** in economic activity, **334,000** jobs and **\$15 billion USD** in wages (Ref:cruising.org)

The Center for Disease Control (CDC) , USA recommended that all people avoid travel on cruise ships, including river cruises, worldwide, because the risk of COVID-19 on cruise ships is very high. Even without the CDC recommendations, people themselves are not willing to go for cruises during the pandemic, for the fear of getting stuck out on a ship, and, not being able to get off. A few cruise companies that have restarted operations have run into problems with infections on board.

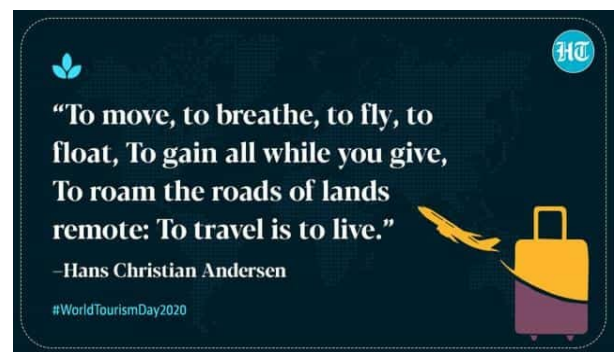
**Lessons learned** :- It is clear that management of crisis events, like COVID-19 pandemic, requires a substantial degree of organizational planning. Various steps should include having a central command, clear demarcations of contaminated and non-contaminated areas in high risk areas within the ship, limiting administrative workspaces to enforced green zones, ensuring availability of reserve staff or other crew relief (not only within the ship , but also hospitals, nursing homes, and clinics) providing workers with personal protective gears

(PPE), recruiting multiple teams of medical specialists and making sure inter-organizational coordination and communication. Early isolation of exposed staff may be critical in stemming continued infection.

**Are cruises sustainable?** Mass vaccinations may give confidence to people to travel again. But a sizable section of the people who travel alone or in groups are the elderly, with many having pre- existing disease conditions. For them it may be too risky to travel. Passengers in future, therefore, may be mostly young or middle aged, without having chronic disease conditions.

The Covid- 19 pandemic has shown that cruise ships need to make appropriate design changes in tune with Covid-safety measures- fewer passengers, more open spaces, full air circulation, safer cabins, protected common areas, and also upgrade the use of technology. But as long as the urge to be in the open sea remains in people, the cruises will continue to provide the luxury, pleasure and adventure they seek.

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 Ref:[en.wikipedia.org/onlineLibrary.wiley.com/](https://en.wikipedia.org/onlineLibrary.wiley.com/)  
[www.nature.com/ cruising.org](http://www.nature.com/cruising.org)



“The whole world feels like a cruise ship now.”  
 -Ray Curto, who had to cancel his cruise due to covid pandemic.



## ART&ARCHITECTURE: ARCHITECTURE AFTER CORONA VIRUS

*"Architects are often inspired to come up with fresh ideas during those moments when (they've) got nothing else to do."*



An April 6, 2020 view of New York City's 42nd Street during lockdown (Photo credit: Getty Images)

*The shock of what COVID 19 has done to the world is mostly due to our collective 'unpreparedness' for it.*

*COVID-19 has profoundly affected every aspect of our lives. Cities, which are home to over half of the world's population, have been the worst affected by the pandemic. It is, therefore, important to understand how urban planning is connected to the spread of diseases, and how pandemics can reshape our cities, work places and homes. We need to take a step back during the current crisis and reassess fundamental assumptions about how they ought to be structured.*

*"By far the greatest and most admirable form of wisdom is needed to plan and beautify cities and human communities."*

**- Socrates**

## Urban planning in the past

*'Form has always followed fear of infection, just as much as function'.*

City planners point out that this is not the first time in history that cities and buildings are being planned in response to a pandemic; cities have always been shaped by pandemics. The Spanish flu (1918 – 1919), Asian Flu (1957 – 1958), HIV / AIDS (1981 –to present), Swine Flu (2009 – 2010) and several others have all had devastating effects of varying degrees, but nonetheless civilization, as we know it, has either gotten past them (through eradication) or continue to live with them (through precaution'. More than hundred years before the covid-19 pandemic the third bubonic plague pandemic that began in China in 1855, and spread around the world, lasted for several decades, killing more than 12 million people in all. As a consequence, an outbreak of Bubonic Plague took place in India in 1896. The colonial authorities created the Bombay City Improvement Trust to redesign the city of Bombay to improve its sanitary and living conditions. The southern part of Bombay island was extensively reshaped, and a significant part of the present South/downtown Bombay was constructed during the period 1898-1925.

Cholera influenced the modern street grid, leading to the introduction of sewage systems. Tuberculosis, a contagious disease, influenced setting up of well lighted sanatoriums/ buildings providing more space, ventilation and maintenance of a hygienic environment.

*It is our collective experience that once the threat of epidemics/ pandemics slowly vanish, people go back to their bad old ways.*

Like other contagious diseases the Coronavirus will also reshape our urban landscapes for years to come. "COVID-19 will add to the list of digital infrastructure that might be the sanitation of our time"(ref: 'Smart Cities' in this write-up) .

During lockdowns people living in countries across the globe are mostly confined to their homes; most people work from their homes; shops are shut; schools are closed; traffic is reduced; few people travel and urban centers are now ghost towns. Even then, most of us feel that 'there is now more of a sense of the city as a place of safety, a place of home and continuity'. *The COVID- 19 pandemic offers us a unique opportunity to study the impact of the pandemic on our cities , work places and homes and to redesign them 'to minimize the impact and enhance urban pandemic resilience'.*

## 1. Redesigning the cities

Redesigning the cities is not an easy task, but is a complex process, as planners need to pay attention to critical factors like the environment, socio- economic impact as well as management and governance issues .

**a. Environmental Factors** The coronavirus pandemic reminds us how far we have moved away from nature. Besides, improvements in air and water quality in cities and towns during lockdowns highlight the significant environmental impacts of human related activities. We are aware that fresh air and sunlight can help faster recovery of COVID-19 patients.

**(i) Air quality** Improving air quality has both short term and long term impact on covid-19 and other pandemics, as

“Growth for the sake of growth is the ideology of the cancer cell.”  
- Edward Abbey

*COVID-19 is an issue of unsustainable urbanization*

long-term exposure to air pollution can increase human vulnerability to pandemics. COVID-19 transmission/mortality rates are believed to be associated with high levels of air pollution.

Traffic emissions are major sources of pollution in many cities, and, non-traffic sources of pollution are also important in some contexts. Air pollution is likely to intensify transmission rate when the wind speed is low. Greening the transportation and industry sectors can significantly improve air quality. But measures to reduce traffic-related pollution are not enough to address air quality in all contexts. As measures designed for reducing some pollutants may increase secondary pollutants, holistic approaches to pollution mitigation are needed.

**(ii) Temperature** Evidences on the association between temperature and COVID-19 transmission rate are inconclusive.

### **(iii) Urban water cycle**

In Annual issue of Life Stream 2018 we discussed in detail how unregulated human activities have resulted in the contamination of water resources in many cities. Lack of sewage treatment facilities in poor areas hampers the effectiveness of lockdown measures.

### **b. Buildings**

**(i) Design and construction** Not only private homes and homes for the poor, but all public and private buildings out to be designed carefully. School buildings need to be

redesigned or existing ones rearranged to keep social distancing norms.



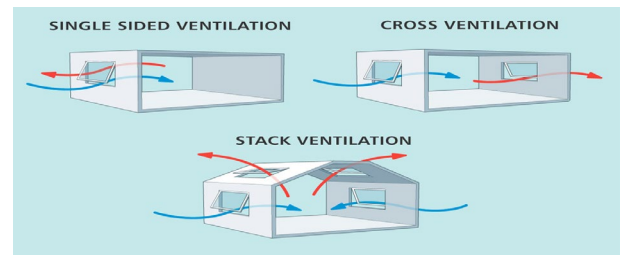
Design-Planning for more office space-Credit:www.bdcnetwork.com

Some public health specialists are of view that the experience of using **modular construction** in industrial and commercial buildings is the key to meeting diverse needs of health services during a pandemic, as traditional fixed installations are labor intensive, offer little in flexibility and are costly to construct. Ability to make a normal patient room more flexible can increase capacity or be easily converted into an ICU. In modular construction, however, protection against accidental fires ought to be kept in mind while selecting construction materials.

**(ii) Natural ventilation** Fully ventilated and well lit rooms are better equipped to fight COVID-19 and minimize the chance of spreading the infection. Increase in total airflow supply to occupied spaces is necessary. All workplaces, schools and tourist accommodations ought to have provisions for fresh and clean air.

“The suburb is a place where someone cuts all the trees to build houses, and then names the streets after the trees.”  
**-Bill Vaughan**

Significance of proper building design is important for hospitals too. When buildings are not designed to provide for fresh air and naturally reduce temperature inside homes, people become completely dependent on appliances for air-conditioning/heating even during daytime. Adequate provision for fresh air and comfortable levels of temperature could be achieved through better designs of buildings. Experts advise that air-conditioners should be run on 'fresh air' mode in both homes and cars.



Natural ventilation control (Credit: tealproducts.com)

The WHO has issued guidance on ventilation and air-conditioning systems in the context of COVID-19 . It recommends increased ventilation through natural or mechanical means, preferably without recirculation of the air. In case of air recirculation, filters should be cleaned regularly, especially relating to jobs ( e.g. frontline workers in retail, tourist accommodation and domestic workers) that place an individual at a medium or high risk of exposure to COVID-19.

**(iii) Saving Energy** Building and construction sector accounts for about 40 per cent of all CO2 emissions and consumes about 36 per cent electricity. Building designs and the construction processes therefore need to be energy-efficient.

Have we become too urban? Most pandemics are inherently anti-urban- ref: The NY Times

**C. Transportation** Increased transport connectivity is a risk factor that may



contribute to the spread of infectious diseases. Public transportation may increase the risk of transmission during pandemics. The pandemic may increase negative attitudes towards public



Chaos on roads in India (pinterest.dk)

transportation. Preference for private transport could undo years of efforts by governments and environmentalists; this could be offset by fast-forwarding of electric vehicles in infrastructure. According to the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) types of infrastructure that promote active mobility include exclusive walking and cycling lanes, walkways and wide footpaths, cycling tracks, interconnected parks and resting areas along the routes.

There is need for sustainable mobility-oriented city planning. Many crowded cities in India like Bangalore, Kochi, Patna, Gurugram and others have opted for metro-rail services to reduce road traffic congestion and air pollution.

## D. Social impacts

### (i) Inclusive design:

Enhancing sense of community is critical for improving response and recovery from the pandemic. Enforcing social distancing and other response measures is challenging in slums. Slum upgrading should, therefore, be prioritized.

**(ii) Core services:** Focus on access to core services such as access to water, housing, and healthcare during pandemics and amenities including public health infrastructure, toilets, drinking fountains and importantly, hand-washing facilities during pandemics to people living in high-density areas needs to be maintained.

**(iii) Open Spaces:** After being forced to remain indoors during lockdowns all of us realize the value of parks and urban green spaces. Many cities lack adequate green and open spaces to meet outdoor exercise and recreation demands of their citizens. While redesigning cities and towns more space should be allocated to pedestrian areas/ parks.

**(iv) Public health:** The Covid-19 pandemic has once again emphasized the need to have an efficient public health service and social welfare systems. To improve access and



Chennai India's sixth largest city, that is getting less than two thirds of the 830 million litres of water it normally uses each day. (Credit:AFP)

restrict travel, smaller units such as hospitals and schools could be distributed across more of the urban areas.

“The government solution to the problem is usually as bad as the problem.”  
- Milton Friedman

## URBANIZATION IN AFRICA



Spatial inequality in Johannesburg, South Africa-Getty Images

*Africa is a diverse continent (1bn people, 54 countries and thousands of languages). Cities are growing very rapidly- urban population-from nearly 40% of the total population (about 395 million) in 2009 projected to triple to more than 1.2 billion or 60% of all Africans, by 2050.*

*Urban planning in Africa during colonization was inspired by the pattern followed in Europe in containing respiratory diseases. Cholera and bubonic plague outbreaks in Nairobi (Kenya) and Lagos (Nigeria) led to slum clearance and urban infrastructure upgrades. Urban planning in French colonial Africa similarly focused on health and hygiene, safety and security.*

*Previous health crises like Ebola have not however, changed any of the urban planning practices. Spatial inequalities due to segregation persist even today in many cities.*

- *Urban planning largely focused on the few 'formal areas.'*
- *Investment / development mostly focus on the major cities.*
- *The quality and nature of urbanization exacerbates transmission rates of infectious diseases like COVID-19.*
- *Containment measures are considerably more difficult due to widespread informal settlements and severe infrastructure and service deficits.*
- *In 2019, only 55% of Africa's urban residents had access to basic sanitation services.*
- *71% urban residents rely on the informal sector - highly vulnerable to loss of income - unable to abide by restrictions and lockdown measures.*
- *With high population densities in cities, overcrowded public transport and marketplaces make social distancing almost impossible.*
- *Slum dwellers face risks of eviction and homelessness, food insecurity and inequalities, especially women.*
- *Disconnect between urban planning and public health-shortage of health professionals and hospital beds and most of its pharmaceuticals being imported, health systems highly constrained in their response to COVID-19.*
- *For Inhabitants of slums and informal settlements access to healthcare services is difficult.*

*Non-inclusion of informal settlements (mostly slums) and the lack of focus on the informal economy (80% of the economy) are two problems with urban planning. But urban transition is also an opportunity to create a new social, economic and environmental development model. (Ref:unhabitat.org unhabitat.org/ conversation.com)*

Local centers must be strengthened.

**(v) Slums:** Enforcing social distancing and other response measures is challenging in slums. Across the US, the virus has amplified the divide between the town and country, with some blaming city-dwellers, for spreading the disease.

**(vi) Population density:** Many planners say that density alone is not a key risk factor contributing to the spread of the virus. "Density makes mass transit possible. It allows for more affordable housing. It creates environments where people can walk and where children can find playgrounds... Further, compact cities are more favorable to services from the private sector – such as food, retail, hospitality, and leisure."

#### E. Economic impact:

During pandemics, economic and social support to the marginalized and vulnerable are greatly needed. In addition to top-down initiatives, certain levels of local leadership and community engagement are critical for timely response to pandemics. Diversifying urban economic activities is essential. Providing relief through targeted programs and switching over to more local supplies that increases self-sufficiency are needed for dealing with the economic hardships during the pandemic.

**F. Migration:** Coronavirus has impacted tourism and migration in cities across the world in different ways. Cities are engines of growth, which attract millions of migrants in search of employment from country sides. In India, the images of millions of migrants walking back to their homes in villages from cities during the covid-19 lockdown are etched in our collective memory. A country like India needs to plan for migration of

over 300 million people from rural to urban areas over the next 10 years. An alternate urban model of dispersed development is likely to create many more challenges, the most important being the acquisition of much more land than before and building more infrastructure. One suggestion is that Public-Private Partnerships (PPPs) need to be reworked for the scale that is estimated.

#### H. Satellite cities/towns



Songdo in South Korea: a 'smart city' whose roads and water, waste and electricity systems are dense with electronic sensors. (credit: Hotaik Sung/Alamy.)

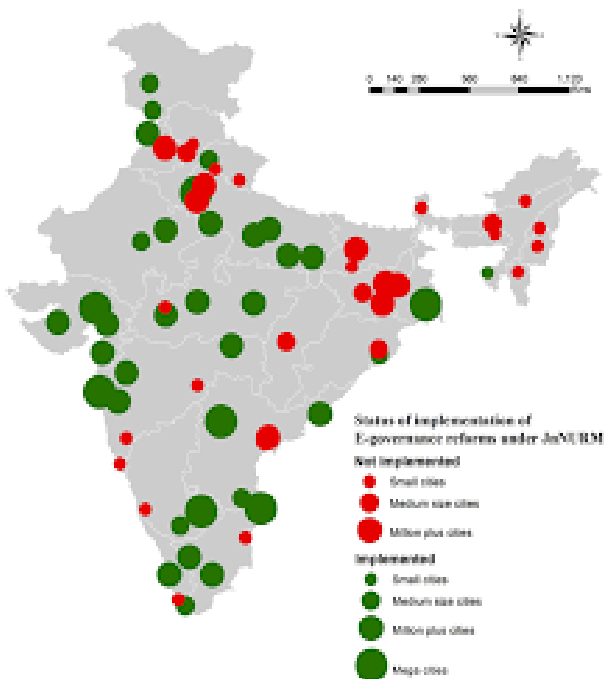
Some planners have suggested that instead of conventional cities with a city centre, urban agglomerations with multiple satellite cities could be the norm. 'Commercial, retail and entertainment would have to completely rethink their business models. Commercial space forms the backbone for any urban development and with the business models of a lot of companies in this space becoming obsolete, a complete breakdown in the market cannot be ruled out'

**I. Smart cities:** COVID-19 is likely to boost smart city movements, as evidenced by the increased reliance on tele-working, tele-medicine, surveillance systems, and online commerce and education.

"Cities have the capacity of providing something for everybody only because, and only when, they are created by everybody." -Jane Jacobs



**(ii) Smart cities-India:** At present 31% of India’s population (about 380 million) live in urban areas which is projected to go up to about 600 million by 2030. The number of families unable to afford a house could reach 38 million by 2030. Almost two-thirds Indian cities have informal slum settlements with 13 million households. More than a third of those families do not have basic amenities like electricity, piped water and sanitation within their premises.



India-smart cities planned witpress.com

**Smart Cities Mission, India** aims to create 100 **smart cities** in the country as model for development and to bring improvements to nearby cities and towns. Bhubaneswar in Orissa was the first one to be approved in 2016 from a list of 20 cities. Pune (Maharashtra), Jaipur (Rajasthan) and Surat (Gujarat) were also taken up in 2016.

A report in ‘*The Hindu*’ newspaper dated 15<sup>th</sup> July 2019 shows that although the Mission was

launched in June 2015, five years on, *a large chunk of the earmarked funds remain to be spent*. Of the 5,151 projects initially proposed, only 3,629 have been actively pursued. Of these, about 25% of the projects have been completed. But in value terms, the share of work completed amounts to just 11% of the total. In 28 cities not a single project has been completed; in 14 cities only one project has seen its conclusion.



Smart City, Bhubaneswar

Construction work has come to a grinding halt during the corona lockdown.

The *Hindu* report also faults the Smart Cities Mission for promoting greater urbanization, while failing to address structural causes of migration: an agrarian crisis, drought and floods, a lack of jobs in rural areas and failed land reform. The report says the Mission does



(Credit: smartcitiesworld.net)

not focus on the specific needs and rights of women, children, and marginalized groups,

“Cities are not only a place where we live but also a place where humanity evolves.”  
 - **Planners Realm**

## What are smart cities?

### Components of a smart city (credit: RF Wireless World)

*A smart city is an urban area that uses data and technology to create efficiencies, improve sustainability, create economic development, and enhance quality of life for people living and working in the city. Area-based development will transform existing areas (retrofit and redevelop), including slums, into better planned ones, thereby improving livability of the whole City. New areas (green field) will be developed around cities in order to accommodate the expanding population in urban areas. Application of Smart Solutions will enable cities to use technology, information and data to improve infrastructure and services. Harnessing technology leads to Smart outcomes*

minorities, migrants, domestic workers, and persons with disabilities.

Critiques of the smart city feel that 'it is just a

*Columbus, Pittsburgh, Denver, San Francisco, and Dallas are just a few examples of how cities are utilizing smart technology to find innovative solutions to some of their most pressing urban challenges. Their experience shows that there is no single blueprint for developing a smart city.*

*London has once again been declared the smartest city in the world, according to the seventh edition of the IESE Cities in Motion Index 2020 based on parameters-mobility, healthcare, security, water, energy, housing, engagement with community, economic development and waste management. New York takes the second spot, followed by Paris.*

buzz phrase that has outlived its usefulness'- They feel that more than smart cities, we need smart solutions in an inclusive policy framework.

Charbel Aoun Shneider in his blog says (we call them) 'mega cities, intelligent cities, resilient cities, green cities, sustainable cities, safe cities, future cities and smart cities'. But 'much like humanity, cities are organic and dynamic in how they respond, change and grow, this is part of what makes each one uniquely exciting and interesting'.

An article in the Guardian news paper

**"Smart cities** do not mean creating jungles of concretes or sophisticated **cities** of glasses with HiFi technologies. But a **smart city** means a **city**, where humans, trees, birds and other animals can grow with all their glories, imperfections, freedom and creativity."

- Amit Ray

pointed out serious privacy and security issues concerning the 'smart' approach"- A vast network of sensors amounting to millions of electronic ears, eyes and noses – also potentially enable the future city to be a vast arena of perfect and permanent surveillance by whomever has access to the data feeds."

**II. Workplace in Covid Times:** Our concept of work space has undergone a profound change during the corona pandemic. Experts point out that open offices were already on the decline before Covid-19 ' to help create office spaces that allow for a balance of isolated concentration and productive, meaningful collaboration'. But in a post-COVID-19 world we need to reassess our priorities, planning for minimum transmission of the virus and other pathogens, as well as ensuring employee health .

Some of the related web sites detail how our concept of shared workspace is going to fundamentally change post-covid. Vaccination, no doubt, will provide a sense of security; nevertheless these changes are most likely to happen.

- **High-rise buildings:** These would become more expensive to build and be less efficient.
- **Automation:** With 80% of infectious diseases transmitted by touching contaminated surfaces, public spaces will move towards development of all types of touch-less technology—like automatic

doors using motion sensors and facial recognition, voice-activated elevators, cell phone-controlled room entry, hands-free light switches and temperature controls, touch free surfaces etc.

- **Building designs-** The reconfigured open office will seat fewer people, as the space allocated to each employee has increased, with larger workstations and higher partitions, in keeping with social distancing norms.
- Agile workspaces like hive zones and jump spaces have been redefined. Sliding panels create dynamic working and meeting spaces; and single occupancy pods and phone booths are being provided.
- **Wider corridors and doorways** and lot more staircases
- **Reduction** in maximum occupancy for lifts and larger lobbies to minimize overcrowding.
- **Work stations** to be connected through digital tools that allow multiple users to work simultaneously and attend video conferences from their own stations;
- **Furniture** - Shrinking of office desks  
**Antibacterial fabrics** and furnishings
- **Use of mobile phones** to eliminate direct contact.
- **Restrooms** with doors will be on the way out, or eliminated wherever possible.
- **Sanitizing** Installation of temporary Plexiglas screens at various check-in points and hand-sanitizer dispensers, as well as Ultra Violet phone sterilizing stations.
- **Navigation-**  
Staggering

entry and exit times to decongest arrival and departures, multiple shifts for lunch, creating separate lanes for to and fro movement to decrease chances of transmission of pathogens.

### III. Affordable Housing



**Housing crisis in the European Union**  
(credit: [institutegratereurope.com](http://institutegratereurope.com))

According to an estimate by the United Nations (UN) the share of global population living in urban centers would increase from 55 percent (in 2018) to 68 percent by 2050 i.e. every two out of three people would be living in a city or town in next 30 years. 90% of this will be in Asia and Africa, especially in countries like India, Nigeria and China. Nearly one in five Europeans live in overcrowded dwellings.

New Policy Institute, UK points out that Britain's top five most over-crowded areas witnessed 70 percent more coronavirus cases than the five least-crowded at the start of the pandemic. Those who live in homes that are already a risk to health have been harder hit by lockdown. Moreover, the risk is further heightened if people live in overcrowded households, especially when you have older people living with younger people. With the increased cost of living in many European cities, people are forced to live in smaller spaces. The dangers of overcrowding, poor ventilation and low quality heating are

“Smart is not just a word; it's an attitude.”  
- **Ogwo David Emenike**



threatening more and more urban inhabitants amid the pandemic'.

### Africa



Construction of a housing project in KwaMashu, the largest poor township near Durban, South Africa (Photo credit: Africa Media Online)

**Africa, India and South East Asia** face the enormous task of shaping the next generation of cities. One of the chief problems countries in Africa face is the huge gap in affordable housing. For example, Kenya has a housing shortage of approximately 2m homes; more than 12m people in Egypt live in informal buildings. But with high GDP growth, limited job creation, high population growth and rapid urbanization, shortage of housing has become a serious problem. Many slum residents in African cities lack access to basic essential services such as water, sanitation, housing and healthcare.

The impact of COVID-19 on incomes and jobs, particularly for low-income and informal workers, will result in mortgage defaults and rental arrears and may lead to forced evictions. Lack of data on tenants and the management of rents and mortgages constrain housing subsidies planned by some African countries in response to COVID-19.

**India-** It is estimated that by 2030, 40 per cent of population in India would be living in cities and contributing 75 per cent to the GDP. The

lockdown during covid-19 pandemic showed how most urban dwellings in India lack infrastructure, natural lighting, ventilation and thermal comfort. The central government is giving a push to urban development in a big way with projects like developing 100 'smart cities' and the urban renewal mission which appear to be grossly inadequate to meet the challenges posed by pandemics like covid-19.

**The way forward:** Nature-based planners feel that we should build affordable and eco-friendly homes and cities for future which will help in containing the spread of diseases.

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 Ref: [www.architecturaldigest.com](http://www.architecturaldigest.com);  
[smartbuilginsmagazine.com](http://smartbuilginsmagazine.com); [www.indiatoday.in](http://www.indiatoday.in);  
[www.commercialdesignindia.com](http://www.commercialdesignindia.com); [newseu.cgtn.com](http://newseu.cgtn.com);  
[www.sciencedirect.com](http://www.sciencedirect.com); [www.itdp.in](http://www.itdp.in);  
[www.ecobusiness.com](http://www.ecobusiness.com); [www.thehindu.com](http://www.thehindu.com);  
[www.architecturaldigest.com](http://www.architecturaldigest.com);  
[efficientsmartbuilginsmagazine.com](http://efficientsmartbuilginsmagazine.com)

*Should the city be an optimized panopticon, or a melting pot of cultures and ideas? what challenges face technologists hoping to weave cutting-edge networks and gadgets into centuries-old streets and deeply ingrained social habits and patterns of movement?*

“Good architecture lets nature in”-Mario Pei

## PANDEMICS & URBAN PLANNING



Promoting public health-- Bandung public cycle- (Photo credit: Madan Bandhu Regmi )



Making more space for people to get around and exercise could help to reduce the risk of infections spreading in cities (credit: Getty Images)



Therapeutic parks in Singapore are designed to boost the mental and emotional well-being of citizens (credit: Getty Images)



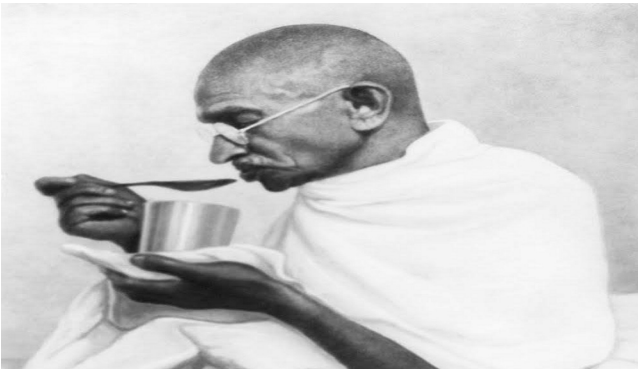
Buildings stand in the Mumbai locality of Dharavi, one of Asia's largest slums. Dharavi was one of the epicenters of Covid-19 pandemic in 2020. The fabric and infrastructure of our cities will have to adapt to a new normal to prevent the spread of the diseases

“Our public spaces are as profound as we allow them to be.”  
-Candy Chang



## FOOD & DIET: GANDHIJI & HIS EXPERIMENTS

*Mahatma Gandhi's unique dietary experiments and his unconventional approach to healthcare have valuable lessons for us, and, they guide us today in the time of the coronavirus pandemic*



Mahatma Gandhi (credit:Getty Images)

*"I have been known as a crank, faddist, madman," wrote Mahatma Gandhi in his weekly journal, Young India, in 1929, referring to his dietary experiments. 'It has now become something of a fad itself to say that many of Gandhi's diet concerns were uncannily contemporary.'"*  
(Ref: hindustantimes.com)

It is astonishing that Mahatma Gandhi who led millions of fellow Indians during India's freedom struggle survived mostly on a frugal diet in his life time. Although of frail constitution, he could walk miles together, without feeling any fatigue. He would undertake periodic fasts, but not have any health problem. Where did Gandhi get his strength, sustenance and stamina from?

In his book, Key to Health, Gandhiji wrote, "Whilst it is true that man cannot live without air and water, the thing that nourishes the

"Nature itself is the best physician."

- Hippocrates

body is food. Hence the saying, food is life". Gandhiji ate frugally. Nevertheless, he constantly experimented with his diet, and these experiments lasted all through his life. No wonder historians say that *Mahatma's experiments with food seem as elaborate as his experiments with ahimsa and truth'*.

**Evolution of Gandhiji's diet:** Gandhiji's attitude to food was complex, always evolving. He came from a Gujarati family whose members were strict vegetarians. According to his own admission, as a schoolboy, he ate meat for a brief period. Soon he overcame this habit. Before leaving for England to study law in 1888, he vowed to his mother that he would not touch meat or liquor. In England he kept his word. But he could not find vegetarian food anywhere, and always remained hungry. Finally, he could find a vegetarian restaurant on Farringdon Street, where he had a hearty meal. "The sight of it filled me with the same joy that a child feels on getting a thing after its own heart," wrote Gandhiji in his autobiography.



Mahatma Gandhi addresses a social meeting of the London Vegetarian Society at the Chelsea Town Hall, November 20, 1931.

Vegetarianism was a new cult in England at that time. He was deeply influenced by the book 'Plea for Vegetarianism' written by Henry Salt. "From the date of reading this book, I may claim to have become a vegetarian *by choice*," writes Gandhiji in Diet and Diet Reforms. He joined the Vegetarian



Society in England and made English friends who were part of the Society.

Gandhiji's experiments in Dietetics are well known. According to him, *'these experiments were conducted not from the point of view of religion, but from the point of view of economy and hygiene'*.

Gandhiji at the age of 23, set sail for South Africa in April, 1893. For 11 days in the summer of 1893, he ate nothing but raw food. He came to the conclusion that "The vital food, does not seem to agree well'. On September 2, Gandhiji returned to his regular diet. This was not his last experiment with raw food. He would continue to experiment with raw food later in his life.

Gandhiji, while living in Durban, made attempts to make his daily life simple. Instead of buying bread from the baker, he started preparing unleavened whole meal bread at home. He started using hand-ground flour, instead of mill flour with the help of a hand mill, as he believed that this would encourage simplicity, good health and economy.

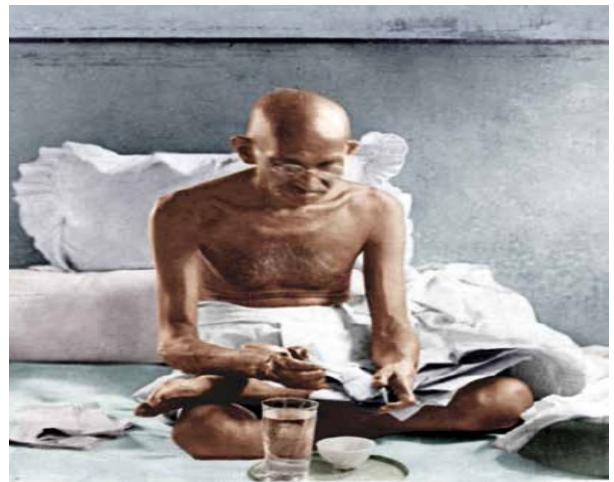
At Tolstoy Farm in South Africa, Gandhiji urged the residents to grow the food in the farm, and also encouraged the consumption of raw vegetables and fruits, partly to free women from kitchen work.



Dinner at the Sevagram ashram in Wardha, Maharashtra. (Alamy Stock Photo)

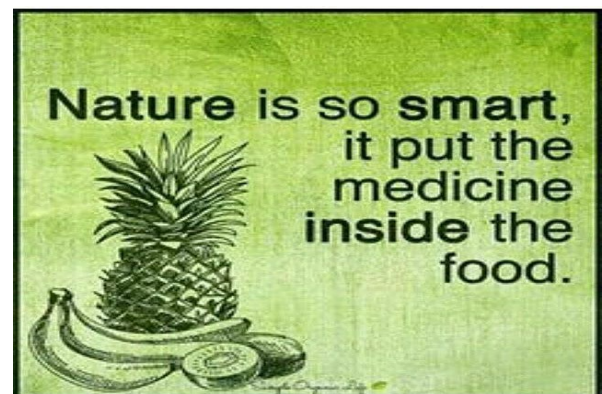
After returning to India, Gandhiji continued his dietary experiments. For years he subsisted on fruits and

nuts. In May 1929, he attempted another experiment by eating only raw, uncooked food. "Medically there may be two opinions as to the value of this diet, but morally I have no doubt that all self-denial is good for the soul' he wrote. According to him food should be taken "--as a matter of duty – even as a medicine- to sustain the body, never for the satisfaction of the palate."



Mahatma Gandhi having breakfast at 6:45 am on a regular day at Mani Bhavan, Bombay 1929.

While he was in India, on a visit to Hardwar for the Kumbh Mela, he took a vow never to take more than five articles of food in 24 hours, and to finish his last meal before sunset. He mostly kept the strict five-foods vow. He finally reached a point wherein he stopped eating all spices and only consumed boiled or raw food.



"It is difficult to think anything but pleasant thoughts while eating a home grown tomato."

- Lewis Grizzard

**His views on food:** Gandhiji's food habits were deeply guided by his belief in the principle of non-violence. After conducting several experiments, he developed firm views on what to eat. Some of his views on daily consumption of food are noted below.

**On eating meat:** Gandhiji became a vegetarian, as part of a conscious ethical choice. He firmly believed that meat brought with it the “defects of the animals from which it is derived.” Besides, for him, vegetarianism had deep spiritual and philosophical basis; it was part of his commitment to ahimsa, the core principle on which his politics was based. To him the greatness of a nation and its moral progress can be judged by the way its animals are treated. Gandhiji himself explained the philosophy behind his embrace of vegetarianism-- *"Man's supremacy over the lower animals meant not that the former should prey upon the latter, but that the higher should protect the lower,--man eats not for enjoyment, but to live". "Man was not born a carnivorous animal, but born to live on fruits and herbs that the earth grows"*.



Mahatma Gandhi and Sumati Morarjee cutting vegetables, 1945. (Ref: IJMR)

**Raw food** appealed to him for many reasons, chiefly due to its simplicity. Gandhiji saw uncooked food as a way to cleanse the body by getting rid of impurities. “That I could dispense with cooking, that I could carry about my own food

wherever I went, that I should not have to put up with any uncleanness of the landlady or those who supplied me with food.” He also believed that nutrients could be lost in the process of cooking. In an article he wrote in 1913, “--If cooking could be avoided, much of the time of our womenfolk would then be saved.” Once India had gone raw, women will be set free from the prison-house of the kitchen.”

Gandhiji saw his raw-food experiments as important, not just for himself but for the society as a whole. Money could be saved by reducing the need for cooking oil and fuel. He hoped that raw food would undo the inequalities that have prevented poor people from having access to healthy food.

**Attitude towards Milk & Eggs:** Said Gandhiji--“We are certainly not entitled to any other milk except the mother’s milk in our infancy.” The humane, ethical reason was based on reports he came across about the torture of cow and buffaloes by their keepers. But Gandhiji fell ill with severe dysentery and was literally in death bed in the midst of a campaign in Kheda during World War I. On insistence of doctors to take milk to regain strength, he agreed to drink goat’s



“The only way to keep your health is to eat what you don’t want, drink what you don’t like, and do what you’d rather not.” – **Mark Twain**

milk, but decided to renounce cow's milk. About eggs, his view was that those who can take milk should have no objection to taking sterile egg.

### *Gandhiji's diet*



Credit: IJMR)

*Gandhiji limited his diet to raw vegetables, curd, fruits, fresh organically grown food, unpolished rice and coarse grains, millets, leafy vegetables, soya beans, neem seeds, jaggery, guava seeds, tamarind, groundnut cake and boiled vegetables with a hint of salt.*

*Gandhiji described his diet in his book , **DIET AND DIET REFORM**, "I take generally: 8 tolas of germinating wheat, 8 tolas of sweet almonds reduced to a paste, 8 tolas of green leaves pounded, 6 sour lemons, and 2 ounces of honey. The food is divided into two parts, the first meal is taken at 11 a.m. the second at 6.15 p.m. The only thing touched by fire is water. I take in the morning and once more during the day boiling water, lemon and honey." When on the move, he favored a snack of plantains with groundnut paste.*

**On cooking oil and sugar** Gandhiji avoided refined sugars, fats and oils, but was favourably disposed towards ghee (clarified butter).



Eating breakfast at Sevagram-1940 Gandhiji with Kasturba Gandhiji

Gandhiji did consume sweets occasionally and had a weakness for sweet mangoes . However, he was extremely cautious as to not take too much sugar in food items or in the form of sweets. He considered sugar to be a harmful and advocated the use of *Gur* or jaggery instead. "*Gur* consisting of cane-sugar and fruit-sugar in the proportion of 2 to 1, would be assimilated more rapidly than cane-sugar alone taken in the same quantity. Therefore, the nutritive value of *gur* is at least 33 percent superior to that of refined sugar," wrote Gandhiji in Harijan.

**Brahmacharya:** For Gandhiji, vegetarianism was also an important aspect of *brahmacharya*, which meant exercising self-restraint, in order to control the senses. "It became my conviction that procreation and the consequent care of children were inconsistent with public service." Said Gandhiji "The diet of a man of self-restraint must be different from that of a man of pleasure."

**On fasting:** It is said that Gandhiji's fasts altered the course of history. He also fasted for religious and health reasons. Almost a century ago, Gandhiji understood the importance of detoxifying the body after heavy meals, by consuming only fruits and water. He considered fasting too as his way of

Each patient carries his own doctor inside him."  
— Norman Cousins



### Five Healthy EATING Rules From Bapu



pinterest.com

1. Follow simple vegetarian diet
2. Avoid processed foods-only simple home cooked meals.
3. Fast in moderation.
4. Monitor salt intake
5. Reduce sugar consumption

(ref: [www.netmeds.com](http://www.netmeds.com))

healing- "nature cure" approach to healing the body'.

**Eating locally:** Gandhiji was of the view that by eating local foods we get more fresh, high quality food. It reduces transportation, supports farmers directly, boosts local economy and helps the soil and ecology. For him, it also meant self reliance, reducing dependence on outside help and imports. He advocated wheat, rice, *jowar*, *bajra* and a range of locally-grown coarse cereals and millets as staple diet. He preferred locally-grown fruits and vegetables. Instead of tea, coffee or cocoa, he suggested the use of honey, hot water and lemon as nourishing drinks.

**Practice of self-restraint:** Gandhiji did not merely believe in advocacy but practiced what he preached. For example, as a regular visitor to the Viceregal Lodge he would always carry his goat's milk curd with him, and offer it to others. He politely refused the scones and ice creams the Viceroy offered. During lunches organized by

others in his honor he would opt for only clear soup or lemon water.

**Healthcare:** Most of us do not know that Gandhiji was interested in studying medicine and wanted to become a medical practitioner. But the force of circumstances made him a political leader and social reformer. This, however, did not in any way affect his deep interest in health, hygiene, nutrition and diseases .

**Health practices:** Gandhiji advocated that adopting **preventive** health measures was better than treatment itself.

**Walking:** Gandhiji considered exercise essential for good health, along with a healthy

### How did Gandhiji mange his fasts?



**Gandhiji during his last fast (ref: [thewire.in](http://thewire.in))**

*Gandhiji fasted on 17 occasions during the freedom struggle, the longest being 21 days. He perfected a routine for long **fasts**. Before going to fast, he would take lemon juice and honey, with warm water. He would keep having water, occasionally with salt or lemon juice, through the **day**, no matter how nauseous or weak he felt. To minimize the loss of energy, he would sleep more than usual.*

diet. "Gandhiji used to walk around 18 km every day for nearly 40

years. *'During his campaign from 1913 to 1948, he walked around 79,000 km, which is equivalent to walking around the Earth twice'.*

**Writings:** A prolific writer, Gandhiji kept journals and regularly wrote on food, diet and health issues extensively, especially in *Harijan*, a weekly newspaper. He also wrote books on diet and health which include 'Diet and Diet Reforms', 'The Moral Basis of Vegetarianism' and the 'Key to Health'.

### Recent publications on Gandhiji & diet

1. A special issue of Indian Journal of Medical research (IJMR), titled '**Gandhiji and Health @150: Footprints of Indian Council of Medical Research's Century Long Journey'** discusses the medical legacy of Gandhiji, his health profile and his experiments on health and diet, based on articles published and health records that are available by the Indian Council of Medical Research (ICMR) in 2019 (on the occasion of the 150th birth anniversary of the Mahatma).

2. **Gandhiji's Search for the Perfect Diet with the World in Mind**" by Nico Slate (Orient Blackswan, 2019); The book sheds new light on important periods in Gandhiji's life as they relate to his developing food ethic.

### Lessons from Gandhiji's experiments

Today many people are attracted to veganism and vegetarianism out of choice. It is relevant to mention here that the Inter-governmental Panel on Climate Change (IPCC) set up by the United Nations has pointed out that high consumption of meat and dairy produce by western countries is one of the factors fuelling global warming. It, therefore, recommended that there should be a major shift towards vegetarian and vegan diets. *In*

*view of the deep implications of climate change, it seems that we now have no choice but to go for a largely vegetarian diet.*

The unprecedented health and humanitarian crisis unleashed by the vicious Corona virus, and the consequent lockdowns, have provided us a unique opportunity for deep reflection, introspection and collective action. It has imposed a Gandhiji- like discipline on at least some of us as never before-- self- reliance, simple living, minimizing wastage, self education, focusing on preventive health, hygiene, sanitation etc. We might have banished Gandhiji from our thoughts, but today a deadly virus has brought his thoughts again to the centre-stage.

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Ref: [www.netmeds.com](http://www.netmeds.com); [hindustantimes.com](http://hindustantimes.com);  
[www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov); [www.netmedst.com](http://www.netmedst.com);  
[www.theatlantic.com](http://www.theatlantic.com); [health.ucdavis.edu](http://health.ucdavis.edu)

### Organic and natural practices as preventive measures to fight COVID-19 -

- *Drink warm water throughout the day.*
- *Practice Meditation, Yogasana, and Pranayama.*
- *Increase the intake of Turmeric, Cumin, Coriander and garlic.*
- *Drink herbal tea or decoction of Holy basil, Cinnamon, Black pepper, Dry Ginger and Raisin.*
- *Avoid sugar and replace it with jaggery if needed.*
- *Apply Ghee (clarified butter), Sesame oil, or Coconut oil in both the nostrils to keep the nostrils clean.*
- *Inhale steam with Mint leaves and Caraway seeds. (Ministry of AYUSH, GOI)*

"What you eat in private, you wear in public."  
-werefite.com

## Food & Immunity

Two examples of immunity-boosting foods are given below:

### 1. Immunity boosting drink (Kadha)

#### Ingredients:

- Ginger grated – 1 tbsp
- Peppercorns – 2
- Cinnamon – 1-inch stick
- Cloves – 2
- Aniseed – 1tsp
- Cardamom pod – 1 crushed
- Unpasteurized honey – 1 tbsp
- Tulsi leaves – a handful

Boil all ingredients, except honey, along with a liter of water in a pan for 30 minutes. Have ¼ cup of this drink warm with a little bit of Gur (jaggery) or honey.

### 2. Mediterranean Diet

The Mediterranean diet has been called the gold standard in preventive medicine for its combination of anti-inflammatory and nutritious foods. It represents the traditional eating habits of populations living around the Mediterranean Sea, including Greece and South Italy, and has long been indicated as a dietary pattern able to preserve cardio-metabolic health. The diet is characterized by the high nutrient content in plant-based foods, with olive oil as the main source of fat, low-to-moderate intake of fish, dairy products, and poultry, low consumption of red or

processed meat, and low to moderate consumption of wine with meals. This dietary regimen is currently included among the eating patterns recommended by the American Diabetes Association for people with pre-diabetes or diabetes, showing favorable effects on HbA<sub>1c</sub> reduction, weight, and lipids in a number of randomized controlled trials (RCTs). Several epidemiological studies confirmed the anti-inflammatory and immunomodulatory effects of a Mediterranean pattern on several diseases. (Ref: [www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov)).

### MEDITERRANIAN CHICKPEA SALAD



(Courtesy: [myfoodstory.com](http://myfoodstory.com))

### EASY TO MAKE MEDITERRANIAN CHICKPEA SALAD

#### INGREDIENTS

- 1 1/2 cups chickpeas cooked, drained and dried
- 1 cup cubed cherry tomatoes
- 1/2 large red onion chopped
- 1 cup cubed English cucumber
- 1/4 cup feta cheese crumbled or vegan tofu feta
- 1/2 cup chopped parsley stems removed

#### Balsamic Vinaigrette

- 1/4 cup extra virgin olive oil
- 1 tablespoon balsamic vinegar
- 2 teaspoons lemon or lime juice
- 1 teaspoon dijon mustard
- 1/2 teaspoon sea salt

**Preparation:** Mix the ingredients and add the balsamic vinaigrette. Same as to regular salads.

“Everytime you eat or drink, you are either feeding disease or fighting it.” - [eatingyoualive.com](http://eatingyoualive.com)





EARTH-OBSERVING SATELLITES MONITOR A VARIETY OF PHYSICAL PARAMETERS ON EARTH'S SURFACE AND ATMOSPHERE GLOBALLY AND PERIODICALLY. *Image: JAXA / NASA's Goddard Space Flight Center*

*Here we present a view from space, analyzing the impact of the pandemic on the environment*

*The lockdown imposed in at least 89 countries, affecting over half the world's population, has severely restricted economic activity and people's mobility, globally. It has impacted the environment in several ways—from the air we breathe to water quality, food security, forests, transportation, weather, rainfall and a host of other things. Are these changes real and measurable? Are they always beneficial? By comparing remote sensing data collected **before and during the pandemic**, NASA, U.S. Geological Survey (USGS), and ESA (European Space Agency) Earth-observing satellites and others have been able to assess the environmental, economic and societal impact of Covid-19 lockdown.*

One question that arises in our minds during the ongoing pandemic is whether we can detect presence of the coronavirus and spread of the disease globally,

“When you look at the number of satellites, what they are doing, what they represent, it is really a vision of trying to have the world in your clutches.”

**-Trevor Palgen**

### Is Covid-19 a simple flu virus or a signal from our planet Earth?

with the help of satellites. We know that satellites are unable to do so at present. However, they can measure changes in Earth's environment due to reduced human activities during the lockdowns.

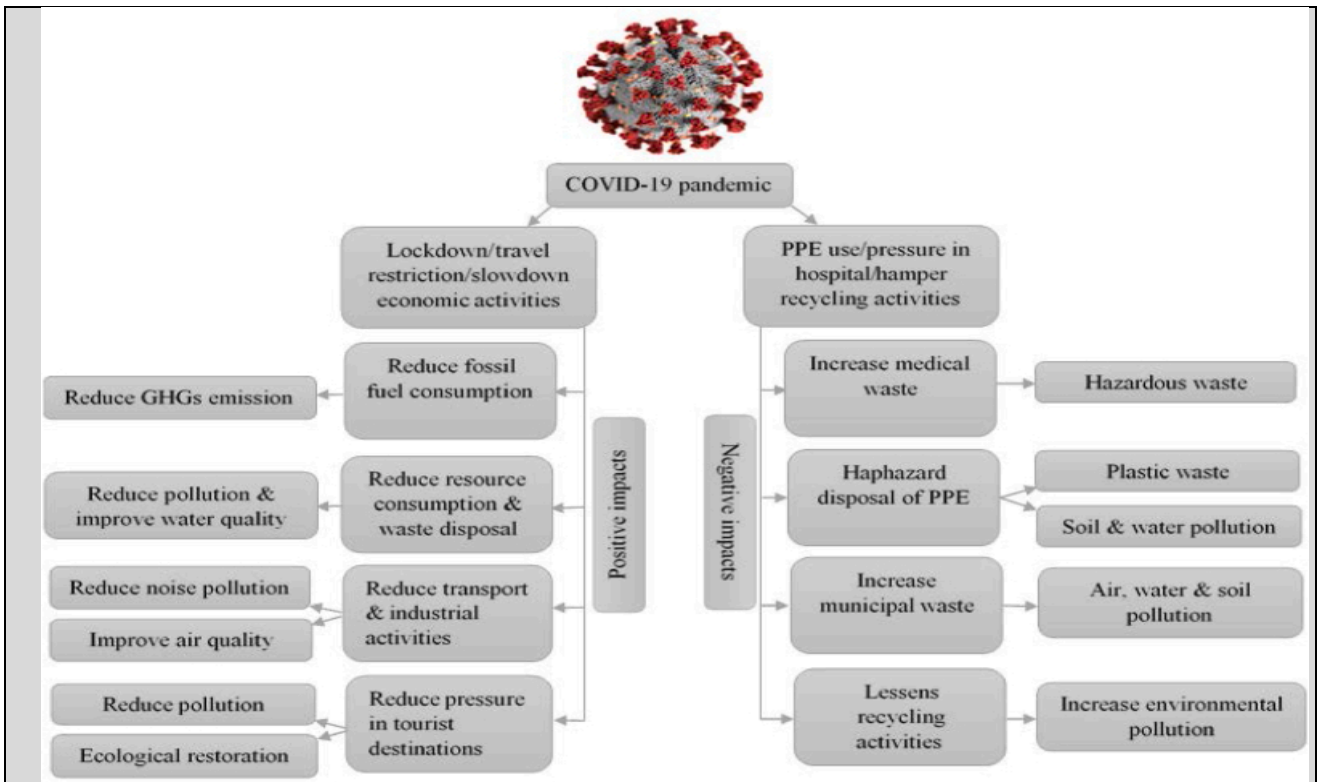
The images sent by the Earth- observing satellites are studied to reveal the connections between the pandemic and the environment. The three space agencies NASA, USGS and ESA put together data collected by each into one joint information source.

Earth Science Division of NASA has taken up a group of six projects on the positive and negative environmental effects of COVID-19 to study how COVID-19 lockdown measures are impacting air pollution and precipitation, food security, fire ecology, urban surface heat, clouds and warming, water quality and aquatic ecosystems. Two projects are exploring how the virus is spread by monitoring dust and weather. Let's now have a look at what the data says.

**Air Pollution:** The World Health Organization (WHO) estimates that about 3 million people die each year from ailments caused by air pollution, and that more than 80% of people living in urban areas are exposed to air quality levels that exceed safe limits. The situation is worse in low-income countries, where 98% of cities fail to meet WHO air quality standards. A study by Harvard University found that an increase of only one microgram per cubic meter in PM 2.5 is associated with an 8% increase in death rates due to COVID-19. Another study by scientists at Cambridge University also reported a link between the severity of COVID-19 infection and long-term exposure to air, including nitrogen oxides (NO<sub>2</sub>-primarily produced by the combustion of fossil fuels

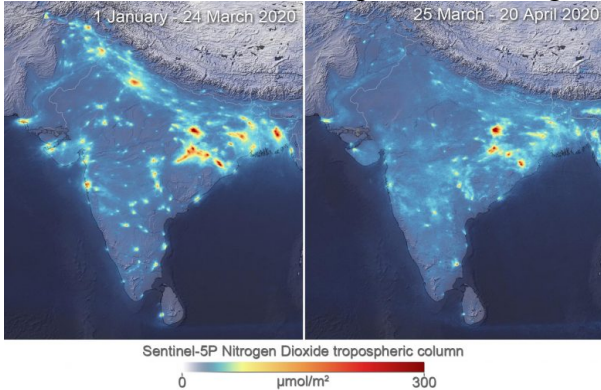
(by industry and and transportation)

unintended consequence of reducing air



Impact of the Covid pandemic. www.ncbi.nlm.nih.gov

and ground-level ozone from vehicle exhaust fumes or burning of fossil fuels. However, space and ground-based observations have shown that Earth’s atmosphere has seen significant reductions in some air pollutants since the COVID-19 pandemic began.



India- These images, by European Space Agency using data from the Copernicus Sentinel-5P satellite, show the average nitrogen dioxide concentrations from January 1 to March 24, 2020, and March 25 (the first day of the lockdown) to April 20, 2020.

The lockdown imposed has the

“For the pathogens transmitted through environmental routes or that have an environmental connection, satellites are powerful”-  
 Timothy E. Ford, University of Massachusetts

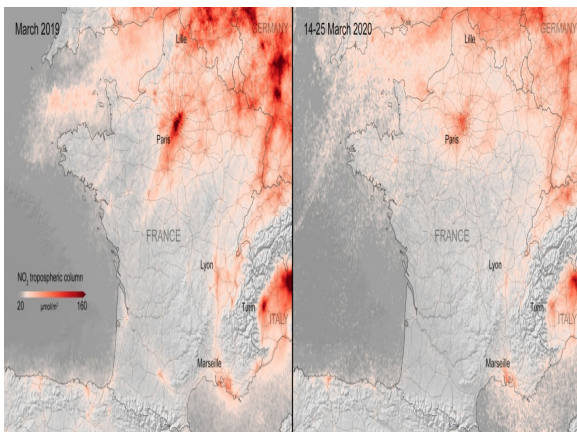
pollution. The media reported that blue skies were visible in many places during the lockdown. Reports from India say that Mt. Everest and other peaks in the Himalayas were clearly visible from several villages in North India, perhaps for the first time in people’s lifetime. According to the Ministry of Ecology and Environment, in China, the air quality went up 11% in the category ‘good’ in as many as 337 cities. Pandemic restrictions have reduced global NO<sub>2</sub> (an air pollutant) concentrations by nearly 20%, due to lockdowns by comparing data collected in 2020, with that for the same period in 2019. Emission of NO<sub>2</sub> is one of the key indicators of global economic activities. It showed significant reduction in many countries especially US, Canada, China, India, Italy, Brazil due to the recent shut down.

Compared with the same period last year, levels of air pollution

Agency	Period/year Comparison with 2019 data	Countries / cities	% reduction
NASA	2019/ 2020	Global	20%
Sentinel-5P satellite of ESA	2019/ 2020	European cities including Barcelona, Madrid, Milan, Rome and Paris	30-60%
Research study in Journal Geophysical Research Letters	2019/Early 2020	Northern china, western Europe and the US	60%
NASA	2019/ 2020	Cities in UK	60%
NASA	2019/ 2020	USA	25.5%
NASA	Do Comparing 2020 data with monthly averages from 2015-2019	New York and other cities in Northern USA	30%
NASA	2019/ 2020	Ontario	Not specified
NASA	2019/2020	San Paolo	54.3%

in the dust particles can be linked to infectious diseases. Studies are on to find whether the seasonal African dust that travels to the Caribbean between May and August every year will have significant impacts on health and mortality associated with the virus.

in New York reduced by nearly 50% .



Air pollution levels in France (Ref: NASA)- Comparison 2019-2020

Nearly 50% reduction of NO<sub>2</sub> and CO<sub>2</sub> was estimated, due to the shutdown of heavy industries in China. Researchers however, caution that **a notable change in one pollutant does not necessarily mean air quality is altogether healthy.** South China Morning Post, reported that “Weak winds, high humidity and a strong thermal inversion had trapped bad air in the city.” NASA satellites also showed a high load of airborne aerosols over different places.

African dust travels from the Sahara Desert, across the Atlantic Ocean to Puerto Rico and the Caribbean.  
Microorganisms

**Agriculture & Food Safety** According to NASA, this year was looking to be a relatively normal year for crops, until the pandemic and consequent lockdowns happened, which are having an adverse impact on food production.

A recent report from the World Food Program forecasts that the COVID-19 pandemic could push over 130 million additional people into chronic hunger by the end of 2020.

Scientists say that "The pandemic has caused numerous problems and uncertainties along the food supply chain, such as, limited labor, transport, cross-border trade and the availability of produce. These limitations create uncertainty in food markets and, therefore, the availability of food in the future. **If we can harness satellite data for this effort, we may be able to keep farmer livelihoods intact and food supplies secure**".

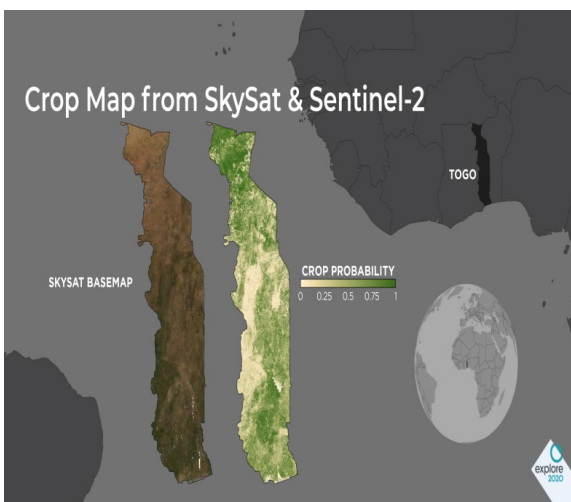
Reduced air and ground travel caused the demand for ethanol to plummet, which caused corn prices to decline. Lockdown policies also made it harder for officials from the U.S. Department of Agriculture (USDA) to travel to farms and collect information about crop planting, progress, and conditions. The subsequent lack of public information about crops

“Air pollution is turning mother nature prematurely grey.”  
- quotefancy.com



caused uncertainty and volatility in agricultural markets and prices as growing seasons progressed. Satellite technology is helpful to handle these types of problems.

ESA, NASA and JAXA continue to work with organizations such as the UN Food and Agriculture Organization (FAO) to ensure the best use of satellites to monitor agricultural production from national to global scales, and, created the *COVID-19 Earth Observation Dashboard*, a platform that pool satellite data to monitor the impacts of COVID-19 worldwide – including agricultural production. 'The launch of Google Earth Engine (GEE) and advances in cloud data storage in recent years have brought satellite technology and analysis to anyone with a desktop computer and internet connection.'



Country-wide cropland probability map and Planet's SkySat Base map of Togo.

**Examples** (i) The National Sustainable Agriculture Coalition estimated that the impact of lockdown could be USD \$1.32 billion in farm losses alone, from March to May 2020.

The use of satellite technology is important because

(ii) Fruit and vegetable crops in Spain, Italy, France, Germany and the UK may end up rotting in the fields

due to non-availability of migrant workers during the lockdown.

(iii) Satellite observations show that in many regions, the rice was planted earlier than the last two years. Scientists in Belgium used data from the Copernicus Sentinel-1 and Sentinel-2 missions and the US Landsat-8 mission together with machine learning to monitor crops on a weekly basis.

(iv) A recent study analyzed the harvests of winter cereals over Spain which are cultivated over almost two million hectares.

(v) Satellite data is used in monitoring key commodity crops, which are corn and soybeans in the US and winter wheat in Russia.

**Forests:** Assessing the impact of covid-19 on forests, especially the short-term and long-term economic consequences, is very important, as livelihoods of a sizable section of population in many countries are dependent on forests.

Experts are of view that if the crisis continues unabated, the reliance on forest goods and services is also likely to see a sharp increase. According to reports, 'Brazil and Colombia have seen an increase in illegal logging and mining; the Philippines has also reported illegal logging and wildlife trafficking; Kenya has reported increased bush meat and ivory poaching, as well as increases in charcoal production, which has been illegal since 2018; Cambodia has seen an increase in poaching, illegal logging and mining; and similar reports have come from Venezuela and Madagascar'.

"Nature provides a free lunch, but only if we control our appetites,"- **William Ruckelshaus**



As Seen in the above images taken in June and September 2020 by NASA’s Landsat 8 satellite, some parts of the Brazilian Amazon rainforest are experiencing rapid deforestation since the start of the coronavirus pandemic. Red indicates areas that have been cleared. Credit: USGS

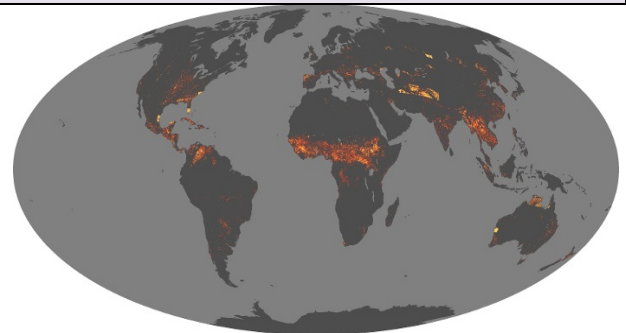
USGS program monitors weekly changes with satellite images from the joint NASA/USGS satellites. Reports show that Brazilian Amazon rainforest were cleared from June to September of this year, since the start of the COVID-19 pandemic. Rapid deforestation also is occurring in the tropics near Indonesia and the Congo. Yet, in other parts of the Amazon rainforest such as Colombia and Peru, deforestation appears to have slowed somewhat, since the onset of the pandemic. Concerns have also been raised in Malaysia and Indonesia, which have the highest deforestation rates in South-east Asia, while in Ecuador, indigenous and afro-descendent communities have reported increased illegal mining in the Choco and Amazon rainforests.

**Forest fires** are becoming more common mainly due to human activities. Controlled fires are lit for clearing forests for farming and pasture; sometimes they are started by lightning or accidentally by people. Many a time forest fires are due to prolonged drought, which are initially the fires that are lit seasonally by farmers and ranchers.

Sensors on NASA and NOAA satellites map active wild fires on Earth each day.

**Satellite observations**

- It helps agricultural planning.
- Enables nations make critical food production decisions amid the covid-pandemic.
- Provides crucial information to monitor planting, crop growth and harvesting for key agricultural commodities from space.
- Offers an effective and accelerated means to map distribution of croplands and characterize the nature of agricultural fields during the pandemic
- Forecasts on yields - early warning of likely food shortages
- Helps to ease travel restrictions to ensure sufficient labor and machinery are in place when crops are ready to harvest.
- Assists authorities to plan rotations to ensure everyone gets a chance to sell their produce at market
- Provides information to markets on how much of a specific kind of crop to expect.
- Has the potential to stop foods from going waste in the fields.
- Harvests can be monitored in near-real time, at parcel-level over the entire country

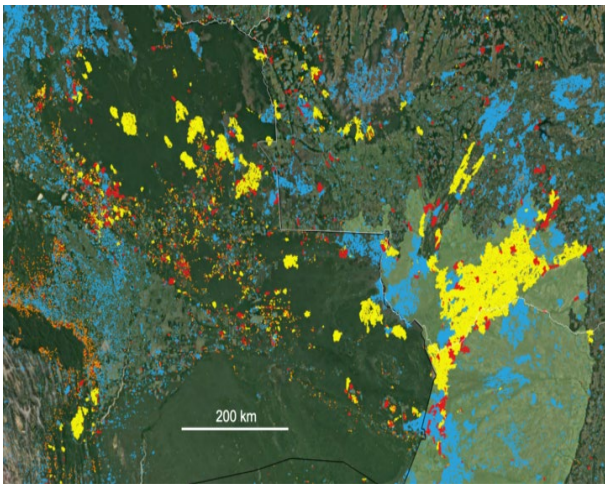


Tracking wild fires across the globe- Credit: NASA

They have tracked fires burning in the Amazon Rainforests in South America from August-

“What we are doing to the forests of the world is a mirror reflection of what we are doing to ourselves and to one another.” -Chris Maser

October, 2020 and the Cerrado (a grassland/savanna ecosystem) to the south as triggered by human, both intentional and accidental. Widespread agricultural burning is noted across Africa as the dry season progresses each year. Agricultural burning occurs in late winter and early spring each year across Southeast Asia. The 2019–2020 **Australian** bushfire season, which stretched from **June** 2019 to March **2020**, devastated portions of the country, scorching an estimated 46 million acres, destroying more than 5,900 buildings (including 2,779 homes), and killing at least 34 people.



This map shows the locations and sizes of fires detected along the northern border of Santa Cruz (Bolivia) and Mato Grosso (Brazil) through mid-October 2020. Yellow represents understory fires; red are deforestation fires; blue are savanna fires; and orange are small clearing and agricultural fires. Credit: NASA

The **2020** California wildfire season is a series of ongoing wildfires that are burning across the state of California. According to Wikipedia, 'A freakish siege of thousands of dry lightning strikes in Northern **California** moved over lands parched in an era of climate change and sparked four of the five largest wildfires in modern state history, with more than 3 million acres burned in California alone'.

Researchers at the Indian Institute of Remote Sensing (IIRS) in Dehradun,

India, documented a striking drop of 83% in the number of forest fires during the lockdown, compared with the average number of fire incidences over the past 15 years.

**Industrial Pollution** Lockdowns have significant impact on industrial pollution. It is estimated that the use of fossil fuel would decline by about 10% around the world owing to the COVID-19. Reports say that industrial activities in India, including extracting and crushing stone for construction projects, slowed or halted because of COVID-19 lockdowns. Due to closure of industries, transportation and companies a sudden drop of greenhouse gases (GHGs) emissions was reported. Key industries in China were operating at much lower-than-normal levels during the quarantine. As a result, carbon dioxide (CO<sub>2</sub>) emissions were at least 25 percent lower in the two weeks following the Lunar New Year compared to 2019. .

During the lockdown period, the major industrial sources of pollution that affect aquatic ecosystems, such as industrial waste water disposal, crude oil, heavy metals, and plastics, have shrunk or completely stopped. Therefore, the level of pollution is expected to be reduced. Besides, global coal consumption is also reduced because of less energy demand during the lockdown period . It is reported that, coal-based power generation reduced 26% in India with 19% reduction of total power generation after lockdown . Again, China, the highest coal consumer in the world, dropped 36% compared to same time of the preceding year (early February to mid-March). However, that decrease in CO<sub>2</sub> emissions for two weeks would only reduce annual totals by approximately 1 percent. These improvements are likely to dissipate as lockdowns are lifted, and economic activity resumes.

**Water pollution** is a common phenomenon of developing countries like India, and Bangladesh, where domestic and industrial wastes are dumped into

“Environmental pollution is an incurable disease; it can only be prevented.”

-Barry Commoner



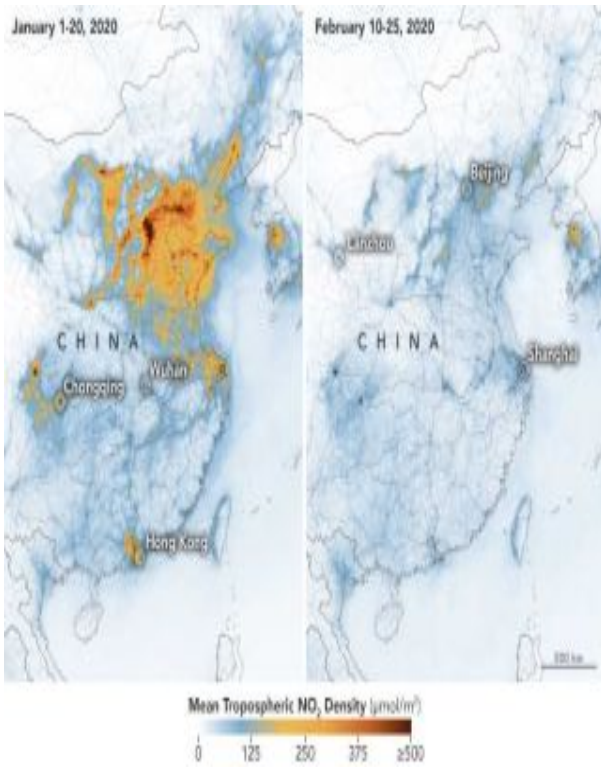
rivers without treatments. Researchers say that during the lockdown period, the major industrial sources of pollution have shrunk or completely stopped. For instance, in the river Ganga and Yamuna industrial water pollution was at all time low on the days of lockdown in India.

**Water quality:** Similarly, the Ganges, a severely polluted river in India, turned cleaner at several places during the nationwide lockdown period that started on 25th March 2020 . The Sunday Guardian wrote that-

untreated effluents from households and industries were discharged into the river, contaminating it and making the water poisonous.'

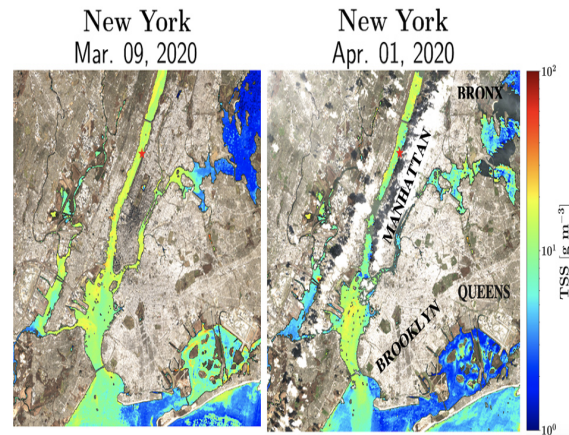
Lock downs during the corona pandemic have affected oceans, rivers, lakes, and other water bodies globally in surprising ways. The Grand Canal in Italy, turned clear, leading to reappearance of many aquatic species.

Satellite data are used in 'finding a human imprint on water quality' to



(Image: © NASA Earth Observatory) A map shows the sharp decline in emissions over China between early January and late February as parts of the country went on lockdown.

In Bihar, life seems to be returning to the river. This may be viewed in the context that, 'there have been ambitious projects to clean the holy Ganga river, including the much-hyped Namami Gange project, and restore its lost glory and purity, but, in the past, they have hardly yielded results, as



Maps of water turbidity compiled using data from NASA's Landsat 8 satellite before and during the lockdowns in New York show decreased turbidity near western Manhattan (indicated by a red star). Colors represent different levels of total material suspended in the water. Credit: NASA

better understand how urban pollutants affect water quality and coral reef health. In addition to data collected on ground, Landsat images are used to observe the impact of the pandemic on land-use changes and track the pollutants which are able to reach water bodies and ecosystems. NASA's Terra satellite, showed that snow in the Indus was significantly cleaner during the COVID-19 lockdowns. The models showed that pollutants

Water is life's matter, matrix and medium-  
Albert Szent Gyorgyi

accumulating on the snow decreased by 36 parts per million.

Snowmelt is an important source of drinking water for more than 300 million people living in the Indus River Basin. With reduced air pollution, less dust and soot accumulate on snow, which would become more white and reflective (a quality named *albedo*). Experts say that while increase or decrease of *albedo* will not change the overall volume of snowmelt, it can influence when the snow melts. Hence, it could affect water availability in the region. Satellites are useful in tracking snow melt.

**Rainfall:** Moisture in the atmosphere condenses around aerosols, or particles like dust, and falls to Earth as rain and snow. Less air pollution may mean less rain. Understanding how the decrease in precipitation is related to reduced aerosols could be valuable to water resource managers.

NASA collects satellite data on water vapor, precipitation, and aerosols. Thereafter, a comprehensive climate model is developed by combining atmospheric conditions such as moisture and temperature with chemical properties and processes that take place in the atmosphere. Reduced number of aerosols during the pandemic may have been responsible for the reduced precipitation in February and March 2020 across the western US, with many areas receiving less than 50% compared to a typical year.

**Transport:** Major transportation hubs including airports, highways, and ports remained deserted during the lockdown as millions of people were forced to avoid travel. Ongoing observations of air quality and of Earth help in tracking how Earth’s systems are responding to these changes in human behavior.

in California's Silicon Valley, is looking at how the reduced number of cars on the road changes, how parking lots, highways, and large industrial buildings’ surfaces absorb sunlight and reflect infrared heat.

Many countries have imposed travel restrictions due to which flights are cancelled worldwide by different airlines. Los Angeles International Airport, the third busiest airport in the world, was practically empty .

NASA points out that planes soaring above leave behind a distinct white trail of clouds called **contrails** produced by aircraft engine exhaust or changes in air pressure. Due to travel bans and lockdown, people are flying a lot less, and consequently, planes are producing fewer contrails, increasing visibility.



Satellite imagery from Planet Labs captured scenes of reduced traffic and empty parking lots near the Wuhan train station and airport.

**Tourism:**

The **Tourism sector** contributes significantly to global gross domestic product (GDP). However, it is also responsible for 8% of global GHGs emission. Due to COVID-19 and lockdowns, people visiting tourist spots around the world virtually grounded to a halt. Satellite images show places

NASA’s Ames Research Center

Our actions over next 10 years will determine the state of the oceans for the next 10,000/- years-  
**Sylvia Earle**



like Tokyo, Disneyland and Mecca totally deserted. Since the beginning of the pandemic, there has been a sharp decrease in the number of cruises. 'Before-and-after' satellite images 'starkly show just how much things have changed across the world as the coronavirus outbreak spread. Images provided by commercial satellite company Planet Labs reveal empty parking lots, beaches, bridges, waterways, and popular tourist and religious destinations in recent days ... like **when the world pauses because of the coronavirus pandemic**'.



Venice then and now - Courtesy : European Space Agency (ESA)

With the help of satellites, teams are studying how decreased tourism during lockdowns affects the environment. Venice is a perfect example for this study. It was described as "alarmingly empty" during the lockdown. The lockdown left Venice streets quiet. A drastic drop in water traffic was reported. Residents of Venice noticed a vast improvement in the quality of the famous canals that run through the city..

“It’s probably going to be our longest disaster response ever. This one is a bit different, because the area for mapping is the whole world.”

Utility Satellite observations /studies 'focus on the automated analysis of data—both images taken from space and information that comes from earthly sources- have made it possible to quantify the efforts needed to sustainably reduce the negative impact of human activity on the environment'. It provides global transparency we need in *tracking true state of ecological damages* to specific locations and the people living there, that usually some governments may want to hide. Further, the data aid various governments and medical workers in their humanitarian efforts, by helping to spot the exact location of villages needing assistance. "--Essentially, up until now, mapping has been something that is the preserve of the elite, because it involves lots of training, special equipment, and expensive software"--. Now -- 'volunteers working anywhere in the world turn satellite images into maps by drawing the buildings and roads on top of them, using a simple online tool'-

**Measuring the impact** Scientists measure how much of the decline in pollution can be attributed to changes in human activity during pandemic-related shutdowns. The advanced tools allow the teams to consider factors that are not accessible using conventional approaches based on geographic proximity. They want to help clarify what environmental factors could prompt a second wave of COVID-19 cases and determine how certain we can be with those conclusions. Interdisciplinary teams study whether surface air temperature and humidity are impacting

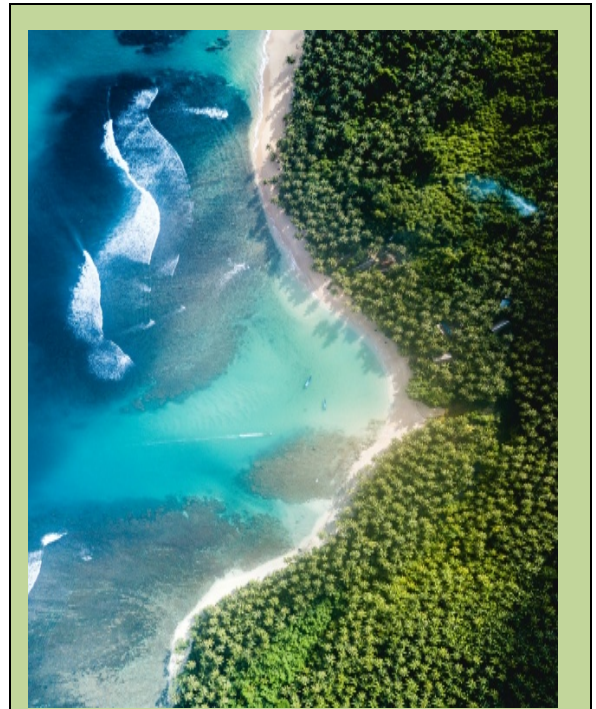
“Imagery is powerful. Imagery is provocative - satellite imagery much more so because it is from space, and it allows us to get this perspective that we don't have to have otherwise.”  
- Sarah Parcak



transmission rates, and, if so, how they do it. Scientists are also trying to find out a potential link between aerosols and COVID-19 severity and mortality.

What Prof. Eri Saikawa, who studies China's air quality and climate issues at the Rollins School of Public Health at Emory University said in an interview to space.com is worth noting, "I think what COVID has taught us is that we are not ready at all for a large shock, something that we would expect from climate change as well". -----

Ref: [nasa.govt.com](http://nasa.govt.com); [space.com](http://space.com); [www.worldbank.org](http://www.worldbank.org); [springler.com](http://springler.com); [economictimes.indiatimes.com](http://economictimes.indiatimes.com); [indianexpress.com](http://indianexpress.com); [www.naturasia.com](http://www.naturasia.com); [scitechdaily.com](http://scitechdaily.com); [www.preventionweb.net](http://www.preventionweb.net); [www.esa.int](http://www.esa.int); [www.researchgate.net](http://www.researchgate.net); [www.esa.int](http://www.esa.int); [www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov); [www.esa.int](http://www.esa.int); [www.bbc.com](http://www.bbc.com); [www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov).



It seems to me that the natural world is the greatest source of excitement; the greatest source of visual beauty; the greatest source of intellectual interest. It is the greatest source of so much in life that it makes life worth living.  
– **David Attenborough**

**LIFE STREAM is a quarterly magazine on holistic life published by a group of people who are committed to spreading the message of living in harmony with nature**

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## LIFE SCIENCE FOUNDATION

### SERVICE IN TRUSTEESHIP

#### ABOUT US

The Life Science Foundation is a Not-for-Profit Public Charitable Trust registered on 30<sup>th</sup> December, 2009. It is a unique initiative by two officers belonging to the Indian Administrative Service (Bihar cadre) namely S. Jalaja and A.N.P. Sinha (IAS-1974) who have retired as Secretaries to Government of India. Their long experience with Governments at the National and State levels have instilled in them the will to continue to serve people, although from a different platform. Service through the medium of a public charitable Trust is in keeping with the Gandhi's ideal of Trusteeship.

#### OUR VISION

The term Life science encompasses all aspects of life from Right to life- an inalienable right of every human being- to the interconnectedness of the entire web of life. Our vision, therefore, is to promote holistic understanding of life and its purpose, and improvement of quality of life of all.

#### OUR MISSION

Our mission is to improve quality of life through policy formulation, applied research and real life action. The Gandhian ideals of Sarvodaya and Trusteeship will be the guiding spirit.

#### OUR AIMS AND OBJECTIVES

To accomplish the above vision and mission, the Foundation will initially have the following aims and objectives. In course of time, more could be included:

1. To promote strategic thinking and suggest policy interventions on holistic and sustainable development.
2. To promote holistic health care system based on simple living, preventive healthcare, and both modern and traditional health systems.
3. To undertake studies, research and action-oriented projects pertaining to holistic life.
4. To undertake pilot projects of good governance including e-governance and eventually support the governments in adopting and up scaling successful pilots.
5. To work towards promoting quality of life of vulnerable sections of population, including women and children.
6. To promote all-round human resource development.
7. To design self-sustaining livelihood projects which minimise subsidies and donor-dependency.
8. To undertake other activities which are conducive to pursuit and fulfilment of the vision, Mission and Objectives of the Foundation.



