COVID-19

A NEW WORLD DISORDER

A frontline review of how the pandemic changes the world and us

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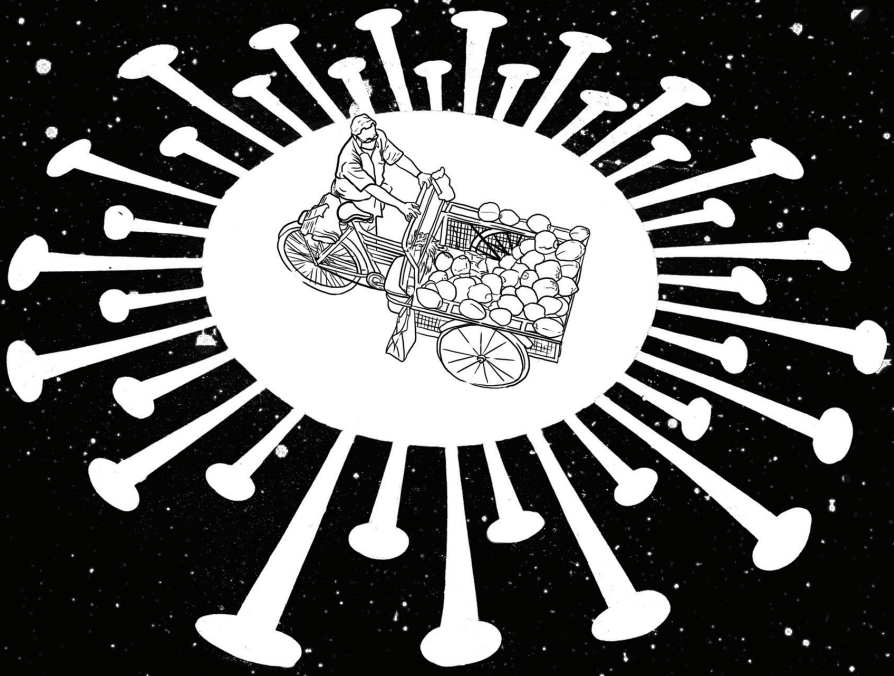

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Down To Earth
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ABOUT THE BOOK

The COVID-19 pandemic can be regarded as the globalised world's most localised emergency. It has gained notoriety as the world's fastest disease outbreak that turned into a pandemic. Barring lifestyle ailments, no other contemporary disease or infection has ever gripped the globe at this speed in recent memory. It has forced over half of the world's population into an involuntary lockdown, and brought nations and their economies to their knees. Six months into the pandemic, the world is yet to even imagine a recovery. It is an epochal event that is (and will be) fundamentally changing the world order and the way we exist in consonance with nature. From political and economic ideologies to natural resource extraction, and to global trade and performance of development schemes, COVID-19 has impacted all our existential coordinates.

This book, and the articles in it, not only offers the first draft of the pandemic's immediate history; they also explore what the world would be like after this. One might refer to it as the "new normal" and argue its inevitability and its acceptance, but the writers here paint a picture of a world like never before. The question we may ask is, how prepared are we for such a world?

CONTENTS

Economy & globalisation

Migration & work

Introduction

Globalisation

Planetary crises

New political order

Death of multilateralism

Environmental governance

New global order (or disorder)

It's time to rethink globalisation

Sunita Narain

The COVID-19 pandemic is the most tumultuous, most catastrophic and the most defining epoch of our lifetime. I cannot think of anything else which happened with such speed — from the end of December 2019, when the first cases were reported in China, to the end of July, when an estimated half of the world's population was locked into their homes. This crisis had no precedent — there was no rulebook that informed governments what to do; how to shut down economies; and when to re-open them. The virus was a mutant — it jumped from its animal host to humans; it was pernicious because it seemed to find new ways to hide itself; and, we could be asymptomatic and yet be a carrier of infection. Deadly and devastating.

But what does this mean for an inter-connected world, which has broken every record in terms of trans-boundary movement of people and trade? Consider this. In 2003, when the world witnessed another such global health crisis, the Severe Acute Respiratory Syndrome (SARS), China accounted for only 4 per cent of the world's gross domestic product (GDP). In 2020 it was 16 per cent. Presently, business begins and ends in China. It is the world's ultimate supply chain. So, this health crisis disrupted business all across the world. Also, now, the movement of people is massive and this is why the movement of the virus was also so fast. But it shows our common vulnerability; how quickly a common cold could become a global contagion.

The fact is that so much of this virus transference is happening because of our dystopian relationship with the natural world. On the one hand, we are pushing every kind of chemical and toxin into our food. This is making food a source of disease, not just nutrition. Antibiotics are being shoved into animals and even crops — not for disease control but to make them grow more; put on weight, so that business profits. As a result, resistance to drugs needed for human survival is on the rise. On the other, we are growing our food in ways that favour disease growth — industrial farms, which are vertically integrated, are fast becoming the source of contagion. Remember the origin of swine flu from industrial hog factories in Mexico that contaminated water!

This breaking of the boundaries between animal and human habitats will lead to more such outbreaks. And this, in a world that is even more inter-connected and globalised, will make the infection wildly contagious.

Global vulnerability will increase — from disease to climate change. In the past three decades, the world has invested in building a monolith trade system, which has no local or regional control. Now, I know that we cannot turn back the clock of globalisation; we cannot wish away this monster world trade system. It is profitable and it is aspirational — everybody wants to be integrated to the world supply chain. But the COVID-19 disruption does allow us a chance to rethink. Fundamentally.

A fundamental question

We need to use this time to think about the issue of global cooperation. There is never a good time for such a pandemic to hit the world, but this is the worst time possible. There is no global leadership or institution, which has the respect and the sagacity to take us through, what is clearly a crisis beyond national boundaries. What we have seen during the pandemic has been a shameful record of self-interest and self-preservation over everything else. It does shock us that even with such a crisis, which is literally bringing the most powerful countries to their knees, we are not getting together to discuss the global response to the global pandemic.

There is the issue of public health. The pandemic taught us that we are only as strong as our weakest link. If there is no access to public healthcare or if public health services have collapsed — as was the case in most of the emerging world (and the United States) presently — then we cannot withstand pandemics. It is also not enough to build this capacity within countries, because if any region of any country or any country of the world is weak, then the contagion will breed there and will spread. For how long will we be able to keep our borders closed? How will this even work? And, this then, leads to my third question about the nature of globalisation post-corona. The most macho leaders; the most high-tech scientific establishments; and the most mighty economic prowess have all met their match in this lowly virus. It should make us humble — think about what we need to do differently; how we need to act and behave differently. But this is where I suspect we will err.

The fact is that every time there is a catastrophic event, the focus is on the immediate — the relief and the rescue — and not on what we must learn for the future. And there is no doubt that the exigencies of COVID-19 management were most urgent and dire. We lost lives in the rich world — which has hospitals and health infrastructure. Just imagine the scale of the human tragedy in the emerging-developing world where none of this exists. But then also imagine the sheer scale of the human deprivation as

jobs are taken away — the economies of the poor are not based on the security of tenure, but on their daily earnings. The hard fact is that we know we should have acted together and we didn't.

China did not share information quickly enough; the virus moved out of the country and spread infection; the World Health Organization (WHO) did not act swiftly enough; or, maybe its voice was not respected enough to be heeded. Till the end of January, WHO was hedging its bets on the containment of the virus in China—it came out against global travel bans and hummed and hawed about the need to elevate the crisis to a pandemic. Then when it acted, it floundered against the sheer scale of the health emergency. It lost credibility in this period, and this at a time when the world needed strong voices to steer it ahead. The United Nations (UN) Security Council did not meet for weeks, and when

it did, it just whimpered and died. It is not just about China and WHO—each country behaved in a manner that it was for itself in this crisis—a dog-eat-dog world. It reached the point where countries pirated protective equipment — masks and gowns that were needed for healthcare workers, competing for medicine supplies and sparring about who would make the first vaccine. It is frightening to think of this when we know that the coronavirus pandemic was an outcome of an interdependent globalised world.

It made clear that we are as strong as our weakest link. If the virus continues to spread in some region of the world — most probably the one with the least healthcare services or one that is ravaged by war and strife — it will stay with us. We will not win this, unless we win it together. That's why the pathetic state of today's global leadership should concern us. There are many respected voices who are arguing that COVID-19 shows the end of multilateralism — it's the death of the UN and all that it stood for. Now, it will be unilateralism at its worst that will set the new world order.

Unilateralism has not helped us in planetary emergencies, and will also not help in future. Very much like COVID-19, climate change needs global leadership — if one country continues to emit, then all actions of the rest will be negated. But if we want all countries to act, then we must build a cooperative agreement, one in which the last person, the last country, has its right to development. We need glob-

al leadership in a globalised inter-dependent world. So, in the new normal of the post-COVID-19 world, we must remember this.

Locusts, pandemics, and leadership

All the crises we see before us today — from air pollution to climate change, from coronavirus to locust attacks — are about pollutants and viruses that know no boundaries. Worse, when you think of the prospects in the future, it is clear that countries will remain connected and live in air bubbles—closing boundaries to travellers other than "safe" countries — which would be difficult to sustain. Already, we have seen this in the United States, where gains made by states like New York in containing the virus were lost as the infection load jumped elsewhere. It's the same in India; it would be the same everywhere. Bubble-wrapping countries to fight the contagion will be, at best, a short-term solution. In the long-run, the world needs to come together to get rid of this virus, or at least contain it.

Similarly, India's locust problem is a direct result of climate change impacts, where weather has turned weird and extreme. The frequency and intensity of cyclones has intensified; rainfall has become variable; and, as a result, breeding grounds for this desert critter have expanded. It is fast turning into a Biblical-scale scourge. But here again, India can do little to control the problem on its own. The most fertile breeding grounds of locusts are in the Horn

of Africa, where governments struggle with lack of finances and equipment to control insect numbers. These will then fly with the changing wind patterns — literally — and make new homes in our world. We need regional cooperation—between countries of eastern Africa, Arabian Peninsula, Iran, Pakistan and India. We need global institutions with heft and credibility to drive this agenda—bring countries together and provide financial and technical assistance to contain the insect.

Here, I don't even need to explain the imperative of global action on climate change—it is a no-brainer. The atmosphere is one; emissions of greenhouse gases know no boundaries. I want to stress the need for global cooperation — and trust between nations. The agreement to act will be built on nations doing what is best in the common interest of the world. This only happens when they know that the agreement is equitable, fair and proportionate.

So, *trust* is crucial. Yet, this word is so passé that it is hard to even write about it. But trust is where effective action boils down to — people have to trust their governments and institutions and then take the harsh actions that are being mandated for say, control of COVID-19. Otherwise, it will not work.

We are at a crucial point in world history. The key global institution is UN that was set up after World War II. It then spawned many agencies and agreements. But over the years, it has made fatal mistakes—never standing up to power and death

by bureaucracy and money. Just think how UN Framework Convention on Climate Change has decided to postpone critical discussions on what is today's and tomorrow's most catastrophic global challenge till end of 2021. What an absolute abdication of its role and responsibility. We also have the powers in a dog-cat-fight for global domination—China versus the rest.

It is not about trade alone; it is also about the new global order (or disorder). Let's not beat about the bush on this. It is clear that China has made massive inroads into the world's economy—and this is across the poor and rich world. It has also no qualms about using fear and coercion as the means to achieving its ends. Already, we know with COVID-19, there is the growing view that effective control on the virus only comes with strong-arm tactics and not weak-kneed democracy.

The answer, I hope, will be clear: Fixing weaknesses in democracy is not about less, but more democracy. It means investing in the local on the one hand, and global community on the other. It is about that compact that will keep the world safe; but most importantly, will keep democracy and the rights of human beings and the environment at the centre of our universe. Nothing less should be acceptable. Not now. Not tomorrow.

Fear, time and mass deaths

The coronavirus has three official narratives—the medical and the governmental are presented emphatically, but the social is ignored

Shiv Visvanathan

The late professor, Ramchandra Gandhi, was one of India's most creative philosophers. I remember he could philosophise anything—from a text to a song to a landscape. He created a "thoughtscape" around each of them evoking a world of web and concepts. Even a child's crying was enough. He could celebrate the primordial, the original or the Neolithic inventiveness of a child's offering. One wishes that one had a philosopher like him to deliberate on coronavirus.

Ramu would have read the coronavirus as text, a performance with immense consequences at differ-

ent levels. He would take key concepts and triangulate connectivity. Imitating him I realised that three worlds as lifeworlds dominate the corona—fear, time and the body. He would say that if you go beyond the cacophony of lockdown and policing, go backstage, one would witness the epidemic as forming three ecologies, each creating a social world of its own.

Ramu would argue that to grasp the lockdown one has to abandon linear time. The linear time of the lockdown has destroyed timetables and what has unfolded is a sheer anarchy of time. The calendar of timetables has yielded to a time of hopeless waiting and unemployment; to obsolescence; and, to apocalyptic encounters. We move from a secular to a demonic world as we are confronted with mass deaths. Mass death, Ramu would have pointed out, cannot be dealt with in body counts. This reveals the society's inability to mourn collective death, and this has become stark for India. Further, in a sociological sense, the concept of life cycle gets abbreviated and distorted, as old age is marked off and equated with vulnerability, as a bundle of susceptible times. Old age loses; its organicity; and, has merged with the mechanical time of obsolescence. Society moves between erasure and obsolescence, unable to confront mass deaths. India neither a demonology nor a psychology for it.

A different set of problem, in time, appears at the level of individual since time is no longer controlled

as timetable—the worker confronts the emptiness of purposelessness. Waiting corrodes the person and has now become the art form of the vulnerable. Waiting is empty time pretending to be coated with hope. It is replete with emptiness, monotony, drudgery and repetition. In fact, the problem of time unsolved by the virus needs psychological attention. At a collective level, we face the hollowness of mass deaths as the modern Indian society has no myths for apocalyptic time or a phenomenological understanding of waiting hopelessness or boredom. Our society cannot plan in linear time and think of timetables as inevitable. We have to plan for a multiplicity of time if we are looking for meaning and sanity. The virus, in fact, becomes an invitation to think futuristically.

Along with the ecology of time, the virus has created an ecology of fear and anxieties—we confront fear as danger and even as everyday terror. But the everdayness of fear is not captured in corona narratives. A housewife's sense of fear and anxiety finds no recognition and consolation. A young woman told me, "I wish I knew a folktale, an Indian myth, which involves the virus". If the virus is one form of mystery, time unfolds as the other. Sadly, our everyday fears are so secularly empty. Boredom, drudgery monotony and repetition as fears of different kinds become an epidemic of imagination.

Sadly, neither spirituality nor professional psychology has much to offer. A psychoanalysis of

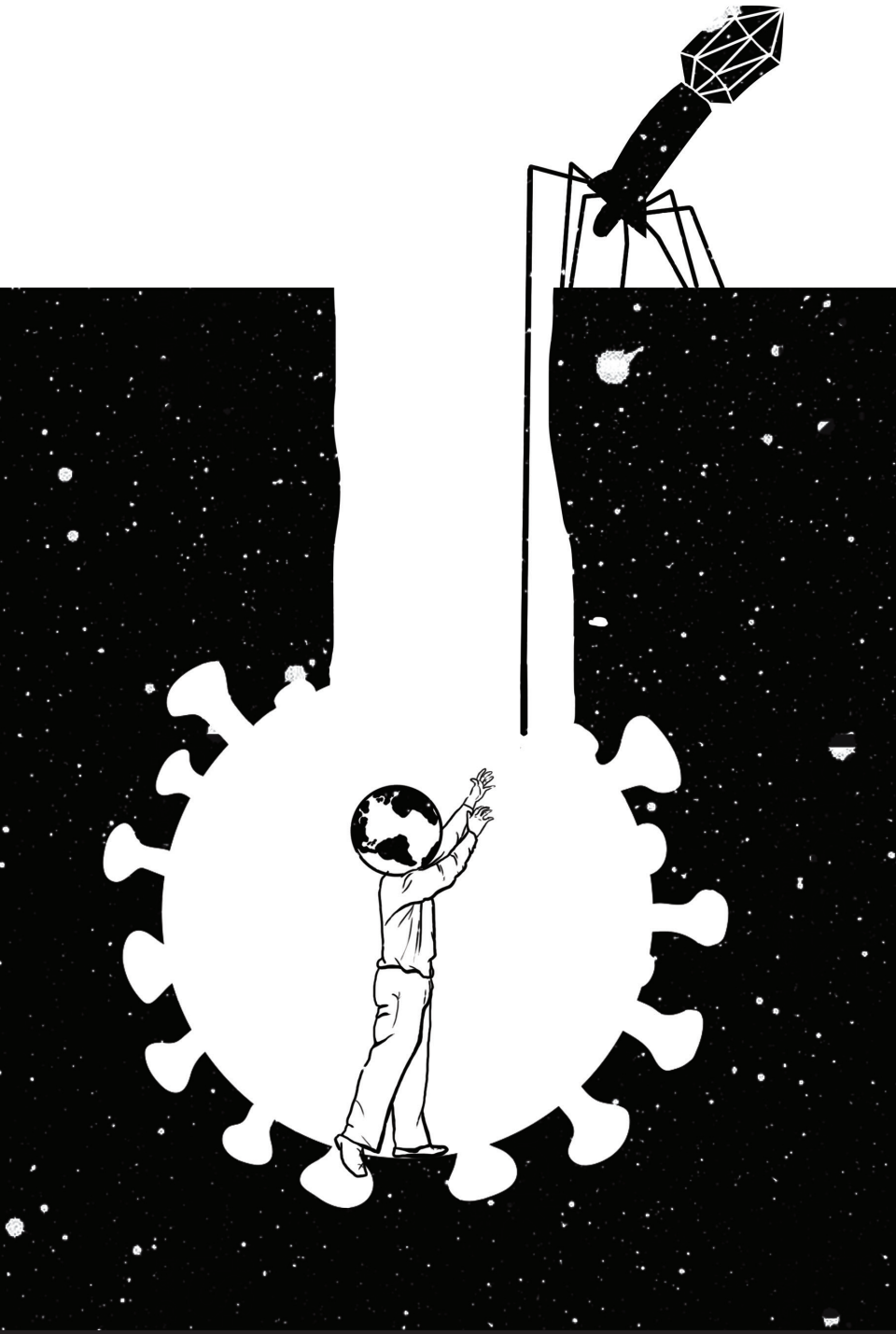
viral time is overdue. We need an anthropology of fear and danger in everyday sense. We are not even taught that fear and anxiety can be normal and need not be repressed. But often they become the silences of the epidemic. We create caricatures of epic heroism, but a housewife or a child combating fears has no place in our narrative. But there are other fears that are even more poignant—the trauma of a slum subject being harassed by the police is ignored. I remember a woman who told me that the police visited her home and interrogated her husband. "He was shocked and humiliated, he feels half a man." The virus amplifies the everyday terror of a slum.

Both fear and time eventually focus on the vulnerability of the body. People hear that a man coughing repeatedly was beaten by a panicky mob. The virus and the lockdown has brought the focus on the migrant. If the epic of Shaheen Bagh empha-

sises the plight of the refugee, the virus unravels the woes of the migrant. The migrant becomes the more liminal creature, underlining the ambiguities of citizenship. If a refugee is homeless away from home, the migrant is homeless in his own country, suspect and treated as deficit evil. The pictures of migrants being sprayed with chemicals in Bareilly show that they are barely seen as humans. Oddly in India, in a Kafkaesque sense, humanity begins with a clerical certificate. Without a ration card, the migrant faces hunger. Without transport, he cannot ascertain how his family is? If he protests such treatment, he is immediately treated as a law and order problem. The social distancing of the migrant is easy for the state as it has already mentally distanced him. A colleague of mine said, "We need a Shaheen Bagh for migrants as we understand so little of their plight."

The corona virus is seen as three official narratives. The medical and the governmental are presented emphatically, but the social is ignored. Sadly, it's the social as memory carries the longest marks of the virus. Beyond medical discourse and policy narratives, the corona demands a different kind of storytelling. John Keynes was wrong. His quotation that in the long run we are all dead is only literally true. It is in the short run that people die in droves, the survival lives into the long run, traumatised by fears few talk about. The violence untold remains a permanent blot on society.

(The author is a renowned sociologist)



The Pandemic

Unravelling of the crisis

Next big pandemics

Viruses

Human-animal-environment

Zoonotic pathogens

First six months

An invisible foe, a planet under lockdown, and …

Richard Mahapatra & Banjot Kaur

February 11, 2020. Certainly, it is not a red-letter day. This day the world named a disease caused by a novel Coronavirus: COVID-19. 'CO' stands for corona, 'VI' for virus, 'D' for disease and '19' for 2019. In a press conference, the World Health Organization (WHO) Director-General Tedros Adhanom Ghebreyesus said, "We had to find a name that did not refer to a particular geography, animal or even an individual." It was a month-and-a-half after the novel coronavirus – already termed as 2019-nCoV- started infecting humans in Wuhan, a city in China's Hubei province. Incidentally, it was December 31, 2019 when the first case of coronavirus was reported from Wuhan. Some even called it the "Wuhan

coronavirus" that point of time. The official nomenclature aimed at preventing incorrect projections and stigmatisation. It gives a standard format for future use in such outbreaks, Ghebreyesus said. "We will have outbreaks of coronavirus in the future too, and this sets a template to name them," WHO Chief Scientist Soumya Swaminathan said.

Within a few weeks, COVID-19 became shorthand for the deadliest pandemic in recent past. On March 11, WHO declared the outbreak of the novel coronavirus disease as a pandemic. And it was different, thus troubling. All four pandemics so far in history have been of the flu virus. This is the first pandemic of a coronavirus outbreak. This is also the fastest a disease outbreak became a pandemic: WHO made the declaration 71 days after the outbreak began. By this date, the global tally of cases had reached up to 124,968, spread across 122 countries. As many as 4,585 deaths had already taken place.

It is the globalised world's most localised emergency. An epidemic has become a pandemic faster in a globalised world, as we have experienced now. But the effort to contain it has to be ultra-local. It boils down to a physical distance of over 3 feet between two individuals just to stop it from spreading further. How a local health infrastructure mounts surveillance and testing in its neighbourhoods makes the difference as to how deadly this globalised scourge becomes. It is almost an intense personal fight to stop a fast globalising invisible virus.

At the epicentre, the Lunar New Year break in 2020 was uncomfortably long and quiet for almost 50 million people in China. Starting January 23, 2020 the authorities locked down some 13 cities, including Wuhan. Public transport and ride-hailing services were suspended in this city of 11 million people. Trains and flights from the city were stopped and people asked to leave their houses only for essential reasons like stocking up food. At places, the police employed drones to ensure that people stay indoors. Travel restrictions and quarantine measures left streets, parks and shopping centres deserted in a dozen other cities, including Chibi, Zhejiang, Huangshi, Xiantao, Enshi, Qianjiang and Xiannning. The country's largest metropolis, Shangahi, resembled a ghost city. As many criticised the government's draconian enforcement of epidemic control laws, the government said the measures were to contain the spread of the virus that posed a "grave threat" as there was no preventive vaccine or cure for it. These scenes to the world outside looked like the usual brutal ways of a one-party ruled country to deal with a health emergency. What China looked at this point of time was to be repeated in over 200 more countries later. But if only travel restrictions and lockdowns could stop this virus.

Towards the end of January, the School of Public Health at University of Hong Kong, published a paper in *The Lancet* which said infections mighty have spilled over to other cities even before the

lockdown happened and "the epidemics are already growing exponentially in multiple major cities of China with a lag time behind the Wuhan outbreak of about 1-2 weeks". "Travel restrictions and lockdowns often only delay transmission, not stop it. Transmission is occurring as expected for a respiratory disease that is contagious in very dense urban areas," said Nathan Grubaugh, a virologist at the Yale School of Public Health, USA. By the end of first week of February 10, COVID-19 had infected 42,638 people and killed 1,018 in 27 countries. Most of them were in China.

By the last week of March, 2020, the planet was locked in containment. Barring lifestyle diseases, no other disease or infection had ever caught the grip of the globe in contemporary time—176 countries, and over 2, 00,000 patients spread in every continent, except the Antarctica. Rich or poor, some 3 billion people were virtually in containment as 112 countries closed their borders. We were in the midst of what is called the containment stage in the global protocol to fight a pandemic. But the invisible foe—COVID-19—had already escaped from our radar. It was spreading faster than anyone had expected. Between February and March, 2020 cases outside China–the origin of the pandemic–had increased by 15-fold. Our helplessness to control this first non-flu pandemic of the 21st century resulted in panic and hysteria. Health experts were no more hopeful of containment because we still didn't know the real

number of cases from poor and developing countries that are ill-equipped to screen and count such cases.

We still don't know how and when it transferred into a human host from an animal. But we know for sure now that it is a prolific jumper from human to human. Taking a clue from the Spanish Flu pandemic of 1918, we, the social animals, have been prescribed with social distancing as the best way forward to delay transmission of COVID-19, not to stop it.

The spread

Coronavirus is not new to us, but COVID-19 is. It is the third new human coronavirus of the century. And its characteristics are not in line with this family of virus. Coronaviruses were supposed to have evolved in humans just to widen their spread, thus, not to kill but just to sicken us. But that is not happening. By this time, COVID-19 had already killed more than the earlier two such infections together—SARS and MERS. When it infects also, the symptoms are not according to observed patterns. They are mild enough not to be noticed and in many cases even absent after being diagnosed.

That was where the spread became unbridled: we didn't treat or contain those who didn't show symptoms. After the outbreak in China, the immediate screening and detection elsewhere were not adequate. In Africa, Chinese workers were allowed

immediately after the New Year holiday, and they were not screened. This also made all of us a potential carrier of the pandemic, and making it simply not containable. Marc Lipsitch, a professor of epidemiology with Harvard University, USA, said, "I think the likely outcome is that it will ultimately not be containable." After China's quarantining 100 million people in and around the epicentre, Hunan, COVID-19 spread to rest of the world much faster. On March 6, we had 100,000 cases which doubled by March 18. As screening and detection became aggressive across the world, new epicentres or secondary hotspots emerged in hydra-like splits, from Europe, West Asia and Southeast Asia, and to Africa.

This meant the world had to mount an even bigger and more expansive containment and surveillance to catch each suspect and then scan all those who were in touch with this individual. The virus emerged as the powerful demolisher of the globalised world, where we all thought the world was with us for everything. One after another, COVID-19 tested the crumbling health infrastructure in the developed world. Their weaknesses and failures got globalised as affected people took the virus to other countries.

Developing countries are dense in settlement and population. This makes containment and detection less effective. Thus allows transmission in multiple chains, almost like an uncontrolled atomic chain reaction. With over 8,788 deaths by March

20, the fear of fatality leaping seemed real now. T Jacob John, a paediatrician who has experience of more than 25 years in microbiology and virology, said, "As much as 60 per cent of the Indian population would be infected in a year's time. Because the infection would be seeded well. The reason why I put such a number is the fact that unlike mosquito or waterborne infections, this is a respiratory infection."

Many countries, and also many experts, hoped that it would become a general community infection, like any other cold and flu. It was argued that in such a scenario the community would develop immunity and thus developing the capacity to fight. But, it also meant that the fatality from COVID-19 would be in thousands till we reached this level of infection. "What is important is the timescale: whether it is in a matter of 6-9 months which will completely overwhelm many health systems, or over many years which will allow health systems to cope adequately," said TEO Yik-Ying, dean, Saw Swee Hock School of Public Health, National University of Singapore.

In Italy, the health system was overwhelmed—considered the second best in Europe—and reported more fatalities than China. Here, doctors applied judgement as to which patient they should to treat and which ones they should leave to die. Most COVID-19 patients were old, and needed intensive care. But there was no adequate health infrastruc-

ture or facilities. The country banned funerals to avoid gatherings, so military transport was arranged to ferry dead bodies. The whole country was under isolation at present. In USA, it was an emergency like never before. Its healthcare system had not been able to manage the deluge of patients. Though the Congress had passed the Families First Coronavirus Response Act to bear the testing costs for COVID-19, the treatment turned out to be prohibitively expensive—27 million Americans were without health insurance and an average treatment costs around $35,000 per patient (based on cases reported). The Kaiser Family Foundation estimated that even with insurance and in case of non-complicated cases, the treatment would cost around $9,763.

With over 200 cases of COVID-19 infections just before a national lockdown was imposed on March 25, India stared at an eruption of cases as screening and detection efforts picked up. The Indian Council of Medical Research said by mid-March, India was in the stage second of the pandemic: dealing with infection from people who travelled to countries with COVID-19 cases. The country checked out and quarantined those who came in contact with the infected. But transmission was believed to have become domestic and untraceable waiting to show up in big numbers in a few weeks, to be specific by mid-April. This was inevitable, but the ongoing efforts to contain the infection could delay it. India had already imposed a travel ban for foreigners.

Some 15 states enforced closure of public gatherings. Five Northeast states had sealed their borders.

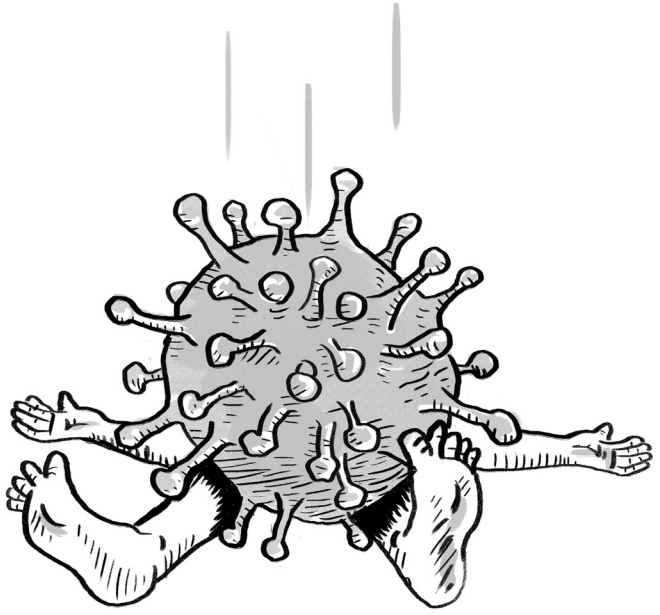
Anticipated, but not prepared

A global health security index did a country-wise assessment of pandemic preparedness and found that not a single country is prepared. Most countries lacked foundational health systems capacities vital for epidemic and pandemic responses. Of the seven categories, this was the lowest scoring category. The average score was 26.4 out of 100. About 131 countries, including several high-income countries, were in the bottom tier of this category. Only 11 per cent countries showed plans to dispense medical countermeasures during health emergencies.

The pandemic brutally shattered the belief that the private sector-led health services are efficient and responsive. At least, it makes the case for a more robust and public-funded response system when every country's infection is globally contagious. In the face of COVID-19, Italy—a high income country—looks as helpless as any poor country without any semblance of an organised public health system. In the 1990s, Italy privatised parts of its healthcare delivery system. A comparison of mortality rate before and after privatisation found public spending was significantly associated with reductions in avoidable mortality rates over time, while greater private sector spending was not at the regional level. The country has also the second highest average life

expectancy in Europe, reaching 79.4 years for men and 84.5 years for women (2011 data).

USA faced flak from its own experts for not testing adequately and for delaying testing for about two weeks. The country couldn't manufacture the test kits at the right time, thus delaying the most critical aspect of containing the virus spread. The White House, the Centres for Disease Control and Prevention and the Food and Drug Administration for long debated and discussed and delayed the kits' manufacture. There was scarcity of kits thus letting out many with the virus freely moving around and transmitting it to others. This explains why 38 per cent of the USA's COVID-19 patients were below 55



years of age, unlike elsewhere. It indicates undetected patients and unbridled transmission, a scenario now feared in developing countries.

In 2018, WHO released a list of 10 diseases that can cause epidemics and all were viral in nature. Besides the usual suspects such as zika, Ebola and SARS (triggered by a coronavirus), it also had a Disease X, to be caused by an unknown pathogen. There is now a growing consensus that COVID-19 is Disease X. "This outbreak (COVID-19) is rapidly becoming the first true pandemic challenge that fits the Disease X category," wrote Marion Koopmans, head, viroscience department, Erasmus University Medical Centre in The Netherlands in journal Cell. Peter Daszak, who was part of the who team that collated the 2018 list, wrote in the *New York Times* that they had postulated that Disease X would be a viral originating in animals and would emerge in a place where economic development drives people and wildlife together. The group predicted that the disease would be confused with other diseases during the initial stages and would spread quickly due to travel and trade.

Disease X would have a mortality rate higher than seasonal flu and would spread as easily as the flu. It would shake the financial markets even before it became pandemic. "In a nutshell, COVID-19 is Disease X," he wrote. This flies in the face of WHO's expectations that the next pandemic would be that of influenza.

The pandemic is a rude reminder of the fact that the world needs to better understand and manage epidemics. "Our understanding of infectious diseases has improved. But we don't fully understand all aspects regarding the emergence of epidemics," said Suresh V Kuchipudi, clinical professor and associate director, Animal Diagnostic Lab, Department of Veterinary and Biomedical Sciences, the Pennsylvania State University. He, however, highlights a similarity among the past few epidemics. "RNA viruses have caused all the recent major outbreaks, including COVID-19," he said. Due to their inherent nature to mutate and evolve, RNA viruses are more likely to cause future epidemics. WHO tracked 1,483 epidemic events in 172 countries between 2011 and 2018. Nearly 60 per cent of the recent epidemics were zoonotic, of which 72 per cent originated in wildlife. Besides COVID-19, who reported nine disease outbreaks in the first 79 days of 2020.

Climate change and environmental degradation are making matters worse as they help viruses to mutate faster, thus increasing the rate of spread. RNA viruses have mutation rates that are up to a million times higher than their hosts. These high rates are correlated with enhanced virulence and evolvability, traits considered beneficial for viruses, wrote Siobain Duffy, associate professor at the School of Environmental and Biological Sciences, Rutgers, The State University of New Jersey, in *PLoS*

Biology in 2018.

Viral diseases are difficult to control and the limited knowledge about them adds to the challenge. Despite decades of experience, scientists are not even close to finding an effective method to contain a viral outbreak. In fact, the currently used containment methods such as social isolation and closing down of schools were also used during the deadly Spanish flu in 1919-20. The methods did not work then, and they do not seem to be working now. Even the much promoted hand washing might not be as effective as is being expected. Researchers at the University of Hong Kong found that personal protective measures such as hand hygiene or face masks and environmental hygiene measures such as improved hygiene and environmental cleaning do not help reduce transmission of influenza.

Despite the mounting threat, there are no global comprehensive surveillance efforts that proactively monitor the emergence of potential pandemic viruses. In 2018, a project (Global Virome Project) was launched to develop a global atlas of most of the planet's naturally occurring potentially zoonotic viruses over the next 10 years. Scientists today know just over 260 viruses in humans, which cumulatively account for just 0.1 per cent of potential zoonoses. In other words, the world remains ignorant about 99.9 per cent of potential zoonotic viruses.

By April, the COVID-19 pandemic metamorphosed into everybody's crisis. The emergence of

Europe and USA as deadlier hotspots than China gave credence to the popular assumption that COVID-19 is an infliction brought on by the rich and well-endowed. By mid-April, it rampaged across the world disrupting the planet like never before. Over 1.73 million people had contracted the novel virus disease and more than 0.1 million had succumbed to it. Unlike the Spanish Flu pandemic which was spread by World War I soldiers, the current pandemic is being transmitted by ordinary citizens of a globalised world. This distinction makes COVID-19 extremely hazardous, both in terms of health and economic costs.

There were already indications that many hotspot countries would be peaking in the COVID-19 spread. But at the same time, many countries were just entering into the exponential spread phase. The other challenge was that pandemics often reoccur, like the Spanish Flu that struck three times between 1919 and 1920 and wiped out nearly 2 per cent of the world's population. It killed both the poor and the rich, including US President Donald Trump's grandfather. Mahatma Gandhi's experience with the flu epidemic is also narrated by Gopalkrishna Gandhi. He wrote: "Curious being the ways of Fate and curiouser still, always, in its ways with Gandhi, even as he recovered with agonizing slowness, his grandson, Shanti, Harilal's eldest son, and Harilal's wife, Gulab, or Chanchal as she was also known, fell mortally ill. And in their case there was no doubt

about the cause. Victims of the great influenza epidemic sweeping across the continent, they died in the last week of October, within days of one another in the village of Patharada in Gujarat where they had gone, in vain, alas, for 'health-change." We now know that COVID-19 will be no different and that the planet has entered into an extremely unpredictable disorder.

A Chinese cover-up

In April also came to focus the role of China and WHO in not being proactive with coming out with the infection. This became a point of contention between China and USA, whose president is known to blame the pandemic to the former. This was also to help President Donald Trump deflate attention from his own ineffective handling of the situation in USA.

Four months into the pandemic, there was little doubt that WHO blatantly soft-pedalled China's dubious role in covering up the debilitating spread of COVID-19. The only question that remained to be answered is: why? As WHO's image lay in tatters, its Director-General Tedros Adhanom Ghebreyesus, at an April-6 virtual press conference to mark 100 days of the pandemic, did the unthinkable to wriggle out of the mess. Ghebreyesus, an Ethiopian, charged that he has been the target of racial attacks for three months because he is black. He even claimed to have received death threats. All this was a prelude

to him refuting the much serious charge made by USA President Donald Trump that who has become "China centric". Tokyo, too, charged WHO with toeing the China line. Japan's Deputy Prime Minister Taro Aso went as far as to say that WHO should be renamed China Health Organization!

There are ample studies that indicate a definite cover-up by China. WHO not only kept itself blind to it but, in fact, showered praises on Beijing. "China is doing more than it is expected to do", "I am impressed with the knowledge of China's leadership on the subject", "China is protecting rest of the world," and "China deserves our gratitude"—these were the expressions Ghebreyesus used at his first media briefing after he returned from China. He never said a word about the cover-up.

WHO, which always praises health workers as "heroes", never mentioned Chinese whistle-blower Li Weliang. The doctor had warned of an unknown pneumonia-type disease much before China declared it to the world. Weliang was jailed for this. He was later released but developed COVID-19 symptoms and died. On January 23, 2020 WHO called a meeting to declare a global health emergency. But it did not declare it and waited for a week for Ghebreyesus to return from China. By this time, COVID-19 cases increased 10 times and the virus entered 18 countries. It even denied human-to-human transmission of the virus till mid-January. Studies now say such a spread started in December, 2019 itself. Till as late

as February, 2020 WHO kept rebuking nations for imposing travel and trade restrictions on China. When countries began evacuating their citizens from Wuhan, the COVID-19 epicentre, who said it did not favour this step. By now, the UN body was completely cornered as countries refused to listen to it. A desperate WHO said it would invoke International Health Regulations and demand explanation from the countries for ignoring it.

The road to declaring COVID-19 a pandemic was equally bumpy. WHO officials vehemently denied this till mid-February despite warnings from global health experts. But WHO kept deflecting the debate between "containment" and "mitigation". Containment means a phase when the virus can be contained or chain of transmission controlled. Mitigation is the stage when it is accepted that the virus can no longer be controlled and efforts should be made to mitigate its impact. WHO kept saying it was pointless to declare COVID-19 a pandemic since containment was possible. However, when it had to finally make that declaration, the UN body started advising nations not to go into the binary of containment and mitigation! It is widely speculated that who delayed the pandemic declaration under pressure from China.

Ghebreyesus obliquely criticised India for not taking adequate "social measures" before announcing a lockdown. All this while, WHO's South Asia officials were praising New Delhi's response to the

virus. Soon, the WHO chief, too, changed track and appreciated Prime Minister Narendra Modi for announcing the ₹ 1.74 lakh-crore bailout package for the poor. Incidentally, the package had been already announced when Ghebreyesus berated India.

WHO has also been fledgling on the issue of masks. For long, it said healthy persons did not need to wear masks. Hours before the US Centres for Disease Control and Prevention advised that everyone should wear masks, WHO said it would support countries' decision. But the next day, WHO issued a fresh guidelines reverting to its previous position. "We may commit mistakes. We are human beings, after all, and not angels," Ghebreyesus said on April 8 in his first admission of serious oversights in his response to the pandemic. "We will do an after-action review once the pandemic ends to learn lessons for future."

On May 18, 2020, 58 countries, including 27 members of the European Union, India, United Kingdom, Australia, Indonesia, Russia, New Zealand, Canada, South Korea and others presented in the 74th World Health Assembly a draft resolution demanding evaluation of WHO's in the COVID-19 pandemic. It demanded initiation "at the earliest appropriate moment to review experience gained and lessons learned from the WHO-coordinated international health response to COVID-19". These countries demanded a probe into "the actions of the WHO" and "their timelines pertaining to the

COVID-19 pandemic" as part of the overall evaluation exercise. The resolution said timelines were to be evaluated regarding "recommendations the WHO made to improve global pandemic prevention, preparedness, and response capacity." The resolution also said that the functioning of the International Health Regulation (IHR) must be reviewed. IHR is a set of obligations according to an international agreement between 196 member states and the body. According to IHR, they had agreed to work together for global health security. Through IHR, every member state is supposed to build capacities to detect, assess and report public health events in its respective jurisdiction.

Unlockdown

Amidst the political turmoil over China and WHO's roles in managing the pandemic, the world under containment wanted respite, as economic activities suffered leading to job loss and unheard of livelihood crises across the world. The world was at a crossroads. On the one hand the virus continued to appear in newer places, infecting thousands every day and forcing countries to extend their lockdown. But on the other hand, those already under COVID-19 lockdown for over six weeks in India were desperate to break free and resume economic activities at the earliest as millions had already lost livelihoods. And, as they were ready to be out of this unprecedented situation, the world witnessed

another challenge: a never-before-experienced exodus of people from economically active urban areas into their already distressed rural homes. They also carried back the threat of COVID-19 to areas that have so far remained untouched by the pandemic.

All top five countries in terms of infection and human mortality were on their way to loosen the lockdown. Starting from China—the origin—to USA to Germany, Italy and Spain, there were plans to allow normal human movement, though in a staggered way. USA—with the highest number of cases of COVID-19 at this point of time—had also announced exit plans for lockdowns in states. In Germany, the government formed a 26-member group of philosophers, scientists, historians, theologians and legal experts to start the process of lifting the lockdown. But it had been cautious to do so in one go. Rather, its strategy was to gauge the social and economic impacts of a prolonged lockdown and how communities would endure it. India allowed certain business activities with low-staff attendance and the Union government opened its offices. Inter-state migrant workers and students were allowed to move to their respective states.

Certainly, our endurance with the pandemic had taken a different curve. However, as governments discussed these exit plans sensing that the infection was finally peaking—as after the peak, the infection falls away—there were developments across the world that indicated how challenging the situation

would be post the lockdown.

There were protests against lockdowns, with a common demand: restore business to save lives. In India, stranded migrant workers in Gujarat and Maharashtra took to streets protesting non-availability of food and basic facilities and demanded return to their states. By this time, key states like Uttar Pradesh, Odisha, Rajasthan, Bihar and Jharkhand had put in place elaborate plans to not only bring the workers back but also to create quarantine facilities for them before they enter villages. Barring the ruling party, most other political parties supported lifting of the lockdown and allowing economic activities, though with restrictions necessary for curtailing the infection.

In USA, there were anti-lockdown protests across the states. Reportedly, these protests were encouraged by President Donald Trump, who had been staunchly against a nationwide lockdown. In the Polish-Germany border area of Saxony on April 29, commuter workers protested against the over six-week lockdown. It is estimated that some 10,000 Polish travel to neighbouring German towns every day for work but had been kept away from work due to the lockdown. "Let us work, let us home," read a protester's banner. South Africa reported food riots in West Cape areas and Johannesburg. Police had to fire at anti-lockdown protesters. Food stores were raided. In Malawi, the country's apex court struck down a nationwide lockdown as people protested

against it citing total collapse of livelihoods. This is the first African country where the judiciary intervened to lift a lockdown.

"We have to live with the virus." These words have somewhat become like an anthem in this time of despair. There had not been a day since March 8 till June 26, when the world, barring a few countries, had not reported record spike in COVID-19 cases. Yet, it became ingrained in our collective consciousness that we had to live with this novel coronavirus, like over a thousand other pathogens, including HIV, Ebola, cholera and rabies, that are now part of our ecosystem and keep cropping up from time to time. This mood of resigned acceptance also reflected in the strategies of political leadership across countries, including India. On May 8, while holding a press briefing, Lav Agarwal, India's official spokesperson on the COVID-19 crisis, said: "It is important that today when we are talking about relaxation, when we are talking about return of migrant workers, we have a great challenge and we need to understand that we have to learn to live with the virus." Earlier on May 4, as the Union government extended the nationwide lockdown, dubbed the biggest in world history, to 54 days, Chief Minister of Delhi Arvind Kejriwal also used "living with the virus" as a truism while urging the Union government for dilution of the lockdown rules.

Prime Minister Narendra Modi had set the tone for this in his address to the nation as early as on

April 14, at the culmination of lockdown 1.0, when he said that "*jaan* (life)" and "*jahaan* (economy and livelihood)" both were equally important. By the first week of May, the country was divided into three zones—red, orange and green on the basis of the number of COVID-19 cases—and certain economic activities were allowed depending on the colour code. Though the government had not introduced any codified lockdown exit plan yet, the focus fast shifted from managing the health emergency to reviving the economy.

How not to flatten the curve

In fact, this was a defining moment for the world. Several countries, despite being ravaged by the pandemic, were getting ready to take a leap of faith to return to normalcy—it's another matter that no one knew if the pre-December-2019-world-normalcy still existed! And they were doing so wielding the certificate of "flattened curve", a term that has not only become popular during the pandemic but has also assumed a positive connotation. In a pandemic, flattening the curve means reducing the number of new cases from one day to the next and then stabilising it before it becomes zero. So, since COVID-19 cases started appearing outside China, governments directed their efforts towards achieving this magical phase. Some efforts included imposing strict curbs on mobility through weeks of lockdowns, aggressive containment and quarantine strategies offer-

ing near-imprisonment experience, enforcement of social distancing up to the level of personal habits and aggressive screening regime. So, did these help achieve the objective?

China and South Korea were able to flatten the curve of new infections by May. Several European countries claimed to have achieved it, implying that cases were on the sliding path now. Germany began levelling its curve about six weeks into the outbreak, while France started seeing results in seven weeks. In Italy, the curve didn't flatten yet but there was a slowdown in new cases. However, in the UK, experts didn't foresee it in the near future as cases continued to rise. The UK's initial response to COVID-19 was marked by a series of missteps. The government pursued a controversial "herd immunity" strategy before finally ordering an Italy-style lockdown to regain control over the virus's transmission. In USA, even though New York, the epicentre of coronavirus in the country, had not convincingly proclaimed this status, President Trump on May 6 declared that the country had flattened the curve and was now in the next stage of the battle, which was a "very safe phased and gradual reopening".

In India, as lockdown 3.0 began on May 4, Agarwal, also the joint secretary at the Union Ministry of Health and Family Welfare, said: "The COVID-19 curve in India is relatively flat as of now and if work is done collectively, the peak may never come." That day India recorded the highest spike

of 3,900 new cases and 200 COVID-19 deaths. It, in fact, broke the previous record spike of 2,293 new cases, documented just two days ago. On March 24, the day the nationwide lockdown was announced, India had only 571 cases. By May 13, the country had 78,003 cases, or 136 times hike in cases. Government officials, however, claimed that significant achievements had been made. One of the most significant gains, they said, was cutting the chain of transmission by achieving a long doubling rate—this rate denotes the number of days in which cases double, indicating a slow spread of infection. On the face of it, this was a prologue to the still elusive objective of "flattened curve". Agarwal, who held daily pressers, had claimed several times in April that doubling rate, which was three days when lockdown began, had increased beyond 12 days; on May 10, he lowered the figure to 10.

But several experts didn't think that it was a valid indicator. "You have to look at the baseline figure," said T Sundararaman, former head of the Union health ministry's National Health Systems Resource Centre. Cases, when in hundreds, would take fewer days to double as compared to cases that are in thousands. Now, saying that the 45,000 cases had taken more than three days to reach the 90,000-mark and calling it an achievement was nothing but a farce, he said, adding that counting the number of days it took for every 5,000 or 6,000 new cases to appear would offer a more realistic scenario.

Using 5,000 new cases as the base, *Down To Earth* did an analysis to understand how the pandemic had progressed in the country and found that 5,000 new cases were being reported every two days since April 30 till mid-May. This indicated that the spread was far from slowing down.

Another tool that epidemiologists often employ for assessing progression of a pandemic involves comparing three-day rolling average, or the average number of new cases reported every three days. Worldometer, a private COVID-19 tracker, showed that the three-day average was 76 for India at the beginning of the lockdown; as on May 5, it was 3,060. Worse, when compared with 10 countries that ranked just above India in terms of higher COVID-19 cases that day, all of them had fewer three-day averages, with the exception of Brazil and Russia. T Jacob John, senior clinical virologist and emeritus professor at Christian Medical College, Vellore, explained: "There were 571 total COVID-19 cases in the country when the lockdown was announced. Forty days later, on May 5, the number of cases increased by 80 times to 45,000. If the government says the situation is better compared to its fear of a 200-time rise, then this is a manufactured good news." India incidentally remained the only country, as per daily situation updates given by WHO, which didn't report community transmission despite more than 60,000 cases. All countries that had reached this threshold or had fewer cases accepted that the

infection was spreading in new communities with no clear source of origin.

The fact is the pandemic is yet to reach its peak in India. A group of researchers who studied the landscape of the epidemic in India, write in medRxiv, a preprint server for research papers, that the country's COVID-19 curve is likely to peak around mid-July and early August. India, thus, still has around two months to prepare for its worst phase. It must not let its guard down in the rush to return to normalcy.

"More than six months into this pandemic, this is not the time for any country to take its foot off the pedal." When Tedros Adhanom made this statement in his media briefing on June 8, he indicated two worrying developments in the six months of COVID-19's unabated spread and human toll. First, notwithstanding the claim that many countries were finally flattening the COVID-19 curve, on the day of Tedros' press briefing, global cases reached 7 million with a death toll of over 0.4 million. Second, more worryingly, for nine consecutive days before Tedros made the statement, the world reported more than 100,000 new cases each day; the highest was on June 7—136,000. Both developments revealed the uncertainty the world had been pushed into by the pandemic. Though the geography of the spread had not changed much, but the explosion of new cases and the degree of infection had certainly brought the focus on Africa and South Asia—India being a curious case of reporting a fast increase in spread

despite having undergone the world's longest national lockdown. In Africa, many new countries reported COVID-19 cases, even though in small numbers.

The crisis was unfolding, stretching the world's capacity to fight it. Tedros, while admitting that the pandemic was worsening, said that in countries (where the spread had slowed down), the biggest threat now was complacency. Studies—to investigate how many of a country's population had been exposed to the virus—show that most people globally are still susceptible to infection.

On June 9, India's capital, Delhi, offered a peek into the near-future scenario of the pandemic. The source of infection for more than half of the cases couldn't be traced, said Delhi's health minister, Satyendar Jain. Then he almost raised an alarm when he said that even though the capital qualified to be a case of community transmission, the Union government was refusing to admit this. This inferred that the national capital was about to witness an exponential growth in spread. Adding to this fear, the Delhi government said that there would be over half-a-million case by July-end in the city-state—from the 31,000-mark on June 10.

On June 8, India lifted the lockdown with a few restrictions. On June 12, India became the fourth worst-hit nation in the world with covid-19 cases. The fear that opening up the economy would make the spread unbridled was still hanging heavy over a billion-plus population.

The chill factor

With the rate of spread increasing, other scary signs were emerging each day. For example, wastewater samples collected from Ahmedabad, capital of one of the worst-affected states in the country, Gujarat, were "found with a marked difference in the SARS-CoV-2 gene loading between the days the samples were collected". Manish Kumar, a scientist with the faculty of earth sciences, Indian Institute of Technology in Gujarat's Gandhinagar conducted the study, in association with the Gujarat Biotechnology Research Centre and the Gujarat Pollution Control Board. Wastewater samples collected from Ahmedabad's civil hospital—a major medical facility treating covid-19 patients—on May 8 and May 27, formed the basis of Kumar's research. The surveillance of wastewater through wastewater-based epidemiology (WBE) helped reveal the spread of the novel SARS-CoV-2 virus that causes the COVID-19 disease. Kumar said that it is not about detection of live SARS-CoV-2 samples in wastewater. It was, instead, about detecting genetic material (ribonucleic acid) through Real-Time Quantitative Polymerisation Chain Reaction (RTQPCR) followed by gene sequencing and matching with a library of Coronaviruses. "We can extrapolate the results of this genetic material estimation to assign it with a probable number of people infected in a given locality or community," says Kumar. This is the first

time an Indian scientist has made a claim like this. Earlier reports of this finding had emerged from different parts of the world during the beginning of the pandemic.

In April 2020, the city water authority in Paris claimed minuscule traces of the SARS-CoV-2 virus were found in non-potable water supply. During the same time, Biobot Analytics, a biotech start-up, along with a team from the Massachusetts Institute of Technology (MIT) and the Brigham and Women's Hospital estimated that at least 440 people were likely to be infected with COVID-19 in areas around the treatment facility, much higher than the reported cases. SARS-CoV-2 may be present in the water cycle, making the poor and the marginalised more prone to health risks, said an editorial published in Environmental Science: Water Research and Technology on April 2, 2020. Kumar says reports of the presence of molecular SARS-CoV-2 have emerged from countries struggling to curb the pandemic. Questions now raised over whether the pandemic can spread through wastewater. Till date, there is no concrete evidence to prove this. And India is well into its monsoon season, usually considered to be a season of diseases mostly related to water and sanitation.

There was another untold impact of the pandemic: as a country's medical systems were overstretched in fighting the pandemic, other killer diseases were not being treated resulting in human casualties.

According to a survey carried out in 155 countries in May by WHO: "Prevention and treatment services for non-communicable diseases (NCDs) have been severely disrupted since the COVID-19 pandemic began". NCDs kill 41 million people each year, equivalent to 71 per cent of all deaths globally. The survey also found that, for instance, 53 per cent of the countries surveyed had partially or completely disrupted services for hypertension treatment. Similarly, about 49 per cent countries reported disruption in treatment for diabetes and diabetes-related complications. Some 94 per cent of the countries said their health ministry personnel working on NCDs had been diverted to COVID-19 duties. According to GAVI, the vaccine alliance, some 13.5 million people might have missed out on vaccinations due to the postponement of campaigns and interruptions in routine vaccinations. "It will be some time before we know the full extent of the impact of disruptions to health care during COVID-19 on people with NCDs," said Bente Mikkelsen, director of the department of NCDs at WHO. After half-a-year since the pandemic was confirmed, we were still awaiting the grim news of its impacts and its ripple effects. Time, in this case, is not a healer, but a reminder of the deathly future that lies ahead.

In these six months, almost all impacts of COVID-19 have been assessed, but the question that still remained unanswered is: when will the pandemic end? In a pandemic, this is a question of utmost

desperation, but we cannot put an end date to it. The world raised this question in early March with a certainty that the modern world would tackle the pandemic effectively and unlike in the past, curtailment would be faster. But the situation didn't support this. As dozens of simulated situations, plotted in graphs, made the rounds with the forecast of the next five to seven months as the probable end of the pandemic, the world asked yet another question: is it containable? This was a question that reflected people's surrender and acceptance to the invisible virus that had been living up to its genetic trait: to colonise human hosts as fast as possible and thrive. For the virus, the prevalent situation turned out to be favourable since it jumped into the human host somewhere in December last year. More and more countries were in phases of unlockdown, thus breaking the barriers of physical distances much needed to stop the spread.

On June 22, a study by Indian Institute of Technology (IIT)-Kharagpur said the pandemic would not end before October 2020 in India. For a country that had been reporting increasing number of infections every day and becoming the fourth most impacted country in the world, this was bad news. There would be more than 700,000 COVID-19 cases when the disease outbreak would near its end in the country, according to projections from a logistical model deployed for the study by Abhijit Das, a computer science and

engineering faculty at IIT-Kharagpur. The calculation, keeping the seven-day rolling average of cases, said Maharashtra—the state affected the most by COVID-19—was expected to have its peak in June. The expected number of cases in the state would be more than 160,000 till the pandemic ends, the study said. Delhi would overtake Maharashtra and cross 250,000 cases, with the pandemic expected to end in the state by November. For Tamil Nadu, the end might come by October with nearly 130,000 cases. Uttar Pradesh, which currently had nearly 16,000 cases, was expected to proceed towards the end by November with more than 40,000 cases. Madhya Pradesh and West Bengal might see the end of the pandemic in September and October, with more than 13,000 and 30,000 cases respectively.

Elsewhere, countries were already talking about or confirming a second wave of the pandemic, extending the period of the crisis. South Korea officially declared on June 22 that it was witnessing a "second wave" of the pandemic. Its capital Seoul reported fresh cases. Before making this declaration, Korea Centers for Disease Control and Prevention (KCDC) made the claim that the country's first wave, in fact, never ended. The uncertainty of forecasting an end to the pandemic or even declaring an end of the infection in immediate terms turned out to be true. South Korea earlier claimed it predicted the second wave only in fall or winter. This meant the second wave happened much earlier. Jeong Eun-

kyeong, director of KCDC, was quoted in media: "Our forecast turned out to be wrong. As long as people have close contact with others, we believe that infections will continue."

Pandemics are known to come in waves, often each wave with its own level of severity not comparable to earlier one. In the last week of May, WHO warned that the countries reporting declining rate of infection—a situation of flattening the curve of infection rate—could experience resurgence or officially termed as "immediate second peak" if they opened up or diluted lockdown-like measures. Mike Ryan, head of emergencies in WHO, said, "When we speak about a second wave, classically what we often mean is there will be a first wave of the disease by itself, and then it recurs months later. But we need to be cognizant of the fact that the disease can jump up at any time." South Korea is a case for instance, even though it hit the situation faster. In May, Ryan famously predicted that the pandemic would come back to countries towards the end of this year where cases or the first wave has ended. "There was also a chance that infection rates could rise again more quickly if measures to halt the first wave were lifted too soon," he said.

For the over 200 countries with covid-19 infection, and in various stages, it is emerging as a major focus area to ascertain whether there would be an end to the pandemic or the virus would just be around keeping the infection cycle intact. On

March 17 in an article on Down To Earth website, Marc Lipsitch, a professor of epidemiology with the Harvard University, stated: "I think the likely outcome is that it will ultimately not be containable." We tend to believe so. When asked by Time magazine, Bruce Aylward, a senior adviser to the director-general of WHO and a reputed epidemiologist, whether the virus would vanish from the Earth, his answer is something that currently the world must take note of. "What it looks like is that we're going to have a substantial wave of this disease right through basically the globe unless something very different happens in the southern hemisphere. And the question then is: What's going to happen? Is this going to disappear completely? Are we going to get into a period of cyclical waves? Or are we going to end up with low level endemic disease that we have to deal with? Most people believe that that first scenario where this might disappear completely is very, very unlikely, it just transmits too easily in the human population, so more likely waves or low level disease."

Ryan also implied that we have to live with the virus, with its episodic attacks, even though its future fatality rate is yet to be ascertained. "It is important to put this on the table: this virus may become just another endemic virus in our communities, and this virus may never go away," he said. We have an experience like this—HIV is also a pandemic and we continue to live with it. A new way of living with the

virus has evolved and, over time, its spread has also been controlled. There is almost an acceptance that the world goes through seasons of flu and cold, most of them are infections that erupted as epidemics in different points of time but gradually became seasonal. Are we going to experience the same? If we believe epidemiologists, we would have soon a regular COVID-19 season, and we will have to pay heavily in terms of human costs.

The next big pandemic is just around

A COVID-19-type pandemic had long been predicted, but scientists' warnings weren't heeded

David Murdoch

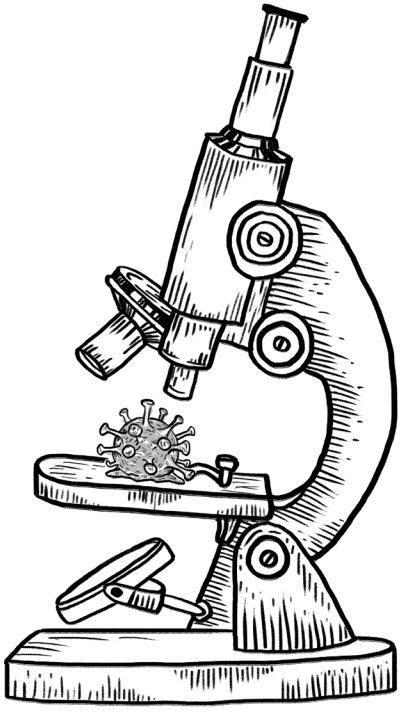
COVID-19 is being referred to as a "once in a century event" — but the next pandemic is likely to hit sooner than you think. In the next few decades, we will likely see other pandemics. We can predict that with reasonable confidence because of the recent increased frequency of major epidemics (such as SARS and Ebola), and because of social and environmental changes driven by humans that may have contributed to COVID-19's emergence.

A COVID-19-type pandemic had long been predicted, but scientists' warnings weren't heeded.

Right now, while we have the full attention of politicians and other key decision-makers, we need to start rethinking our approaches to future preparedness internationally and within our own nations. That includes countries like New Zealand, where — despite getting its active COVID-19 cases down to zero in June 2020 — big challenges remain. We can't say we weren't warned. Less than five years ago, I was one of about 100 global experts invited to a WHO meeting in Geneva, prompted by the then ongoing Ebola outbreak in West Africa. Then, as now, WHO was criticised for its response to the outbreak. The December 2015 meeting was meant to improve international collaboration and preparation for future epidemics and other infectious disease risks.

The very last presentation was from David Nabarro, then the United Nations Special Envoy on Ebola (and now a Special Envoy on COVID-19). In the wake of the Ebola outbreak, politicians were more focused on public health than ever before. Nabarro urged us to show greater leadership and capture that interest, before political and public attention moved on. He stressed the importance of trust, respect, transparent communication, and working with nature.

Yet five years later, we're still talking about inadequate funding for pandemic preparedness; delays in adopting preventive measures; failure to develop surge capacity in health systems, laboratories and supply chain logistics; and reduced infectious dis-



ease expertise. But there are signs that some lessons may have been learned. For example, countries most affected by SARS (such as Taiwan and Singapore) have tended to respond more quickly and decisively to COVID-19 than other countries.

Primed and ready, vaccine developers have progressed at enormous pace, with several COVID-19 vaccine candidates already undergoing clinical trials. The volume and pace of sharing scientific information about COVID-19 has been unprecedented. We've also seen a number of rapid reports urging

us to learn from these pandemic and past epidemics to protect us from future events—especially by taking an holistic "One Health" approach. This brings together expertise across human health, animal health and the environment.

For instance, in May 2020, the Lancet One Health Commission called for more trans-disciplinary collaboration to solve complex health challenges. Similarly, the World Wide Fund for Nature's March 2020 report on The Loss of Nature and Rise of Pandemics highlighted the likely animal origin of COVID-19, and how intimately connected the health of humans is to animal and environmental health.

As well as working more effectively together internationally, each country will need its own strategy. So what should we be doing to protect New Zealand from future infectious diseases threats? Our health system has, for the most part, responded well to COVID-19. Our research institutions and universities have engaged quickly and effectively to provide scientific support for the public health response. Yet we can and must still do better. Our expertise and systems are not always well joined up–vital for coordinated and timely responses to challenges like COVID-19.

We allow scientists to work in silos, despite obvious overlapping interests and skill sets. Of particular importance for tackling infectious diseases is the need to break down artificial barriers between human, animal and environmental health. This

approach makes particular sense in New Zealand. We are an island nation vulnerable to introduced infectious diseases, and economically dependent on agriculture and the physical environment. But we're also home to an existing indigenous Māori worldview and knowledge system that emphasises interconnectivity between humans, animals and the environment. University-led efforts, such as One Health Aotearoa, have brought together professionals and researchers from different disciplines. But more investment is needed to get even better value from such collaborations.

We need to strengthen capability in such areas as epidemiology, modelling and outbreak management, and build pandemic plans that are flexible enough to respond to all eventualities. New Zealand has a Centre of Research Excellence in plant biosecurity – but not in animal biosecurity or infectious diseases. We also need to better integrate science and research into the health system, a key feature of the New Zealand Health Research Strategy 2017-2027. This requires a culture change so research is regarded as business as usual for district health boards, providing the science needed to inform policy, preparedness and best practice.

Crucially, we need a new generation of scientists and professionals who are systems thinkers and comfortable working with multiple disciplines and across the human-animal-environment interface. And we need the kind of leadership Nabarro called

for: science-informed and forward-looking, rather than reactive. We have seen good leadership based on science in the highest levels of New Zealand's government in response to COVID-19 We now need to see these at all levels of health, research and politics to get us out of this pandemic in the best shape possible – and be better prepared for our next pandemic.

(The author is Dean and Head of Campus, University of Otago)

Bats spread viruses, so do humans

Pathogens that trigger infectious zoonotic diseases are fast learning how to expand their realm

Ishan Kukreti

If viruses were capable of emotion, they would commemorate the day WHO declared COVID-19 a pandemic and celebrated each time a country announced a lockdown to contain the spread of the respiratory illness. For what SARS-CoV-2, or severe acute respiratory syndrome coronavirus 2, has achieved is no mean feat for its family.

Yes, there exist hundreds of Coronaviruses out there. Till the early 21st century, they were mostly known to circulate among pigs, camels, bats and cats and caused mild forms of common cold in humans.

They caught the attention of virologists in 2002, when one member jumped from a horseshoe bat to a human, possibly via a civet cat, and went on to cause severe acute respiratory syndrome (SARS) among 8,500 people and killed 900.

Just like COVID-19, symptoms include fever, sore throat, shortness of breath and pneumonia. A decade later, another coronavirus, believed to have originated from bats but transmitted to humans via camels, caused a similar outbreak in Saudi Arabia. It was named the Middle East Respiratory Syndrome (MERS). Despite high fatality rates—9.5 per cent in case the of SARS and 34 per cent for MERS— none of these Coronaviruses managed to cause large-scale outbreaks. While SARS-COV appears to have disappeared in 2004, MERS-COV causes limited outbreaks. Now, call it a third time lucky or the outcome of an evolutionary strategy, SARS-COV-2, despite a low fatality rate of 2-5 per cent, has emerged as the most devastating pandemic since the 1918 Spanish flu.

The success of SARS-COV is no mean achievement, when compared with other thousands of pathogens that naturally get transmitted between animals and humans but more often than not fail to establish a disease in human populations, let alone cause epidemics. Most of these zoonotic pathogens, be it a virus, bacterium, fungus or parasites (protozoa and helminths), are believed to be host-specific. This means they usually restrict themselves to a limited number of species, such as bats, pigs, rats

and chimpanzees, and prefer residing in them by creating a life cycle reservoir. This trait of pathogens is due to species barriers.

Along with the human body's resilience system against diseases, species barriers help us most of the times lead a life free from infections, despite the fact that we live in a pathogen-filled world. Crossing it is not easy as these barriers are determined by the level of human exposure to pathogens—directly through faeces or body fluids like saliva, blood and urine, of an infected animal, or indirectly through areas where they live and roam, or contaminated surfaces—and the ability of pathogens to infect a human and cope with the new host's immune response. It thus requires the pathogen to undergo specific changes through mutation or genetic exchanges with the host.

However, these mutations are not always successful. Thus, a vast majority of animal-to-human spillover most likely results in a dead-end for the virus (and other pathogens), said Abi Tamim Vanak, a disease ecologist at the Ashoka Trust with the Research in Ecology and the Environment (ATREE), a Bengaluru-based non-profit. This means the pathogen does not get transmitted beyond the infected person, he adds.

There have been instances when the pathogen has managed to hop on to humans, but did not cause mortality or morbidity. Early this year, researchers in the Brazilian states of Tocantins and Amapa identi-

fied one Ambidensovirus in patients with symptoms similar to dengue or Zika. "Viral species in this genus have been described only in insects, shellfish and other invertebrates; never in mammals," the researchers wrote in the March issue of journal *PLoS One*. They are, however, not sure if Ambidensovirus is responsible for the patients' morbidity.

These pathogens have managed to cross species barriers and establish diseases in human population. However, most of these pathogens maintain their life cycle reservoir in an animal and infect humans when they get a chance. For instance, avian influenza virus (H5N1) caused the bird flu outbreaks in humans when people came in direct contact with infected poultry or surfaces and objects contaminated by droppings or during slaughter, de-feathering and butchering.

While WHO maintains that the virus does not transmit efficiently from person-to-person, experts worry. "Animal-human interfaces where humans frequently get in contact with wild animals allow viruses to evolve and jump into humans leading to the emergence of a new virus," said Pranav Pandit, a veterinary epidemiologist at the University of California, USA. H5N1 is considered endemic in poultry in six countries and at least 15 countries have reported human infections since 2003. It might not be long before the virus mutates to establish a life cycle reservoir in humans and spreads from person to person, infecting even those who have never come in contact with poultry.

That would result in a catastrophe as H5N1 can kill 60 per cent of those infected.

Most human pathogens that have caused epidemics like measles, smallpox, tuberculosis, flu and whooping cough have actually had a low-key beginning like H5N1. Initially, they stayed relatively contained by restricting their jumps to humans from animal hosts like cattle, pigs, ducks and dogs. Their virulence increased as they eventually created a life cycle reservoir in humans.

Faster, wider

What's worrying is that more and more zoonotic pathogens are now establishing themselves in human populations. In the past 30 years, they have been responsible for 75 per cent of the 177 emerging or re-emerging infections that the world is now grappling with. In fact, of the 23 infectious diseases that WHO lists as "epidemic and pandemic-prone", as many as 17 are capable of human-to-human transfer; no treatment or vaccine is available for nine of these diseases.

HIV1, which is responsible for a majority of HIV infections worldwide, is one such virus. It made the jump from African primates to humans as a result of bushmeat eating in the 1970s. Subsequently, it has established a life cycle reservoir in humans. The Ebola virus, which causes a severe haemorrhagic fever with a fatality rate of up to 90 per cent, however, shows what a virus is capable of to ensure

its transmission. Since its first detection in 1976 in Sudan and the Democratic Republic of Congo, the virus has managed to cause outbreaks without establishing a natural reservoir in humans. It has rather mutated to develop the ability to transmit from human-to-human. This newfound ability of Ebola came to light during the 2013 outbreak when it spilled over, possibly from a bat to a 18-month-old boy in Guinea. Within months, it became a global epidemic.

But the ongoing pandemic by SARS-COV-2 shows how zoonotic pathogens are constantly honing their genome to expand their realm. A study published in *Antiviral Research* in April, 2020 throws some light on this. Despite a genome sequence highly similar to that of other sars-like Coronaviruses, SARS-COV-2 differs from sars-cov in its interaction with Ace2 (angiotensin-converting enzyme 2), a crucial enzyme that remains attached to the outer surface of human cells in the lungs, arteries, heart, kidney and intestines. Both SARS-COV and SARS-COV-2 use these cells as receptors to infect humans. As per the study, somewhere in its journey from a bat to a pangolin or a snake and finally to humans—the pathway still remains shrouded in mystery— the SARS-COV-2 went through mutations which has enabled it to bind with Ace2 more efficiently, making it more successful to infect a person and ensure human-to human transmission, despite a low reproduction rate of 2 and fatality of 2-5 per cent.

By comparison, SARS-COV had a reproduction rate of 2.8 and fatality rate of 9.5 per cent. In many ways, these mutations are the reason SARS-COV-2 has had a death toll of over 265,000 in just five months till the first week of May compared to its older cousin that killed 914 over two years.

Emergence of such robust and intelligent pathogens is worrying for another reason. This global coup is largely led by viruses, particularly RNA viruses that can exploit all known mechanisms of genetic variation to cause epidemic spread.

This is probably because this sub-microscopic particle, made either of RNA or DNA as its genetic material, can replicate or produce multiple copies of itself only when inside a living host cell. Most of the jumps to humans are, however, made by RNA viruses that account for some 37 per cent of emerging infectious diseases, said a study, published in *ILAR Journal* in 2017. In fact, some of the biggest zoonoses like chikungunya, dengue, Zika, avian influenza, Lassa fever, Ebolavirus, MERS and SARS are all caused by RNA viruses.

These RNA viruses are considered recent evolutionary origins. Their mutation rate can be 100,000 times higher than DNA viruses. "RNA viruses show remarkable ability to adapt to new environments and confront different selective pressures they encounter. This not only include the host's immune system and defense mechanisms, but also the current artificial challenges devised by the biomedical

community," noted the *ILAR Journal* study. This high rate of mutation of a RNA virus is because of the way it replicates. In DNA viruses, several proteins correct themselves if there is any faulty genome replication. But RNA viruses replicate without this proofreading process and this increases their mutation rates. But this has a downside too: any undesirable mutation can negatively impact the fitness of the virus.

Among the RNA virus group, Coronaviruses have been found to have overcome this trade off between mutation rate and incorrect replication. A study published in *PLoS Pathogens* in May 2010 says SARS-COV had mutated to produce an enzyme that diminishes the number of mutations. "The viruses might switch the proofreading mechanisms on or off depending on the context, allowing them to rapidly adapt to new environments without losing replicative fidelity," the study said.

It's also about how we transgress into the habitat of wild species or "manufacture" food from domesticated animals. For instance, villages in the eastern foothills of the Western Ghats in India regularly experience outbreaks of the Kyasanur forest disease (KFD), a viral haemorrhagic fever similar to Ebola and dengue that is spread by ticks (*Hemaphysalis spinigera*) living on monkeys. Here, people mostly depend on forests for a living. SARS and COVID-19 outbreaks have also been linked to exposure to the viruses in Chinese wet markets. Interconnectedness of the world has only made the spread massive and

instantaneous.

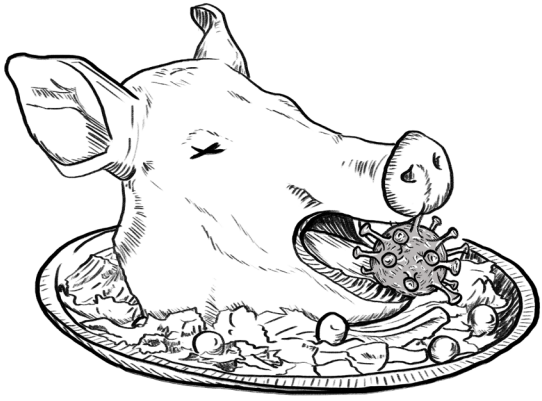
It's not just the interface with wildlife, livestock also plays a role. In the case of Spanish flu, it is widely held that the avian influenza virus jumped from a pig on a military farm in Kansas, USA, to the first known human case. Though there are other theories about where the "jump" took place, from Europe to China, what's clear is that the virus mutated from animals and was taken across the world by the movement of soldiers during the World War I. Ultimately, the Spanish flu killed more people than the war.

So, it is a combination of factors— movement of people, living conditions, population density and, of course, eating habits—that makes the virus more deadly in its new host. Ebola, for instance, was not new to parts of Africa even though outbreaks were reported way back in 1976. What changed between then and the outbreaks of 2013-14 was the demography in the affected countries, says Sanath Muliya, a scientist with the Wildlife Institute of India, Dehradun, Uttarakhand. Between the 1960s and early 2010s, population density increased by 223 per cent in Guinea, 178 per cent in Sierra Leone and by 275 per cent in Liberia, particularly in the urban parts that experienced high rural-to-urban migration. All major outbreaks occurred in such urbanised set-ups with high human densities, says Muliya.

A similar development in Indonesia in 1998-1999 led to the first outbreak of the Nipah virus infection, but in neighbouring Malaysia. The virus is naturally

harboured by pteropid fruit bats. But in the months before the outbreak, large-scale deforestation was going on in Indonesia for pulpwood. Palm oil industries had also prompted slash-and-burn of forests for setting up industrial plantations. While deforestation destroyed the bat's habitat, the haze reduced flowering and fruiting of forest trees. Reduced rainfall caused by the severe 1997-1998 El Niño conditions exacerbated the situation, resulting in mass migration of pteropid bats to Malaysia, which was experiencing an upsurge of large-scale piggeries with fruit orchards on their edges. A combination of factors led to the spillover of a novel virus from the bat to the domestic pig and then to pig farmers.

The scope and scale of deforestation and the opening of new interfaces with forests and wildlife increase the chances of spill overs, said Prashanth N S, public health expert at the Institute of Public Health, Bengaluru, adding, "The way in which we



interact with our environment has increased the exposure to newer pathogens that would have otherwise not come into contact with large populations."

The influenza A (H1N1) virus—swine flu — is not transmitted from human to humans by eating pork, and that remains its saving grace. Today, it is widely accepted that swine flu was first found in human beings in La Gloria, a little town in Mexico. It is known that a young boy suffering from fever in March 2009 became the first confirmed victim of the outbreak, which then spread from country to country. But then, when the disease broke out, what was quickly lost in this tragedy was the location of the ill-fated town—right next to one of Mexico's biggest hog factories, owned by the world's largest pig processor Smithfield Foods.

What was also not reported that people in the town had repeatedly protested about water pollution, terrible stench and waste against the food giant. While this fact was never followed up or uncovered, what was reported was that food majors wanted who to change the name of the contagion so that pork eating would not be affected. Virologists at the US CDC, however, based on genetic fingerprinting found that the strain of this swine flu is the same as first identified on industrial pig farms in North Carolina, the hub of industrial pig farms in USA.

The H1N1 strain is high on the evolutionary ladder. In 1998, when there was an outbreak of swine flu among pig herds in North Carolina, it was

a triple hybrid—containing gene segments from human, bird and classical swine influenza viruses—that spread across pig herds of the integrated world. Then it mutated further. Today, it is believed that the common flu virus infecting humans has got mixed with this hybrid, creating an altogether a new human-animal virus.

In 1997, when the world first caught avian flu (H5N1), wild migratory birds that are the natural carriers of the virus, had been widely indicted for the spread, but with little evidence. It was easier to blame wild birds with no defenders in agribusiness, than birds produced in poultry factory farms. The problem stemmed from the model of growing chicken in an environment that is highly conducive for the virus. The birds are raised in tightly confined, often poorly ventilated enclosures with regular exposure to chemicals, blood and faecal matter. Diseases can spread, and spread fast, in such conditions. Since the birds also have lowered immunity because of their genetic uniformity, they are almost literally sitting ducks when a disease hits.

But after avian flu hit Asia, the Food and Agriculture Organization (FAO) told governments that while it would be possible to tighten biosafety in commercial poultry farms, it would be impossible to do it in non-commercial enterprises, such as backyard production systems where flocks forage outdoors. It recommended animal production should move to larger farms where surveillance is possible.

Danielle Nierenberg, who researches this sector at Washington-based World Watch Institute, reported that this prompted Vietnam in April 2005 to impose a ban on live poultry markets and asking farms to convert to factory-style methods.

A maligned production system

This is when, the need of the hour was to regulate the industrial processes of growing chicken so that the virus does not breed and does not grow. The business needed to improve the genetic stock of birds and raise their immunity against diseases, just the way traditional backyard poultry farmers do. But instead of reforming the poultry industry, the containment of the flu ended up promoting the very industry and its practices and destroyed the livelihoods of small and marginal farmers.

Studies also show how viruses are ever adapting and ever-expanding via new susceptible hosts and additional transmission routes. S Abdul Rahman, executive director, Commonwealth Veterinary Association, said, unlike the old diseases like cholera and pneumonia, which we know how to deal with, these diseases are highly unpredictable. "With factors like climate change, zoonoses are emerging as the single-biggest threat to human health and we are not prepared, as is evident from covid-19 pandemic," he said.

But the pathogens are honing their genome and preparing for their next mutation, and there is

no doubt about it. A study published in *Nature* in October 2015, titled "Spillover and pandemic properties of zoonotic viruses with high host plasticity" said that pathogens, present in animals belonging to 10 biological orders, are 12 times more likely to transmit from human-to-human than those found in only one animal order. This is because the evolutionary process which equips a virus to rapidly adapt to new hosts also makes it capable of interspecies transmission. Many viruses, like Ebola, SARS-COV and MERS-COV, before jumping to humans were limited only to animals. When all conditions were met, they made the jump. Small wonder, most jumps have been made by RNA viruses.

The next step would be finding the right transmission route for easier, faster and effective dispersals. So far, oral, aerosols, direct contact, fomite and vectors have been the five primary routes of disease transmission for zoonotic pathogens. These routes are crucial for determining their contagiousness, which is measured through reproduction rate (R0) or the number of secondary cases one case would produce in a susceptible population. In a way, they are responsible for taking a pathogen from the level of transmission to the level of epidemic spread. Cholera, a waterborne zoonotic bacterial disease, has a very high R0 of 9.5. By comparison, the R0 of Zika is 4.2; R0 of covid-19 is 2.

A reason for this low R0 of COVID-19 is that the virus is still only hitching rides on droplets, expelled

from the body through coughs and sneezes. Since respiratory droplets are heavy, they cannot travel more than 1 metre. At least, that's what who believes as of now.

However, with studies finding that SARS-COV-2 can travel up to 8 metres, several virologists seem to disagree that it is not airborne. As the jury is still out on how SARS-COV-2 travels, the fact remains that airborne transmission is the most lethal of all routes that can make a virus most contagious. Pandit says multiple factors determine if a pathogen is able to transmit with airborne droplets. First, an infectious person should be able to create droplets that are of appropriate size so that they can become aerosolised droplets with the help of particulate matter in the air. Then enough viable infectious dose has to remain in the air for a significant time so that either wind or air currents transmit it to other places where it can infect another susceptible person.

Once in the air, the success of the virus to remain infections depends both on the virus and the particle. Environmental factors like temperature, ultraviolet radiation, relative and absolute humidity, and air movement are important drivers influencing virus viability. Factors like temperature and humidity also impact the size of droplets which, in turn, affect the viability of virus.

So far, Q fever among animals like goat, sheep and cattle, caused by zoonotic bacteria Coxiella burnetii is believed to be the only disease that is trans-

mitted through airborne dispersal. While it remains to be seen as to how long other pathogens can resist this temptation to go airborne, a study published in the Cell in 2014 found evidence of airborne transmission of avian influenza among ferrets. The researchers discovered that the ability to go airborne only took five substitutions in the virus.

A bigger public health crisis

The threats zoonoses pose to the public health, global economy, food security and geopolitics are well established. In what may sound like prophesy now, a 2014 study published by the Bank of American Merrill Lynch, after extrapolating historic examples, estimated that, "a severe and prolonged global pandemic could kill 180-360 million and hit global GDP by as much as 5-10 per cent in the first year, with most industry sectors adversely affected."

Pandemics aside, between 1997 and 2009, the economic cost of six major zoonoses outbreaks was estimated to be about US $80 billion by the World Bank report "People, Pathogens and our Planet": The Economics of One Health, 2012. The cost would have been much higher had these outbreaks metamorphosed into pandemics. A 2011 report by the Organization for Economic Co-operation and Development showed that pandemics are a prime global catastrophic threat.

Potential losses resulting from a severe influenza pandemic, for instance, can be about 71 million

human fatalities and $3 trillion, or 4.8 per cent of global GDP. Zoonoses such as leptospirosis cause an estimated 1.03 million human infections and 60,000 deaths annually across 34 countries, for which there is adequate surveillance data, says Bethan Purse, an ecologist at the UK Centre for Ecology and Hydrology. In 2000, who estimated that more than a billion people are at the risk of scrub typhus and over one million cases occur annually. Since then, South-Asian countries with good surveillance have shown a rising incidence of scrub typhus. Muliya says zoonoses kill the most number of people, second only to non-communicable diseases. In terms of years lost due to premature death or to disability for living with the health condition or its consequences, they are second to none.

Unfortunately, though most of the major disease outbreaks have been caused by zoonotic viruses, Pandit said viral infections, in general, are difficult to treat. Very few antiviral drugs are effective against them, unlike antibiotics which we use against bacterial infections as they are broadly effective. Besides, since emerging viruses are novel, developing vaccines or antibodies related treatments take a lot of time, he added.

"Dealing with zoonoses is tricky because they keep mutating, forcing us to restart the effort to control it anew," said Muliya. This also makes it difficult to promote a permanent cure. Another reason for the difficulty in treatment is that many zoonot-

ic outbreaks are underreported. Zoonoses mostly infect people living under poverty with little access to healthcare. WHO's report on neglected diseases also notes a correlation between living in proximity with livestock and the emergence of zoonoses. "Although one or more of these diseases can be found in almost every livestock-keeping community in the developing world, they are often simply forgotten," acknowledged a 2015 report titled "The control of neglected zoonotic diseases", prepared by WHO. Since these diseases are neglected, adequate efforts have not been made to curb them. Consider Ebola and Zika. Before they caught the global attention with outbreaks in 2013 and 2015, these diseases were, for a long time, considered tropical neglected diseases. But despite the attention, vaccines have not been developed for them so far. Ironically, before the outbreak, two promising candidates, the adenovirus-vectored (Ad5-GP) and the vesicular stomatitis virus-vectored (vsvag/ebovgp) were tested on non-human primates in 2003 and 2005. Although the trials produced positive immunogenicity and safety data, Ad5-GP was not investigated further.

Experts had been warning about a COVID-19-like pandemic for a long time. Yet, no one could say when it was going to strike. The potential for future pandemics is vast. As many as 1.7 million unidentified viruses of the type known to infect people are believed to still exist in mammals and water birds. Any one of these could be the next "Disease X", and

it could be potentially more disruptive and lethal than COVID-19. Since such pandemics are a direct consequence of irresponsible human activity, we need to act now, when we are in the middle of a pandemic, caused by a zoonosis.

Rampant deforestation, uncontrolled expansion of agriculture, mining and infrastructure development as well as unregulated trade in wild animals have created a "perfect storm" for the spillover of diseases from wildlife to people. Unfortunately, communities who live on the fringes of forests are most vulnerable to such infectious diseases and pay the price of resulting outbreaks. Experts at the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), an independent intergovernmental body, in a recent article suggested ensuring that the actions being taken to reduce the impacts of the current pandemic are not themselves amplifying the risks of future outbreaks and crises. First, ensure the strengthening and enforcement of environmental regulations and deploy only those stimulus packages that offer incentives for more sustainable and nature-positive activities. Second, recognise the complex interconnections among the health of people, animals, plants and our shared environment.

Third, fund health systems and incentivise behavioural change on the frontlines of pandemic risk. It may be politically expedient at this time to relax environmental standards and to prop up

industries such as intensive agriculture and fossil-fuel-dependent energy sectors, but doing so without requiring urgent and fundamental change, essentially subsidises the emergence of future pandemics, say the ipbes experts.

WHO has already floated a globally recognised response framework for dealing with zoonoses. According to WHO, "One Health" is an approach to design and implement programmes, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes. Purse said, "We need to first understand how people come into contact with zoonotic infections as they use ecosystems for their livelihoods, what are their priorities and means of coping with diseases. Only by taking this joined up approach, can we understand what changes in policy, behaviour or systems might be required to reduce risks of infection and mitigate impacts."

There is also a need to pump in more funds for neglected tropical diseases, which include zoonoses. As part of pandemic preparedness, surveillance programmes need to be initiated of species like bats that are known sources of zoonotic pathogens and studies need to be done to understand "zombie" viruses and microbes that are being released as the Arctic thaws.

COVID-19 pandemic has offered us an opportunity to prepare for much bigger threats that are yet to come. Let's not waste it.

How do viruses jump species?

And why are 'spillovers' becoming more common?

Steve Wylie

Viruses are little more than parasitic fragments of RNA or DNA. Despite this, they are astonishingly abundant in number and genetic diversity. We don't know how many virus species there are, but there could be trillions. Past viral epidemics have influenced the evolution of all life. In fact, about 8 per cent of the human genome consists of retrovirus fragments. These genetic "fossils" are leftover from viral epidemics our ancestors survived.

COVID-19 reminds us of the devastating impact viruses can have, not only on humans, but also ani-

mals and crops. Now for the first time, the disease has been confirmed in a tiger at New York's Bronx Zoo, believed to have been infected by an employee. Six other tigers and lions were also reported as "showing symptoms". According to the BBC, conservation experts think COVID-19 could also threaten animals such as wild gorillas, chimps and orangutans. While virologists are intensely interested in how viruses mutate and transmit between species—and understand this process to an extent—many gaps in knowledge remain.

Most viruses are specialists. They establish long associations with preferred host species. In these relationships, the virus may not induce disease symptoms. In fact, the virus and host may benefit each other in symbiosis. Occasionally, viruses will "emerge" or "spillover" from their original host to a new host. When this happens, the risk of disease increases. Most infectious diseases that affect humans and our food supply are the result of spillovers from wild organisms.

The new coronavirus (SARS-COV-2) that emerged from Wuhan in November, 2019 isn't actually "new". The virus evolved over a long period, probably millions of years, in other species where it still exists. We know the virus has close relatives in Chinese rufous horseshoe bats, intermediate horseshoe bats, and pangolins—which are considered a delicacy in China.

Past Coronaviruses, including the severe acute

respiratory syndrome coronavirus (SARS-COV), have jumped from bats to humans via an intermediary mammal. Some experts propose Malayan pangolins provided SARS-COV-2 this link. Although the original host of the SARS-COV-2 virus hasn't been identified, we needn't be surprised if the creature appears perfectly healthy. Many other Coronaviruses exist naturally in wild mammal and bird populations around the world.

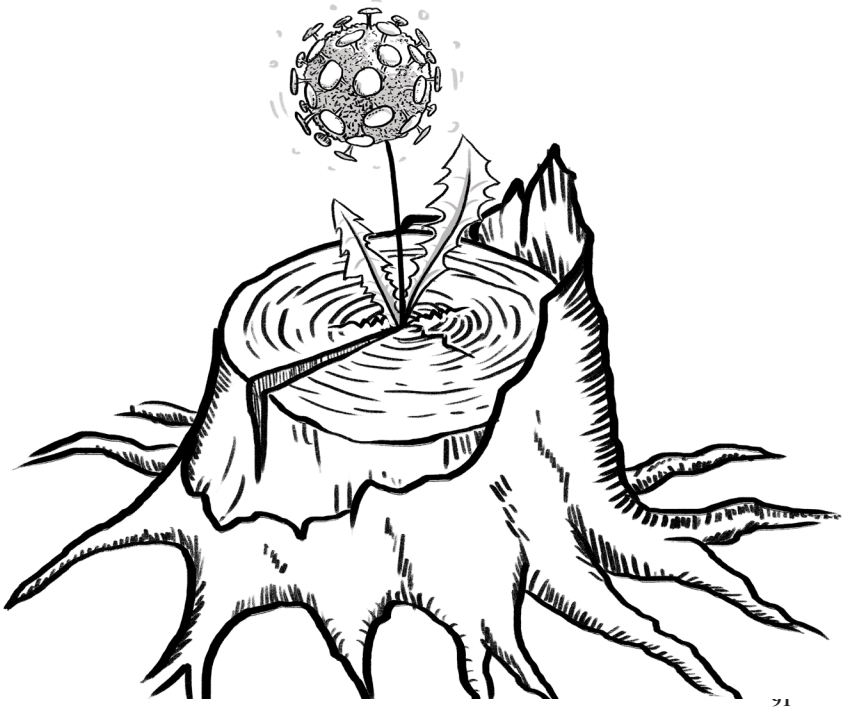
Human activity drives the emergence of new pathogenic (disease-causing) viruses. As we push back the boundaries of the last wild places on Earth—felling the bush for farms and plantations—viruses from wildlife interact with crops, farm animals and people. Species that evolved separately are now mixing. Global markets allow the free trade of live animals (including their eggs, semen and meat), vegetables, flowers, bulbs and seeds—and viruses come along for the ride. Humans are also warming the climate. This allows certain species to expand their geographical range into zones that were previously too cold to inhabit. As a result, many viruses are meeting new hosts for the first time.

Virus spillover is a complex process and not fully understood. In nature, most viruses are confined to particular hosts because of specific protein "lock and key" interactions. These are needed for successful replication, movement within the host, and transmission between hosts. For a virus to infect a new host, some or all protein "keys" may need to be

modified. These modifications, called "mutations", can occur within the old host, the new one, or both.

For instance, a virus can jump from host A to host B, but it won't replicate well or transmit between individuals unless multiple protein keys mutate either simultaneously, or consecutively. The low probability of this happening makes spillovers uncommon. To better understand how spillovers occur, imagine a virus is a short story printed on a piece of paper. The story describes:

- How to live in a specific cell type, inside a



specific host
- How to move to the cell next door
- How to transmit to a new individual of the same species.

The short story also has instructions on how to make a virus photocopying machine. This machine, an enzyme called a polymerase, is supposed to churn out endless identical copies of the story. However, the polymerase occasionally makes mistakes.

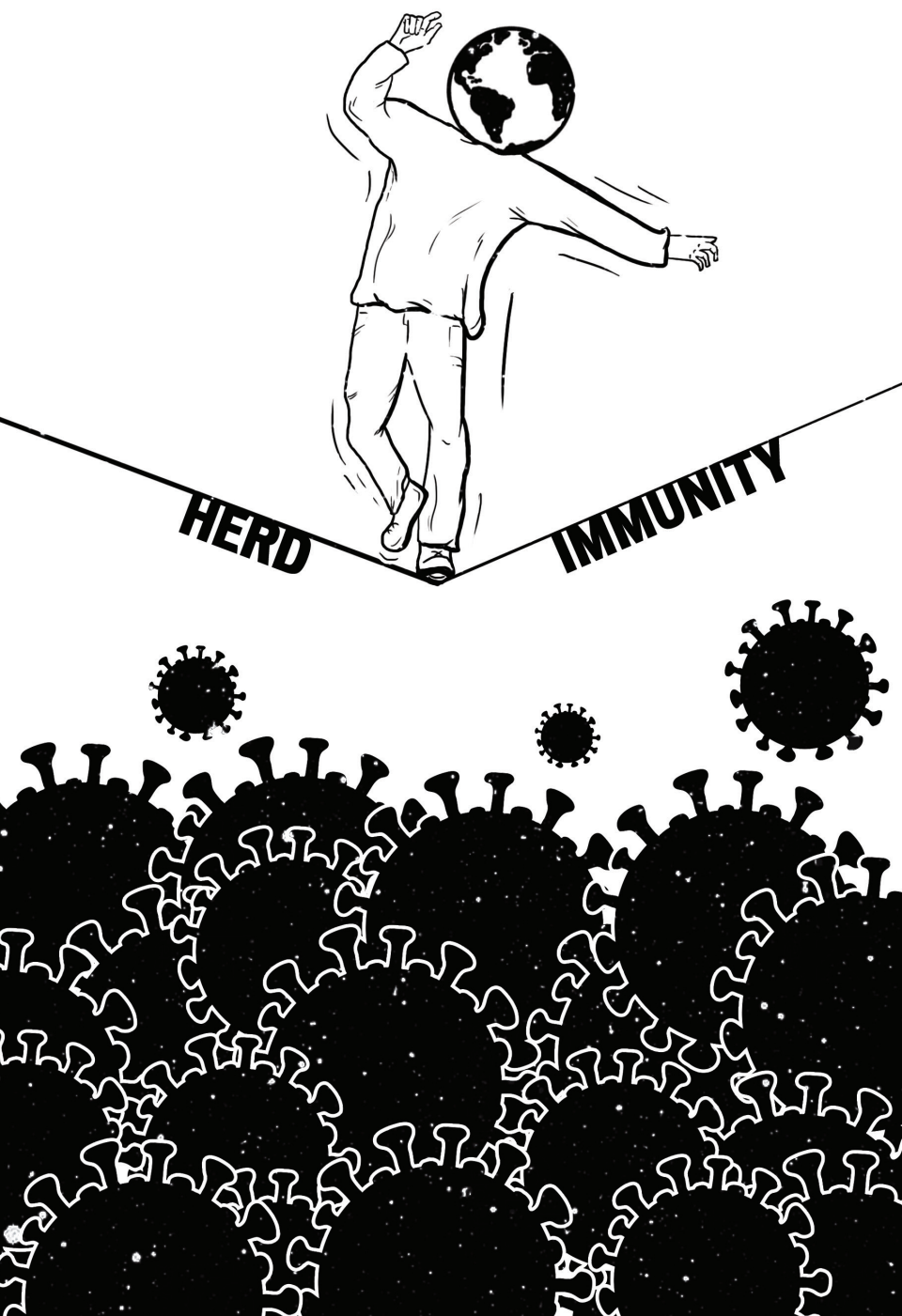
It may miss a word, or add a new word or phrase to the story, subtly changing it. These changed virus stories are called "mutants". Very occasionally, a mutant story will describe how the virus can live inside a totally new host species. If the mutant and this new host meet, a spillover can happen. We can't predict virus spillovers to humans, so developing vaccines preemptively isn't an option. There have been ongoing discussions of a "universal flu vaccine" which would provide immunity against all influenza virus mutants. But so far this hasn't been possible.

Despite how many viruses exist, relatively few threaten us, and the plants and animals we rely on. Nonetheless, some creatures are especially dangerous on this front. For instance, Coronaviruses, Ebola and Marburg viruses, Hendra and Nipah viruses, rabies-like lyssaviruses, and mumps/measles-like paramyxoviruses all originate from bats.

Given the enormous number of viruses that exist, and our willingness to provide them global transport, future spillovers are inevitable. We can

reduce the chances of this by practising better virus surveillance in hospitals and on farms. We should also recognise wildlife, not only for its intrinsic value, but as a potential source of disease-causing viruses. So let's maintain a "social distance" and leave wildlife in the wild.

(Author is Adjunct Associate Professor, Murdoch University)


HERD
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Governance

Immunity

Human struggle with body and virus

Testing as a strategy

Frontline health care

Rural governance structure

The global pharma industry

Inevitability of India and China

COVID-19 drug patents and affordability

Water and sanitation

Are we immune?

The assumption that we are immune to the virus once infected is fraught with scientific, ethical and legal issues

Vibha Varshney

Literarily everyone wants be immune from the pandemic. The very mention of the term "immunity" offers hope and reassurance in this time of utmost desperation. It is also at the core of the global strategy to combat the infection. Governments worldwide are desperate to identify those who have recovered and developed antibodies against SARS-CoV-2. Some say this could serve as the basis for an "immunity passport" that would enable individuals to travel or to return to work assuming that they are protected against reinfection.

By mid-June, 2020, Chile was poised to become the first country to provide such certificates to recov-

ered COVID-19 patients, which would be valid for three months. In March, Germany tested its population for immunity against COVID-19 using the rapid test kit. In Gangelt municipality, 14 per cent of the 500 people tested were found to have antibodies against SARS-COV-2. Swab tests showed 2 per cent were sick. Based on the findings, Germany planned to conduct serological tests across the country to issue immunity certificates so that people could resume work. But on May 5, it decided not to go ahead unless the study was cleared by its ethics council. Alexandra L Phelan, professor at the microbiology and immunology department and an adjunct professor of law at the Georgetown University Law Center, USA, wrote in *The Lancet* on May 4 that the potential discriminatory consequences of immunity passports might not be expressly addressed by existing legal regimes, because immunity from disease (or lack thereof) as a health status is a novel concept for legal protections. In their column in *New York Times*, Kenneth Roth, executive director of Human Rights Watch, and Annie Sparrow, a critical-care paediatrician and assistant professor of population health science and policy at the Icahn School of Medicine at Mount Sinai, USA, wrote that employers might insist on antibody certificates simply to minimise absenteeism or medical costs among their workers; employees might find it easier to work with colleagues who have antibody certificates rather than to continue with face masks and social distancing.

But in this fight some are willing to make sacrifices. These are the countries that hope to achieve "herd immunity" naturally. The debate around their quest is so intense that "herd immunity" along with 30-odd other words and phrases related to the pandemic made its way into Oxford Dictionaries (online version) in recent months. The dictionary defines herd immunity as "protection from a disease that happens if a large percentage of the population is immune to it". Proponents believe once adequate immunity develops in a population, the spread of COVID-19 would stop. Vaccines are usually used to create such herd immunity against infectious diseases like measles, mumps, polio and chickenpox. But can we actually bank on our own immunity system to tide over the pandemic? If yes, to what extent? Researchers are racing against time to find the answers. An analysis by the Center for Infectious Disease Research and Policy, USA, made public on April 30, said COVID-19 is not likely to be halted until 60 to 70 per cent of the population was immune.

A magical state in a real world

However, studies on isolated populations show no city has so far managed to achieve this magical state. In Spain, one of the worst-hit nations in the pandemic, the government launched a rapid serology test on April 27 to gauge the exposure of people to SARS-COV-2. It found only 11.3 per cent and 7.1 per cent people have developed antibodies

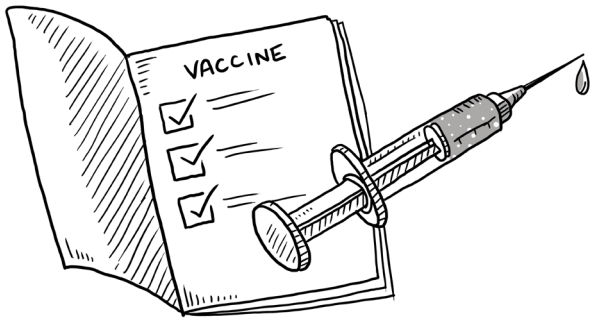
against COVID-19 in Madrid and Barcelona, which have paid the highest price in fatalities. In the last week of April, New York City, the epicentre of the pandemic in USA, also launched an antibody study by testing 15,000 people at grocery stores and community centers across the state. Its findings show 12.3 per cent people now have COVID-19 antibodies. A similar study by the city government of Boston, in Massachusetts State of USA, finds 9.9 per cent people have antibodies against COVID-19. In UK, the COVID-19 Surveillance Report shows that 14.8 per cent people in London had antibodies against COVID-19. Sweden, which has not imposed lockdown, is hopeful that herd immunity would see it through the pandemic. When COVID-19 broke out there towards the end of February, the government issued guidelines banning gatherings of over 50 people. Restaurants, schools and parks remained open. It estimated that in Stockholm 60 per cent people would develop antibodies against the virus by May-June. But its Public Health Agency said only 7.3 per cent people had developed antibodies by the end of April. Speaking to local media, Anders Tegnell, the country's chief epidemiologist and brain behind the strategy, said, "Either the calculations made by the agency and myself are quite wrong...or more people have been infected than developed antibodies." Naturally developed immunity following a sickness is dicey. Even if adults develop immunity against the disease—a study posted on medRxiv on March

30 said older patients developed more antibodies against COVID-19 than the younger ones— it can circulate among children and infect those with weakened immune systems. Besides, there is no evidence to show how long the immunity would protect from COVID-19.

Other viruses like the flu mutate over time. So antibodies from a previous infection provide protection for less than a year. In case of COVID-19, many patients who tested negative after treatment tested positive again. As per one theory, these people getting reinfected might have developed low immunity during the first round of infection. But there is no conclusive evidence on this. When researchers from China tried to reinfect the rhesus monkeys recovered from COVID-19 infection, they did not succeed. The monkeys developed immunity against the disease, said a study published on preprint server bioRxiv on March 13. However, researchers at Fudan University, Shanghai, who studied blood samples from COVID-19 patients released after treatment, found nearly one-third had low levels of antibodies. In some patients, antibodies could not be detected. A review by the Norwegian Institute of Public Health also found limited evidence on immunity after infection with SARS-COV-2. "Two studies showed sustainable immunoglobulin G (IgG is an antibody) levels one to two years after SARS-COV infection, but it is uncertain whether this finding can be generalised to SARS-COV-2," noted the document

published in April. A paper published in *Immunity* on May 3, however, revealed how antibodies behave in people who recovered from COVID-19. It compared the immune responses of 14 patients—eight recently discharged with six follow-up patients. When compared with healthy controls, all recovered patients had higher levels of antibodies against COVID-19. But when compared among themselves, newly discharged patients had more antibodies than follow-up patients. But for how long would this immunity last? Would they get reinfected if exposed to high quantities of virus or their physical state weaken? Scientists do not have answers to these probing questions so far. It seems we have to live with the virus for some time even after a vaccine is ready. But there is a caveat.

Vaccines do not provide 100 per cent immunity. Flu vaccine, for one, is 59 per cent effective in adults and 27 per cent in keeping a person out of a hospital. A 2012 review said BCG vaccine, primarily used against tuberculosis, was 60 per cent effective in the first five years after inoculation. The effec-



tiveness decreased to 56 per cent between five and 10 years and to 46 per cent for up to 15 years. But vaccines against diphtheria are effective. The COVID-19 vaccine has been put on a fast track and there are chances that it might not be tested very robustly. This can pose a serious risk. In an interview with USA-based natural health activist Joseph Mercola, Robert Kennedy Jr, an environmental lawyer and anti-vaxxer, narrated the problems with vaccines against coronavirus. He said they triggered the production of two kinds of antibodies. While neutralising antibodies help fight the disease, the binding ones make the body more vulnerable. In 2012, four vaccines were tested on ferrets that showed good antibody response. But when they were exposed to the wild virus, they died. This again happened in 2014 when dengue vaccine DENVAX was administered on children in the Philippines. When they got infected with dengue, 600 of them died.

Do certain communities have more immunity?

Some communities may have an advantage over others when it comes to immunity. This natural defence mechanism of the body trains itself and evolves as people get constantly exposed to pathogens. Being challenged daily with diseases like tuberculosis, malaria, dengue and chikungunya, Indians are more immune to infections compared to several other nationals. There is also evidence that Indians

have evolved to gain more genes that protect them against viral infections. "These genes enable natural killer (NK) cells, a type of white blood cells in our body that provide a first line of defense against viral infections," said Rajalingam Raja, director of Immunogenetics and Transplantation Laboratory at the University of California in San Francisco, USA. Two families of genes, KIR genes and HLA genes, play a part in this protective function. Indians have more KIR genes than the Chinese and Caucasians said Raja in an article in Genes and Immunity in 2008. He said Indians have also evolved to gain unique genes that regulate T and B cells, which produce specific and longstanding immunity to infection and could make Indians more immune to SARS-COV-2.

However, the authorities couldn't base this special immunity of citizens to take a decision on easing the lockdown. As Raja said, the number and type of genes are highly variable between individuals. "We do not know which gene is protecting from the SARS-COV-2 infection." COVID-19 remains a big unknown. The only evidence we have is it is highly infectious and has a fatality rate 10 times higher than that of flu But we still do not know of all its symptoms and have little understanding about its long-term health impacts. So most researchers are in favour of taking precautions. "We should maintain the current levels of infection or even reduce the levels until a vaccine becomes available. This will take some level of continued physical distancing for an extended

period, likely a year or longer, before a highly effective vaccine can be developed, tested and mass produced," said Gypsyamber D'Souza, epidemiologist with the Johns Hopkins Bloomberg School of Public Health, USA. But waiting for this vaccine might not make much sense for countries like India, which have pathetic vaccine coverage—as per the National Family Health Survey of 2015-2016, the percentage of fully immunised children ranged from 91.3 per cent in Puducherry to 35.7 per cent in Nagaland. The virus seemed unstoppable, stirring second wave in countries like South Korea that had contained it the first time. The way to go ahead would be to have a mix of testing, physical distancing, imposing quarantines and lockdowns, and ensuring sanitation and healthcare, but all implemented at the correct time and as per the need.

Testing times

The world's growing obsession with tests might weaken our response to the pandemic

Vibha Varshney & Banjot Kaur

With no antidote or vaccine in sight, countries were in a fix; any careless move could undermine the hard-fought gains and lead to an explosion of new cases. In India, where the Union government had relaxed restrictions while extending the lockdown since May 2020, states were nervous as the infection count continued to rise. But as Australia's Prime Minister Scott Morrison said about easing lockdown: "It's going to be step by step, there is going to be some trial and error, this is completely uncharted territory." The world was frantically looking for role models—countries that had weathered the pandem-

ic storm and had worked out plans to reanimate their economies. One country that emerged as a sign of hope was South Korea. Rising like a phoenix from the ashes, it came out stronger from a similar crisis in 2015 when an outbreak of the highly-fatal Middle East Respiratory Syndrome (MERS), also caused by a coronavirus, sickened 186 people and killed 38.

So on January 20, 2020, when the country reported its first COVID-19 case, health officials knew they had to quickly quarantine the infected and trace those who came in contact with them before they could spread the disease further. Its biotech industry had, in fact, started working on a diagnostic kit much earlier, as soon as China, the country of origin of the disease, released the genome of the virus, sars-cov-2. By February 12, when the total number of cases was way below 100, the Korea Centers for Disease Control and Prevention had approved the test kit by one local biotech company, Seegene, on a fast track basis. Such approvals typically take a minimum of six months. Soon, other companies joined forces. With the diagnostic kits in hand, the country launched a massive testing and contact-tracing campaign. Even asymptomatic people could get themselves tested for free. Since hospitals had turned into hotbeds of infection during the MERS outbreak—paralysing the healthcare delivery system—this time the country kept the testing and treatment facilities separate. By early April, it flattened the curve and held the parliamentary election. By June, the country had a

huge infrastructure for COVID-19 diagnosis—638 testing centres, including 80 drive-through screening kiosks, and a capacity to test 23,000 people a day. It did not have to resort to lockdowns.

Small wonder, widespread testing became the mantra for defeating COVID-19. In USA, as President Donald Trump wanted Americans to return to work and get the economy running, state governors pushed and fought for more tests. In the third week of May when the death toll neared the 100,000 mark—the highest in the world—the White House rebuked its top health agency, the Centers for Disease Control and Prevention (CDC), saying "it let the country down" on providing testing CDC had botched up the testing kit it was asked to develop. It was only on February 28, a month after the first case was reported in the country, that CDC decided to rope in other public and private entities for developing tests. By April 27, the Food and Drug Administration (FDA) had issued emergency-use authorisation to 70 test developers. That day, President Donald Trump unveiled two documents—Testing Overview and Testing Blueprint—and said a big part of "opening up America again" depended on testing to determine how many had been exposed to the virus. By May 21, it was conducting 39.42 tests per 1,000 people; South Korea's testing rate was 15.65 per 1,000. In Africa, authorities struggled to compete with richer countries for procuring testing material on the global market. Even where there

was enough money, many African health authorities were unable to obtain the supplies needed, said a commentary published in The Lancet on May 7. There's no doubt that testing is the cornerstone of this fight against COVID-19. But it seemed more than helping in the combat; it led to confusion and chaos worldwide. Could governments rely on them for reopening economies?

Which tests, for what?

First, let's delve into the world of diagnostic tests where every reaction and every chemical matters. Broadly, two methods of tests are available for SARS-COV-2: molecular, which looks for the presence of the virus or its genetic material in the sample of nasal mucous or saliva, and serological, which looks for the presence of antibodies in the blood. The first one is based on a routine lab technique, reverse transcription polymerase chain reaction (RT-PCR), which amplifies the minuscule amount genetic material in a pathogen and helps identify it. The technique has to be customised as per the disease by using primers, or short nucleic acid sequences, specific to the pathogen's genetic material. Typically, the procedure involves sticking a swab, similar to an ear bud, but uses nylon instead of cotton, deep into the nose or throat, retrieving mucous sample, placing the swab in buffer solution to transport and isolate the virus, replicating its genetic material using chemicals or reagents like primers, enzymes and nucleotides,

and then detecting it with fluorescent probes. Once the sample reaches lab, the entire process takes six hours. The serological test kit, on the other hand, is simpler and portable, just like a pregnancy test kit, and can give results in 20-30 minutes. It is also cheaper—in India, a rapid antibody test costs about ₹400 compared to RT-PCR that costs ₹4,500. Based on a drop of blood, these test strips look for antibodies that are produced as a natural defence mechanism of the body when exposed to a pathogen. Thus, it not only helps finding out those who were infected and subsequently recovered, it also helps identifying asymptomatic patients who could have silently spread the infection.

But the effectiveness of any medical test depends on accurate diagnosis. This is assessed in two ways: specificity and sensitivity. Sensitivity is the ability of a test to correctly identify those with the disease (true positive), whereas specificity is the ability of

the test to identify those without the disease (true negative). This is crucial as the disease would continue to spread if a positive patient is reported negative. If someone tests false positive, then he or she would have to go through needless treatment and duress. Both the tests are mired in these specificity and sensitivity issues. This limitation is now getting more pronounced because of the haste with which the testing tools and kits are being developed and approved.

Besides, never before has the world seen such a huge demand for tests. This has overwhelmed developers as well as suppliers, triggering shortages everywhere. Let's examine RT-PCR. This test, considered the gold standard for COVID-19 diagnosis, depends on a robust supply chain for each and every ingredient. That's its major drawback Between February and April, as active cases kept mounting, the world faced a shortage of COVID-19 RT-PCR testing kit components, right from swabs and buffer to enzymes. In USA, Colorado received 7 per cent of the swabs it had requested from the federal government till April 24. California received 90,000 of the 350,000 swabs it had asked for. To maximise the available swabs, CDC revised its guidelines on March 9 and asked technicians to collect one specimen swab instead of two. A major problem with RT-PCR tests is that it depends on proprietary ingredients, protected by a registered trade name. These cannot be quickly developed by other manufacturers to meet the shortfall. Although

other versions of the ingredients might work, it's not easy to simply switch to a different type as even tiny changes can make the test fail. False results can be disastrous in this fight against COVID-19. In March-end, the Netherlands faced shortage in reagents. It asked Roche, which supplies to most Dutch labs, to share the recipe for its buffer solution. Under pressure from the European Commission, Roche agreed but shared a generic recipe available in text books. That month USA also saw short supply of extraction reagent developed by Dutch company Qiagen. "We will never have enough testing as reliance is on proprietary reagents. There needs to be more sources of PCR reagent, including from domestic producers," says Leena Menghaney, lawyer with humanitarian group Médecins Sans Frontières. To overcome the shortage, researchers have come up with alternatives.

One USA-based Formlabs is working on 3D printing with pliable resin, which can replace the nylon swabs. Others are working on testing methodologies that simply would not require swabs. To reduce the dependence on buffer solution, dry swabs are also being developed. Some have found that a saline solution or standard buffer solution work equally well as the specialised ones. But these need to be validated by regulatory agencies before they are put to use. Any glitch can further reduce the reliability of RT-PCR, already fraught with accuracy issues. An analysis of the available RT-PCR kits for COVID-19

shows some have sensitivity of just 90 per cent and specificity of 96 per cent. In real world conditions, this could be just 66 to 80 per cent, which means one in every three would be falsely tested as negative. Pitfalls mar antibody test too It is portable, faster and cost-effective. But it isn't a diagnostic tool and can, at best, be used for research.

The reason for this is simple. Our body develops antibodies only after a week or 10 days of being infected by a pathogen. Since rapid antibody test works by sensing these antibodies, it often fails to diagnose active cases. In a study posted on preprint server medRxiv on April 20, researchers from the Oxford University, analysed nine COVID-19 rapid tests used in UK. Their specificity was good, between 85 and 100 per cent, but sensitivity was low, between 55 and 85 per cent. Due to low sensitivity, a positive result would indicate that the person was infected and has antibodies against the virus. But in case of a negative result, it is difficult to rule out if the person is infected. Thus, the researchers say, these tests are good for population-level surveys, but inadequate for patient applications. The unreliability of antibody tests has been long known. In the case of influenza, its sensitivity is as low as 70 to 75 per cent, and thus false negative results are a major concern. Tests for dengue have variable performance, depending on the developer, serotype, medical history and duration of sickness. Even pregnancy kits that have been in use since 1976 and are generally considered

reliable have not been validated for reliability. So when WHO asked countries to "test, test, test", it talked only about RT-PCR. But a dipstick analysis shows that there is little correlation between widespread uses of these tests, disease prevalence and prevention of deaths. *Down To Earth* selected from each continent two countries conducting maximum number of tests and compared their test rates with their rates of cases and deaths. Let's consider UK, Australia, New Zealand and USA whose testing rates were almost same in May, 2020—they conducted 50,000 to 60,000 tests per million population. As on May 30, fatality rates in Australia and New Zealand were just seven and eight per million, whereas the figures were a massive 944 for the UK and 622 for USA. While the Oceania countries managed to keep their rates of infection at around 500, it had crossed 10,000 in USA and reached 6,707 in UK. This shows there are other factors that play a critical role in winning the battle than just widespread testing.

The India case

With densely packed cities, widespread malnutrition and a rickety health infrastructure, India has little margin for error when it comes to handling the COVID-19 pandemic. But so far, the two things that have helped the country from a tsunami of cases are its past experience and staying nimble, said the Indian Council of Medical Research (ICMR). "We learned from the 2009 Swine flu epidemic," it said

in a recently released Intelligent Testing Strategy. Then only two institutes—the National Institute of Virology and the National Centre for Disease Control—had the capacity to perform molecular tests essential for pathogen diagnosis. But presently, there is a network of virus research and diagnostic laboratories (VRDL), 13 of which were roped in for testing in cities with international airports even before the country reported its first cases. Imposing nationwide lockdown, dubbed the biggest and stringent, is also part of this testing strategy, ICMR said. This provided time to create adequate facilities to trace, track, test, quarantine and treat before the disease spread uncontrollably. As on May 28, at least 641 public and private laboratories and those in research and development institutions, universities and public and private medical colleges had been roped in to ensure that the load of testing didn't overwhelm the system at any time. At places where these could not be provided, a system to transport samples to the nearest testing facility was put in place or automated machines like TrueNat were provided, claimed ICMR. The government was constantly revising its testing guidelines to iron out glitches as the pandemic spread and threw new challenges.

By June, India had the capacity to test around 0.14 million samples a day, which the government planned to ramp up to 0.2 million. At least 35 developers, including 20 domestic ones, were providing

RT-PCR kits. While antibody tests were not part of the guidelines, they too were being employed in the country and supplied by 15 developers, including 10 domestic ones. Using rapid test kits, on May 12, ICMR initiated a community-based serological survey to estimate the prevalence of COVID-19 in the population. It also carried out a hospital-based surveillance to monitor the trend of infection in all districts. In the absence of treatment, these tests would not be of any help to patients, but the data helped understand the progress of the pandemic. For instance, online database ourworldindata.org that provides information on the number of tests a country conducts to find one COVID-19 case, said most countries would see a fall in the ratio as their outbreaks grew. Once the number-of-tests-to-positive case ratio started rising again, it suggested that country had controlled the pandemic. As per the database, as on March 13, India was conducting 86.667 tests to find one case, meaning fewer people were infected. This number had gradually been going down and on May 26, it was as low as 21.503, suggesting that India was heading towards the peak of the epidemic.

In India, the level of testing is low. On May 26, it performed 0.075 tests per 1,000 populations, which is way lower than the 1.167 tests by USA per 1,000 population. Public health experts however say widespread testing might not provide much insight into COVID-19 prevalence or help contain it. Russia,

for instance, performed 11,603.5 tests to find one positive case on March 5 and then 12,841.5 tests for one on the very next day. However, this high level of testing did not help the country, which became the third worst-hit by the pandemic by May. On May 26, it reported one new case per every 25.919 tests performed. K R Antony, Kochi-based public health consultant and former director of the State Health Resource Centre, Chhattisgarh, said, "In India a seven-fold increase in testing after March 27 at the national level did not have a corresponding increase in positive cases. Of the total test samples, positive cases continued to hover around 3.9 per cent. This suggests the prevalence of cases does not increase with the increase in the number of tests, of course barring hot spots in cities and districts that report high infection. In fact, the more we widen the net of sample collection to the general population the lower will be the positivity rate." This is particularly true for India where almost half of the districts were not affected by the pandemic in May. "Due to the complexity of the disease in terms of high proportion of asymptomatic cases and the uncertainty surrounding the testing and its validity, sole dependence on testing and seeing it as a magic bullet to the problem of COVID-19 is incorrect," said Mathew George, professor at the Centre for Public Health, Tata Institute of Social Sciences, Mumbai.

The age of the patient, co-morbidities, whether symptomatic or asymptomatic, occupation, staying

single or with a family of elders—all these factors decide the course of action more than the test results, he added. Gaps in the pandemic control system can also lead to spread of the disease. Consider the national capital Delhi, which operated 32 labs in May—15 are government run and 17 privately owned. Following a Delhi High Court order on May 4, Delhi put all data related to daily tests, positive cases and pending cases in the public domain. An analysis of these data showed massive backlogs. There were days when the backlogs matched the number of tests done that day. Other than infrastructure, shortage of technicians was a reason for such backlogs. "This is because no earlier planning was done for such type of viral pandemic in India," said A R Deshmukh and S N Bhattacharjee, of Delhi-based All India Medical Laboratory Technologist Association. Besides, the cost of performing the test for a large majority of people who have not been exposed to the coronavirus could be prohibitive in a country, whose per capita expenditure on public health in 2018 was ₹1,657—way less than RT-PCR test which costs ₹4,500. Understandably, the government tried to reduce the testing burden. On April 13, in areas with low prevalence of COVID-19, ICMR said pooled samples (genetic material from five patients) could be tested using RT-PCR. In this, all patients needed to be tested only if the pooled sample tested positive. However, the desperation of several other countries was not limited to cost-cutting.

Analyst Joe Hasell at *ourworldindata.org* compared testing strategies followed by South Korea, Italy, UK and USA. These countries reported their first cases in January. While South Korea tested early, monitored the outbreak and managed to curb it, Italy, UK and USA focussed on testing quite late, resulting in runaway cases. New Zealand too followed the "go hard, go early" approach despite inadequate infrastructure to contain the pandemic. Its Prime Minister Jecinda Ardern claimed that the country was on track to eliminate the virus. Australia, which ranked among countries that had successfully fought against COVID-19 despite moderate restriction measures, allowed local governments to impose lockdowns while ramping up health infrastructure. To help people return to normality while keeping the virus under control, the focus shifted to localised and targeted measures. On May 28, the UK launched the Test and Trace service, with 25,000 contact tracing staff and the capacity to trace the 100,000 contacts per day. Its idea was to ensure that the R0 number remained lower than 1 such that one infected person didn't infect more than one person. While the infected person would be tested, an intensified effort would be on to trace down their contacts who would then be asked to self-isolate for 14 days. This would reduce the need to quarantine and lockdown large areas. Scotland and Northern Ireland introduced similar systems of test, trace and break the chain strategy. To deal with the pandemic,

the world needs to urgently innovate and change the way it deals with diseases. While the health infrastructure needs to be made robust, not only in one country but across the world, health care requires more than just tests and ventilators. It requires identifying what strategy works where and when as the battle is not going to be over anytime soon.

Frontline healthcare to the masses

It is time the government institutionalised the network of public healthcare sector that have been leading India's response to the pandemic

K Srinath Reddy

"CLINICAL MEDICINE saves lives in retail. Public health saves lives in wholesale," was the simplified definition offered by a colleague, attempting to convey the essence of public health to his non-medical friends who were trying hard to comprehend the concept and value of this discipline. It is true that the colourful signboards and neon lights of retail outlets attract more attention than the obscure wholesale warehouses, despite the bulk value they provide.

Both public health and clinical care save lives and are important to society, as illustrated even in the case of COVID-19. Disease prevention, surveillance,

contact tracing, community engagement, isolation of cases and primary care are key public health functions that are the frontlines of defence against the virus. Hospital care is needed to care for sicker patients, with intensive care when necessary. Health promotion, disease prevention, diagnosis, clinical care, rehabilitation and palliative care are part of a continuum of health services. Publicly-administered health services provide the essential element of continuity, which fragmented private healthcare services do not provide.

In all of these areas, public sector health services have a pivotal role to play. While clinical care has now seen the heterogeneous private sector—with diverse unorganised and organised elements—play a more dominant role over the past two decades, public health has remained an almost exclusively a public sector function with a supportive role played by the voluntary sector. The latter is represented by a diversity of community-based organisations, self-help groups and development non-profits. The organised private healthcare sector is virtually absent in primary care and minimally present in smaller towns. In contrast, the public sector extends from the village level sub-centres to the urban tertiary care institutions.

It is the network of Indian public sector institutions that have been leading the India's response to COVID-19, both in public health and clinical care. From the Accredited Social Health Activists

(ASHAs) at the frontline to the ministries of health at the state and central levels, a coordinated response has been mounted deploying the strength and commitment of the public sector. If the Indian Council of Medical Research is framing the technical recommendations that guide the national response at the apex, the field level work of contact tracing, home isolation, syndromic surveillance and community health education are being carried out by an army of frontline health workers. The National Centre for Disease Control is mapping the spread of the disease through the Integrated Disease Surveillance Programme.

The State Health System Resource Centres and State Institutes of Health and Family Welfare are providing technical and operational support to state health ministries. The value of investments in primary healthcare, limited as they were, has come to the fore during the pandemic response. The need to strengthen district hospitals—as a dependable public sector asset—was also recognised when the response strategy was developed. The need to augment public sector's capacity to manufacture active pharmaceutical ingredients, generic drugs, vaccines and medical equipment has also come to the forefront.

From public sector labs performing free tests for virus detection to public sector hospitals providing free healthcare, the response to COVID-19 has provided a vision of what could be the future of India's health system, if a public sector model of universal

health coverage is adopted and earnestly implemented. The private sector has offered to provide both laboratory and hospital care support, but at a negotiated price. The unevenly distributed presence of the organised private healthcare sector—and its disconnect with the public health and primary care functions—make it a weak partner in the national response to COVID-19. Even though we enter the future with the reality of a mixed health system, the clearly demonstrated value of the interconnected public health and healthcare systems must now place them in the top priority list of policy and public financing.

(Author is president, Public Health Foundation of India Views expressed in this article are personal)

Partnering for the larger good

The private healthcare sector is largely located in urban areas. It is therefore necessary for both the public and the private sectors to come together to deal with the pandemic

Girdhar J Gyani

INDIA HAS been very pro-active in dealing with the COVID-19 pandemic. China, from where the virus originated, announced about its presence in the second week of January this year, and India constituted the advisory group on January 17, much ahead of WHO announcing it as public health emergency on January 30. The first case in India was reported on January 30—a medical student returning to Kerala from Wuhan. Thermal screening at airports was taken up on a war-footing, including quarantining the suspect cases. Even as number of cases rose to 300 mark, Prime Minister Narendra Modi asked

people to observe a voluntary curfew for 14 hours on January 22, and as cases continued to rise, he ordered a nationwide lockdown on March 23, which he kept extending.

The private healthcare sector too began to actively participate in various discussions. Industry associations constituted five task forces, including one on COVID hospitals, to work out structural and other requirements to deal with the crisis. I happened to be the convener of one of these taskforces. After going through the available data from other nations, which were in the thick of the pandemic, we realised that about 80 per cent of the infected COVID-19 cases were expected to be mild/moderate which would require just home quarantine, about 15 per cent of the cases were expected to be severe, which would require normal hospitalisation and, about 5 per cent of the cases were expected to be critical, which would require ICU care. In addition, a vast number of people would need to be screened and tested for COVID-19. The recommendations were submitted to the government. Some of the recommendations were:

• The first contact points for any person who experiences symptoms related to COVID-19 such as fever, shortness of breath, cough and sore throat should be a "Fever Clinic". This was intended to be a standalone set-up to reduce the risk of contamination and could be operated by a general physician, nurses and support staff.

• Corona care centers/isolation centres should be set up as dedicated facilities to quarantine and treat patients with mild/ moderate symptoms, who do not require ICU-type interventions. Corona detection scanning centres should be set up in dedicated area hospitals, CHCs, district hospitals, teaching hospitals, in re-oriented educational institutions or temporary enclosed structures like stadiums, schools if the situation demands.

• For treatment of critical care patients, it was recommended to set up dedicated COVID hospitals. These could be dedicated district hospitals, teaching hospitals, medical colleges that could be converted to exclusively treat COVID-19 patients or private hospitals converted to dedicated hospitals and run under pre-established operational terms. It was also recommended to undertake district-wise mapping and based on per capita availability of ICU beds. As broad estimate, it was suggested to have 100 ICU

beds with urban population of more than 2 million and 20 ICU bed-dedicated hospitals in districts with urban population between 1-2 million. An existing government hospital was suggested to be first line of defence as critical care COVID hospital. If not available, then armed forces hospitals, ESI, PSU hospitals could be considered. If these options were exhausted, private hospitals could be converted as dedicated hospital(s).

The implementation has been very much on the aforementioned lines. While the present number of infected cases are being treated in government hospitals, state governments have initiated a dialogue with private sector hospitals to come forward and provide dedicate hospitals or independent blocks within the hospitals as COVID hospitals. To cite a few examples, the Rajasthan government has earmarked the Mahatma Gandhi Medical College & Research Centre, Jaipur, with 1,000 beds as a COVID hospital. The Odisha government too has dedicated a 625-bed COVID hospital and handed it over to the Kalinga Institute of Medical Sciences (KIMS) to operate. Major corporate hospital groups like Apollo, FORTIS and MAX now have dedicate blocks to treat critical COVID cases. There are many such initiates of public-private-partnership already in place and more are in the offing.

India has a little over 1.6 million beds divided between the public and private sector. While the public sector is spread over uniformly in urban and

rural regions, the private sector is more urban-centric. It is therefore necessary that the two sectors come together to deal with the pandemic.

Private hospitals are running skeletal OPD services and only doing emergency admissions during the lockdown. But things will change when the government advises these hospitals to resume the full range of operations as a large number of patients are waiting to undergo various procedures, including surgeries. Importantly, a new risk has emerged as many asymptotic cases are turning out to be COVID-19 during hospital stay. This has necessitated hospitals to assume all admissions as COVID suspects, and preferably get the rapid test done before taking up surgeries. This will require hospitals to operate under new SOPs, and with appropriate level of PPEs. This will surely raise the overall cost by 25-30 per cent. This is going to be huge challenge as private hospitals are already under a huge financial strain. We, therefore, are working on guidelines jointly with the government as the virus is going to remain for a long time.

(Author is director general, Association of Healthcare Providers, New Delhi)

Big Opportunity For India

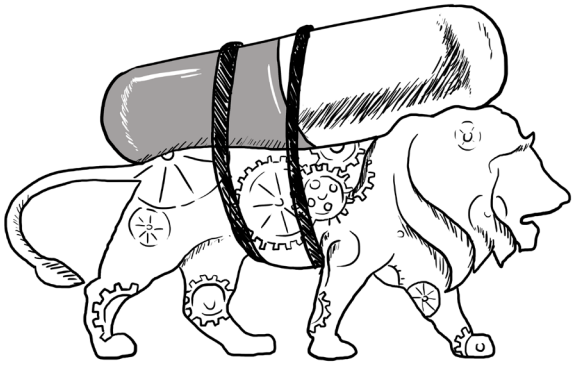
India can replace China as the world's preferred source of pharmaceutical ingredients

Reji K Joseph

BULK OF the active pharmaceutical ingredients (APIs) required by the pharma industry across the world is produced in China and India. The COVID-19 pandemic has exposed the risks of global supply chains being focused on a single country, which currently is China. COVID-19 has sent alarm bells to national security establishments in many countries, including India, on the risks of relying on a single country for the supplies. So far, the economic efficiency argument prevailed, but now the security dimension is on the forefront, which would result in many countries adopting measures to reduce reliance on China. In such a scenario, India is likely to become the preferred country for sourcing APIs.

Many countries have declared intention to resort to Compulsory Licenses (CL), if required, for ensuring the adequate supply of drugs for treating COVID-19. (Compulsory licensing is when a government allows someone else to produce a patented product or process without the consent of the patent owner or plans to use the patent-protected invention itself, according to the World Trade Organization.)

Israel issued a CL in March, 2020 to import generic versions of Kaletra of AbbVie, which is used for treating HIV/AIDS and has been found to be useful in COVID-19 cases. The Indian Patent Act, 1970, has a provision that enables export under CL. Exports under CL, if countries resort to it, would be an immediate opportunity for Indian pharmaceutical industry. But India's gains from the opportunity in the API business would depend on how swiftly its policymakers respond to it. While India is an exporter of certain APIs, it is quite dependent on China for many others, especially those produced through fermentation, and intermediates (chemical compound which is in the process of becoming an API from a raw material is called an intermediate). When supplies from Wuhan were affected, the price of paracetamol went up 40 per cent in India. In order to eliminate the dependence on China for APIs and intermediates and to promote their domestic production, the Union Cabinet, on March 21, 2020 decided to launch a scheme at a cost of ₹10,000 crore. Under the initiative, ₹3,000 crore will be used



to create common facilities in three API Parks, which are expected to be established by the private sector, while ₹6,940 crore will be used for the Production Linked Incentive (PLI) scheme over a period of eight years. Though this is a welcome initiative, it may not achieve the objective unless additional measures are incorporated to overcome the constraints India has compared to China. It is expected that common utilities at API Parks and PLI are sufficient to offset the price disadvantage that Indian API manufacturers have as compared to their Chinese counterparts. But it might not turn out to be so. Price competence that Chinese firms have acquired has two key aspects—their larger scale of operations and superior technologies. The average size of SEZs in India is about 1 per cent of the average size of SEZs in China. They use technologies that rely on cheaper raw materials like cauliflower for fermentation whereas our firms use glucose and lactose which are much costlier. Moreover, it may take about eight years to

set up API Parks and begin commercial production. By then, the Chinese are likely to have come up with even better technologies that further push the prices down. This possibility would amount to business insecurity for the potential Indian investors in the proposed API Parks. As we have a structural disadvantage in terms of the size of SEZs, we need to focus on cost-effective and greener technologies. This technology component has been missing in India's recent initiatives to boost domestic production of APIs and intermediates. Development of appropriate technologies has to be done in a mission mode and the large network of Council of Scientific and Industrial Research laboratories and public sector universities can be used. The business insecurity will be overcome if API Parks with common utilities are established by the government and then enterprises are invited to establish their production units there. This will considerably reduce the cost for producers and partly offset the disadvantage India has in terms of size of operations as compared to China.

(Author is an associate professor in Institute for Studies in Industrial Development, New Delhi)

Between A Cure And Access

As researchers scramble to come up with therapies to treat COVID-19, patents could keep the drugs out of reach for many

Latha Jishnu

IT IS a feverish hunt for ways to treat one of the deadliest infections the world has known since the 1918 Spanish flu. As millions more are infected by COVID-19, researchers are scrambling to come up with a range of items to cope with the pandemic—from easy-to-use diagnostic kits and medicines to the holy grail of them all: a vaccine against the severe acute respiratory syndrome (SARS) Coronavirus-2, which causes the COVID-19 disease. Vaccines, however, are a long way off even though over a hundred pharma companies, research institutions and global collaborations have been set up to find the magic

bullet to halt the pandemic. The vaccine hunters may be attracting big money and headlines, but as much of the research attention is focussed on existing therapies to help patients—especially those who become critically ill—to fight the virus. These endeavours are as fascinating as they are varied, drawing in systems biologists, Big Pharma, universities, start-ups and a host of others in an effort to stop SARS-COV-2 from reaping a deadly harvest. Since every virus is different, new drugs have to be developed to fight diseases. But this takes time—of several years—and requires humungous amounts of money.

COVID-19 does not allow us that kind of luxury; it spreads extraordinarily fast and that is the danger that hangs over the world, although compared to other viruses such as Ebola and Zika it is not so deadly. So readily available drugs are under the scanner in laboratories across the world where researchers are narrowing their search to find medicines that work best against the virus. Repurposing is the new strategy. It was the Chinese who showed the way. They used an experimental drug, remdesivir, developed by Gilead Sciences of USA to fight Ebola, in combination with chloroquine, the tried and tested warhorse in the battle against malaria. Remdesivir did not work against Ebola, but is one of the drugs showing promise in tackling COVID-19. There is also favipiravir, which was developed in 2008 by Fujifilm Toyama Chemical Co of Japan to treat the West Nile virus, foot and mouth disease and yellow fever,

and is reported to have shown "excellent results" in the treatment for COVID-19 in China in January and February, 2020. Several countries, notably Russia, are betting on Favipiravir, marketed as Avigen, to fight the COVID-19 pandemic. Elsewhere, too, innovative therapy involving a cocktail of drugs meant for different ailments has found to have been effective in treating patients. In Thailand, a combination of oseltamivir— used to treat influenza—and HIV drugs, lopinavir and ritonavir, have been used to cure a few patients with severe symptoms, according to press reports from Bangkok, but later reports from China said the tests had proved negative. Is it now a simple matter of producing enough remdesivir, favipiravir and certain HIV drugs to come up with a cure?

For one, there is the patent hurdle. For another, precious little research has gone into repurposing drugs in the country. The biggest block, of course, is the patent protection on drugs that are making news. This means generic drug firms cannot make inexpensive generic versions of the medicines. In India, the main patent on favipiravir expired in August last year, but there is a catch: Fujifilm Toyama holds four other patents on the molecule, one of which lasts till 2028. In the case of remdesivir, the patent claim was filed in October 2015, which means it will stay in force till 2035. Curiously, India approved the patent claim only in February, 2020 soon after reports emerged from China about its success in treating

COVID-19 in a combination therapy. A patient aid group has contested the patent, pointing out that remdesivir lacks novelty, creativity and an inventive step, which are perquisites for grant of patents. There are, however, other drugs which could be repurposed if the Indian generics industry is willing to do some research. The Quantitative Biosciences Institute (QBI) at the University of California, San Francisco, is offering such drugs on a platter. It first mapped how COVID-19 attacks human cells. It then worked round the clock, through a network of 22 labs, to identify existing drugs that can disrupt the pathways of the new virus. By March, 2020 it identified 27 FDA-approved drugs that could accelerate the development of a treatment and bring it to the market much faster than a new drug would take. Since many of the drugs are no longer patent generics, firms could use this research to select those drugs that are best suited to their expertise.

For the moment, it is the hype and desperation that are driving reports of successful treatments rather than the proven efficacy of the repurposed drugs. The problem is that no controlled, randomised tests have been conducted so far. For instance, Gilead rushed to publish a study "Compassionate use of remdesivir for patients with severe COVID-19" on April 10 in *The New England Journal of Medicine* which was assailed by pharma experts. Duncan Richards, clinical pharmacologist and professor of clinical therapeutics at the Oxford University who described "compassionate use" as unlicensed therapy, said: "Research based on this kind of use should be treated with extreme caution because there is no control group or randomisation which is the hallmarks of good practice in clinical trials." For Gilead, that was a major setback, coming in the wake of a major disappointment after China cancelled two clinical trials on remdesivir. On April 15, the Chinese authorities notified the USA multinational that it was unable to conduct the test on patients with severe symptoms because the epidemic had been controlled and no eligible patients could be enrolled.

A similar trial on patients with mild or moderate forms of COVID-19 was halted earlier. Gilead is now pursuing bigger trials. In India, no work appears to have started on therapies and there are indications that the health authorities are banking on remdesivir to see the country through. The chief of the Indian Council of Medical Research has said that it would

be using the drug if local companies could make it. Can they do so? Yes, if they secure a voluntary licence (VL) from Gilead. This appears to be a distinct possibility since some companies have announced plans to work on remdesivir in recent days. Besides, Gilead is known for using the VL route in India, which allows the company to dictate the terms of manufacture, from price and quantity to marketing restrictions. Compulsory licences (CLs) should be the preferred option since India's patent law allows their use in the case of a public health crisis. However, the Narendra Modi government is unlikely to plump for CLs since it could mean a confrontation with drug multinationals and the Trump Administration. This has become clear since Modi first came to power. The latest instance of such pusillanimity was the alacrity with which Delhi revised its policy barring exports of hydroxychloroquine after Donald Trump warned of retaliation if India did not supply the drug. This is in sharp contrast to what is happening elsewhere. A swathe of countries—from Germany to Chile and Israel—have recently passed laws to allow them to issue CLs and use other such measures to cope with the crises caused by the pandemic. The possibility of India coming out with its own treatment seems extremely slim at the moment. Yusuf Khwaja Hamied, the iconic chairperson of leading drugmaker, Cipla, has spoken of repurposing its HIV drug Lopimune— which is a combination of lopinavir and ritonavir—for the treatment of coronavirus.

He also said that work would commence on other promising anti-viral compounds—favipiravir, remdesivir and bolaxavir. But Hamied who gave hope to millions afflicted with HIV/AIDS may find himself hamstrung now. His company, like others in the country, is facing an acute shortage of active pharmaceutical ingredients (APIs) —raw materials used to make drugs— which is supplied by China. Over the past decade, the Chinese had become the principle supplier of APIs to India by undercutting domestic firms. The recklessness of such a short-sighted policy that allowed local API manufacture to die out has come back to haunt the country.

A patent pool?

It was a short letter that Costa Rican President Carlos Alvarado Quesada wrote to the WHO Director-General in March, 2020 but it contained an ambitious proposal. WHO, said Quesada, should create a pool of rights, on a voluntary basis, to all technologies that are useful in the detection, prevention, control and treatment of the COVID-19 pandemic. Quesada's proposal was grand in its scope. The pool should include not just rights in existing and future patented inventions and designs, copyrights and blueprints for manufacturing diagnostic tests, devices, drugs, or vaccines but also access to regulatory test data, know-how and cell lines. It should provide for free access or licensing on reasonable and affordable terms, in every member-country. He urged WHO develop an

initial concise memorandum of understanding on the intent to share rights in technologies funded by the public sector and other relevant actors, and reach out to member-states, non-profit institutions, industry and others, to sign such a MOU. The specific details could be worked out later. Tedros Adhanom Ghebreyesus welcomed the proposal immediately, saying that WHO was working closely with governments and agencies around the world to promote rapid R&D, an effort rooted in its "commitment to equitable access for all". While the WHO chief's anodyne response did not address the ticklish issues in Quesada's letter, beleaguered as he is by the withdrawal of financial support by USA President Donald Trump, support for the proposal came quickly, and from an unexpected quarter—the European Union. The 27-nation bloc, some of whose members have suffered the worst of the pandemic so far, is all for promoting "equitable access".

It proposed a draft resolution that urged the World Health Assembly (WHA), the decision-making body of WHO, to voluntarily pool intellectual property (IP) in order to ensure equitable access to vaccines, therapies and other medical products needed for combating the pandemic. The concept of a patent pool is not new. Ten years ago, the UN-backed Medicines Patent Pool (MPP) was set up to increase access to medicines to treat HIV, hepatitis C and TB for low- and middle-income countries. MPP partners with civil society, governments and

the pharma industry to license these lifesaving medicines to generic manufacturers who supply it at a much lower cost. So far, the pool has secured the IP for 18 drugs, some of them new, from the top innovator companies, showing that crucial partnerships can sometimes be forged with Big Pharma in a good cause. With the COVID-19 fatalities accelerating, mpp has decided to temporarily expand its mandate to include any health technology that could contribute to containing the pandemic. It has offered its IP and licensing expertise to WHO, thus adding to the momentum for a patents pool to fight COVID-19. WHO needs all the support it can get since nations which are diehard supporters of patent rights, foremost among them USA, are certain to baulk at the idea of IP sharing, especially of the sweeping nature that Costa Rica has proposed. That's why the EU proposal is significant. It means it has broken ranks with USA. May 2020 should tell us whether more nations are ready to do the right thing.

Amidst the pandemic, as WHO sought to garner support for an initiative to share the knowhow for treatments and vaccines for COVID-19, the biggest lobby group of pharmaceutical multinationals made its position clear: nothing doing. It was not entirely unexpected. Yet the manner and timing of Big Pharma's rejection of a patents pool to make the technology accessible to all was blunt to the point of being brutal. A day before WHO was to launch the COVID-19 Technology Access Pool, or C-Tap,

the International Federation of Pharmaceutical Manufacturers and Associations (IFPMA) held an online media briefing on progress related to COVID-19 vaccines with chief executives from four of its top member-companies, Pfizer, GlaxoSmithKline (GSK), Johnson & Johnson and AstraZeneca participating. It is clear that despite the hype, deflections and semi-truths, the world is not all that close to developing a vaccine against the new coronavirus SARS-COV-2 although billions of dollars are being thrown into the hunt. As COVID-19 infections and fatalities spiked, it would make sense for governments and the pharma industry to respond positively to the WHO call for "open and collaborative approaches in pre-competitive drug discovery" to stop the spread of the disease.

But companies have other priorities like protecting bottom lines and pushing up shareholder value than equitable access on their mind. That's why we heard some rather startling statements at the IFMPA briefing. Pascal Soriot, CEO of Astra Zeneca, claimed he was unaware of the WHO patent pool, bizarre as it sounded. But pressed on the issue, he said IP was fundamental for drug companies; if you don't protect it there's no incentive for anyone to innovate. The British firm has received more than $1 billion from USA for development, production and delivery of the vaccine that it has licensed from Oxford University. So which company would get first rights to the vaccine, the UK or USA? Everyone, of course! The sharpest rejection of C-Tap came from Albert

Bourla, Pfizer chief executive. He thought "it is nonsense and at this point of time also dangerous". Why? Because the risks the companies were taking involved billions of dollars and the chances of developing something were still not very good. In other words, Big Pharma is in a tough spot and all this talk of freely sharing IP and data is misplaced. Besides, as GSK's boss Emma Walmsley contends there isn't all that much evidence that IP is a barrier to access. Just look at the great work GAVI, the global vaccine alliance is doing through a public-private partnership. There was much praise for Bill Gates and his charitable foundation which is doing so much to widen access to vaccines by supporting GAVI and other initiatives like CEPI (Coalition for Epidemic Preparedness Innovations). The Gates Foundation does play a significant role. It's an investor in two of these companies to which it also makes huge donations, reveals the venerable New York magazine *The Nation*. Charity and business make for a good partnership.

(Author is a columnist)

A ray of hope for global solidarity

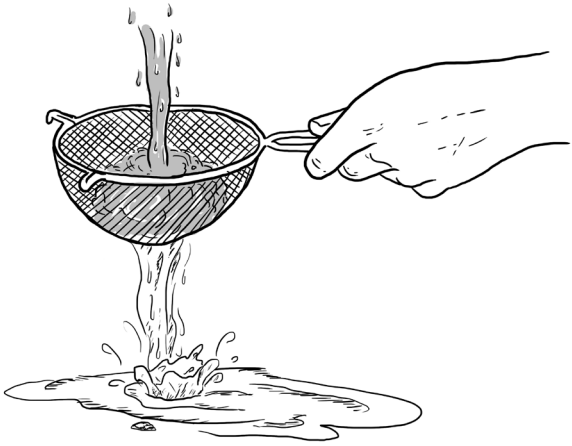
This is the right time to accelerate efforts to ensure universal access to safe water and sanitation

Dhesigen Naidoo

WE ARE in the throes of an unprecedented global pandemic, perhaps unexpectedly with a variant of a virus we collectively contained and managed in the SARS epidemic of 2002-2004. This new SARS-COV-2, or COVID-19, has thrown the world into a storm, with no corner on Earth unaffected. Its impact has already been severe on the social, political, economic, security and health fronts. Our anxiety for personal and collective safety has risen to understandably high levels. Our governments are investing in war-like strategies such as lockdowns and total isolation to flatten the infections curve and maintain

the numbers with levels that our mostly fragile, and under-resourced, health systems can manage.

Water is central to both the containment of infections as well as the treatment regimen of those who are infected and ill. Regular washing, in particular hand-washing, is one of the better lines of defense against the further spread of the virus. Hand-washing campaigns have gone to the top of the list of many national interventions. What this has inevitably done, as crises generally do, is put a magnifying glass on the issues of water security and safe sanitation access. And once again, worldwide, but mainly in the Global South, we have been found wanting Using the budget prioritisation for emergency measures, water access has become a key objective with tanker services, water harvesting and storage tanks being key short-term measures. Similarly, access to safe sanitation and organising for rapid de-densification of settlements and slums are key interventions in the COVID-19 response plan of governments. This, together with the measures to ensure short-term food security and a measure of economic safety nets, will help us toward being in reasonable shape, as individuals and nations—both through, and especially beyond, this crisis. One of the many risks associated with this pandemic is the slowing of the pace in achieving development targets, including the Sustainable Development Goals (SDGs). There is a high probability that SDG-6, the goal for water and sanitation, will be further delayed.



Depending on the global recovery time from the crisis, this could be for a long time. In this flurry of emergency responses, it is important to note that we also have the opportunity to do the opposite. We can, in fact, accelerate our efforts toward the SDGs in the medium term, and be firmly on the pathway to sustainable development and a lower carbon economy in the long term.

This is the moment when in many countries in the world unsafe water and poor sanitation are key COVID-19 risk factors on the one hand, and core to the containment and recovery strategy on the other. They are enjoying much political attention in the public sector and huge focus in the private sector. This must be the right time to engage in catalytic actions to leap-frog the current system constraints to universal access to safe water and sanitation with

concomitant, smarter, eco-friendly waste and wastewater treatment. This should be complemented by the industrialisation of the beneficiation of waste and wastewater to produce fertilizers, energy, high value chemicals, lipids and proteins. These actions will prove transformative—economically, socially and environmentally. To make this a reality, there are some critical success factors. Firstly, we have to heighten our efforts to translate the vast repository of scientific and technological knowledge in this domain to tangible products and services for immediate use on the ground. There will have to be substantive support to product and business development and an overhaul of our archaic regulatory rules and operating procedures. Secondly, we need new economic models to effect large-scale implementation and sustainable operations and maintenance. Thirdly, we need to bolster our partnerships between science and society, governments and business, local and international. COVID-19 has introduced a ray of hope for new global solidarity. It has emphasised that we are unarguably friends in need, let us become friends indeed!

(Author is chief executive officer, Water Research Commission, South African government)

Economy & globalisation

Pandemic recession

Socialism

De-globalisation

Barbarism

Rise of the state

Poverty

Decline of development gains

Global supply chain

What will the world be like after coronavirus?

Four possible futures are: a descent into barbarism, a robust state capitalism, a radical state socialism, and a transformation into a big society built on mutual aid

Simon Mair

WHERE WILL we be in six months, a year, and 10 years from now? I lie awake at night wondering what the future holds for my loved ones. My vulnerable friends and relatives. I wonder what will happen to my job, even though I'm luckier than many: I get good sick pay and can work remotely. I am writing this from the UK, where I still have self-employed friends who are staring down the barrel of months without pay, friends who have already lost jobs. The contract that pays 80 per cent of my salary runs out in December. Coronavirus is hitting the economy

badly. Will anyone be hiring when I need work? There are a number of possible futures, all dependent on how governments and society respond to coronavirus and its economic aftermath. Hopefully we will use this crisis to rebuild, produce something better and more humane. But we may slide into something worse. I think we can understand our situation—and what might lie in our future— by looking at the political economy of other crises. My research focuses on the fundamentals of the modern economy: global supply chains, wages, and productivity. I look at the way that economic dynamics contribute to challenges like climate change and low levels of mental and physical health among workers. I have argued that we need a very different kind of economics if we are to build socially just and ecologically sound futures. In the face of COVID-19, this has never been more obvious. The responses to the COVID-19 pandemic are simply the amplification of the dynamic that drives other social and ecological crises: the prioritisation of one type of value over others. This dynamic has played a large part in driving global responses to COVID-19. So as responses to the virus evolve, how might our economic futures develop? From an economic perspective, there are four possible futures: a descent into barbarism, a robust state capitalism, a radical state socialism, and a transformation into a big society built on mutual aid. Versions of all of these futures are perfectly possible, if not equally desirable.

Small changes don't cut it

Coronavirus, like climate change, is partly a problem of our economic structure. Although both appear to be "environmental" or "natural" problems, they are socially driven. Yes, climate change is caused by certain gases absorbing heat. But that's a very shallow explanation. To really understand climate change, we need to understand the social reasons that keep us emitting greenhouse gases. Likewise with COVID-19. Yes, the direct cause is the virus. But managing its effects requires us to understand human behaviour and its wider economic context. Tackling both COVID-19 and climate change is much easier if you reduce nonessential economic activity. For climate change this is because if you produce less stuff, you use less energy, and emit fewer greenhouse gases. The epidemiology of COVID-19 is rapidly evolving. But the core logic is similarly simple. People mix together and spread infections. This happens in households, and in workplaces, and on the journeys people make. Reducing this mixing is likely to reduce person-to-person transmission and lead to fewer cases overall. Reducing contact between people probably also helps with other control strategies. One common control strategy for infectious disease outbreaks is contact tracing and isolation, where an infected person's contacts are identified, then isolated to prevent further disease spread. This is most effective when you trace a high percentage of contacts. The fewer contacts a person has, the fewer

you have to trace to get to that higher percentage. We can see from Wuhan that social distancing and lockdown measures like this are effective. Political economy is useful in helping us understand why they weren't introduced earlier in European countries and USA.

A fragile economy

Lockdown is placing pressure on the global economy. We face a serious recession. This pressure has led some world leaders to call for an easing of lockdown measures. Even as many countries sat in a state of lockdown, the US president, Donald Trump, and Brazilian President Jair Bolsonaro called for roll backs in mitigation measures. Trump called for the American economy to get back to normal in three weeks (he later accepted that social distancing would need to be maintained for much longer). Bolsonaro said: "Our lives have to go on. Jobs must be kept…We must, yes, get back to normal." In the UK meanwhile, four days before calling for a three-week lockdown, Prime Minister Boris Johnson was only marginally less optimistic, saying that the UK could turn the tide within 12 weeks. Yet even if Johnson is correct, it remains the case that we are living with an economic system that will threaten collapse at the next sign of pandemic.

The economics of collapse are fairly straightforward. Businesses exist to make a profit. If they can't produce, they can't sell things. This means they

won't make profits, which means they are less able to employ you. Businesses can and do (over short time periods) hold on to workers that they don't need immediately: they want to be able to meet demand when the economy picks back up again. But, if things start to look really bad, then they won't. So, more people lose their jobs or fear losing their jobs. So they buy less. And the whole cycle starts again, and we spiral into an economic depression. In a normal crisis the prescription for solving this is simple. The government spends, and it spends until people start consuming and working again. (This prescription is what the economist John Maynard Keynes is famous for). But normal interventions won't work here because we don't want the economy to recover (at least, not immediately). The whole point of the lockdown is to stop people going to work, where they spread the disease.

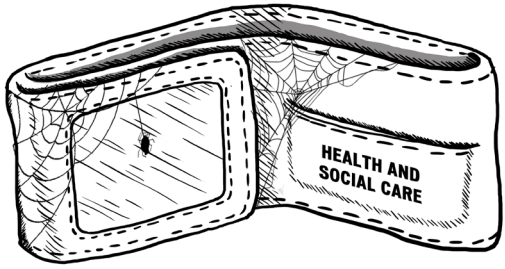
One recent study suggested that lifting lockdown measures in Wuhan (including workplace closures) too soon could see China experience a second peak of cases later in 2020. As the economist James Meadway wrote, the correct COVID-19 response isn't a wartime economy—with massive upscaling of production. Rather, we need an "anti-wartime" economy and a massive scaling back of production. And if we want to be more resilient to pandemics in the future (and to avoid the worst of climate change) we need a system capable of scaling back production in a way that doesn't mean loss of livelihood. So

what we need is a different economic mindset. We tend to think of the economy as the way we buy and sell things, mainly consumer goods. But this is not what an economy is or needs to be. At its core, the economy is the way we take our resources and turn them into the things we need to live. Looked at this way, we can start to see more opportunities for living differently that allow us to produce less stuff without increasing misery. I and other ecological economists have long been concerned with the question of how you produce less in a socially just way, because the challenge of producing less is also central to tackling climate change. All else equal, the more we produce the more greenhouse gases we emit. So how do you reduce the amount of stuff you make while keeping people in work? Proposals include reducing the length of the working week, or, as some of my recent work has looked at, you could allow people to work more slowly and with less pressure. Neither of these is directly applicable to COVID-19, where the aim is reducing contact rather than output, but the core of the proposals is the same. You have to reduce people's dependence on a wage to be able to live.

What is the economy for?

The key to understanding responses to COVID-19 is the question of what the economy is for. Currently, the primary aim of the global economy is to facilitate exchanges of money. This is what economists call "exchange value". The dominant idea of the current

system we live in is that exchange value is the same thing as use value. Basically, people will spend money on the things that they want or need, and this act of spending money tells us something about how much they value its "use". This is why markets are seen as the best way to run society. They allow you to adapt, and are flexible enough to match up productive capacity with use value. What COVID-19 is throwing into sharp relief is just how false our beliefs about markets are. Around the world, governments fear that critical systems will be disrupted or overloaded: supply chains, social care, but principally healthcare. There are lots of contributing factors to this. But let's take two. First, it is quite hard to make money from many of the most essential societal services. This is in part because a major driver of profits is labour productivity growth: doing more with fewer people. People are a big cost factor in many businesses, especially those that rely on personal interactions, like healthcare. Consequently, productivity growth in the healthcare sector tends to be lower than the rest of the economy, so its costs go up faster than average. Second, jobs in many critical services aren't those that tend to be highest valued in society. Many of the best paid jobs only exist to facilitate exchanges; to make money. They serve no wider purpose to society: they are what the anthropologist David Graeber calls "bullshit jobs". Yet because they make lots of money we have lots of consultants, a huge advertising industry and a massive financial sector.



Meanwhile, we have a crisis in health and social care, where people are often forced out of useful jobs they enjoy, because these jobs don't pay them enough to live.

Pointless jobs

The fact that so many people work pointless jobs is partly why we are so ill prepared to respond to COVID-19. The pandemic is highlighting that many jobs are not essential, yet we lack sufficient key workers to respond when things go bad. People are compelled to work pointless jobs because in a society where exchange value is the guiding principle of the economy, the basic goods of life are mainly available through markets. This means you have to buy them, and to buy them you need an income, which comes from a job. The other side of this coin is that the most radical (and effective) responses that we are seeing to the COVID-19 outbreak challenge the dominance of markets and exchange value. Around the world governments are taking actions that three months ago looked impossible. In Spain, private hospitals have been nationalised. In the UK, the

prospect of nationalising various modes of transport has become very real. And France has stated its readiness to nationalise large businesses. Likewise, we are seeing the breakdown of labour markets. Countries like Denmark and the UK are providing people with an income in order to stop them from going to work. This is an essential part of a successful lockdown. These measures are far from perfect. Nonetheless, it is a shift from the principle that people have to work in order to earn their income, and a move towards the idea that people deserve to be able to live even if they cannot work. This reverses the dominant trends of the last 40 years. Over this time, markets and exchange values have been seen as the best way of running an economy. Consequently, public systems have come under increasing pressures to marketise, to be run as though they were businesses who have to make money. Likewise, workers have become more and more exposed to the market—zero-hours contracts and the gig economy have removed the layer of protection from market fluctuations that long term, stable, employment used to offer. COVID-19 appears to be reversing this trend, taking healthcare and labour goods out of the market and putting it into the hands of the state. States produce for many reasons. Some good and some bad. But unlike markets, they do not have to produce for exchange value alone. These changes give me hope. They give us the chance to save many lives. They even hint at the possibility of longer term

change that makes us happier and helps us tackle climate change. But why did it take us so long to get here? Why were many countries so ill-prepared to slowdown production? The answer lies in a recent World Health Organization (WHO) report: they did not have the right "mindset".

Our economic imaginations

There has been a broad economic consensus for 40 years. This has limited the ability of politicians and their advisers to see cracks in the system, or imagine alternatives. This mindset is driven by two linked beliefs:

- The market is what delivers a good quality of life, so it must be protected;
- The market will always return to normal after short periods of crisis.

These views are common to many Western countries. But they are strongest in the UK and USA, both of which have appeared to be badly prepared to respond to COVID-19. In the UK, attendees at a private engagement reportedly summarised the Prime Minister's most senior aide's approach to COVID-19 as "herd immunity, protect the economy, and if that means some pensioners die, too bad". The government has denied this, but if real, it's not surprising. At a government event early in the pandemic, a senior civil servant said to me: "Is it worth the economic disruption? If you look at the treasury valuation of a life, probably not." This kind of view is endemic

in a particular elite class. It is well represented by a Texas official who argued that many elderly people would gladly die rather than see USA sink into economic depression. This view endangers many vulnerable people (and not all vulnerable people are elderly), and, as I have tried to lay out here, it is a false choice. One of the things the COVID-19 crisis could be doing is expanding that economic imagination. As governments and citizens take steps those three months ago seemed impossible, our ideas about how the world works could change rapidly. Let us look at where this re-imagining could take us.

Four futures

To help us visit the future, I'm going to use a technique from the field of futures studies. You take two factors you think will be important in driving the future and you imagine what will happen under different combinations of those factors. The factors I want to take are value and centralisation. Value refers to whatever is the guiding principle of our economy. Do we use our resources to maximise exchanges and money, or do we use them to maximise life? Centralisation refers to the ways that things are organised, either by of lots of small units or by one big commanding force. We can organise these factors into a grid, which can then be populated with scenarios. So we can think about what might happen if we try to respond to the coronavirus with the four extreme combinations: 1) State cap-

italism: centralised response, prioritising exchange value; 2) Barbarism: decentralised response prioritising exchange value; 3) State socialism: centralised response, prioritising the protection of life; and 4) Mutual aid: decentralised response prioritising the protection of life.

State capitalism

State capitalism is the dominant response we are seeing across the world right now. Typical examples are the UK, Spain and Denmark. The state capitalist society continues to pursue exchange value as the guiding light of the economy. But it recognises that markets in crisis require support from the state. Given that many workers cannot work because they are ill, and fear for their lives, the state steps in with extended welfare. It also enacts massive Keynesian stimulus by extending credit and making direct payments to businesses. The expectation here is that this will be for a short period. The primary function of the steps being taken is to allow as many businesses as possible to keep on trading. In the UK, for example, food is still distributed by markets (though the government has relaxed competition laws). Where workers are supported directly, this is done in ways that seek to minimise disruption of normal labour market functioning. So, for example, as in the UK, payments to workers have to be applied for and distributed by employers. And the size of payments is made on the basis of the exchange value a worker

usually creates in the market, rather than the usefulness of their work. Could this be a successful scenario? Possibly, but only if COVID-19 proves controllable over a short period. As full lockdown is avoided to maintain market functioning, transmission of infection is still likely to continue. In the UK, for instance, non-essential construction is still continuing, leaving workers mixing on building sites. But limited state intervention will become increasingly hard to maintain if death tolls rise. Increased illness and death will provoke unrest and deepen economic impacts, forcing the state to take more and more radical actions to try to maintain market functioning.

Barbarism

This is the bleakest scenario. Barbarism is the future if we continue to rely on exchange value as our guiding principle and yet refuse to extend support to those who get locked out of markets by illness or unemployment. It describes a situation that we have not yet seen. Businesses fail and workers starve because there are no mechanisms in place to protect them from the harsh realities of the market. Hospitals are not supported by extraordinary measures, and so become overwhelmed. People die. Barbarism is ultimately an unstable state that ends in ruin or a transition to one of the other grid sections after a period of political and social devastation. Could this happen? The concern is that either it could happen by mistake during the pandemic or by

intention after the pandemic peaks. The mistake is if a government fails to step in a big enough way during the worst of the pandemic. Support might be offered to businesses and households, but if this isn't enough to prevent market collapse in the face of widespread illness, chaos would ensue. Hospitals might be sent extra funds and people, but if it's not enough, ill people will be turned away in large numbers. Potentially just as consequential is the possibility of massive austerity after the pandemic has peaked and governments seek to return to "normal". This has been threatened in Germany. This would be disastrous. Not least because defunding of critical services during austerity has impacted the ability of countries to respond to this pandemic. The subsequent failure of the economy and society would trigger political and social unrest, leading to a failed state and the collapse of both state and community welfare systems.

State socialism

State socialism describes the first of the futures we could see with a cultural shift that places a different kind of value at the heart of the economy. This is the future we arrive at with an extension of the measures we are currently seeing in the UK, Spain and Denmark. The key here is that measures like nationalisation of hospitals and payments to workers are seen not as tools to protect markets, but a way to protect life itself. In such a scenario, the state steps in to protect the parts of the economy that

are essential to life: the production of food, energy and shelter for instance, so that the basic provisions of life are no longer at the whim of the market. The state nationalises hospitals, and makes housing freely available. Finally, it provides all citizens with a means of accessing various goods—both basics and any consumer goods we are able to produce with a reduced workforce. Citizens no longer rely on employers as intermediaries between them and the basic materials of life. Payments are made to everyone directly and are not related to the exchange value they create. Instead, payments are the same to all (on the basis that we deserve to be able to live, simply because we are alive), or they are based on the usefulness of the work. Supermarket workers, delivery drivers, warehouse stackers, nurses, teachers, and doctors are the new CEOs.

It's possible that state socialism emerges as a consequence of attempts at state capitalism and the effects of a prolonged pandemic. If deep recessions happen and there is disruption in supply chains such that demand cannot be rescued by the kind of standard Keynesian policies we are seeing now (printing money, making loans easier to get and so on), the state may take over production. There are risks to this approach—we must be careful to avoid authoritarianism. But done well, this may be our best hope against an extreme COVID-19 outbreak. A strong state able to marshal the resources to protect the core functions of economy and society.

Mutual aid

Mutual aid is the second future in which we adopt the protection of life as the guiding principle of our economy. But, in this scenario, the state does not take a defining role. Rather, individuals and small groups begin to organise support and care within their communities. The risks with this future are that small groups are unable to rapidly mobilise the kind of resources needed to effectively increase health-care capacity, for instance. But mutual aid could enable more effective transmission prevention, by building community support networks that protect the vulnerable and police isolation rules. The most ambitious form of this future sees new democratic structures arise. Groupings of communities that is able to mobilise substantial resources with relative speed. People coming together to plan regional responses to stop disease spread and (if they have the skills) to treat patients. This kind of scenario could emerge from any of the others.

It is a possible way out of barbarism, or state capitalism, and could support state socialism. We know that community responses were central to tackling the West African Ebola outbreak. And we already see the roots of this future today in the groups organising care packages and community support. We can see this as a failure of state responses. Or we can see it as a pragmatic, compassionate societal response to an unfolding crisis.

Hope and fear

These visions are extreme scenarios, caricatures, and likely to bleed into one another. My fear is the descent from state capitalism into barbarism. My hope is a blend of state socialism and mutual aid: a strong, democratic state that mobilises resources to build a stronger health system, prioritises protecting the vulnerable from the whims of the market and responds to and enables citizens to form mutual aid groups rather than working meaningless jobs. What hopefully is clear is that all these scenarios leave some grounds for fear, but also some for hope. COVID-19 is highlighting serious deficiencies in our existing system. An effective response to this is likely to require radical social change. I have argued it requires a drastic move away from markets and the use of profits as the primary way of organising an economy. The upside of this is the possibility that we build a more humane system that leaves us more resilient in the face of future pandemics and other impending crises like climate change. Social change can come from many places and with many influences. A key task for us all is demanding that emerging social forms come from an ethic that values care, life, and democracy. The central political task in this time of crisis is living and (virtually) organising around those values.

(Author is research fellow in Ecological Economics, Centre for the Understanding of Sustainable Prosperity, University of Surrey, the UK)

Pandemics are the spillovers of globalisation

The world is as strong as its weakest links

Ian Goldin

I HAVE felt the need to rethink globalisation for very long now. We know globalisation is very good as it lifts people out of poverty, creates opportunities, spreads vaccines and medicines, jobs and finance. That is one of the reasons India like many other developing countries have seen rapid progress. It is sharing of ideas, technologies, skills, good and services, finance with other countries which defines the beneficial part of globalisation. But it also very dangerous and can be very ugly. I always think globalisation as the good, the bad and the ugly. In order

to harvest the benefits, one has to manage the risks. But what we are seeing is that people are not managing the risks, and this is making globalisation dangerous. Dangers like pandemics are the spillovers of globalisation.

Integration of China with the world economy, 1.4 billion tourists, business travellers around the world every year are not only spreading good things, but also spreading bad things. Take the case of pandemics like that of the COVID-19. The rapid growth of cities like Mumbai and Wuhan which have airports means that anything that happens in these cities can go across the world in just a few days. And this is what we are seeing in this pandemic. This spread is not only in pandemics, we saw this spread in the financial crisis in 2008 too, cyber viruses which are spread around the world are another example, and there are also existential unintended consequences of rapid growth coming from globalisation, like climate change.

The answer is not de-globalisation. The answer is not to build high walls. There is no wall high enough even for mighty countries like India, China and USA to keep out the great threats in the future. These are the threats such as climate change, pandemics and financial crises. These high walls keep out ideas, technologies, vaccines and finance.

What is missing from globalisation is political globalisation and human globalisation. We need to recognise that the world is as strong as its weakest

links. We have countries turning their backs on the United Nations. This is not fit for the 21st century. Global agencies are doing their best, but their shareholders, the governments, are not reforming and empowering them. That is the challenge.

What is more going to happen, globalisation or de-globalisation? It depends on how you define globalisation and what you are talking about. If you are talking about Asia, my sense is that we would continue to see a rapid growth of Asian economies like India, China and Indonesia. They will also recover when the pandemic is over. We will see growth in other places too, but at a slower pace. We are not entering de-globalisation, and but only entering globalisation of a different nature. We are more likely to see less of manufacturing trade, but more services trade. Asian countries recognise that they need the benefits of globalisation, which I don't see

being reversed. If these are being reversed, it would be detrimental. Of course, we also need policies to manage the risks of globalisation.

To control pandemics, countries need the capacity to monitor and respond. When governments allocate resources, the military is given 100 or more times more than health and pandemic preparedness. We need to reverse the trend and catch up with the world threats. We need to increase investment in surveillance and in the overall healthcare system. It also requires investment in improving hygiene and sanitation, upgrading of slums and informal settlements, investing in health research, investment in regulation and enforcement. It also requires changes in behavioural patterns. For example, people should not touch their faces so often, they should wash hands more often. Such measures can reduce the risk of infectious diseases. The current pandemic has made people aware of this. I hope we can use this as an opportunity to learn, so that we do not have another pandemic and also are better able to manage other systemic risks such as climate change.

(Based on a conversation with Ian Goldin. He is an economist and professor of globalisation and development at the University of Oxford. He forecasted a pandemic similar to the current one in his book The Butterfly Defect: How Globalization Creates Systemic Risk, and What to Do about It*)*

Global poverty will be up for the first time since the 1990s

The resources needed to lift the incomes of the poor to above the poverty line could increase by 60 per cent

Andy Sumner, Christopher Hoy & Eduardo Ortiz-Juarez

As COVID-19 slowed in developed countries, the virus's spread was speeding up in the developing world. By May, 2020, three-quarters of new cases detected each day were in developing countries. And as the pandemic spread, governments faced juggling the health consequences with economic ones as this shifted to becoming an economic crisis. Our research shows that the poverty impact of the crisis will soon be felt in three key ways. There is likely to be more poverty. It is likely to become more severe. And as a consequence, the location of global

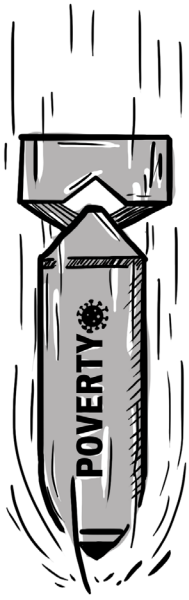
poverty will also change.

Having looked at estimates from a range of sources – including the Asian Development Bank, Goldman Sachs, IMF and OECD–we considered three possible economic scenarios stemming from COVID-19, where global income and consumption contracted by 5 per cent, 10 per cent or 20 per cent. We found that the economic shock of the worst-case scenario could result in up to 1.12 billion people worldwide living in extreme poverty – up from 727 million in 2018.

This confirms our earlier estimates that the coronavirus could push up to 400 million people into extreme poverty, defined by the World Bank as living on less than US$1.90 per day – the average poverty line in low-income developing countries. This number rises to over 500 million if using the World Bank's higher average poverty lines for lower middle-income (US$3.20) and upper middle-income (US$5.50) developing countries.

The potential increase is driven by millions of people living just above the poverty line. These people are likely to be badly affected because many of them work in the informal sector, where there is often little in the way of social security. Such a rise in extreme poverty would mark the first absolute increase in the global count since 1999 – and the first since 1990 in terms of the proportion of the global population living in poverty.

On the intensity of the poverty, the resources



needed to lift the incomes of the poor to above the poverty line could increase by 60 per cent, from US$446m a day in the absence of the crisis to above US$700m a day. For the existing extreme poor and those newly living in extreme poverty, their loss in income could amount to US$500m per day.

In terms of where poverty is located, it is likely to increase dramatically in middle-income developing

countries in Asia, such as India, Pakistan, Indonesia and the Philippines. This point to the fact that much of the previously poor population in these countries moved to just above the poverty line. In other words, these countries' recent economic progress has been relatively fragile. We'll also likely see new poverty in countries where it has remained relatively high over the last three decades, such as Tanzania, Nigeria, Ethiopia and the DRC.

How to respond to the poverty pandemic

COVID-19 poses a significant threat to developing countries, as their health systems tend to be weaker. More severe cases have also been linked to high blood pressure, diabetes and air pollution, all of which are prevalent in developing countries. Meanwhile, there are suggestions that COVID-19 could hinder the treatment of other illnesses such as TB, HIV/AIDS and chronic malaria.

But developing countries generally have a lower proportion of people at high risk from COVID-19 in terms of age (>70 years). As such, economic shocks may pose a greater relative risk to their populations. The question emerges as to whether lockdowns are the best option to contain the virus in developing countries if they entail severe income losses. Estimates of the share of jobs that can be performed at home is less than 25 per cent for many developing countries–much lower than the ~40 per cent recorded in, for example, USA and Finland. It's as low

as ~5 per cent in countries such as Madagascar and Mozambique.

Consequently, there's also a clear need for a range of social safety-net policies. These already exist in many developing countries, but their coverage and funding needs to be expanded substantially. Such policies include cash transfer programmes, universal one-off cash payments, in-kind food/vouchers, school feeding schemes and public works programmes. In middle-income developing countries, these are funded by the national government, whereas in low-income countries these are often co-funded by donors. Any set of policies should also incorporate "pay to stay home" or "pay to get tested" schemes.

The long crisis

Looking further ahead, the poverty impacts beyond 2020 are closely related to if or when an effective vaccine is developed. Even if we take the best-case scenario and a vaccine is discovered later this year, it's uncertain how long it would take to reach the entire global population. It could take years.

There is no guarantee developing countries would get access to the vaccine at a reasonable cost, or if everyone in developing countries would get the vaccine for free. We could end up living in a new COVID-19 apartheid, with the vaccinated and non-vaccinated residing in separate areas and working in different labour markets. This is a startling but very real possibility that no one is talking about much yet.

While this might sound far off, there are already some countries – such as Chile – issuing "immunity passports". Such passports might determine what work people can do by determining where they can go. This could leave the poorest without access to earning opportunities or only with lower-income opportunities if their movement is restricted. The crisis is increasingly looking like a long crisis. If so, it will have repercussions on global poverty for years to come.

(Andy is Professor of International Development, King's College London; Christopher is Research and Policy Fellow, Australian National University; and Eduardo, a PhD Student, King's College London)

Who is to blame?

This pandemic has brought the failures of the neo-liberal economic model, almost literally, to our doors

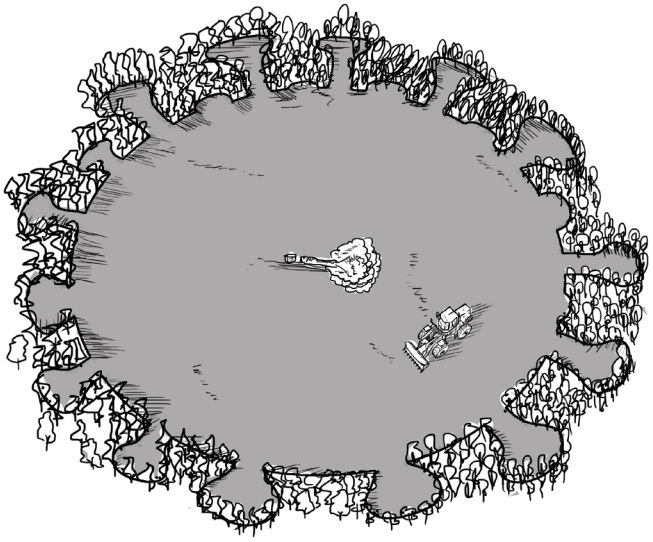
Mridula Mary Paul & Abi T Vanak

Every crisis needs a good scapegoat. In the case of the novel coronavirus pandemic, we seem to have found multiple. Starting from bats and Chinese culinary adventurism, to natural habitat destruction and industrial food production, we have linked this pandemic to various causes, each championed by its own chorus of archangels—ranging from environmental scientists to first-world Gaia-worshipping vegans. While we must never deny anyone the glory of their "I told you so" moments, but that seems to be as far as many of us are willing to go. The role played by the global economic structures that fomented this pandemic is obscured behind our million small

indignations.

When we hear concerns expressed about the effects of the pandemic on the economy, we don't realise we have it all backwards. Diseases are not a threat to the economy. The economic juggernaut that led us here is the real threat we should be worrying about. Diseases are symptomatic of this. We can find a cure. We can make a vaccine. We can hug a few trees, recycle our beer cans, and righteously munch on non-GMO kale. But what do we do about the systemic failings of the neo-liberal economic system that is at the root of the crisis we are in the midst of?

Acquiring diseases from animals is not a new phenomenon. It has been commonplace for much of human history. Zoonotic pathogens are plentiful on the planet. In most cases, humans are dead-end hosts—there is no further human-to-human transmission, thus reducing the chances of an outbreak. However when incidences of cross-species transmission, referred to as "viral chatter" increases, there are greater chances that a pathogen with the capacity for human-to-human transmission slips through, potentially turning into an epidemic. We are now at a point where conditions needed for an infectious disease outbreak are lined up perfectly. It only needed that final spark, which in the case of COVID-19, were wild meat or 'wet' markets. There have been others, at other times. The structural conditions that enabled these, however, have remained the same.



Framing the pandemic simplistically as a public health crisis—one that was caused by strange eating habits of people in faraway places—suits the neo-liberal economic narrative. Corporations and governments, that have wrought havoc with the environment in myriad ways, have been masters of deflection. With allies among a certain brand of largely urban conservationists and animal rights activists, they have excelled in passing the buck on to the smallest actors at the outer edges of the economic machinery. In this worldview, clear-felling of entire forests was a legitimate economic endeavour, while collecting firewood for subsistence was portrayed as a threat to the environment.

Large-scale aquaculture that laid waste entire landscapes with their introduced salinity were alright, but artisanal fisheries were deemed over-ex-

ploitative. Oil palm and soy plantations in rainforests were couched in the language of development and progress, but shifting cultivation by a few communities was singled out as a major threat to the planet. Industrialised cattle farming was not demonised, even when it led to bovine spongiform encephalopathy or the mad-cow disease in the UK, but subsistence hunting and eating wild meat was a conservation (and now, a health) crisis.

It is not that we are entirely oblivious. The links between the destruction of the natural environment and the emergence of disease is widely, if grudgingly, accepted. We know that economic activities like mining, logging, road-building, and plantations in areas of high biodiversity (and therefore higher diversity of host-pathogen interactions) are creating more avenues for these pathogens to jump from animals to humans. We are aware that the economic growth imperatives that demanded cuts to social funding have weakened public health systems globally, thus making it easier for emerging infectious diseases to spiral out of control. Yet it is around the ban of wildlife markets that we see a wide-ranging consensus emerging.

While wild meat might be a luxury consumable in some parts of the world, in others parts, it is vital for the nutritional security for poor communities. Furthermore, wild meat represents only a fraction of global meat consumption. Rather, it is the large livestock production chains that are known hubs of

zoonoses, as seen in the 1997 outbreak of the Asian highly pathogenic avian influenza A (H5N1) virus. But no one is rushing to ban commercial poultry production just yet.

This is not to say that all small-scale economic activity is sustainable. The injection of capital and the ubiquitousness of the market have made sure that traditional systems that ensured stable relationships between humans and their environment have largely broken down. Wild meat consumption is not a subsistence endeavour in every case. A study from Cameroon showed that commercial timber felling deep within forests brought roads, more people, crowded habitations, poor sanitation, and an increased demand for wild meat—essentially, the ideal cocktail for zoonotic diseases to emerge, as was seen in the case of Ebola.

Areas like these, usually in tropical countries, are referred to as 'hotspots' for infectious disease. We have conveniently pathologised entire landscapes, rather than call into question the large-scale economic ventures that disrupt environments and societies in these areas. Given that these ventures are spurred by the demand and consumption habits of many of us, perhaps we are wary of asking the question that would implicate our own selves.

Instead of introspection, what we encounter in discussions of the pandemic is platitudes about finding better ways to modify environments. Despite living through one of the biggest backlashes of

the economic system, we are still in pursuit of its 'sustainable' version. One that has proved to be so elusive thus far that it may be time to accept that it probably does not exist. What we need to discuss instead is how to fundamentally alter our economic and development systems to put the environment at the centre of the equation. A system that reverses centuries of inequity and prioritises the wellbeing of humanity, and not the comfort of a few.

Optimism is naturally in short supply when even in the midst of a pandemic that we know was caused by environmental destruction, governments continue to clear projects that cut through prime forest lands. This pandemic has brought the failures of the neo-liberal economic model, almost literally, to our doors. So much so that most of humanity is trapped in their homes, and cannot leave. If the incontrovertible evidence in the tragic form of the rising human death toll of this disease does not force us to confront the structures that brought it about, there may be no one left to blame pretty soon.

(Paul is a senior policy analyst with ATREE and Vanak is convenor of the Centre for Biodiversity and Conservation, ATREE)

Multiple poverty shocks

The pandemic has exacerbated poverty and the inter-generational transfer of poverty. Denial is no longer possible

Aasha Kapur Mehta & Rupal Dalal

We are living through a time of extreme adversity. The entire country is in lockdown in an attempt to survive the threat of the coronavirus pandemic. Economic activity is at a standstill. All plans and goals—whether related to sustainable development or otherwise—have gone for a toss. There is simply no chance of our being able to achieve either Sustainable Development Goal 1 (SDG 1—End poverty in all its forms everywhere) or SDG 3—Ensure healthy lives and promote well-being for all at all ages. However, even before the onset of COVID-19, the likelihood of achieving these goals was bleak.

The pandemic has exposed two serious errors

that we have made. The first is with regard to understanding the nature and extent of poverty. The second is our low investment in public-funded provisioning of quality healthcare. These have to be absolute priorities in post-COVID-19 India.

Poverty estimate mess

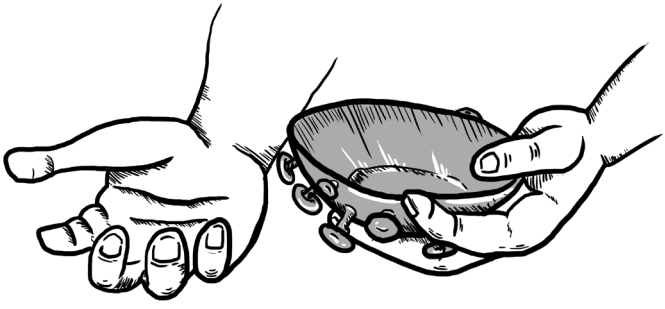
The fact is that the number of people living in poverty in India has always been massive. In 2004-05, the proportion of the population in poverty increased from 27.5 per cent to 37.2 per cent, when the Tendulkar Committee raised the poverty line from ₹356 to ₹447 per capita per month in rural areas and from ₹539 to ₹579 in urban areas. These were small increases in a deprivation level poverty line, and yet, the numbers escalated sharply. Similarly in 2009-10, a whopping 100 million additional people were counted as poor—455 million, instead of 355 million—if the Rangarajan Committee's poverty lines were used (₹801 and ₹1,198 per capita per month in rural and urban areas respectively, instead of the Tendulkar Committee's ₹673 and ₹860).

The fact that we stopped estimating poverty after 2011-12 didn't make the poverty problem go away. All it meant was that it was no longer a priority. However, whether measured or not, poverty, chronic poverty, and the dynamics of poverty have remained the biggest developmental challenge that has faced us since Independence. The commitment to give free cereals to 800 million people in the ₹1.7

lakh crore relief package announced by the Finance Minister is a sign that the government has realised the gravity of the poverty situation in India and the severe distress unleashed by the lockdown.

Morbidity and low budgetary allocations

The National Sample Survey Office estimates the prevalence of morbidity in India—those reporting ailments during the last 15 days—to be only 7.5 per cent in 2017-18 (8.3 per cent females and 6.7 per cent males). Morbidity is reportedly less than 3 per cent in Assam and Bihar, and as high as 24.5 per cent in Kerala! Clearly, the reported 7.5 per cent morbidity in India is grossly inaccurate. The result is that budgetary allocations to healthcare have been abysmal. In reality, the disease burden and out-of-pocket spending in times of ill health are very high in India. Hence, health shocks cause entry into poverty. There is a rapid epidemiological shift in the disease burden to non-communicable diseases (NCDs). In 2015, the World Health Organization estimated that



1 in 4 Indians had a risk of dying from NCDs before they reached the age of 70. In 2017, the Ministry of Health and Family Welfare was candid in pointing out that government spending on healthcare was only 1.15 per cent of GDP and "it is unrealistic to expect achieving key goals in a Five Year Plan on half the estimated and sanctioned budget". Based on global evidence, "unless a country spends at least 5-6 per cent of its GDP on health, with government expenditure being a major part, basic healthcare needs are seldom met".

Lockdown, job loss and health shocks

Any health shock causes entry into poverty for most of those who suffer from it. However, COVID-19 is contagious. The lockdown that has led to the closure of businesses, job losses and extreme distress has exposed the vulnerability of a large proportion of the population. Most of them depend on money earned each day or at the most in a month, to survive and so, do not have savings to help tide over the lockdown. Except for those with an assured source of income and those exempted from the lockdown because they provide essential services, everyone else is either already poor or is vulnerable to poverty. This has exacerbated and placed the poverty problem center stage and denial is no longer possible.

Children in households that are poor face inter-generational transmission of poverty. The science of the first 1,000 days is well-known—from

conception to the completion of two years of life is the most crucial period for a child. Physical growth and most of the brain development occurs during this period. Low birth weight, poor dietary intake, malnutrition and high disease load lead to lower cognitive development. Poor learning environments combined with poor cognitive development will trap them in low-skill and low-income jobs. Hence, pregnant or lactating mothers, infants and young children need protection not just from the virus, but also from the lack of healthcare, inadequate diet and ineffective breastfeeding.

Failure to pay attention to these issues will result in underweight, stunting and poor cognitive development in children, and decrease their future earning potential. Additional risks are due to pregnant mothers in labour not being admitted in hospitals; untrained staff unable or unwilling to support; not protecting and promoting breastfeeding at the time of birth; and, lack of proper guidance on effective latching and skin-to-skin care at birth.

Reducing vulnerability to the pandemic

While the health ministry has just ordered state departments to re-start all essential healthcare including antenatal care (ANC), the pandemic is already leading to severe and adverse consequences for children just born or yet to be born. Protein-rich foods are not available to mothers either due to poverty or due to a breakdown in the supply chain due

to the lockdown. If we want to prevent malnutrition and low immunity among children, it is crucial that special rations are provided to mothers urgently, which include nutrients like protein, good fats, vitamins, essential minerals with less sugar to restore their ANC. Immunisation prevents dreadful infections like measles, diphtheria and pertussis in babies and this needs to be restarted at the earliest. We are risking the health of newborn children if we do not make these facilities available at this critical time. The risk of poor outcomes during the pandemic is far higher among those with co-morbidities. India is the diabetes capital of the world. Rice and wheat have a high glycemic index. Sugar is the root cause of insulin resistance. Millets are high in fibre, protein and minerals, and are far more nutritious than rice and wheat.

At this time when face-to-face meetings are difficult due to the lockdown, mothers, caretakers and healthcare personnel can get online health and nutrition content that can prevent the intergenerational transmission of poverty and enable survival. Inputs such as free health spoken tutorials developed by IIT-Bombay are available and can reach and improve the life chances of our population and reduce the onset of obesity, diabetes and other co-morbidities by encouraging the consumption of millets and nutrient-dense foods based on locally available products. These free online tutorials in 15 Indian constitutional languages provide health and

nutrition content that can help mothers, caretakers and healthcare personnel to gain the right information during the critical phase of first 1,000 days and thereafter.

Some of the items that can be included in their rations are eggs, beans, pulses, peanuts, seeds and dried or fresh vegetables. The Integrated Child Development Services can provide locally made sprout powders, nut-seeds powder, daily eggs, dry drumstick leaf or curry leaf powders. It is important to follow the latest Indian Academy of Pediatric Junk Food Guidelines on zero sugar or jaggery under 2 years of age to prevent NCDs in the future. This will help create the immunity required to fight the threat of COVID-19 as well as the potential threats that may emerge in the future. However, post-COVID-19, India must prioritise decent work, livelihoods and free public provisioning of quality healthcare.

(Aasha is visiting professor and head, Centre for Gender Studies, Institute for Human Development, Delhi. Rupal is adjunct associate professor, Department of CTARA. IIT Bombay)

The big pharma mess

The pandemic has exposed a serious fault line in the global pharmaceutical supply chain

Vibha Varshney & Kundan Pandey

In february-end, when usa confirmed 60 cases of covid-19, President Donald Trump dismissed it. "This is like a flu," he said. Within weeks, usa had 0.2 million cases and the number of deaths crossed that of the 9/11 terrorist attacks in 2001. A grim-faced Trump now called the contagion "vicious" and to tackle the unprecedented crisis, usa scrambled to get life-saving medical supplies by hook or by crook. In India, Tamil Nadu had ordered 0.4 million rapid test kits from China to tackle a sudden spurt. The consignment was to reach the state on April 9, 2020 but Washington, in all likelihood, put pressure on

Chinese manufacturers and the kits were swiftly diverted to USA. Like USA, all nations are scurrying for medical supplies and they are ready to play dirty. Pharmaceuticals have turned out to be the most vital sector. It's about national security, say countries, and each wants to reduce its dependence on foreign supplies. On March 25, for instance, when the coronavirus, SARS-COV-2, was spreading rapidly, the European Union included health, medical research and biotechnology as part of its "restrictive list" of foreign investment. Italy was then the worst affected after China and begged EU member nations for face masks. Instead of offering help, Germany and the Czech Republic promptly banned export of masks and other protective equipment. Germany intercepted a truck, on way to Switzerland with 240,000 masks, before it left German soil. Turkey and Russia followed suit. As deep cracks appeared in the global supply chain of masks, personal protection equipment (PPE), testing kits, drugs and ventilators, this has triggered infighting within countries. In USA, the federal government has seized masks, thermometers and other essentials ordered by different states. In France, the government requisitioned all available masks for its own use. Israel deployed its intelligence agency, Mossad, to take control of all ventilators in the country.

India has further been pushed into the eye of the storm with experimental drugs like hydroxychloroquine (HCQ) becoming part of the politics. As stocks

of active pharmaceutical ingredients (APIs)—basic therapeutic chemicals that act as raw materials for producing tablets, capsules and syrups—dwindled globally, India put 13 APIs, also called bulk drugs, and their formulations on the restricted list for exports on March 3, 2020 and then banned their export on April 4. These accounted for 10 per cent of India's total pharma export. The anti-malarial HCQ was part of the list. But India was forced to

lift the ban on humanitarian grounds. USA, in fact, threatened India with retaliation. On April 6, India's Directorate General of Foreign Trade (DGFT) had to permit export of APIs and formulations made from them. Export of formulations made from paracetamol was also allowed, though DGFT continues to restrict export of the API for paracetamol. This medicine for fever is part of the arsenal to provide relief to COVID-19 patients. The pharmaceutical industry has developed in a way that makes every country vulnerable during crisis, said Ashok Madan, executive director of Indian Drug Manufacturer Association. As every country scrambles for medical essentials, it has enormously strained the global supply. At the same time, the scramble has also exposed a faultline in the global supply chain, created over the years by an industry that has flourished by putting profit before public health. With bulk of the production of pharmaceuticals and medical essentials occurring only in China and India, global reliance on these countries is overwhelming.

The API crisis

Developed countries make APIs only for patented drugs. It is left to India and China to produce APIs for generic drugs. USA imports 80 per cent of the APIs from the two countries. China is the biggest player. It provides 97 per cent of the antibiotics and over 90 per cent of vitamin C used in USA. In 2018, 95 per cent of ibuprofen, 91 per cent of hydrocortisone,

70 per cent of acetaminophen and 40-45 per cent of heparin in the USA was procured from China. Similarly, some 90 per cent of the APIs for generic medicines in the EU were sourced from India and China indicates a paper prepared in March for the EU pharmaceutical committee. According to UK's Medicines and Healthcare Products Regulatory Agency, China manufactures around 40 per cent of all APIs used worldwide although the World Health Organization (WHO) puts this figure at 20 per cent. The China Chamber of Commerce for Import and Export of Medicines and Health Products says the export value of Chinese APIs in 2018 was US $30.48 billion and the export volume reached 929.72 million tonnes. The reason for Chinese supremacy in API manufacturing is because when the sector first developed in China, it was state-owned.

The government strategically supported the industry and gave them incentives such as cheap electricity, water and labour, negligible financial costs and no charge on land; it also established special industrial zones. "In the late 1980s, when global corporations started shifting their production base to developing countries, their interest was to get cheap labour and raw materials in an effort to maximise the benefit," said K M Gopakumar, legal advisor and senior researcher with Third World Network, an international research and advocacy organisation. China emerged the winner and managed to kill India's existing pharmaceutical sector. "For example, China

dumped cheap Penicillin G in India, outperforming Indian manufacturers like Hindustan Antibiotic in the public sector and Torrent Pharmaceuticals Ltd, Alembic Pharma, Southern Petrochemical Industries Corporation Ltd and JK Pharmachem in the private sector," explained Madan of the Indian Drug Manufacturer Association. With the pandemic, China had to lock down its production hub in Hubei province, which hit hard its supply to the world. The region has 44 companies which are either approved by the US Food and Drug Administration (FDA) or meet EU standards. These units have been shut since January 24, 2020.

Unlike China, India is more involved in producing finished products. The country is the world's largest provider of generic medicines, accounting for 20 per cent of global generic drug exports in volume terms. Small wonder, India is also called the "pharmacy to the world". In response to a Rajya Sabha question, the government said on March 13, 2020 that India exported medicines worth $14,389 million in 2018-19. Medicines were sent to more than 200 nations—from the highly regulated North American and European markets to countries with limited drug manufacturing capacity, including most of sub-Saharan Africa, wrote researchers at the University of Oxford in F1000 Research, an open access publishing platform, in April this year. Indian manufacturers represent 67 per cent of the 563 who pre-qualified pharmaceutical products for HIV/AIDS,

diarrhoea, hepatitis, malaria, influenza, reproductive health, tuberculosis and neglected tropical diseases. Unfortunately, production of 130 of these drugs is dependent on APIs sourced from China. Of the total import of APIs in India, 67.56 per cent is from China. On March 13, when the BJP and Congress leaders Prabhakar Kore and Selja Kumari questioned in the Rajya Sabha about drug security, chemicals and fertilisers minister D V Sadananda Gowda said that according to the Central Drugs Standard Control Organisation, the present stock-in-hand of APIs would be sufficient only for two to three months to produce formulations. The government's ban on export of APIs and formulations was a result of this fear.

A dependent world

Chinese dominance in the pharmaceutical sector has been questioned across the world. In an April-6 note, the USA Congressional Research Service observed that COVID-19 "is drawing attention to the ways in which the USA economy depends on manufacturing and supply chains based in China". White House trade adviser Peter Navarro was working towards relocation of medical supply chains to USA. Japan and Australia had similar plans. In September 2019, the European Fine Chemical Group, a non-profit association of European fine chemical manufacturers, published a briefing paper asking countries to reduce their dependence on China and India. Maggie

Saykali, director of Specialty Chemicals, a grouping of over 50 sectors of Europe's fine and consumer chemicals industry, said that massive offshoring of API production and Registered Starting Materials leaves the EU dependent on China and India for close to 80 per cent of its medicinal products.

COVID-19 has underlined these dark spots of global supply chain, said Saykali. Only 28 per cent of the manufacturing facilities making APIs for USA markets were based in that country. This was told to a USA House of Representative subcommittee by Janet Woodcock, director, Center for Evaluation and Research, US FDA. In her testimony, Woodcock quoted two papers to highlight why China and India were in advantageous position when it came to producing APIs. Referring to a 2009 paper by the World Bank—"Exploratory Study on Active Pharmaceutical Ingredient Manufacturing for Essential Medicines"—she said if a typical Western API company had an average wage index of 100, the index was as low as 8 for a Chinese company and 10 for an Indian company. Referring to a 2011 FDA report—"Pathway to Global Product Safety and Quality"— Woodcock said China and India enjoyed advantage of low labour costs which reduces the API manufacturing costs. API manufacturing in India can reduce costs for USA and European companies by 30 to 40 per cent. Manufacturing in China gets benefit of lower electricity, coal and water costs. Chinese firms are also embedded in a network of raw mate-

rials and intermediary suppliers and, therefore, have lower shipping and transaction costs. They face fewer environmental regulations regarding buying, handling and disposing toxic chemicals, leading to lower direct costs for these firms, Woodcock said.

A national threat?

India, too, has been worried about its increasing dependence on China. In 2014, Rajya Sabha member Motilal Vora raised the issue of inappropriateness of importing API from a single country in the House. The same year, National Security Advisor Ajit Doval called the rising dependence on Chinese drug makers a "national threat". In 2013, a high-level committee on promoting domestic manufacture of APIs had already been set up under V M Katoch, the then director general of Indian Council of Medical Research (ICMR) and secretary of the department of health research under the Union Ministry of Health and Family Welfare. In July 2018, a parliamentary standing committee report presented to the Rajya Sabha pointed out there was an urgent need to revive the country's capability to produce APIs. The committee noted that China had increased the prices 1,200 per cent in the last two years. This slashed the profit margin for India's industry. To increase self-sufficiency, the Katoch committee's report, submitted to the Ministry of Chemicals and Fertilizers in February 2015, recommended the creation of three to six mega parks. These parks should provide

free or shared water, electricity, effluent treatment plants and testing facilities to the pharmaceutical industry. The government would have to invest ₹750-1,000 crore for each of these.

The committee recommended that the private manufacturers should be provided benefits like 15-year tax-free status, access to loans and foreign investment. It also pushed for reviving the public sector Indian Drugs and Pharmaceuticals Limited with an infusion of ₹500 crore. While this committee's report was awaiting implementation, the government formed another task force in 2018, chaired by Mansukh Mandaviya, the Union Minister of State for Chemicals and Fertilisers. This, too, reiterated the recommendations of Katoch committee. India has already started work to revive the industry. Department of pharmaceuticals has approved development of mega parks in Andhra Pradesh, Telangana and Himachal Pradesh and is providing assistance up to ₹100 crore for creation of Common Facility Centre (CFC) in these under the scheme Assistance to Bulk Drug Industry for CFC. India's record in creating such parks has, however, not been good.

Affordability is the key

Manufacturers say it is not easy to cut the umblical cord with China for supply of basic drugs. The government needs to regulate drug prices to ensure that people have access to cheaper medicines. This,

in turn, makes the pharmaceutical sector look for ways to cut prices, thus increasing their dependence on the low cost Chinese model. Beside availability, the affordability of medicines is a major challenge for India. Media reports already demonstrate that API prices in India have shot up after the pandemic. China provides 75 per cent of APIs used in the formulations of drugs in the National List of Essential Medicines (NLEM) and there could be an increase in prices of medicines in the list. In a recent interview to the national daily Financial Express, Mandaviya said increased self-sufficiency in manufacturing of critical bulk drugs would ensure the availability of essential drugs listed under NLEM at affordable prices.

The government has to mandatorily ensure that prices are low as these drugs are part of the Essential Commodities Act, 1955, which regulates the prices of essential supplies like grains, foodstuffs and medicines. The list of drugs under price control has steadily expanded from 74 in 1995 to nearly 860 in 2019. According to brokerage firm Centrum Broking, going by the wholesale price index of 2019 and 2020, the increase in prices of drugs under NLEM would not be steep. However, prices of non-NLEM drugs would continue to increase at 10 per cent. "With China resuming supplies of raw materials, potential disruption in manufacturing is now no longer a concern. There has been inflation in select raw material supplies but the same should only have a minor impact on gross margins during the quar-

ter," brokerage firm Nirmal Bang said. Private manufacturers have not been keen to provide medicines that are under price cap. They say it does not help as the poor are still not able to afford them. "The problem is that India spends too little on healthcare," wrote Amir Ullah Khan, professor of economic policy at the Indian School of Business and the Nalsar University of Law, in the national daily *Mint*. Instead of price control, he suggested that options like trade margin rationalisation, centralised procurement, social health insurance schemes, cross subsidisation and state financing of essential drugs should be used. India has to keep the drug costs low. Its public spending on health is very low. It is unlikely that the country would be able to procure much if it buys at the private sector prices. Public sector pharmaceutical companies, therefore, become relevant as they can provide drugs at the cost price even after including the cost of pollution control.

No time for quick-fix measures

Environmental pollution is, obviously, the most devastating byproduct of the drugmaking race, but global efforts to reduce it have been tardy. In 2014, the EU issued a draft strategy to ensure that companies which supplied antibiotics to them were responsible and non-polluting. Under this, the EU members could have environmental clauses in international agreements. This would have allowed EU inspectors to visit factories in Asia or Africa to ensure that

they were not polluting. But the draft was diluted. The replacement passage in the new 2018 draft merely gave the countries an option for "the possibility of using procurement policy to encourage greener pharmaceutical design". The dilution was linked to lobbying by drug companies. Voluntary declarations show that the pharmaceutical industry spent nearly €40 million (about $37 million) on lobbying EU institutions in 2015. Public records show the European Federation of Pharmaceutical Industries and Associations had over 50 meetings with the Juncker commission in its first four-and-a-half months of office. Fortunately, the European Parliament is demanding stricter measures again. Its environment committee has unanimously backed a call to go tough on pharmaceutical pollution, including reductions in drug use, greener manufacturing and better waste management. Developing countries, too, are formulating policies to control pharmaceutical pollution. On January 23, India released a draft Environmental Standards for Bulk Drug and Formulation (Pharmaceutical) Industry to limit the concentration of toxins in effluents released by bulk drug manufacturers. It specifies maximum residues for 121 antibiotics that can be present in the treated effluent of bulk drug and formulation industry and in the outlet of the common effluent treatment plants. The draft notification also prescribes maximum concentration for various other parameters, including heavy metals and hexavalent chromium. China,

too, is trying to reduce environmental pollution. In 2002, it formulated the China Safety Production Law which controls all industries, including chemical and pharmaceutical. But the industry continued to pollute. With President Xi Jinping at the helm, it is taking action to ensure that the Chinese industry is in line with global environmental standards. Between 2016 and 2018, inspections led to the closure of 150 factories producing APIs, according to a white paper published by consultancy firm Beroe in July 2019. In case of antibiotics, China issued strict guidelines in its National Action Plan 2016. It promotes green manufacturing of antibiotics and monitoring of effluents. In January 2018, China came out with an "environmental tax declaration" under which less polluting industries are eligible for tax reductions. A 25-per cent tax relief is allowed if the discharge, mainly wastewater and air pollution, is 30 per cent lower than the national or provincial standards. If a company is able to maintain its pollution level at 50 per cent lower than the standard concentration, they can apply for a 50 per cent tax reduction. According to the Beroe white paper, China also plans to put in measures so that polluters would face a levy of between 1.2 yuan ($0.18) and 12 yuan ($1.8) for every 0.95 kg of nitrogen oxide or sulphur dioxide they release. According to estimates, taxes up to 50 billion yuan (about $7.68 billion) will be collected annually from manufacturers.

Such stringent pollution norms would increase

manufacturing costs and take away China's competitive edge. Earlier too, diligently operating European firms went out of business because they could not compete with a non-compliant China, according to an article published in Chemical & Engineering News in 2018. It says a strict inspection regimen could trigger a migration of business back to the West as environmental compliance would increase the cost of operating in China. India, however, has been unable to control pollution in its pharmaceutical hubs like Patancheru-Bollaram Industrial Estate in Telangana, Baddi Industrial Area in Himachal Pradesh, and sipcot Industrial Estate in Cuddalore, Tamil Nadu. This despite the Environment (Protection) Rules, 1986, in force. India's new pharmaceutical parks are planned in these very places. At a recent meeting with NITIAayog, the Department of Pharmaceuticals promised fast environmental clearances to the industry. Such quick-fix measures would be detrimental in the long run unless strict regulations are put in place. India has to be more cautious now.

Time to rethink

China claims it has resumed production of APIs and says it is unlikely that there would be any shortage in India or globally. The pandemic, however, has given the world a chance to do a rethink on the pharmaceutical industry. Countries have realised that their over-dependence on one can cause big

trouble. They are now trying to become self-sufficient. India is developing legislations and employing public spending to bring API development back. The US and EU are also contemplating legislation to bring both APIs and Finished Dosages (FDs) back home. But industry experts say this is not the way to go. "This would be a knee-jerk reaction," said Kiran Mazumdar-Shaw, chairperson and managing director of Biocon Limited, a biotechnology company based in Bengaluru. "The surge in demand has caused an acute shortage of medical supplies, diagnostics and medicines which ought to point fingers to the failure of global healthcare systems to stockpile inventory as a preparedness response to any public health crisis. Once the surge in demand recedes, countries would need to manage costs and competitive market forces will favour economies of scale," she said. Others concur. "We believe that production of both APIs and FDs must be global, with trusted trade partners, to ensure that any type of national or international disaster does not cause a collapse of the manufacturing and supply of pharmaceuticals," said David Gaugh, senior vice-president, Association for Accessible Medicine, a trade association representing the manufacturers and distributors of generic prescription drugs. Industry favours pharmaceutical parks as these would be SEZ-like structures with fiscal incentives, common utilities and common effluent treatment plants that can create economies of scale and lower operational

costs. But some fear this would help only the private industry. Y Madhavi, scientist at the National Institute of Science, Technology and Development Studies, New Delhi, said public sector is crucial in the regulation of the sector. Citing an example from 2008, she says public sector vaccine manufacturers were closed down with the assurance from private manufacturers that they would give affordable vaccines for the universal immunisation programme. This never happened. The industry makes huge profits with trade margins that can sometimes be 4,000 per cent of the cost price. In October 2019, the Department of Pharmaceuticals proposed a maximum trade margin of 43 per cent over cost price for 10,600 non-scheduled drugs. Gopakumar said the solution lies in increasing the capacity, both in public and private sectors. "You need to have a new kind of public sector, maintain the assets that the private players can operate. The government has to spend the money. The private sector will make the money and pay the government back," he said. Whatever mix be the strategy—private versus public sector or domestic production versus import—the industry cannot be permitted to pollute. This would result in a price hike. S Srinivasan, who runs a generic drug company LOCOST, said the price would not increase beyond 5 per cent if the chemicals are made in large quantities. "Much of it will be capital costs which need to be apportioned over time," he said. This gives hope. "No doubt API production is high-

ly polluting, but new technology must be brought and upgraded constantly to minimise the impact of pollution," said Sakthivel Selvaraj, director of health economics, financing and policy at Public Health Foundation of India, New Delhi, adding that the additional cost due to pollution control measures would be negligible. Even if these costs are factored in, India would still have an edge both in API and formulation business.

Migration & work

Informal works and workers

India's unaccounted workforce

Formal-informal division

Welfare measures

Development delivery

Cash support schemes

Circular economy

Society and past pandemics

Into an abyss

India's largest ever movement of workers in crisis points to the disruptive economic future, and a rethink on how we treat the informal sector

Richard Mahapatra

As the monsoon clouds enveloped Kerala, thousands of workers from across India were migrating to their villages. Even though they had been surviving on daily wages, May is the month they would normally return to their original—and seasonal— source of livelihood: farming. But this year the seasonal migration back to village was not about a romantic notion of people still rooted in their ancestral occupation— there was no aura of a homecoming with hopes and the joys of producing critical foodgrains for a few months, and, there was no eagerness to reach home and inform their families

on a big saving to be invested in many essentials, including on farms. On the contrary, India's monsoon season has begun with a deluge of woes—for workers, farmers and farming. And this is going to be the most devastating spillover of the COVID-19 pandemic. Amid the lockdown—India's 68 days is the longest in the world—the country not only reported a consistent rise in COVID-19 cases, it also willingly reconciled to live with the virus. By May 31, when most of the restrictions were lifted, the enormity of the pandemic simply shrunk into oblivion, masking another crisis of a much bigger scale.

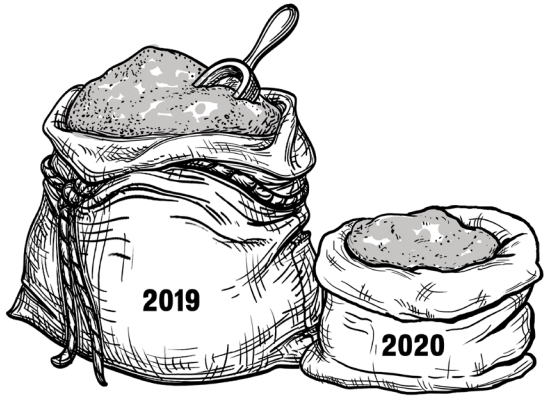
During April-May, millions of workers were forced to return to their villages. But this was not the usual monsoon reverse migration; they were left unemployed due to the cessation of economic activities in cities and towns. "It seemed there were more people on the roads than in villages," said Vivek Mishra, a correspondent with *Down To Earth* who walked with migrant workers to track and chronicle this unfolding economic mayhem. Their "forced" migration made the pandemic look insignificant, in terms of human suffering. Headlines changed: pandemic as a prefix to this crisis was succinctly replaced with the economic crisis. Ekta Parishad, a non-profit helping migrant workers return home across India, collected primary information of 31,424 migrants between April 11 and May 20. Of the 24,681 stranded adults, 37 per cent were daily-wage earners, followed by industrial labourers such as construc-

tion workers (30 per cent), farm labourers (26 per cent), and labourers employed in the service sector (7 per cent).

It is estimated that 100 million workers have moved away from urban areas in these two months. That would make it the biggest-ever movement of people in India's history. But it is also the most disruptive economic development. India's villages were already economically wrecked, forcing people to migrate to towns and cities for livelihood. Now, with millions returning to the villages, an urgent expansion of the rural economy is required to sustain this transition. To begin with, each of these workers has a family to sustain. Together, these informal workers contribute around 10 per cent to India's GDP. Add to it the fact that the agriculture sector's contribution to GDP is 15-16 per cent; which also primarily comes from these workers. Put together, they decide the economic fate of the country. The challenge now is how to reinvent an economy of such scale immediately to sustain the homecoming workers. The great migration is happening at a time when, in fact, policymakers were expecting migration out of rural areas, given the economic situation existing there. For instance, since January unseasonal rains and extreme weather events damaged the winter cash crops. Due to a low demand in the markets, farmers were not even earning a fair price for their produce, thus taking a further cut in their meagre earnings.

Displaced people, misplaced mindset

Internal displacements because of disasters like cyclones and floods are common in India. There were more than 5 million new displacements in 2019—the most in the world—according to Geneva-based Internal Displacement Monitoring Centre (IDMC). And the bulk of the displacements were triggered by extreme weather events that are linked to climate change. In terms of scale, India saw the wettest monsoon in 25 years in 2019, which triggered 2.6 million new displacements. Cyclone Fani was responsible for another 1.8 million new displacements in the same year. Similar numbers are expected this year too due to Cyclone Amphan and the near definite signs of a weak monsoon. However, the lockdown—coinciding with the harvesting season for winter crops—means that the farmers are losing a significant chunk of their earnings. More than half the farmers who harvested their crops this year suffered a lower yield during the nationwide



lockdown, compared to the last season of sowing the same crop, says the survey of 1,500 farmers in 200 districts across 12 states. The lockdown also forced 55 per cent of farmers to store their crops as they were unable to sell them. The IDMC survey—aimed to evaluate the impact of lockdown on agricultural production and livelihood—was conducted by the Harvard TH Chan School of Public Health, Public Health Foundation of India and the Centre for Sustainable Agriculture from May 3 to May 15, 2020. Farmers in Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Telangana, Uttar Pradesh and West Bengal participated in the survey. About 40 per cent of farmers who experienced a yield loss say this was due to lack of labour, storage or transport options. Unexpected weather change was also cited as a reason for the loss in yield by 80 per cent of farmers, found the survey. "We call this the Great Lockdown, because, if you look around the world, the containment measures that have been put in place...are generating the scale of contraction and activity that are just historical numbers," said Gita Gopinath, chief economist of IMF in a podcast. On May 22, the Governor of Reserve Bank of India Shaktikanta Das declared the Indian economy would shrink, for the first time in 41 years, or there would be negative growth. The top six industrialised states in India, which account about 60 of industrial output, are severely impacted by the COVID-19

lockdown. These are the states that have reported the maximum outflow of workers. This means that employment generation would be very difficult in these states in the near future.

The world is at crossroads. The choice between economy and curtailing the pandemic through lockdowns has already been made in favour of the former. But unlike many countries with severe infections, the hope to endure a contagious disease and avoid an economic death has taken over national strategies. The pandemic's toll in terms of economy could be gauged from this fact: into half-a-year since the outbreak of the COVID-19, some 200 countries had become poorer than in December 2019, strictly in terms of economic outputs. India would have the largest number of the new poor in the world due to the pandemic, according to the World Bank. The World Bank's Global Economic Prospects in June raised the level of poverty due to the pandemic in comparison to its earlier forecasts: in April it estimated 40-60 million people will be pushed into extreme poverty. Latest estimate showed that 71-100 million people would be left poorer.

Poverty will double in India

A transfer of at least ₹750 per person a month for six months will help them recover from economic damage wrought by the pandemic

Shweta Saini & Pulkit Khatri

In the second week of April, UN's International Labour Organization (ILO) said that about 400 million workers from informal sector in India are likely to be pushed deeper into poverty due to COVID-19. There is no dispute that poverty will worsen in the country, but the question is by how much? We try and answer this in the article using data with the National Sample Survey Office (NSSO) and the erstwhile Planning Commission.

Through quinquennial surveys, NSSO offers estimates of monthly per capita consumption expendi-

ture (MPCE) of households. This data, which is taken as proxy for income, was the basis of estimating poverty levels by the Planning Commission. Latest data in this regard is available for 2011-12 (2017-18 NSSO report is pending for release) and that year 21.9 per cent of the country's population, or about 270 million people, were estimated to be living below the poverty line. Using NSSO's MPCE data and Planning Commission's state-level poverty data as our base, we simulate the impact of income shock due to COVID-19 on the country's poverty level.

We simulate an income shock scenario, where individuals suffer a loss for three months, implying a loss of about 25 per cent in average MPCE for the year. We assume a uniform shock across the fractiles (based on MPCE, NSSO distributes population into 12 fractiles or cut-off points) and that incomes would return to pre-COVID-19 levels after the disruption from March to May.

Let's illustrate our calculations using the example of Uttar Pradesh. In 2011-12, poverty threshold levels (per person per month) for the state were ₹768 for rural areas and ₹941 for urban areas. Based on this, the state's poverty ratio, or the percentage of people living below the poverty line, was estimated to be 29.4 per cent. When we introduce the income (MPCE) shock of 25 per cent and measure it against the poverty line, the state's poverty ratio becomes 57.7 per cent.

Upon applying this new ratio to the 2019-20

population estimates, we find that 71 million more people are likely to be pushed into poverty in Uttar Pradesh because of COVID-19 shock. Using the same method for all the states and Union Territories, we find that in case of a 25 per cent income shock across all fractiles, India's poverty rate rises to 46.3 per cent, which is more than twice the 2011-12 levels and higher than even the 1993-94 levels. This means India will have an additional 354 million poor, taking the total count of country's poor to about 623 million.

At the state-level, we find that the shock increases poverty by more than double in 27 of the 35 studied states and UTs. Five states—Uttar Pradesh, Bihar, Maharashtra, West Bengal and Madhya Pradesh—account for over 50 per cent of the newly added 354 million poor. During our calculations, we made some assumptions for the sake of simplicity. First, we assumed a uniform income shock across all fractiles. But by now, there is enough evidence that most people in the lowest fractiles (the ones already poor or at the threshold of poverty), who work in the informal sector, are the worst hit. This shows the income shock is not likely to be uniform across all fractiles. Second, in our worst-case scenario we assumed a shock of 25 per cent in income. Sadly, there is growing and widespread evidence of job losses, majorly among low-income fractiles, indicating a likely income shock much greater than 25 per cent. Third, our assumption about incomes

eventually recovering to pre-COVID-19 levels after three months is overly optimistic.

Income levels in the coming months will be determined by how the economy recovers and lost employment is regenerated. Nevertheless, above exercise is extremely useful as it gives us at least a base estimate and we can infer that due to COVID-19, poverty will grow and inequality will worsen.

We use our MPCE analysis to propose a solution. Our calculations show that if the Union government makes a direct benefit transfer (DBT) of ₹312 per person per month to its poor, then most people in most states can return to pre-COVID-19 levels of MPCE. The fact that economic situation of the country was not so bright even in pre-COVID-19 times, is another matter. Given that there are likely to be about 623 million poor, this DBT will cost the government about ₹19,500 crore per month. In case,

the government increases the transfer amount to ₹750 per person per month then it will not only help the poor recover from economic damage resulting from the pandemic but also help them assuage poverty. This DBT would cost the government some ₹46,800 crore a month. The government may want to consider transferring the DBT amount at least till December, 2020 in addition to other benefits like increased entitlements under the public distribution system (PDS) and subsidy on LPG cylinders.

This pandemic is not just a social and economic crisis. It is also a humanitarian crisis. Considering the uncertain future that lies ahead of us, a self-sufficient and better prepared poor can prove to be the best weapon against the deadly virus and DBT can go a long way in ensuring this.

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Give them guaranteed basic income

Had a minimum income guarantee scheme been in place, it would have required only a ramping up of the transfers to protect the poor

Santosh Mehrotra

AMID INCREASING joblessness and household indebtedness since 2012, as demonstrated by the National Sample Survey, a minimum standard of living for the country's poor is under threat. Unfortunately, recent schemes inspired by the Universal Basic Income (UBI) debates seem to be designed more to garner votes than address their vulnerability. Rather than adopting a quasi-UBI as suggested in the Economic Survey of 2017 and doing away with many existing developmental programmes, this article argues a case for, and presents the design of, a much better method of targeting cash transfers as a supplement.

The shock of COVID-19 to the incomes of the poor has made the case of a minimum income guarantee (MIG) more urgent.

India's unemployment situation, which was 30 million or 6.1 per cent of the country's labour force in 2017-18, will worsen as the economy goes into a recession in Financial Year 2021, primarily due to COVID-19. Even the Prime Minister's Economic Advisory Council warns that unemployment will rise by 40 to 50 million. This will exacerbate the pre-existing problems of the lowest (poorer) deciles of our population, which continue to remain unaddressed. For instance, the All-India Debt and Investment Survey of NSSO for 2013 shows that 51.9 per cent of the 90 million farmer households were indebted that year. Worse, most loans were for consumption purposes, and not for production.

Social conflicts will rise if no action is taken to supplement incomes at this point. But current methods of cash transfer have proven extremely weak. A survey by the Stranded Workers Action Network (SWAN) during the first 21 days of the lockdown showed cash transfers or free foodgrain supply under the public distribution system (PDS) hardly reached anyone: 98 per cent of the 11,100 migrant workers surveyed reported they had received nothing. Another survey 32 days later showed only a slight improvement.

A separate survey of 4,000 workers from various states showed that half from rural areas and one-

third from urban areas had not received cash transfers from the government. Almost 37 per cent of them said that having lost their livelihoods they had to take loans to cover expenses during the lockdown, mostly from money-lenders or friends and families. This level of vulnerability calls for massive job creation in industry and services. But that is unlikely for quite some time post COVID-19. Even before COVID-19, job generation had fallen with more youth, now better educated than before, looking for work. India's poor desperately need a cash transfer mechanism, as social assistance, at this time of dire need.

Time ripe for income guarantee

Three cash transfer schemes have been initiated since late 2017: Rythu Bandhu by the Telangana government, Kalia by the Odisha government and PM-KISAN (Pradhan Mantri Kisan Samman Nidhi) by the Centre. What's common in all three is that they offer cash transfer to farmers and that they were started in rapid succession. Each scheme was introduced months before state or national elections and each returned the incumbent party to power.

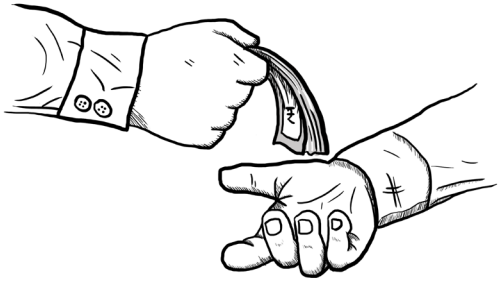
But there have been issues with their design. First, they target farmers, leaving out the million other vulnerable people and even excluding several categories of farmers. Second, governments seem to have decided that the way out of the crisis in agriculture, where rural distress and farmer suicides keep

rising, is cash transfer. They are also being perceived as a way out of farm loan waivers, which many governments have adopted in the country parts of the universe they seem to be trying to benefit, and in doing so may end up worsening some inequalities that already pervade rural areas. Fourth, they suffer from problems with identifying the beneficiaries in a situation where land records are poor, rarely updated and the quality of data is highly variable among the states.

What's clear, none of the programmes can be seen as addressing the real issue of poor consumption capacity of the poor. While MIG can address this gap, the country at present has all the infrastructure ready to make it a success. To make cash transfers a success in India, at least three requirements should be fulfilled: correct identification of the poor; biometric identification of the beneficiaries; and bank accounts for them. Since 2018 these three preconditions exist, which can enable India to introduce a credible targeted cash transfer programme.

The Socio-Economic and Caste Census 2011-13 (SECC) correctly identifies beneficiaries based on verifiable criteria. The second condition is possible since all citizens have Aadhaar card, which is biometric-based and should avoid duplication and ghost benefits. Finally, after the opening of over 300 million accounts under Jan Dhan Yojana, all households have bank accounts.

Some issues still need resolution. SECC is seven



years old and the lists need to be revalidated by gram sabhas. This way, unjust exclusions and unfair inclusions can be eliminated. Second, Aadhaar numbers must be seeded into bank accounts to eliminate "ghost beneficiaries appearing". Third, once seeding is done, any household with more than one bank account should be removed from beneficiary lists. Fourth, there may still be households that don't have bank accounts; they will have to be discovered through gram sabhas and mohalla sabhas. Finally, since bank branches are present at a frequency of one per four-five villages, the number of banking correspondents will have to increase.

So, who gets how much?

For this, we propose a design. There are 109 million, or 60.65 per cent of rural households that need to be included as MIG beneficiaries. Those not eligible for MIG are the 70.7 million "automatically excluded households" or the better-off households that include those paying income tax and owning a vehicle.

Those who should be given highest priority for income transfers include rural households falling

under SECC's "automatic inclusion criteria". These usually belong to one of the five categories: households without shelter; households living on alms, destitute; manual scavenger households; primitive tribal group households; and legally released bonded labour households.

There are 107.4 million rural households that have one or more of the seven deprivations, who should also receive MIG. The criteria are: landless households and female-headed households should also be categorised as eligible for MIG. We propose that the money to be transferred should be directly proportional to the deprivation suffered by households. Automatically included rural households with greatest vulnerability should be eligible for ₹8,000 per household annually; rural households with multiple deprivation should receive households deriving major part of income from manual casual labour; households belonging to Scheduled Castes or Scheduled Tribes; households with no literate adult above 25 years; households with only one room with kuchcha walls and kuchcha roof; households with no adult member in the age of 16 to 59; female-headed households with no adult male member between 16 and 59 years; and households with disabled member and no able-bodied adult.

For urban areas, given the fact that full SECC data has not yet been released, identification based on deprivation cannot be ascertained. Hence, only households in urban slums are targeted for MIG.

By SECC data, these account for 20 per cent of the urban households in the country. In addition to slum-dwellers as beneficiaries, elderly households, differently-abled without necessarily relieving rural distress. Third, they exclude significant ₹6,000 annually; rural households facing just one criteria of deprivation to receive ₹4,000 annually; while rural non-excluded households considered for deprivation, not reporting deprivation and facing least level of deprivation should be offered ₹3,000 annually. In the case of urban slum households, they should receive ₹3,000 annually.

We propose that MIG covers 70 per cent of rural households and 20.12 per cent of urban households (urban slums) at a cost of ₹56,900 crore or 0.28 per cent of India's GDP as on 2019-20. The additional coverage of 21 per cent of other vulnerable urban households at the cost of ₹10,628 crore will cost an additional 0.05 per cent of India's GDP (2019-20). This would bring 41 per cent of the urban households in this proposed scheme. Overall the proposed scheme would cover 70 per cent of rural households, and 41 per cent of urban households, at a total cost of ₹67,528 crore, or just 0.33 per cent of India's GDP. Given that PM-KISAN costs ₹60,000 crore in Financial Year 2021, it can be replaced by the proposed MIG.

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India's circular migrants

Informal workers have lost faith in the city and many have vowed to not return

Priya Deshingar

India's model of capitalism and social reproduction among the elite has depended heavily on a precarious workforce that circulates between underdeveloped regions and the urban informal sector, industrial zones and middle-class homes.

A significant chunk of workers are interstate migrants. They come from poor, historically disadvantaged castes and classes and work outside suffocating agrarian relations of serfdom and indebtedness, patriarchal norms and stagnant wages in the countryside.

But these migrant men and women are adversely

incorporated into urban and industrial economies — they work low-paying jobs, do not have formal contracts and are outside the reach of the law. They provide critical labour that sustains India's economy, but remain on the margins. In the already precarious existence, the abrupt lockdown prompted by the novel coronavirus disease (COVID-19) pandemic and loss of livelihood resulted in a migrant exodus, which has been compared to the great migration during Partition.

So how many circular migrants are we talking about?

This seems to be the burning question, especially since state governments, labour departments and other agencies have been scrambling to find representative data. According to the 2011 Census, India has 454 million migrants, out of whom only 54 million are interstate migrants.

But we have known for some time that these numbers are gross underestimates and account for only a fraction of workers in circulation. In order to address the imbalance, I estimated the extent of circular migration in India at 100 million just over a decade ago, based on industry estimates by sub-sector. The data is backed by rigorous empirical studies.

According to my calculations, migrant workers contributed to about 10 per cent of the national gross domestic product.

Given the galloping pace of development in

export industries such as textiles and other domestic industries over the last decade, it is time to revisit these numbers. Let us examine the key sectors that provide employment to migrants with few formal qualifications. My calculations, based on estimates from reliable and established industrial development agencies, international organisations and non-profits are as follows.

The textile and garment industry employed 119 million workers in 2015 at a time when its market value was $108.5 billion. Given that the industry is on a growth trajectory with a projected market share of $223 billion by 2021 and the trends point towards outsourcing, piece rate and informalisation, it is likely that the numbers of workers would have doubled and most of them would be in the informal sector.

Studies of Tirupur and the National Capital Region clusters show that 70-100 per cent workers are interstate migrants from Bihar, Uttar Pradesh and other poor states, while the Bengaluru cluster employs mainly intrastate migrants. Thus, one can conservatively assume that at least 100 million migrants work in this sector.

Another giant is the construction industry which employs around 60 million workers, mainly migrants working as carpenters, masons and plumbers. Add to this the growing number of migrant female domestic workers coming from impoverished parts of Jharkhand, West Bengal and Chhattisgarh to work in middle-class homes in Delhi, Mumbai,

Hyderabad and other cities.

According to International Labour Organization estimates, there are 20-90 million domestic workers in India. If we take an average of the two and assume that at least half are migrants, the estimate is roughly 27.2 million.

Other significant employers of circular migrants are brick kilns, which has 23 million workers, according to Anti-Slavery International, an internation non-profit. This is followed by small scale mines (12 million); street vendors (10 million); rickshaw pullers (10 million); and gem polishers and cutters (1.5 million).

These numbers add up to 243 million and would be higher if we were to include other significant sub-sectors, including fisheries and seafood processing, footwear, ceramics and leatherwork.

My informed guess is that the overall number is close to 250 million. But let us not get obsessed with precise numbers—it is the overall scale that I want to draw attention to—and the fact that the lockdown was imposed without a thought to workers who lost their livelihoods and accommodation overnight.

The unspoken side

I believe this was due to the interconnected problem of inaccurate data and because a majority of disenfranchised migrants were lower caste and poor. It was only after their plight became visible and there was public outcry that action was taken.

But even this has been fraught with problems: The relief package of ₹3,500 crore to feed stranded migrants and Shramik trains and take them home, have failed to reach a majority of migrants who lack of documents such as Aadhaar cards or registration under the Interstate Migrant Workmen Act.

First-hand accounts from the Stranded Workers Action Network and others indicate that only 10-25 per cent workers have left so far and a second, larger wave of return migration is expected.

Migrants have lost faith in the city and many have vowed to not return. Even though migrants are extolled for their tenacity in the face of adversity, few will forget the humiliation of being abandoned in the time of need. Many do not even know who their bosses are due to multiple layers of subcontracting.

The arrogance and indifference to the plight of poor, lower caste and uneducated labouring classes continues and is manifest even in the relief measures provided—there have been reports of Shramik trains not providing food or water to their passengers in a dignified manner.

Till date, only five million workers have been sent home on these trains and many more are waiting to go home. Taking advantage of the gap in services, an industry of dalals has sprung up and it charges ₹3,000 or more to take them home. Here, too, those without the means are being left behind.

The response of the authorities to this has been to take migrants off unauthorised vehicles and place

them in detention centres. Migrants continue to travel on foot, tempos, buses and other means, often at night to evade detection. They have been criminalised in their own country.

It may not be too late for the government to amend its approach and offer rapid assistance on a humanitarian basis without insisting on documentation. Help could be offered on the basis of community validation—numerous good citizens and civil society organisations who are offering help on the ground could be asked to help the authorities to identify who should be given assistance.

Likewise, government should move away from a system where its own agencies have a monopoly on generating migration data and involve others who generate statistics of their own. This is critical for understanding the scope of invisible migrant workers who are hard to reach through conventional surveys.

Finally, serious steps must be taken to provide

migrant workers with greater security at destination including insurance against loss of pay due to shocks such as the COVID-19 pandemic, regardless of proof of identity and domicile.

More also needs to be done to support vulnerable families whose breadwinners have returned. State governments are starting to set up commissions to provide migrants jobs and business loans, but they should consult them to better understand their aspirations. Here, too, the identification of beneficiaries should be done through community involvement rather than government alone to ensure fair distribution.

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Widening gulf

The political economy of the formal-informal dichotomy in a post-coronavirus world

Indranil De

Policy and planning in post-colonial countries have always been biased towards the urban elite. Thus is evident from the division of urban areas—between well-served and unserved areas. The well-served areas emerged as formal areas of residence, and the unserved areas as informal areas or slums. Indian policymakers have always maintained a hierarchy between formal and informal sectors, with informal as subordinate to the formal. This is not only reflected in the urban settlements, but also in urban services.

For instance, the urban informal waste collectors are ignored by policymakers by not including them in the planning process. However, they are the major

service providers in urban waste management and meet the gap in service provisions, which municipalities should have done otherwise. Practically, the formality-informality divide of the sectors is a negotiated concept. It depends on the convenience of the elites to define some activity as formal or informal. Whenever a need arises, an informal area of residence is formalised for crony capital gains. On the other hand, formal transactions are hidden by relegating them as "informal" for personal gains.

The Indian economy is dominated by the informal sector with more than 80 per cent of the labour force engaged in it, according to International Labour Organization (ILO). Almost all employment in agricultural sector is informal. With so many people engaged in the informal sector, this sector is probably more important than the formal sector. But the formal-informal hierarchy has relegated less importance, sometimes as even non-existent. Take for instance the announcement of ₹50,000 crores by the Reserve Bank of India (RBI) for the benefit of non-banking financial companies (NBFCs) and micro-finance institutions. The NBFCs would, in turn, support real estate companies. It is not clear how this finance is going to benefit the rural money lenders or organisations registered under the Societies Act, 1860, which remain a very important part of rural credit system even today. Each of these registered organisations has hundreds of members, if not thousands. They are not considered as formal

credit institutions, yet meet the requirements of rural credit to the unorganised or informal sector.

Let's now discuss the strategy of the government to contain COVID-19. The government locked down the country on March 24, initially for 21 days, which was extended later. Before the lockdown, the government allowed all Indian nationals to come back to India. These foreign travellers were the initial carriers of the virus as they were exposed to it. Yet, the government did not give any hint of a lockdown before actually declaring it a few hours before its implementation. The army of informal workers was suddenly left in the lurch. The sudden unfolding of events forced them to the streets. The untold misery of informal workers is well known to us. The formal sector employees remained at home, although with a lot of inconvenience.

But the major cost of lockdown has been borne by the informal sector due to loss of livelihood and

insufficient public support. However, the majority of the benefits of lockdown were distributed to the formal sector employees. In a nutshell, the major economic cost has been incurred by a large section of population, generally ignored by the bureaucracy, while the benefits are shared by a small influential group of people.

Why is it possible to ignore a large section of population to the benefit of a smaller section of population in a democratic country? The combined effect of two important anomalies of institutional functioning may provide the answer. The first reason is that institutions are endogenous. The policy and functioning of the political and economic institutions are dominated by a group of the rich and influential. As a result, the policies benefit more to them than others, which, in turn, increases their control over the institutions.

Then why has the ignored group not collectively overthrown the much smaller but influential group? The influential group provides selective benefits to a smaller section of the ignored group and develops a patron-client relationship. This is called political clientelism, where a group of poor is given some benefit against political support while another group is declined the same benefit. Thus, a market for public goods is created and public service is privatised against votes. This exchange may be some castes being included in the group of scheduled or backward castes for getting preferred treatment or

distributing higher amounts of foodgrain from the public distribution system to a smaller group of poor.

We are now waiting for any vaccine for coronavirus to be invented. Lockdown is only buying us time to roll out the vaccine in the market. However, it is not certain whether the poor would be able to reap the benefits of vaccination. We may draw lessons from poor basic public service delivery to poor. One reason for the lack of basic public service in densely-populated urban slums—especially sanitation and pollution control—is that there is no great benefit for such initiative for the rich. With the discovery of good medicine (such as Penicillin) and better nutrition, the rich can protect themselves against most of the public health disasters happening in slums.

According to WHO, about 1.5 million people died due to TB in 2018. The international media's response to such a loss is anyone's guess—hardly any policymaker, statesman or important personality is affected. Hence, the post-coronavirus world would be gloomier for the poor, not only for higher economic inequality, but also for higher disparity to access protection against the virus. People associated with the informal sector will be "managed" through political exchanges.

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Stemming brain drain

It is likely to re-emerge as an important conflict of interest between source and recipient countries

Binod Khadria

The first week of the nationwide lockdown saw images of masses trying to return to their native villages in rural India with their bundled belongings by whatever means of transport they could lay their hands on—overcrowded train tops, bus tops, hand-carts, bicycles—or literally laying their feet on the long path back home hundreds of kilometres away. The scenes of outmigration from cities like Delhi were reminiscent of the Partition of India and the unprecedented population transfer that followed. The partition migration was triggered by a newly

drawn line between two nations whereas the present exodus has highlighted another kind of divide within the country—between the rural and the urban India. There was one more remarkable difference—the sudden lockdown that led to the unanticipated displacement of migrant workers from cities like Delhi and its surrounding areas was meant for saving lives from coronavirus through maximising so-called "social distancing".

The search for a better life usually motivates a rural-to-urban migration. The question is whether the move has actually provided a life to these migrants any better than what they would have had in rural areas? Now that we are witnessing the opposite trend, this gives us an opportunity to rethink internal migration in India and turn a grim situation into a less dire one, rather somewhat better eventually—both for rural folks and city-dwellers. The Global Compact for Migration (GCM) agreed upon by most countries in December 2018 has aimed to make migration sor—safe, orderly and regular. The Compact is meant to apply to international migration across borders, where the responsibility of implementation lies more with the destination countries. However, can we not extrapolate it for internal migration as well? Could there be a pledge to make migration between rural India and the cities "safe, orderly and regular"? As for the lockdown migration, it was none of these, but there is scope to learn for the future.

On April 23, 2020, two of the world's largest democracies — the United States and India — independently executed two separate legal orders that could have a profound impact on the ensuing novel coronavirus disease (COVID-19) pandemic as well as the post-COVID-19 era. The Indian president signed an ordinance to amend a 123-year-old Epidemic Diseases Act and mandated deterrent punishment for any physical harm caused to healthcare workers. Triggered by mob attacks on healthcare workers engaged in testing people for SARS-COV-2 and implementing social distancing, the ordinance legalised punishment with a penalty between ₹50,000 and ₹5,00,000, along with non-bailable imprisonment from six months to seven years.

The United States president, as authorised under Section 212 (f) of the 1952 Immigration and

Nationality Act, signed an executive order to block the entry of categories of people deemed 'detrimental' to the country's interests.

To protect American citizens from foreign competition for American jobs, USA order banned, for an initial period of 60 days, the filing and processing of new green card applications for immigrating into the US as legal permanent residents.

Whereas the Indian ordinance supported Sustainable Development Goal (SDG) 3, which 'ensures healthy lives and promotes well-being for all at all ages', the USA order prioritised SDG 8, which states: 'Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all'.

Notably, the USA order exempted foreign doctors, nurses, researchers and other healthcare workers and their dependents from the ban. The Indian Human Resources for Health (HRH) labouring to save human lives in the present pandemic are the common beneficiaries in both orders — of assured safety to their life and property in India and unrestricted access to health-sector employment in the USA—both of which are akin to prioritising SDG 3.

As a major source country of migrant workers in the global south, India supplies a large workforce of medical professionals, students and trainees to other countries. As the largest destination country in the global north, USA receives migrants from all over the world, many of whom are HRH professionals.

Global imbalance

With their promulgation in the two major players in international migration paradigm, these legislations highlight the grim reality of global imbalance in the supply of skilled professionals, particularly in times of urgent need.

There are several long-standing factors behind this imbalance, such as the limited number of educational and training institutions, long gestation periods to create competencies and a shift in occupational hierarchies and career choices that favour corporate managerial jobs over HRH professions.

Another important reason that has evolved to become a major cause of this disparity is the growing segregation of factor-utilisation from factor-endowment of precious human capital.

This "brain drain" used to be discussed and debated more prominently until the late 1990s, but was subsequently replaced with a neutralising 'brain gain' argument driven by the forces of 21st century globalisation like enhanced global mobility, compensatory remittances to source countries and a new focus on return migration.

Return migration was originally projected to benefit source countries, but the dominant effect was to allow destination countries to replace older migrant workers with younger generations and those educated in newer vintages of knowledge and skills.

Now, in the wake of the COVID-19, I suspect brain drain to re-emerge as an important conflict

of interest between source and recipient countries, particularly in STEM fields (Science, Technology, Engineering and Mathematics), which include HRH. Some people would argue that sooner or later, a potent COVID-19 vaccine would enable life to return to normalcy. Others suggest that even with the vaccine, life is bound to move to a 'new normal'.

Stemming brain drain

Nevertheless, given the ensuing economic downturn the world over involving large-scale job losses, there would be a significant paradigm shift calling for fresh thinking on sharing scarce resources. If individual countries are left to themselves to introduce changes without international cohesion and coordination, conflicts of interest will resurface with renewed strength.

How to pre-empt such an escalation in this 'talent war' and stem brain drain?

While it may be too early to project changes in long-term trends of flows and stocks of international migration, a temporary reduction in cross-border mobility in the short-to-medium term is certainly expected. New restrictions on travel, entry and stay imposed by countries and fear, cost and uncertainty amongst migrants and their families could trigger greater selectivity of their specialisation, nationality, gender and overall numbers in future migration policies.

In the shortest run, this would skim the

frontline HRH, primarily doctors and nurses required for life-saving interventions, that is, to conserve human capital.

But very soon, it would be logical to expect young professionals in the entire domain of STEM-fields to be in higher demand across the borders.

Ironically, because STEM professionals require dedicated training, the numbers of international students in these fields would swell. In addition, such demand would pose acute challenges for gaps in the health sector and care systems of countries of origin when they need them the most.

"Talent war"

One vital question to be asked here would be: How could such brain drain be offset through sharing of STEM professionals and students among countries?

Competition to recruit international students in STEM fields has led to a talent war among the destination countries through "education fairs", which are likely to cause long-term brain drain of future workers. One resource-sharing strategy would be to declare them a sixth 'global common' (others being the High Oceans, Atmosphere, Outer Space, Antarctica and the Internet) that can be equally used by all countries.

This would eventually replace the trinity of conflicts between countries—that of "Age, Wage and Vintage"—to acquire migrants who possess advantages of younger age, lower wages bill (lesser pay, perks,

pension) and latest vintage of knowledge, eventually turning them into tools of global complementarities, cooperation and partnership for global welfare.

The specific issue of mutual understanding to operationalise this between a destination and an origin country would lie in joint and collaborative education and training programmes, while furthering the true spirit of the Global Compact for Migration. Its objective 18 states: Invest in skills development and facilitate mutual recognition of skills, qualifications and competencies.

Here, the focus should be on joint investment in education and training of STEM workers and students and their quantum and scale being decided through analysis of demand and supply between the destination and origin countries.

I have previously vouched for innovative models of dual, multiple and global citizenship to create a pool of "global health-keeping force" along the lines of the "UN Peace-keeping Force"—readily accessible to a crisis-hit country.

This would be a far more effective strategy to combat brain drain of HRH than the often circumvented pleas by WHO and the HRH-deficient origin countries in Africa, Asia and the South Pacific for practicing "ethical recruitment". As cited in the UN-IOMs just-published Red Book 2020 by the International Dialogue on Migration, I have argued in the favour of creating a "smart engagement" of not only HRH, but a wider range of high-skilled

STEM youth in global migration governance.

Global bodies need to prioritise stability in educational, career and migration choices of the youth, but now, these choices are precariously threatened by urgent necessities created by the current pandemic. A significant step towards stemming the brain drain of medics, scientists and students would be to show exigency and declare STEM-youth as the sixth 'global common' to be equitably shared by all unilaterally yearning-to-survive countries in a pretending-to-be multilateral world.

(Author is a migration scholar and former professor, Jawaharlal Nehru University, New Delhi)

"Sufferers then, sufferers now"

In earlier pandemics, migration helped maintain disease-distancing, but they were a socially cohesive mass helping each other

Kancha Ilaiah Shepherd

In any pandemic, the poor suffer more because of low immunity levels and other reasons. In 1897, when undivided India had a population of 180 to 200 million, the bubonic plague killed 10 million, mostly the poor and those living in urban slums. As per data, it affected 70 per cent people, 14 per cent became very sick, and 6 per cent died of it. If COVID-19 transmits to the masses, the biggest problems will occur in India, Indonesia, South Africa, Bangladesh, Pakistan and other such countries. As it happens, the diseases, in both the instances, are said to have originated in China. In 1897, it came via the ports of Mumbai and Kolkata. This time it has arrived with

the highly mobile rich people in aeroplanes.

In 1897, my grandparents lived in the Warangal town of the princely state of Hyderabad and were shepherds. The area is now a part of the state of Telangana. The worst-hit areas were those where poor people, like my grandparents lived. My grandfather died of the plague. There was scarcity of food. Shepherds, the fishing community, dalits dependent on the cattle economy and rural forest-dwelling families fled. My grandmother, Kancha Lingamma, and her elder sister, Alli Earamma, whose husband had also died, ran deep into the forests along with their herds of sheep in search of green pastures and water resources. They settled in areas that had tanks or a stream. My maternal grandparents also joined them. Though the plague gripped the whole country and was virulent, it took a long time to spread since there was very little human-to-human contact and habitations were spread out.

Migration helped maintain disease-distancing, but they were a socially cohesive mass helping each other. People formed community associations. Gradually this gave birth to new clusters of hamlets. What saved my family and others who escaped from their original places of residence was access to meat and milk protein. People ate their own sheep and goats. Dalits and tribal survived mainly on beef and forest food. There was no vegetable economy at that time. Women used to stay under the trees, along with children and cattle, and cook or collect forest

food/ fruits. Men used to go into the forest to graze cattle. Fishers supplied their stock in return for milk and meat. Slowly, the migrant communities started cultivating the abundant land available irrespective of their staple livelihood activities. This is how they finally got access to foodgrains and pulses. By the time of my generation [Shepherd was born in 1952], the shepherd community had settled in small villages. I was born in Papaiahpeta, a hamlet set up by the family and friends of my grandmother.

There was no health infrastructure under the Nizam who was ruling the princely state. Even pre-British India didn't have a structured medical system. Poor people were never given access to traditional medical treatments like the Patanjali system,

ayurveda or homeopathy. For these communities, there were local practices like plant-liquid medicines. The British enacted the Epidemic Diseases Act, 1897 to segregate people and curtail transmission. The Act is still being used to the same end. Collectors were given additional powers. They also deployed medical teams. But in colonial times, brahmins did not prefer to be doctors because it involved touching people of all castes. The British order was for doctors to serve everybody. So thanks to colonialism which "de-castified" medicine in India.

(Author is a writer, political theorist and activist.

This is based on a conversation with Kundan Pandey)

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