

## Authors

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The Executive Summary is produced weekly and contains in-depth analysis. International SOS publishes a COVID-19 [Daily Case Summary](#).

## INTRODUCTION

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**In this week's edition of the International SOS COVID-19 Executive Summary we explore:**

1. Variations in interventions used in Europe and Scandinavia
2. Focus on Sweden
3. Focus on Taiwan
4. Preventing a second wave
5. Reducing interventions
6. The true prevalence of SAR-CoV-2
7. Serosurveys
8. Wastewater surveillance
9. Focus on India
10. COVID-19 is class conscious
11. Mortality of COVID-19 patients on ventilators
12. A Virologist's Perspective: Professor John Oxford

## FOCUS ON INTERVENTIONS IN EUROPE AND SCANDINAVIA

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A detailed paper published by the [Imperial College COVID-19 Response Team](#) summarises the timing and effect of COVID-19 related interventions introduced by 11 countries.

The interventions measured were:

- Case-based self-isolation mandated
- Social distancing encouraged
- Public events banned
- School closures ordered
- Lockdown ordered

**Figure 1: Intervention timings for the 11 European countries included in the analysis**



### Assumption:

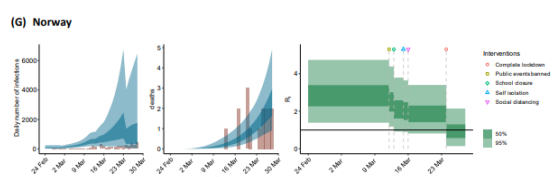
Specific interventions are assumed to have the same relative impact on  $R_t$  in each country when they were introduced there and are informed by mortality data across all countries.

### Findings:

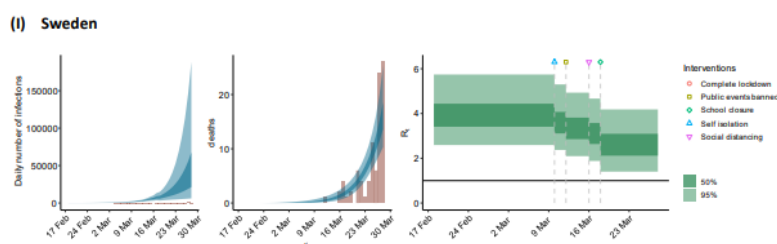
“Across all countries we find current estimates of  $R_t$  to range from a posterior mean of 0.97 [0.14-2.14] for Norway to a posterior mean of 2.64 [1.40-4.18] for Sweden, with an average of 1.43 across the 11 country posterior means, a 64% reduction compared to the pre-intervention values.”

### Comparing the effect of the various interventions between countries:

**The best: Norway:**  $R_{t0}$  reduced to  $< 1$  by interventions



**The worst: Sweden:**  $R_{t0}$  remains  $> 1$  despite interventions



**COMMENT:** The relative contribution of each intervention in reducing the  $R_{t0}$  is relevant to any discussion about which interventions to lift and when.

## FOCUS ON SWEDEN

Sweden has been following a “flexible” coronavirus response and betting on “social obedience”. Social distancing was encouraged and visits to aged care facilities banned. Bars and gyms remained open and social gatherings were limited to 50 people, however high schools and universities were closed. **It seems that this experiment was a failure.**

[ABC News, 7 April](#): Professor Peter Nilsson said that that it is “unthinkable” for people to stay home for 18 months and that could lead to societal breakdown. **However, Sweden has so far recorded more than 400 coronavirus deaths — about 10 times as many as Australia. Its population is around half that of Australia.**

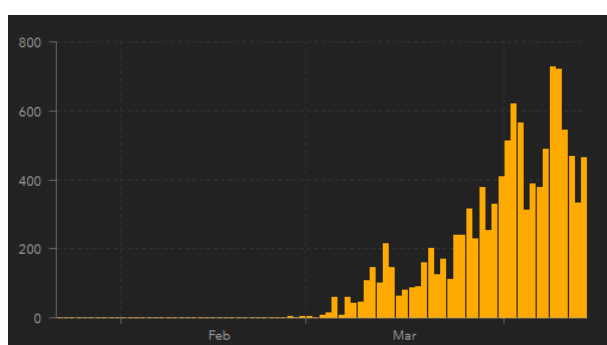
[The Lancet, March 28](#): **The initial slow response in countries such as the UK, the USA, and Sweden now looks increasingly poorly judged.** As leaders scramble to acquire diagnostic tests, personal protective equipment, and ventilators for overwhelmed hospitals, there is a growing sense of anger. The patchwork of harmful initial reactions from many leaders, from denial and misplaced optimism, to passive acceptance of large-scale deaths, was justified by words such as “unprecedented”.

[Forbes, 14 April](#): **22 Scientists say coronavirus strategy has failed as deaths top 1,000.** Sweden's relatively relaxed approach to controlling the spread of the coronavirus has come under fire in international media and from many locals in the capital, Stockholm, where more than half the country's deaths have been recorded. **Now, 22 researchers have publicly criticized the strategy and called on politicians to make changes.**

[Dagens Nyheter, 14 April](#): **A group of researchers from a range of top Swedish universities and research institutes make harsh criticism of the Swedish Public Health Agency and their present coronavirus strategy.** They say that elected politicians must now intervene with “swift and radical measures”.

### SWEDEN

#### DAILY CONFIRMED CASES



**TOTAL CASES: 11,445**

**DOUBLING TIME: 11 DAYS**

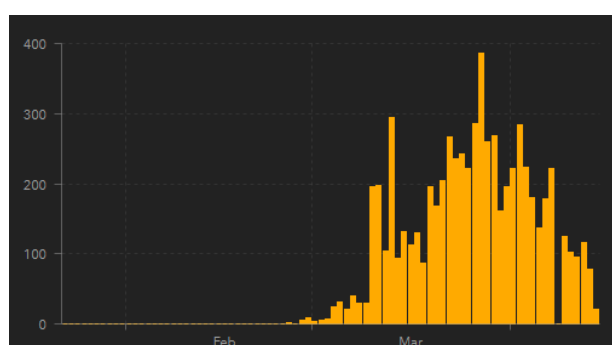
**TOTAL DEATHS: 1,033**

**POPULATION: 10.23 million**

**DEATHS PER 100,000: 1.033**

### NORWAY

#### DAILY CONFIRMED CASES



**TOTAL CASES: 6,623**

**DOUBLING TIME: 18 DAYS**

**TOTAL DEATHS: 139**

**POPULATION: 5.37 million**

**DEATHS PER 100,000: 0.139**

Graphs from [Johns Hopkins University](#)

## FOCUS ON TAIWAN – A MODEL OF PANDEMIC PLANNING

**“Taiwan has a population the same as Australia (25 million) but a fraction of the coronavirus cases”**

Professor Ih-Jen Su began annual rehearsals of a possible pandemic from China almost two decades ago after SARS killed more than 20 per cent of people it infected in Taiwan. The director of infectious diseases at Taiwan's National Health Research Institutes established dedicated respiratory nursing homes with thousands of ventilators and increased intensive care capacity to 10,000 beds, four times the size of Australia's capacity even though the two have roughly the same population.

Taiwan has recorded 385 cases of COVID-19 to Australia's 6,314. It began scrutinising and quarantining passengers on flights from Wuhan and Guangdong in December, implemented travel bans on China and introduced strict social-distancing measures in January. In an interview with [The Sydney Morning Herald](#) on 12 April from Taipei, Professor Su said Taiwan had always kept a step ahead of the information from China. "When they say it seems to have human-to-human transmission, we have a sense that there must be a big human-to-human outbreak so we start ahead of the information," he said. "That is why Western countries suffer so much, even in Europe and the United States. They don't have the experience of Taiwan."

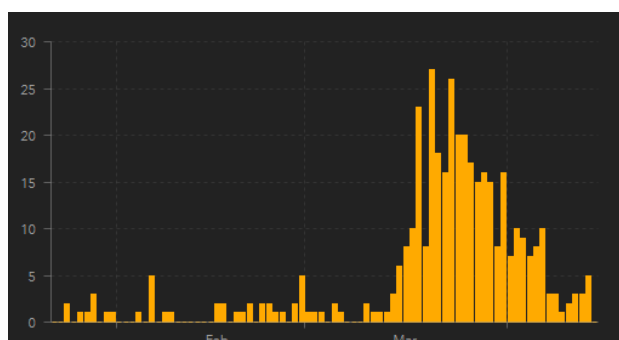
Professor Su sent experts to Wuhan at the first sign of an outbreak in December.

Taiwan initiated the response it had spent 17 years rehearsing, Professor Su said. "We are so close to China, Taiwan would be the first country suffering from any outbreak. We exercise hospital and control measures one to two times a year. The most important thing is the earlier the better for control measures".

Thirty dedicated public health physicians took over the health system and 1,100 quarantine facilities were set up across the country.

### TAIWAN

#### DAILY CONFIRMED CASES



**TOTAL CASES: 393**

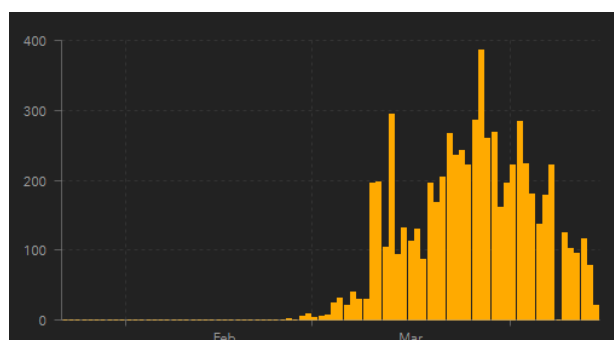
**DOUBLING TIME: 21 DAYS**

**TOTAL DEATHS: 6**

**POPULATION: 24 million**

### AUSTRALIA

#### DAILY CONFIRMED CASES



**TOTAL CASES: 6,415**

**DOUBLING TIME: 18 DAYS**

**TOTAL DEATHS: 62**

**POPULATION: 25 million**

Graphs from [Johns Hopkins University](#)

**NOTE:** Taiwan is excluded from the WHO due to China's objection to its membership

[NPR, 14 APRIL:](#) Taiwan reported no new coronavirus cases on 14 April, marking the first time authorities there have reported zero new cases in more than a month. It's also the latest achievement for a health system that first acted to prevent the spread of COVID-19 back in December. The last time Taiwan's Central Epidemic Command Center announced no new cases was on March 9, 36 days ago.

## PREVENTING A SECOND WAVE

[Sydney Morning Herald, 13 April:](#) **Russian border town becomes China's second virus wave frontier.** A total of 108 new coronavirus cases were reported in mainland China on Sunday, up from 99 a day earlier, marking the highest daily tally since 5 March. Imported cases accounted for a record 98, China says, with 49 involving Chinese nationals returning from Russia's Far Eastern Federal District, home to the city of Vladivostok, who re-entered China through border crossings in Heilongjiang province.

[Caixin, 13 April:](#) **Africans caught up in Guangzhou campaign to contain imported infections.** Guangzhou reported its first imported case of Covid-19 on 15 March, and 119 of the city's 479 new cases between that date and the end of Saturday came from people entering China from abroad. Another 13 new cases of local origins during that period were related to imported cases, 12 of those involving African nationals.

[New York Times, 9 April:](#) **Why coronavirus cases have spiked in Hong Kong, Singapore and Taiwan.** None of these places had a single day with more than 10 new cases until March, even as the coronavirus spread around the world. That changed in the past two weeks, as both Hong Kong and Singapore saw new cases in the double digits for consecutive days, with the bulk attributed to those who have traveled from abroad. Singapore's numbers are now triple-digits, with large clusters of cases linked to dorms for migrant workers.

Taiwan was hit with a surge of new cases, the vast majority of which were imported from other countries, while the number of locally transmitted infections remained low.

Students or expatriates returning from Europe or the United States account for a large share of the imported cases. At least 191 of the confirmed cases in Hong Kong, for example, were among students who had returned from studying abroad in Britain. Similarly, 46 cases in Taiwan were among students studying abroad in Britain who had returned home after mid-March.

## REDUCING INTERVENTIONS

[WHO Guidance, 13 April:](#) **WHO Provided six criteria for transitioning to and maintaining a steady state of low-level or no transmission**

1. **COVID-19 transmission is controlled** to a level of sporadic cases and clusters of cases, all from known contacts or importations and the incidence of new cases should be maintained at a level that the health system can manage with substantial clinical care capacity in reserve.
2. **Sufficient health system and public health capacities are in place** to enable the major shift from detecting and treating mainly serious cases to detecting and isolating all cases, irrespective of severity and origin.
3. **Outbreak risks in high-vulnerability settings are minimized**, which requires all major drivers and/or amplifiers of COVID-19 transmission to have been identified, with appropriate measures in place to minimize the risk of new outbreaks and of nosocomial transmission.
4. **Workplace preventive measures are established** to reduce risk, including the appropriate directives and capacities to promote and enable standard COVID-19 prevention measures in terms of physical distancing, hand washing, respiratory etiquette and, potentially, temperature monitoring.
5. **Risk of imported cases managed** through an analysis of the likely origin and routes of importations, and measures would be in place to rapidly detect and manage suspected cases among travelers (including the capacity to quarantine individuals arriving from areas with community transmission).
6. **Communities are fully engaged** and understand that the transition entails a major shift, from detecting and treating only serious cases to detecting and isolating all cases, that behavioural prevention measures must be maintained, and that all individuals have key roles in enabling and in some cases implementing new control measures.

[NPR.ORG, 6 April:](#) **Dr Anthony Fauci: The country can return "to a real degree of normalcy" before a coronavirus vaccine is available.**

Dr Fauci, Director of the National Institute of Allergy and Infectious Diseases, said it may be possible to loosen societal restrictions sooner. "I don't think that you're going to have to say that the country cannot get back to a real degree of normalcy until you absolutely have a safe and effective vaccine," he said during the briefing.

A test that measures people's antibodies, and presumably, their immunity, to the virus will be available widely by May, according to U.S. Public Health Service. That kind of test will be "so important," Fauci said, because then health officials will know how widely the virus has spread.

Broader testing capability, including antibody testing, would help the country reduce the kind of COVID-19 mitigation by social distancing that is in effect now. "We will have in place the capability of identifying cases, contact tracing and isolating so it never gets out of hand," he said.

[ABC.net.au, 13 April](https://www.abc.net.au/13-april): Australian Federal Health Minister, Greg Hunt, has outlined the three tests Australia will need to pass before the coronavirus restrictions end.

#### **Test one: A sustained decrease in cases**

Australia has so far managed to flatten the infection curve, recording fewer than 100 new cases a day for the past week — well down from weeks ago. But further falls in cases are needed.

#### **Test two: Rapid response capabilities:**

Mr. Hunt said leaders needed to be satisfied that if, there was a localised spike in cases, then health workers would be well placed to respond, contain and isolate the infected people.

"If there were individual cases which broke out into a local spike, then the ability to respond, contain and to isolate will be absolutely critical to Australia's capacity to, further down the track, progressively lift restrictions on a step by step basis," Mr. Hunt said.

#### **Test three: An exit plan**

Mr. Hunt has repeatedly said social-distancing measures will be in place for at least six months and potentially longer if researchers are unable to develop a vaccine.

He said Australia was looking to South Korea, Japan and Singapore to monitor how they were planning their response to the virus.

He said any steps to reopen Australian businesses would be targeted and gradual to ensure there was not a sudden surge in cases.

### **TRUE PREVALENCE OF SARS-CoV-2? 5-50 X THE CONFIRMED RATE?**

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#### **Italy: Virus cases 10 times higher than reported**

Italy may have 10 times the number of virus cases than officially reported, the emergency chief Angelo Borrelli told daily [La Repubblica](https://www.larepubblica.it/) in an interview on 24 March. "It is credible to estimate that there are 10 positive cases for every one officially reported." That would raise the total number to over 600,000 the newspaper reported.

#### **True number of cases '5-10 times higher'**

Reported in [The Chronicle](https://www.thechronicle.com.au/), Australia's Chief Medical Officer, Professor Brendan Murphy, says the true number of coronavirus cases around the world may be five or even ten times higher than the current official estimate. We believe that the true number is probably five or ten times as much as that, because we know that judging by the death rate, the testing rate, and in many countries they're not detecting all the cases. There are some countries that don't have the capacity to test."

#### **ILI surveillance estimates symptomatic case detection rate of SARS-CoV-2 in the US to be 1/100**

A pre-print (= not peer reviewed) article in [MedRxiv on 14 April](https://www.medrxiv.org/content/10.1101/2020.04.14.20071111v1) tries to estimate the under-reporting of cases in the US caused by "a failure to identify early cases imported to a country, bottlenecks in RT-PCR testing, and the existence of infections which are asymptomatic, sub-clinical, or with an alternative presentation than the standard cough and fever."

Using publicly available CDC data, a "surge of non-influenza ILI (influenza-like illness) above seasonal average" is correlated with COVID-19 case counts across states.

By quantifying the number of excess ILI patients in March relative to previous years and comparing excess ILI to confirmed COVID case counts, we estimate the syndromic case detection rate of SARS-CoV-2 in the US to be 1/100.

This corresponds to approximately 28 million presumed symptomatic SARS-CoV-2 patients across the US during in the three-week period March 8 to March 28, 2020.

Together these results suggest a conceptual model for the COVID epidemic in the US in which rapid spread across the US are combined with a large population of infected patients with presumably mild-to-moderate clinical symptoms.

### Universal Screening for SARS-CoV-2 in Women Admitted for Delivery

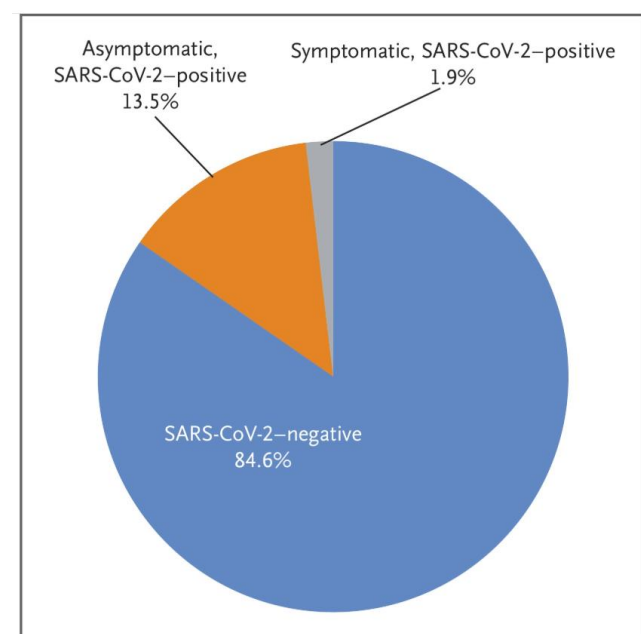
[New England Journal of Medicine, 13 April](#): Between 22 March and 4 April, 2020, a total of 215 pregnant women delivered infants at the New York-Presbyterian Allen Hospital and Columbia University Irving Medical Center. All the women were screened on admission for symptoms of Covid-19.

Results:

- 1.9% (4 women) had COVID-19 symptoms and tested positive
- 13.7% (29 women) were asymptomatic and tested positive

**Thus 29 of the 33 women (87.9%) who tested positive on admission had no symptoms.** Three of these (10%) developed symptoms.

Symptom Status and SARS-CoV-2 Test Results among 215 Obstetric Patients Presenting for Delivery.



This study, while not universally generalizable, underscores the risk of COVID-19 among asymptomatic obstetrical patients.

### Over 1% of New York residents have tested positive.

A report in the [Washington Post](#) on 14 April calculated this figure. As of Monday, there were 195,301 confirmed cases in a population of 19.45 million – making an infection rate of just over 1%. It is slightly higher for New York City: 104,410 cases in a population of 8.4 million = 1.2%.

Further reading:



- Li, R. et al. Substantial undocumented infection facilitates the rapid dissemination of novel coronavirus (SARS-CoV2). Science (2020) doi:10.1126/science.abb3221.
- Zhao, A. J. et al. Title : Antibody responses to SARS-CoV-2 in patients of novel coronavirus disease 2019 Brief Title : Antibody responses in COVID-19 patients. (2020).
- Jombart, T. et al. Inferring the number of COVID-19 cases from recently reported deaths. medRxiv 2020.03.10.20033761 (2020) doi:10.1101/2020.03.10.20033761.

#### **Comment:**

If the true numbers of coronavirus cases are 10-50 times the number of confirmed cases (perhaps 15X), then possibly 15% of the New York population have been infected with coronavirus so far and hopefully are immune.

This number very roughly correlates with the first findings of the "COVID-19 Case-Cluster-Study" of the Gangelt Community, Heinsberg District of North Rhine-Westphalia State, Germany, which had also had a serious outbreak. The details were included in our [Executive Summary of 10 April 2020](#).

However, as 60-70% immunity is required to obtain an  $R_t$  of  $< 1$  via herd immunity alone, both New York and the Gangelt Community would need to have at least four times as many people infected as have been so far to achieve that end point.

## **SEROSURVEYS**

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To better understand the actual number of people who have been infected with coronavirus, surveys of the antibody status of populations are needed. Such studies are called "serosurveys." For more information on antibody testing, see our [Executive Summary of 7 April 2020](#).

### **Michigan hospital system to test workers' blood**

[The biggest hospital system in Michigan](#) is launching a large test for novel coronavirus antibodies. Beaumont Health will test blood samples from its 38,000 employees, as well as thousands of additional physicians and affiliates, officials said in interviews. Participation is voluntary, but officials said they expect many employees will want the test, particularly those working in emergency rooms and intensive care units who are at high risk of contracting the virus. Researchers hope to complete their work by the end of May.

### **NIH to study 10,000 adults**

The [National Institutes of Health](#) is conducting a study to determine how many adults in the United States without a confirmed coronavirus infection carry antibodies to it. The NIH is seeking up to 10,000 volunteers. This study will give us a clearer picture of the true magnitude of the COVID-19 pandemic in the United States by telling us how many people in different communities have been infected without knowing it, because they had a very mild, undocumented illness or did not access testing while they were sick", said Anthony S. Fauci, M.D., NIAID Director. "These crucial data will help us measure the impact of our public health efforts now and guide our COVID-19 response moving forward." Healthy volunteers over the age of 18 from anywhere in the United States can participate and will be asked to consent to enrollment over the telephone. Individuals with a confirmed history of COVID-19 or current symptoms consistent with COVID-19 are not eligible to participate.

### **Solidarity II /WHO**

The World Health Organization has announced [an ambitious global effort, called Solidarity II, of so-called serosurveys](#), studies that look for antibodies to SARS-CoV-2 in the population. The program, which will involve more than half a dozen countries around the globe, will launch in the coming days, says Maria Van Kerkhove, who is helping coordinate WHO's COVID-19 response. (Solidarity 1 is a megatrial of clinical treatments for COVID-19)

### **Stanford / Santa Clara study**

[Dr Jay Bhattacharya](#), a health policy expert at Stanford University, says next week he and his colleagues hope to test 5000 people in California's Santa Clara county for antibodies. He says the study is "about 90%" based on the WHO's early investigation protocol.



## WASTEWATER SURVEILLANCE

Sampling of the inlets of sewage (wastewater) treatment plants is used for [polio surveillance](#) and to discover emerging [recombinant noroviruses](#).

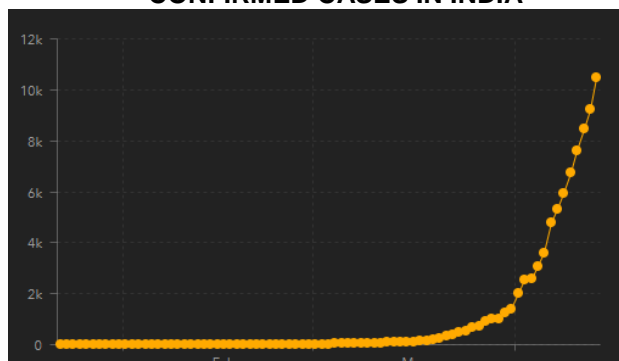
More than a dozen [research groups](#) worldwide have started analysing wastewater for the new coronavirus as a way to estimate the total number of infections in a community, given that most people will not be tested. The method could also be used to detect the coronavirus if it returns to communities, say scientists. So far, researchers have found traces of the virus in the Netherlands, the United States and Sweden.

Gertjan Medema, a microbiologist at KWR Water Research Institute in Nieuwegein, the Netherlands says that monitoring influent at this scale could provide better estimates for how widespread the coronavirus is than testing, because wastewater surveillance can account for those who have not been tested and have only mild or no symptoms, says Medema, who has detected SARS-CoV-2 genetic material — viral RNA — in several treatment plants in the Netherlands. “Health authorities are only seeing the tip of the iceberg”.

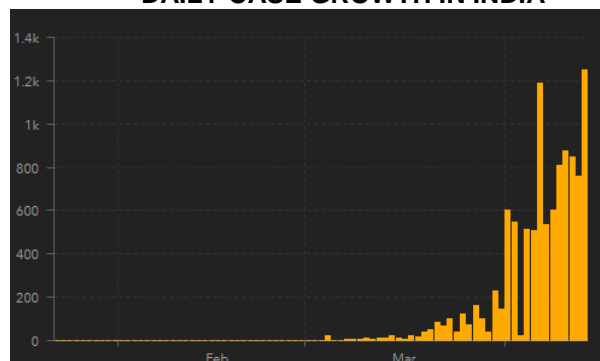
## FOCUS ON INDIA

Since confirming its first COVID-19 case on 4 March 2020, there has been a sharp rise in cases. At present, 10,500 have been confirmed and case growth is exponential with a doubling time of [seven days](#). [Half of India's 718 districts](#) are now affected by coronavirus with 120 new districts reporting cases in the last 10 days.

**CONFIRMED CASES IN INDIA**



**DAILY CASE GROWTH IN INDIA**



Graphs from [Johns Hopkins University](#)

So far, [180,000 PCR tests](#) have been completed in India with 4.3% testing positive.

If the actual number of cases is 15 times higher than the confirmed number, then the number of cases in India now is  $\geq 150,000$ .

If the “lockdown” (now extended to the end of April) and other public health measures do not arrest the spread of the SARS-CoV-2, India could have 600,000 cases by the end of April, 2.5 million cases by mid-May, and 10 million cases by the end of May.

Poverty, poor levels of education, and population density may frustrate mitigation efforts.

Officially there has been [no surge in hospital admissions](#) with influenza-like illness, which could indicate rapid community spread. However, this could be due to a lack of information or weak reporting. However, a [private hospital](#) in the central city of Indore is already seeing a surge of cases and treating more than 140 COVID-19 patients, with nearly a third in critical care.

[Dr Jacob John](#), a retired professor of virology at Christian Medical College, Vellore, believes India must prepare for the worst. “I don’t think we have yet understood the enormity of the problem that is likely to befall us in the next two months. For too long the virus dictated our responses rather than the other way round.” Dr John says India’s response has been largely “evidence-based and reactive when it should have been projection-based and proactive. It’s a tactical error,” says Dr John. “We all know community transmission is there.”

There is particular concern regarding slums such as [Dharavi](#) in Mumbai, where 2.5 million people are crammed into 2.5 square kilometers. Cases have been confirmed, however social distancing is not possible. “This is a public health emergency waiting to happen”, he said.

There is concern that the lockdown will cause food shortages. There are reports that [when a case is confirmed in an area](#), the labourers leave the area and trucks stop coming.

#### **Shutterstock images of the Dharavi Slum in Mumbai**





## COVID IS CLASS & RACE CONSCIOUS

[New York Times, 7 April](#): **African-Americans account for more than half of those who have tested positive and 72 percent of virus-related fatalities in Chicago, even though they make up a little less than a third of the population.** “Those numbers take your breath away, they really do,” said Ms. Lightfoot, who is the city’s first black woman elected as mayor.

[New York Times, 12 April](#): **Inmates, farmworkers, detained immigrants, Native Americans and homeless families** are among the discrete groups whose dilemmas have attracted notice. What they share may be little beyond poverty and one of its overlooked costs: the perils of proximity.

“The pandemic is a reminder that privacy is at a premium among the poor, hard to find and extremely valuable,” said Stefanie DeLuca, a sociologist at Johns Hopkins University. “Living in crowded conditions not only increases the risk of infection but can also impose serious emotional and mental health costs.”

[ForeignPolicy.com, 9 April](#): **No masks, no gloves: With India on lockdown, hundreds of thousands of people are cleaning up trash, medical waste, and even sewage without any protective equipment.** While most Indians remain confined to their homes under a three-week national lockdown to keep the coronavirus at bay, 30-year-old Bhimrao Tambe still spends eight hours a day on Mumbai’s streets. A contract sanitation worker with the city’s civic authority, he picks up waste with his bare hands and loads it onto a truck—without gloves, boots, a uniform, or hand sanitizer. For this work, he is paid \$4 a day.



## MORTALITY OF COVID-19 PATIENTS ON VENTILATORS

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[New England Journal of Medicine, 30 March](#): Patients on ventilators had a mortality rate of 50%.

[Washington Post, 7 April](#): At least half of COVID-19 patients on ventilators don't make it.

[The Guardian, 29 March](#): Data from the Intensive Care National Audit and Research Centre (ICNARC) showed that of 165 patients treated in critical care in England, Wales and Northern Ireland since the end of February, 79 (48%) died.

## A VIROLOGISTS PERSPECTIVE: PROFESSOR JOHN OXFORD

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An editorial in JAMA Neurology (10 April 2020) was headlined "Neurologists more to the front line". The piece is useful and provides extra background to a new paper from Wuhan (Mao et al) describing a retrospective observational case series of 214 consecutive patients hospitalized and diagnosed as severe cases of Covid-19 infection.

But to step back a moment, we could appreciate that there could be neurological manifestations for many, if not most, respiratory virus infections. I will give two examples, one not yet solved and the other fortunately having become uncommon because of a vaccine being available.

Following the Spanish Influenza Pandemic of 1918 the neurologist Von Economo working in Vienna identified young patients with Parkinson's Disease. Up to that time he had only diagnosed Parkinson's Disease in elderly patients. Soon hospitals around the world began to identify similar cases. The disease, also called Epidemic Encephalitis was also described in the 1960's by Oliver Sachs. (Awakenings). By 1925, five million cases had been diagnosed and the disease became notifiable.

My own group in London and also that of J. Taubenberger in the USA, tested brains from cases and attempted to find Influenza RNA. Neither group was successful. The connection however is accepted, especially by epidemiologists at the CDC. As regards pathology the main changes are detected in the mid brain area.

More well-known is the link between measles and SSPE (sub-acute sclerosing panencephalitis). This is a rare complication of measles in children, occurring before the introduction of the vaccine at a rate of one case per 200,000. The association was established by detecting measles RNA in the brain. Often a child would have perfectly normal measles with a rash, would recover and then after 3 to 4 years begin to have neurological signs of dizziness and imbalance.

To return to the study of Mao et al in Wuhan, their patients presented with neurological symptoms including impairment of smell and taste. There is already some data of infiltration of the brain stem by the virus, raising the question of whether the pathophysiology of the respiratory failures could be caused directly by invasion of the CNS by the virus. Mao et al note that the receptor ACE 2 for COVID-19 is present in many organs including the nervous system. Certainly in previous outbreaks of SARS and MERS coronavirus RNA was detected in the CSF and also in the brain at autopsy. They were not able to conduct advanced neural imagery because of the risk of infection.

### Addendum. A personal view from London.

The total deaths in the UK in hospitals identified by PCR today reached 10,000. The total will be in excess of this because people dying at home, or in care homes, are not registered. There is still a crisis about the lack of PPE and this does appear real, as does the lack of PCR tests.

A clinical feature of patients in the outbreak has been obesity and also the extra mortality in BAME (black, Asian and minority ethnic) groups. These groups have higher rates of diabetes and suffer poorer and overcrowded housing.

A debate continues here about the use of masks, and the question has been described as "vexed".

An article in NEJM (1 April 2020) concluded that the main purpose of universal masking in hospitals is psychological giving health care workers the confidence to adjust and implement preventive strategies.

Finally, on a historical note, West J B, Applied Physiology 2005, wrote a review of the 1952 polio epidemic in Copenhagen. Three thousand polio patients, children and young adults were admitted between August and December, 1,250 with paralysis, 345 with respiratory failure. One thousand five hundred medical and dental students were recruited to provide 24-hour manual ventilation using rubber bags. It has been called a "heart breaking article".

## **AUTHORS**

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