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# DownToEarth

FORTNIGHTLY ON POLITICS OF DEVELOPMENT, ENVIRONMENT AND HEALTH

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ingredients for  
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# UNMASKING CORONAVIRUS

The virus spread to 27 countries in just 31 days.  
Is the world prepared for a pandemic?



# CORONAVIRUS

More than a month after the first case was reported from China, there is little the world knows about the new coronavirus. The strain remains a mystery, its symptoms deceptively similar to common cold and there are no curative or preventive vaccine or medicine. What's certain is that the virus is highly contagious. In just 45 days, it has killed over 1,000 people in China and infected more than 40,000 in 27 countries. Worryingly, we have not yet seen the peak of the spread. Is the world ready to face a pandemic?

A report by **Banjot Kaur** and **Alok Gupta**

People queue up to buy masks in Hong Kong



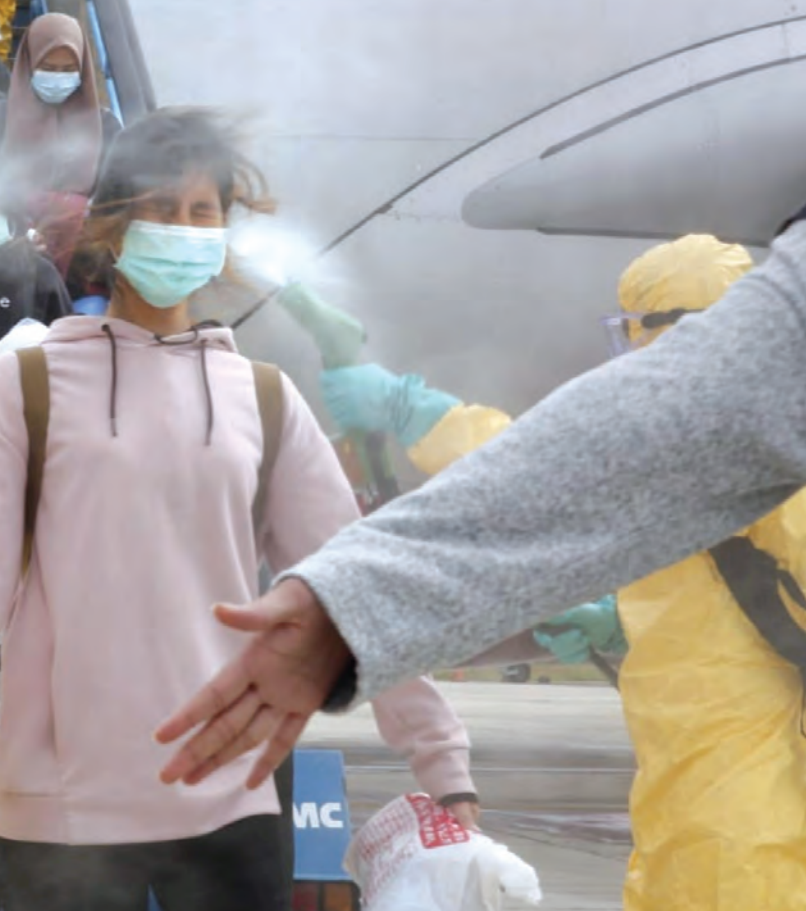
**T**HE LUNAR New Year break has been uncomfortably long and quiet for almost 50 million people in China. Since January 23, the authorities have locked down some 13 cities, including Wuhan in the province of Hubei, which is the epicentre of the deadly coronavirus outbreak. Public transport and ride-hailing services have been suspended in this city of 11 million people. Trains and flights from the city have been suspended and people have been asked to leave their houses only for essential reasons like stocking up food. At places, the police has employed drones to ensure that people stay indoors. Travel restrictions and quarantine measures have also left streets, parks and shopping centres deserted in a dozen other cities, including Chibi, Zhejiang, Huangshi, Xiantao, Enshi, Qianjiang and Xianning. The country's largest metropolis, Shanghai, resembles a ghost city. As many criticise the government's draconian enforcement of epidemic control laws, the government says the measures are to contain the spread of the virus that poses a "grave threat" as there is no preventive vaccine or cure for it.

But if only travel restrictions and lockdowns could stop this virus. A week later, the School of Public Health at University of Hong Kong, published a paper in *The Lancet* which said infections may 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," says Nathan Grubaugh, a virologist at the Yale School of Public Health, USA. As of February 10, the new coronavirus—named COVID-19 by the World Health Organization (WHO) almost one-and-a-half month after the virus was first identified—had infected 42,638 people and killed 1,018 in 27 countries. Most of them are in China. On February 10, Hubei



reported 103 deaths in 24 hours.

The toll could further rise as at present, 3,000-4,000 new cases are being confirmed every day. "Some of these cases are likely a backlog in testing and the daily case reports may present onsets that happened weeks ago," says Grubaugh. There are other reasons, too. The symptoms are deceptively similar to common cold—the classical symptoms include fever, cough and fatigue. In some people, the virus can remain asymptomatic for up to 14 days and thereby, spread stealthily. Besides, Chinese authorities have been notorious for keeping information under wraps. Consider this. A mathematical model developed by the Johns Hopkins University, USA, to gauge the spread of the virus, estimates that 58,000 people would have been affected in China by January 31. Though government data puts the figure at 11,791, it is difficult to believe given the government's track record. On December 30, 2019, Li Wenliang, a doctor in Wuhan, is believed to have first disclosed about the virus to his medical school alumni group on the popular Chinese messaging app *WeChat*. The same day, the city's municipal health commission infor-



med medical institutions about the patients but warned them not to release treatment information to public. Though on December 31, Wuhan's health authorities announced the outbreak and alerted WHO, Li was reprimanded by the police for "spreading rumours online" and "severely disrupting social order". The whistleblower succumbed to COVID-19 a week later.

## NEW BUT FAMILIAR ENEMY

The virus is not entirely new to scientists. It belongs to a large family of viruses that have taken the world by storm earlier. In November 2002, a strain of coronavirus, named the Severe Acute Respiratory Syndrome (SARS), was first isolated from patients in southern China suffering from pneumonia-like symptoms. Then too, China had kept the illness a secret for months. SARS travelled across 24 countries, killing 800 people and infecting another 8,000 before it was contained in July 2003. Almost a decade later, another strain of coronavirus caused the Middle East Respiratory Syndrome (MERS) in Saudi Arabia. It spread to 27 countries killing 912 people and infecting 2,400 before being contained in 2014. But

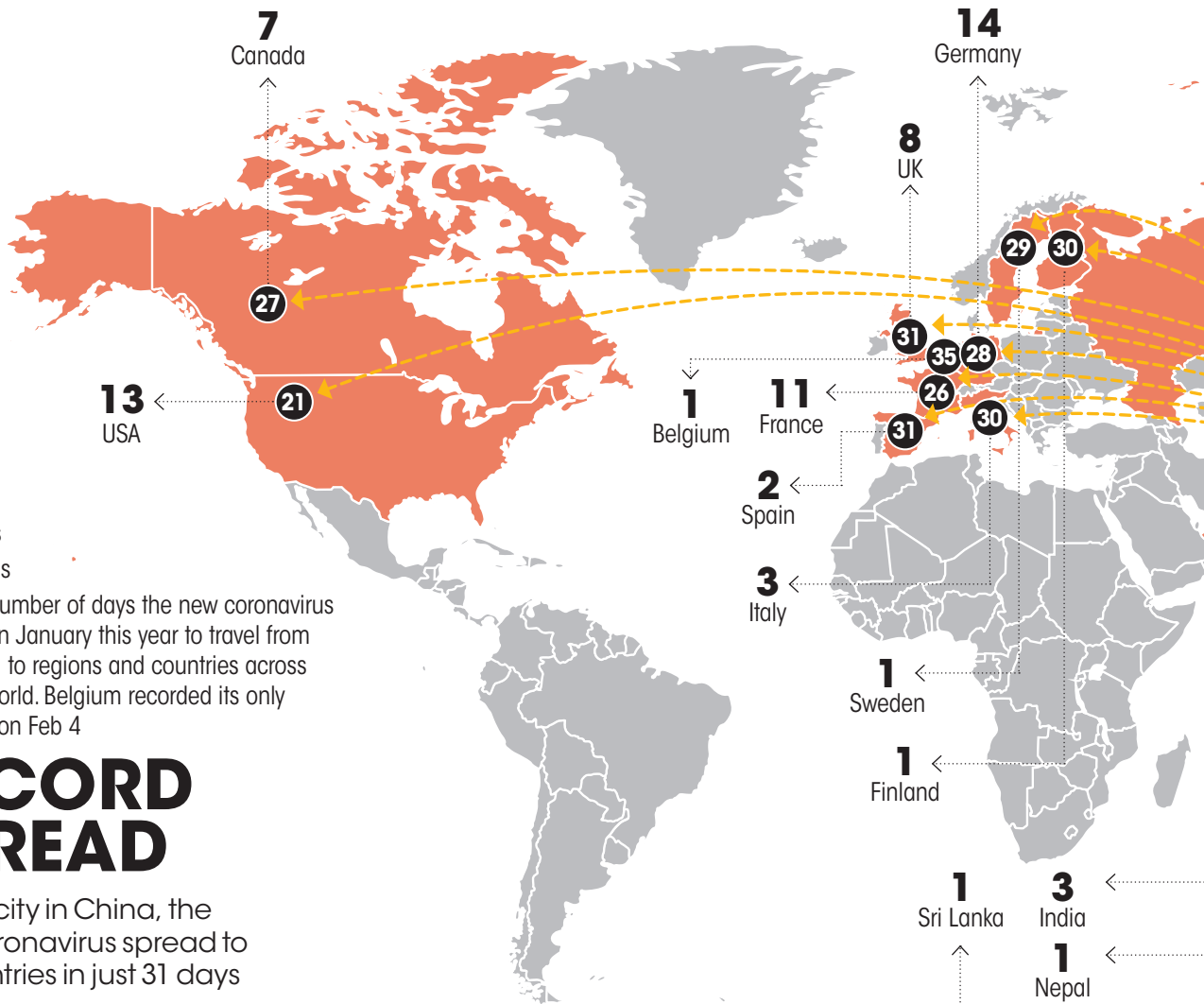
▲  
People in Indonesia being sprayed with an antiseptic after they arrived from Wuhan, China, where the virus originated

COVID-19 has caused global mayhem in just 31 days (see 'Record spread' on p34).

So far, epidemiologists have managed to prepare a preliminary estimation of the epidemic potential of COVID-19 and say the basic reproduction number, or  $R_0$ , of COVID-19 is 2.6. This means a person infected with COVID-19 can infect 2.6 more susceptible people. In comparison, SARS had an  $R_0$  of 2; MERS had 1. But as more and more studies pour in—some 50 scientific studies have been published on COVID-19 in just 20 days of the outbreak—the value appears to exceed WHO's estimate that ranged between 1.4 and 2.5. A study published in journal *medRxiv* on January 29, in fact, estimates that the  $R_0$  for COVID-19 could climb up to 4.08.

A probable reason for this exponential spread is a highly interconnected world (see 'How the virus spread' on p35). A lot has changed since last major outbreaks of SARS and MERS. Today it takes less than 36 hours for one to travel to any part of the world. Consider Hubei. Its mobility is unmatched—it has a robust rail and bus service and waterways systems. Air travel connects it to 55 cities within the country and 23 international cities. Wuhan alone hosts 23 universities and colleges that attract students from across the globe. Since travel ensures the virus a smooth transmission from person to person, Lunar Year festivities enabled it to spread faster.

Scientists and health workers are racing against time to contain its spread. But they are yet to decipher the nature of the virus. "The global medical fraternity is 'shadow boxing' as the basics are still unknown," says WHO director general Tedros Adhanom Ghebreyesus. So far, the Chinese authorities identified the source of COVID-19 to the Hunan seafood market, where game meat, including live foxes, crocodiles, wolf puppies, porcupines and camel meat are sold. This market could have provided vital clues and helped researchers identify the real source of the virus. But the local authorities quickly cleaned the market and shut it down.



00 Cases  
 00 Deaths

00 The number of days the new coronavirus took in January this year to travel from China to regions and countries across the world. Belgium recorded its only case on Feb 4

# RECORD SPREAD

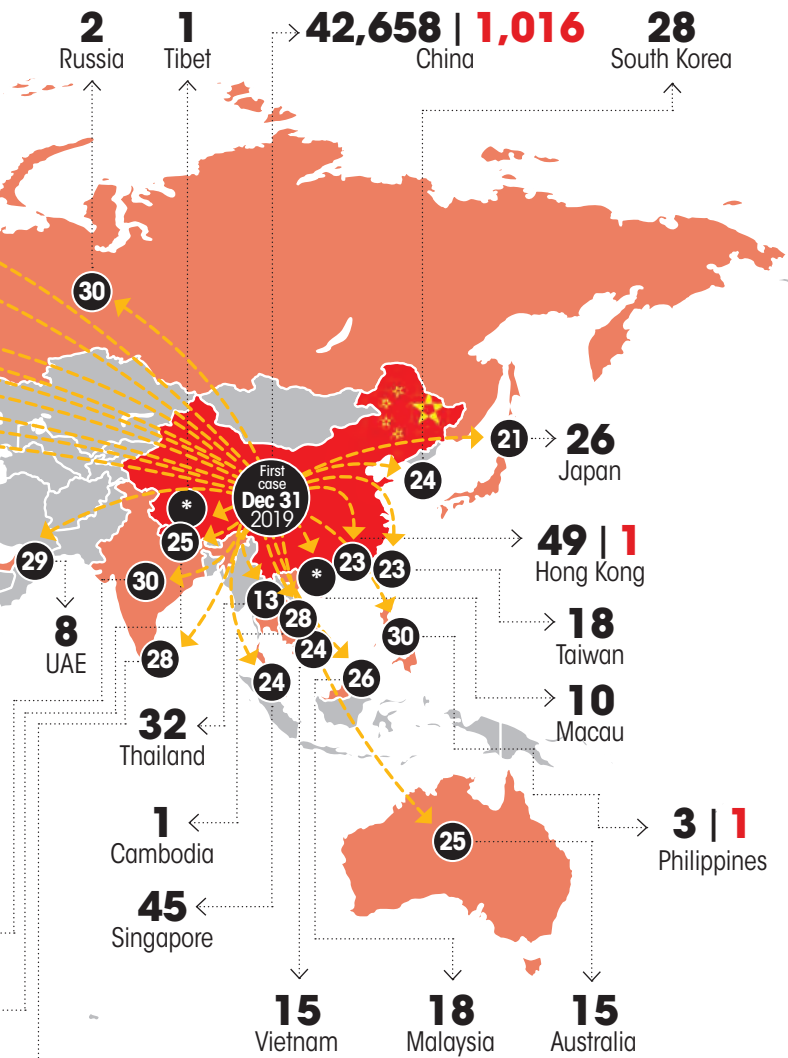
From a city in China, the new coronavirus spread to 27 countries in just 31 days

**TOTAL CASES** 43,129 | **TOTAL DEATHS** 1,018

“Municipalities should have included a few scientists in their team,” says Xiaowei Jiang of the Xi’an Jiaotong-Liverpool University, China. In fact, scientists who have studied genome sequence of the virus—isolated from blood samples of the initial 41 patients who contracted the virus—say bats could be the host of the virus. On February 7, state news agency Xinhua published a study by South China Agricultural University that says genome sequences of viruses in pangolins is 99 per cent identical to those on coronavirus patients. The study thus suggests that pangolins could be the intermediate host for COVID-19. However, researchers are still uncertain on both these counts. They also cannot decipher how the virus will mutate.

## RESPONSE ASSESSMENT

China has built a 1,000-bed hospital in record 10 days, which is a first-of-its-kind intervention in any past outbreak. The government has also announced a financial package of 1 billion Yuan (US \$143 million) to Hubei to deal with the crisis. China manufactures 20 million face masks per day; it is now trying to scale up production. However, the magnitude of the outbreak is testing China’s health infrastructure. When the crisis began to explode, the region was hit by shortage of testing kits, medicines, masks and hand sanitisers. “There’s severe shortage of medical supplies not just in Wuhan but also in surrounding cities,” says Wang Xiaodong, governor of Hubei. Other countries too have pressed the panic button or are struggling to



Note: figures as of January 11, 2020. \*Information not available. Source: Johns Hopkins University, USA | Graphics: Sanjit / CSE

implement containment measures. Russia and Singapore have shut borders with China. The US and Australia have imposed travel restrictions. Many others have moved towards imposing partial bans. As far as India is concerned, it has cancelled visas of all those travelling from China, except for Indians, and has advised its citizens not visit China for now. There is no safety protocol, but the advisory has been taken on the basis of assessment of the pathogen's virulence, says a health ministry official.

About 650 Indians have been evacuated from Wuhan and kept at quarantine centres. Three patients, diagnosed positive for COVID-19 in Kerala, had returned from Wuhan. As of February 7, as many 1,275 flights coming from China, Hong Kong and Thailand covering 0.13 million passengers

## HOW THE VIRUS SPREAD

Dec 31, 2019  
New coronavirus affects humans exposed to animals



Unknown animals

Humans exposed to animals



Jan 21, 2020  
Virus spreads from infected humans to humans without animal contact

Humans exposed to animals



Humans without animal contact

Feb 01, 2020

Humans without exposure to animals also start transmitting the virus

Infected humans



Rapid spread due to mobile population



had been screened. In all this, the Union ministry of AYUSH stunned the world saying certain homeopathic and ayurvedic medicines could prevent the infection. "This was an irresponsible statement," says Asokan KV, secretary of Indian Medical Association.

Chinese scientists at the Wuhan Institute of Virology say they are testing antiviral drugs, which can suppress the activity of the virus, and not necessarily kill it. This drug will soon enter the human trial phase. Globally, various groups of scientists are working to develop a vaccine. However, it may not be easy. Scientists have still not found a vaccine for either SARS or MERS. Though there has been a pathological optimism about fast development for a weapon against this new, but familiar enemy.



Influenza victims crowd into an emergency hospital near Fort Riley, Kansas, US, in 1918 during the Spanish flu, the first pandemic in recorded history that lasted two years

# Are we prepared for a pandemic?

No. The world has not even made a start

**A** pandemic is an epidemic occurring worldwide, or over a wide area, crossing international boundaries and usually affecting a large number of people,” says a World Health Organization (WHO) bulletin. The COVID-19 has already spread to 27 countries and infected over 40,000 people. The past four pandemics were caused by the influenza (flu) virus, therefore the medical discourse has so far been only on flu pandemics. For the past two years, WHO has been listing pandemic as an important health challenge. “A pandemic of a new, highly infectious,

airborne virus—most likely a strain of influenza—to which most people lack immunity, is inevitable. It is not a matter of “if” another pandemic will strike, but “when” it will strike,” WHO said this year.

While WHO had warned of an impending flu pandemic, nobody expected a new coronavirus to strike first, and in such magnitude. Earlier outbreaks—SARS in 2003 and the Middle East Respiratory Syndrome (MERS) in 2012—were also caused by coronaviruses, but were not declared pandemics. Even during the last pandemic in 2009 due to swine flu, the

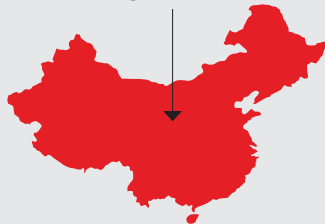


reproduction number (R0)—infected people transferring infection to other affecting others—was 1.3-1.8; for COVID-19, it is 2.6. The fact that the outbreak is assuming pandemic proportions has been established in a research paper published in *medRxiv* by three researchers from health institutes in Glasgow and Lancaster in the UK and Florida in the US. They state that the total number of cases just within Wuhan, the epicentre of the outbreak, would be greater than 190,000. (See 'Peak season for...' on p42.)


## HISTORY OF PANDEMICS

All the four pandemics the world has seen so far were zoonotic diseases

**CHINA**



**SPANISH FLU**  
1918-20



Deaths  
**50 million**  
Host animal  
**Waterfowl**

### ASIAN FLU

1957-58



Deaths  
**1.5 million**

Host animal  
**Pig**

### HONG KONG FLU

1968-70



Deaths  
**2 million**

Host animal  
**Pig**



### SWINE FLU

2009-10



Deaths  
**575,000**

Host animal  
**Pig**

## ARRIVAL OF THE ZOOTIC

Though we do not know when and where the next pandemic will surface, we do know how it will emerge. “The next pandemic will be a zoonotic disease,” Jonathan Epstein, vice-president of Science and Outreach at EcoHealth Alliance, a science-based non-profit in New York, told *Down To Earth*. Zoonotic diseases are caused by infections that spread from animals to humans. EcoHealth Alliance says waterfowls will host the flu pandemic, while bats and rodents would be the source for a coronavirus pandemic.

“Over the last 15 years, we’ve found dozens of novel SARS-related coronaviruses in bats in China and other parts of the world. Our research has shown that people in China hunt bats that are known to carry viruses linked to SARS and novel coronavirus. Those exposed to these host animals earlier have developed antibodies against these viruses, which means they’ve been exposed to them and can spread the disease,” says Epstein.

It is not a coincidence that China is the country of origin of three of last four pandemics. “While we can’t predict from where the next influenza pandemic is going to emerge, there are certain places that need particular attention. And, China is the place of all of them,” said Dennis Carrol, former director of emerging threats division of United States Agency for International Development, in a Netflix series, *Pandemic* (see 'History of pandemics').

After the outbreak, China imposed a temporary ban on wildlife trade across the country. “What we need is not a temporary ban, but permanent regulations for wildlife trade in China. What is not required is the elimination of wildlife. We need to adjust the way we do things so that we safely live alongside wildlife by limiting opportunity for outbreaks to occur,” Epstein suggested. The World Wide Fund for Nature has issued a similar statement.

Though no direct has been established between COVID-19 outbreak and climate

change, but studies say warming temperatures and melting of ice are exposing new viruses to the ecosystem. For instance, researchers recently found 33 viruses trapped in the Tibetan glacier. Out of these, 28 were completely new to science and all of them had the potential to cause an outbreak. The study was published in *bioRxiv* on January 7, 2020. As ice melts, viruses are being released in the air, which would travel through rivers and streams, infecting humans. Also, as the world is urbanising at a rapid pace, natural habitats are being destroyed. This has further exposed us to a host of new viruses for which we have no immunity.

So how many people will be affected in a future pandemic? “The 1918 global influenza pandemic sickened one-third of the world’s population and killed as many as 50 million people—2.8 per cent. If a similar contagion occurred today with a population four times larger and travel time anywhere in the world less than 36 hours, 50-80 million people could perish,” WHO warned in a 2019 report.

On any given day, more than 10,000 flights operate globally, and this explains how inter-connectivity will accelerate this spread. “During the Ebola epidemic in 2014, models estimate that without travel restrictions, 7.17 infected passengers per month would have departed from highly-affected countries like Liberia, Sierra Leone and Guinea to various destinations around the globe,” say Pierrot Derjany and his colleagues from Embry Riddle Aeronautical University, USA.

As a pre-emptive move, the global airline industry has cancelled flights now because it does not want to become the virus carrier. British Airways, Cathay Pacific Airways, Delta Airlines, Egypt Air, Air India, Air Canada, Emirates, Ethiopian Airlines, FinnAir, Hainan Airlines, Israel Airlines, American Airlines and Air Tanzania have called off all or a few select flights within a couple of weeks of the outbreak in China.

So there is no doubt that an outbreak of a large-scale pandemic will rattle the global economy. The World Bank estimates that a global influenza pandemic akin to the scale and virulence of the one in 1918 would cost the world economy US \$3 trillion, or up to 4.8 per cent of the world’s GDP. The cost would be 2.2 per cent of GDP for even a moderately virulent influenza pandemic.

## ARE WE PREPARED?

The answer to this question depends on three conditions: nobody knows what virus will cause the pandemic; how virulent will it be; how many people would be killed or infected; and, if any symptomatic treatment will work. The shocking thing is that no country has developed precautionary safety protocols as prescribed by WHO—planning and coordination, situation monitoring and assessment, prevention and containment of virus, health systems response and communication for awareness.

“National health security is fundamentally weak around the world. No country is fully prepared for epidemics or pandemics, and every country has important gaps to address,” warns the Global Health Security (GHS) Index report prepared by the Johns Hopkins University and Nuclear Threat Initiative. There are certain parameters upon which countries are ranked. On a scale of 100, almost all countries scored only 40.2. Less than 7 per cent countries scored better in terms of prevention of pandemic. Worse, less than 5 per cent countries had a rapid response strategy, says the report.

A *British Medical Journal* paper on global preparedness published last year highlighted the most prepared countries were concentrated in Europe and North America, while the least prepared countries were clustered in Central and West Africa and Southeast Asia. But coronavirus is also becoming a great leveller. It is attacking both rich and poor

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# “Peak season for coronavirus is yet to come”

**ERIC FEIGL-DING**, an epidemiologist at the Harvard Chan School of Public Health, USA, spoke to **DOWN TO EARTH**

## **Do you believe in reports that there was a cover-up by China in early December?**

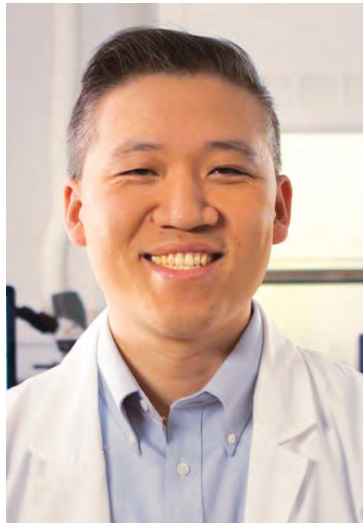
I do not want to go into the politics of cover-up, but I do believe that China delayed a little bit in ramping up public health facilities in the initial days due to which crucial time was lost. More significantly, even at present a lot of underdiagnosis is happening because the labs have reached saturation point and are facing shortage. So the actual number of cases can be much higher.

## **What about the controversy in the number of people affected?**

It is true that the number of cases is high. You may still not be counting the milder cases. There are reports that patients are being turned away in Wuhan. Everyone agrees the difference could be of eight times at least in the epicentre.

## **WHO has not announced bans, but many countries have imposed full or partial bans.**

No doubt the transmission rate is very high. But before imposing blanket bans,



countries would keep people coming from China under quarantine for 14 days—the incubation time period. This was a pragmatic approach. And one has to understand whether such travel bans, if at all they were to be implemented, were required only for Wuhan city, the epicentre of the outbreak, or entire China. Countries should be rational about it.

## **What about the fact that human-to-human transmission has happened in more than five countries other than China?**

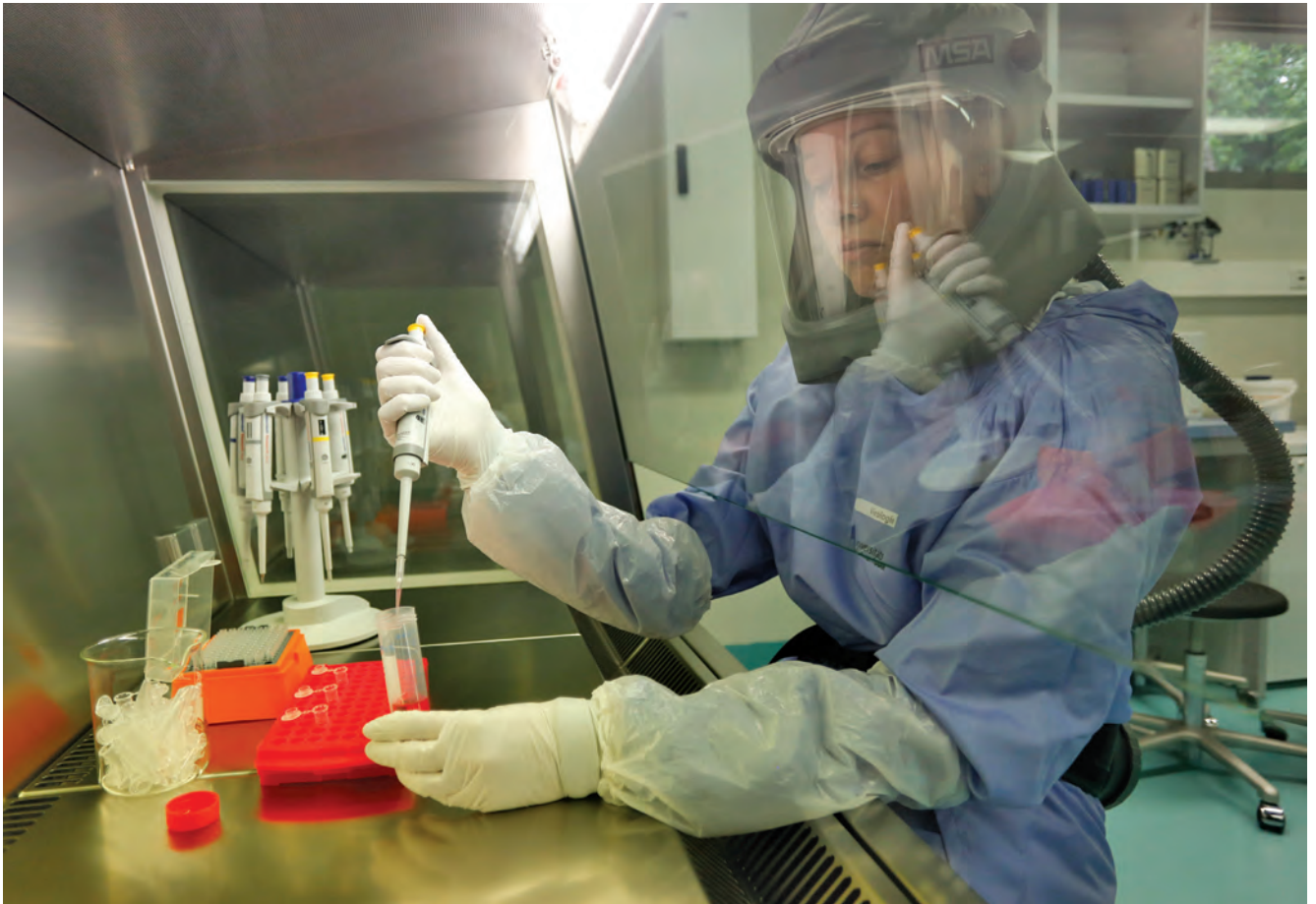
It has happened, but it is restricted to close family members.

## **How much is this coronavirus outbreak comparable with SARS?**

The reproductive number ( $R_0$ ) of SARS varied from 2 to 2.5, at some places even 4. The  $R_0$  of this outbreak is nearly 2.6. But what is important is SARS took three months to reach a number of close to 8,000. In the case of COVID-19, in a little over one month's time, we are close to a tally of 41,000. This exponential growth should worry us while we still do not know the exact reasons for it. In the case of SARS outbreak, there were hardly any asymptomatic cases. But in the current outbreak, there are many. This poses a great challenge to us because they may go unreported and later lead to infections.

## **Have the number of cases peaked? What can you say about the possible trajectory?**

It is very difficult to talk about a possible trajectory, but one thing can be said that the peak is yet to happen. This is expected by the end of February, after which the cases may begin to come down. Viruses do not usually like summers.



countries. And there is no vaccine available. So those in rich countries are surviving only on symptomatic treatment.

Since the world was sure that the next pandemic would be a flu pandemic, efforts have centred around developing the universal flu vaccine—the one which will give protection against existing and future strains of flu. The US-based National Institute of Allergy and infectious Diseases is leading one of the initiatives to develop a universal flu vaccine.

“At present, seasonal influenza vaccines protect only against the existing strains of H1N1, H3N2 and two influenza B viruses. The next generation vaccine will provide protection against more than these four viruses and hopefully against other circulating strains and also the future ones that may emerge,” Jennifer Gordon, influenza vaccines program officer with US’ National Institutes of Health, told *Down To*

^  
A researcher at the Bonn Faculty of Medicine in Germany looks at bat and human cell culture models to characterise and compare coronaviruses

*Earth*. The vaccine will provide 75 per cent immunity; existing vaccines are providing only 10-60 per cent immunity.

There are several probable candidates for a universal flu vaccine—many are under clinical trials and one has already reached the last phase, the human trial, as animal studies have shown positive results. “However, we don’t know when the final product will be out and what it would cost,” says Gordon. WHO and philanthropic bodies are funding such research initiatives. Though there are many public and private initiatives to develop a universal flu vaccine, there are only a few projects in infancy to find a vaccine for coronaviruses.

But whatever be the nature of the next pandemic—be it a coronavirus or a flu virus—what would be immediately required for the world is to contain the spread of the virus from one place to another.



## “WE NEED TO ADDRESS THE UNKNOWN”

BY CHRISTIAN LINDMEIER

**THOUGH MANY** experts say the coronavirus outbreak is close to a pandemic, the World Health Organization (WHO) does not believe so. At present, we are in the phase where it's an epidemic with multiple foci, and we will try to extinguish the transmission in each of these foci. Previous coronaviruses including SARS and MERS didn't lead to a pandemic when they first emerged. However, we still do not know much about this virus. That's why WHO is monitoring the evolution of this outbreak every minute with a network of scientists, clinicians, disease trackers, governments, supply chain experts and partners from the public and private sector.

In fact, WHO declared the new coronavirus COVID-19 a Public Health Emergency of International Concern (PHEIC) on January 30, 2020. This the sixth time a PHEIC has been declared—the previous ones were H1N1 in 2009, Polio in 2014, Ebola in West Africa in 2014, Zika in 2016, Ebola in the Democratic Republic of Congo in 2019. Following the declaration of a PHEIC, WHO has issued temporary recommendations. These measures address travel, trade, quarantine, screening and treatment to make sure countries are prepared to deal with this outbreak. They can also set global standards of practice in these areas. WHO is also working towards reducing secondary infections amongst close contacts and healthcare workers; preventing transmission amplification events and super spreading events (which happened in the case of SARS); and, preventing further spread.

To reduce zoonotic transmission, we need to identify animal source(s) and limit exposure; equip countries to detect, isolate and provide healthcare for infected patients; and, provide optimised care. We also need to address the unknown through clinical severity, treatment options, epidemiologic studies, diagnostics, therapeutics and vaccines. As WHO's director-general said: “The risk of it becoming more widespread globally remains high.”

*(The author is spokesperson of the World Health Organization)*

Though it has been criticised for its methods, China placed 13 big cities under full or partial lockdown, affecting about 50 million people, to contain the spread. This is happening for the first time in history anywhere in the world. Undoubtedly, this caused hardships to people and experts are divided over its efficacy.

On the one hand, China has locked down its affected regions and on the other, many countries have strictly advised its citizens not to travel to China. So, are there any protocols for such bans? Globally, countries have taken stringent decisions to safeguard their citizens. Russia and Singapore have shut borders with China. The US and Australia have also imposed travel restrictions. Many other countries have moved towards imposing partial bans.

But WHO stands alone. As countries have taken safety measures on their own, WHO has looked at the tottering economy and not issued a single travel advisory. In fact, Michael Ryan, WHO's director for health emergencies programme, defends this stance. “If all 191 countries behave in a manner they wish to, there will be no alignment in our response and it will only add to the problem,” says Ryan.

WHO is expected to take the lead during such emergencies, but has sipped with China and has defended it. It did not reprimand China for delaying the news of the outbreak. Ironically, the Chinese authorities admit the cost of delay. “It's a moment of shame. If we had taken strong measures earlier, the outbreak would have been under control,” Ma Guoqiang, Wuhan Communist Party Secretary, told the state broadcaster China Central Television on February 1.

WHO's ambiguous position on COVID-19 should force countries across the world to devise strategies, build health and emergency infrastructure. Meanwhile, to follow what trajectory the novel coronavirus takes, watch this space. **DTE**

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