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A Professional's Perspective: An Interview with Dr Jithesh

Recently, Anvesha had the amazing opportunity of interviewing Dr Jithesh, an epidemiologist from Wayanad. Dr Jithesh received his MBBS from Calicut University in 1996, and went on to receive his Master's in Public Health from AMCHSS, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram. He has been diligently serving in Kerala Government's Health Services sector since June 2000, and is currently the Superintendent at Taluk Hospital, Areekode. Here is a transcript of our interaction with Dr Jithesh (J):

Q: Thank you so much for accepting our request Dr Jithesh. We would like to start by asking you about the tests, since they are few in number. What are the processes involved in a COVID-19 test? Why is it so hard to get tested for COVID-19? Why are the tests so few?

J: Routine confirmation of cases of COVID-19 is through tests like real-time reverse-transcription polymerase chain reaction (rRT-PCR), which detects unique sequences of viral RNA through nucleic acid amplification tests (NAAT). Confirmation is by nucleic acid sequencing when necessary. The tests target specific genes of the virus. Since SARS-CoV 2 (the COVID-19 virus) is a totally new variant, we need to first identify the genetic sequence of the virus and then develop specific tests targeting particular genes. The low availability of test kits is due to the time involved in identification of the genetic sequence followed by the development of test kits.

Q: What must we do in order to stop the spread of the disease at an individual and community level?

J: Guidelines would be different for different groups of persons. *General guidelines (common to everyone):*

1. Hand hygiene (hand wash/hand rub)
2. Respiratory hygiene (covering face when coughing/sneezing)
3. Restricting mobility
4. Maintaining 1 metre distance in social gatherings
5. Avoiding crowding and mass gatherings such as festivals and functions

Symptomatic individuals:

1. Medical mask
2. Transportation to designated care centre in designated ambulance followed by isolation

People who have travelled to COVID affected regions or have contacted patients:

1. Home quarantine: stay in adequately ventilated spacious single rooms with toilet and hand hygiene facilities. If single rooms are not available beds should be placed at least 1 metre apart
2. Maintenance of social distancing (more than 1 metre)
3. Limit the movement of the patient in the house
4. Minimise the use of shared spaces and cutlery
5. Ensure that shared spaces (kitchen, bathroom) are well ventilated
6. Limit the number of caregivers (ideally 1)
7. Use dedicated linen and eating utensils for the patient (clean with soap and water after use)

Caregivers:

1. Caregivers should wear a tightly fitted medical mask that covers their mouth and nose when in the same room as the patient
2. Avoid direct contact with body fluids, particularly oral or respiratory secretions, and stool
3. Use disposable gloves and a mask when providing oral or respiratory care and when handling stool, urine and other waste
4. Follow hand hygiene before and after removing gloves and the mask
5. Do not reuse masks or gloves

Special care must be given to the elderly and persons with co-morbid conditions (chronic illnesses, immunosuppression, etc).

Q: What factors (external and internal) determine the spread of a viral outbreak?

J: Many viruses can infect humans and cause disease. The transmission patterns vary from virus to virus, though they all share the ability to transmit from person to person. Human transmissibility is influenced by the environment in which the pathogen and host meet.

1. *Environmental factors:* temperature and humidity, climatic factors, airflow and ventilation
2. *Host factors:* Pre-existing immunity, efficiency of muco-ciliary clearance, efficacy of respiratory secretion and its viscosity, nutritional status, weather-related socio-behavioural factors, family and social structures
3. *Agent factors:* Virus stability, size, droplet size, etc

Q: What measures need to be taken once the COVID-19 epidemic has ended? How do we prepare (or avert) any COVID-19 like epidemics in the future?

J: Prevention of epidemics like COVID-19 depends on day-to-day habits of our community. Hand hygiene (washing hands, or using a hand-rub at occasions when it is needed) and proper respiratory hygiene (covering your nose and mouth while coughing or sneezing) are factors that need to be incorporated into the daily routine of each person in the community. This will aid in the prevention of all diseases spread through droplets/airborne modes of transmission. Therefore, even after the COVID-19 pandemic has ended, it would be in the community's best interests to inculcate these habits in each individual in the community so that epidemics like COVID-19 do not become catastrophic.

Q: What is your opinion on the theory of the coronavirus being a bioweapon developed by a foreign government, which is gaining traction in the media?

J: Coronavirus has been here for a long time. There have been different variants and mutants coming up in between; we had the SARS and MERS pandemics, both of which were due to variants of the coronavirus. The virus behind COVID-19 is closely related to the SARS variant, and is therefore known as SARS-coronavirus 2. This is a very common virus closely linked to the common cold virus, which

has been here in the environment for a long time. Therefore, it is highly unlikely that this was developed as a bioweapon. Such a common virus is usually not a candidate for being developed as a bioweapon. I don't consider this as a serious possibility as of now, based on data currently available.

Q: How has the general public responded to the pandemic? What steps can we take in order to make them understand the gravity of the situation?

J: The public has, by and large, been very receptive and very cooperative with the efforts of the government to contain the epidemic in Kerala. The advice given by the government is being followed by the majority, though there are some outliers who have been very reluctant to do so. There have been several breaches in the home quarantine set-up; in the recent outbreak in Kasaragod was caused by one person refusing to be quarantined at home. There are also several religious and other gatherings being held in some locations. These are all a minority but could cause a serious outbreak in Kerala, unless they are adequately controlled. At the same time, a vast majority of the population has been very receptive to the directives and have been following them most diligently. Further steps need to be taken to get the message across to sections of the population which might have been left out. The message needs to be constantly repeated, so that nobody at any point underestimates the seriousness of the issue. The campaign must be sustained using all forms of media, from print media and interpersonal communication, to mass media campaigns through the television, radio and social media. All these are being done, and need to be sustained until the epidemic is over.

Q: What are the prospects of a vaccine against the virus?

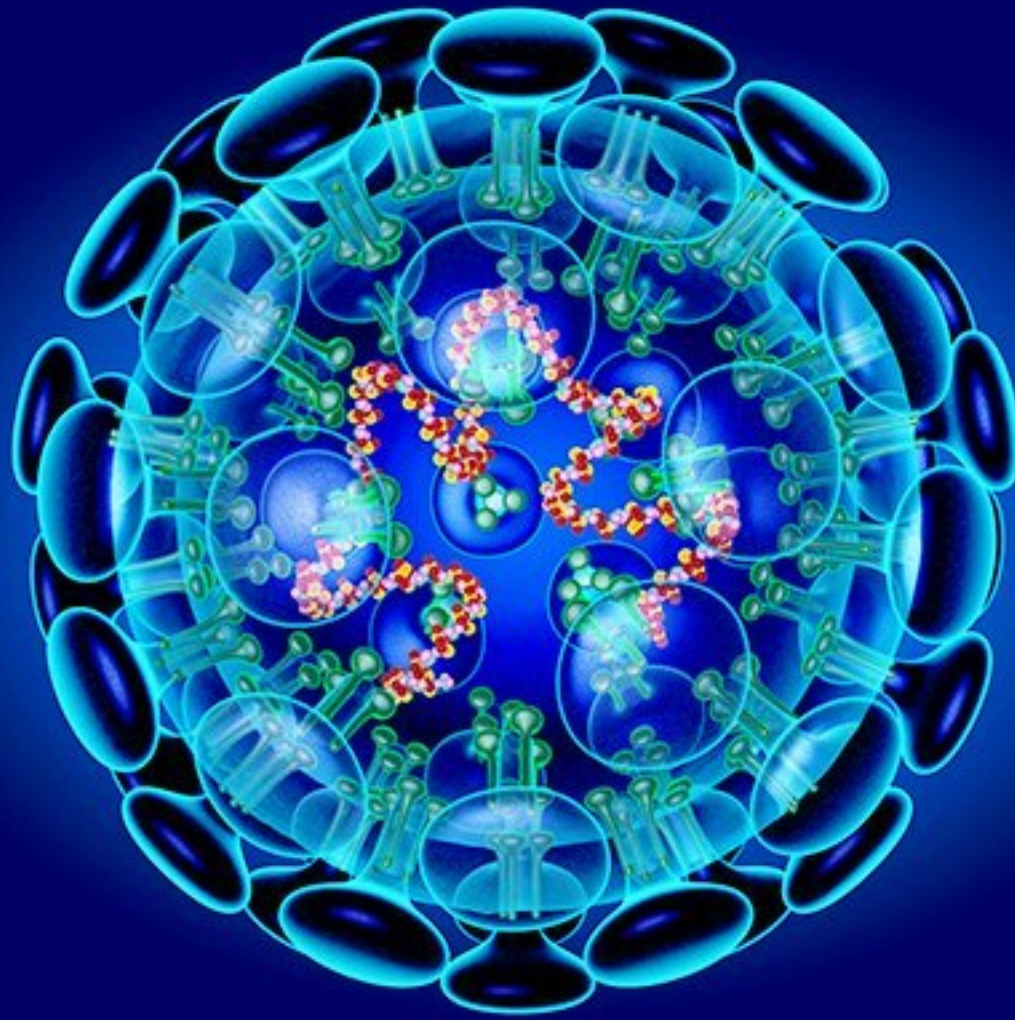
J: The World Health Organization is working with scientists across the globe on at least 20 different coronavirus vaccines with some already undergoing clinical trials in record time – just 60 days after sequencing the gene. This rapid rate is largely due to the efforts of the Chinese scientists; they successfully sequenced the genes of this novel coronavirus, and shared the sequence data with the entire scientific community. However, these vaccines are still a long way away from being available for public use, since the clinical trials and safety approvals needed to get a workable vaccine to market could take up to 18 months.

Q: How do the actions taken by the government of Kerala compare with the other states? What could the other states learn from the Kerala model, which has proven to be efficient in containing viral outbreaks?

J: The efforts of the Kerala government have been exemplary. Kerala has always had a reputation for leading the health sector in several aspects including outbreak control, from the early days to the latest Nipah and corona outbreaks. Kerala has been a leading force in the country. Other states are yet to come up to that level. Several states are looking closely at the actions being taken by Kerala. How to use the community awareness to control such epidemics, how to take measures not only to control the epidemic, but also to anticipate what is yet to come and take preventive measures against it so that we run ahead of problems and prevent them from even occurring, or at least from taking on large proportions – this is what Kerala has been showing as an example to the country, even in the case of the COVID-19 outbreak.



Viruses: A Brief Overview



Viruses are notorious in the field of epidemiology for their ability to spread rapidly and bring the lives of billions worldwide to an abrupt halt. The current COVID-19 pandemic only adds to the already extensive list of lethal outbreaks such as Ebola, SARS, HIV/AIDS and the various flus and poxes. How exactly do these gnarly specimens, that still leave scientists questioning the very definition of life, wreak such havoc?

Surprisingly, viruses are extremely small and ordinary in design, only consisting of a packet of genetic material (RNA in the case of coronavirus) enveloped by a coat of proteins. The primary function of these seemingly harmless specimens is to invade a cell and use the host cell's machinery to create copies of itself, as the virus by itself is incapable of cellular division and metabolic functions, which is why it has left researchers baffled for decades on its characterisation into the living or the inanimate. Once the hijacked cell has created sufficient copies, the new troop of viruses exits the cell by causing cellular lysis, a process that results in the host cell's death. Each new virus infects and kills a new host cell, thus resulting in an exponential rise in their population within the infected individual. The viruses also cause the immune system of the infected individual to overreact, leading to further death of the body's cells.

Coronavirus enters the body through the eyes, nose or mouth, either via inhalation or through direct contact. Once inside, the virus makes its way through the respiratory tract, first infecting the throat which leads to soreness and dry coughs, and eventually reaches the lungs, where it deals the most damage. As a result, several respiratory symptoms arise, even leading to pneumonia in severe cases. However, most individuals (80%) face only mild symptoms, with the fatality rate measuring around 4%. There is much to learn about the disease since we are in the primary stages of its evolution, and it is in our best interests if we strongly adhere to the guidelines issued by various agencies.


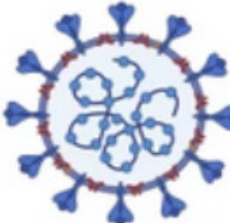
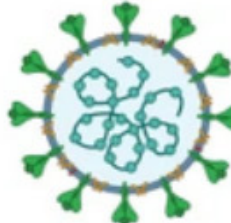
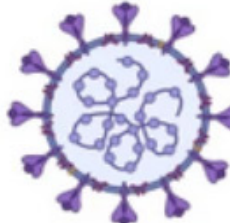
Here are some helpful resources:

- 1) <https://www.mohfw.gov.in/> (Government of India's dedicated website)
- 2) <https://www.who.int/emergencies/diseases/novel-coronavirus-2019> (WHO's dedicated website)
- 3) <https://www.youtube.com/watch?v=BtN-goy9VOY&feature=youtu.be> (A great infographic)

– Balaram Vishnu S., B'17

COVID-19: How Does It Compare?

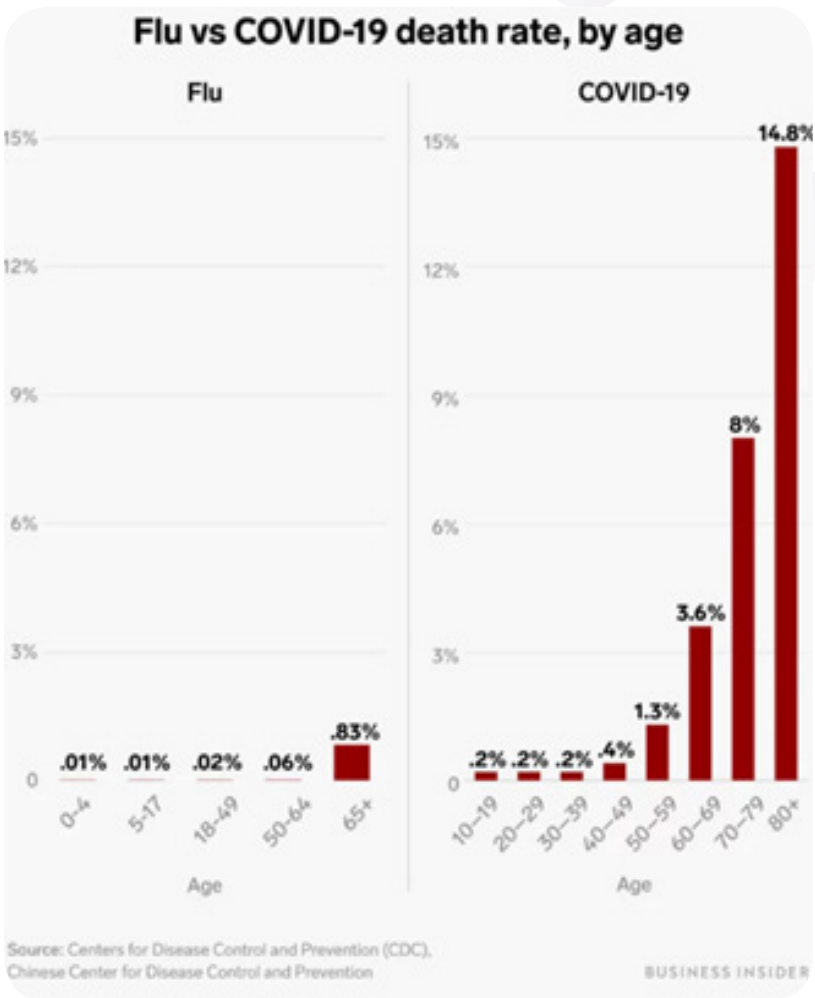
Prior to this, you would have come across hundreds of articles, news notifications and memes comparing the SARS-CoV-19 with other pandemics. Some insist that they are doing a great job handling the situation while others yell doomsday. With the current rate at which news travels across the globe, along with the fact that this is the first pandemic in the 'WhatsApp era', it's not hard to notice the amount of misinformation perpetrated. This is a brief summary of how COVID-19 compares with other commonly referred pandemics:

Disease	Flu	COVID-19	SARS	MERS
Disease Causing Pathogen	 Influenza virus	 SARS-CoV-2	 SARS-CoV	 MERS-CoV
R_0 Basic Reproductive Number	1.3	2.0 - 2.5 *	3	0.3 - 0.8
CFR Case Fatality Rate	0.05 - 0.1%	~3.4% *	9.6 - 11%	34.4%
Incubation Time	1 - 4 days	4 - 14 days *	2 - 7 days	6 days
Hospitalization Rate	2%	~19% *	Most cases	Most cases
Community Attack Rate	10 - 20%	30 - 40% *	10 - 60%	4 - 13%
Annual Infected (global)	~ 1 billion	N/A (ongoing)	8098 (in 2003)	420
Annual Infected (US)	10 - 45 million	N/A (ongoing)	8 (in 2003)	2 (in 2014)
Annual Deaths (US)	10,000 - 61,000	N/A (ongoing)	None (since 2003)	None (since 2014)

Epidemiological Comparison of Respiratory Viral Infections (Akiko Iwasaki / Yale University / BioRender)

Explaining the terminology –

- R_0 – a measure of infectivity – estimate of how many people a sick person is likely to infect
- CFR – Case Fatality Rate – No. of deaths due to the disease / No. diagnosed with the disease.



Before drawing any conclusions, note that both these values are highly context-dependent. The above values give an idea about the situation around the world, but they do vary with location, time, and evidently, age.

The graph below shows the comparison of the CFRs of COVID-19 and the most commonly used reference, the seasonal flu. Given the commonalities between the seasonal flu, COVID-19 and the other influenza epidemics of history, it is tempting for many to infer a sense of security from the measly magnitude of numbers seen here. Following the graphs, however, makes differences in their underlying physiology quite apparent (they show up as the vast differences in terms of infectivity and fatality).

Given the novelty of the pathogen, it will take time to understand it thoroughly before a solution is devised. However, for the very reason that it is different from influenza, the hopes of containing it are much higher.

“We don’t even talk about containment for seasonal flu – it’s just not possible,” WHO Director-General Tedros Adhanom Ghebreyesus said. “But it is possible for COVID-19. We don’t do contact-tracing for seasonal flu – but countries should do it for COVID-19, because it will prevent infections and save lives. Containment is possible.”

The COVID-19 is a pandemic unlike anything we’ve seen. Its infectivity and fatality are indeed a reason for worry and are not to be taken lightly. However, with the right measures, it can be contained. All it takes is giving up ignorance and arrogance, and following the measures given in this informative pamphlet.

– Yashas Ramakrishna, B’16

Predicting the Course of COVID-19

Transmission of an infectious disease is a stochastic (probabilistic) process that can be mathematically modelled to predict the spread and growth of the disease. The choice of model and determination of relevant parameters are critical for accurate predictions. However, modelers have struggled to chart the course of the COVID-19 pandemic so far.

The multiplication of any organism can be represented as an exponential graph that saturates at some point. The rate of growth, point of saturation, etc., of the graph are determined by epidemiological parameters. These parameters are calculated based on the initial data available. In the case of COVID-19, the information currently available is insufficient for any long-term predictions. It takes anywhere between 2 - 14 days for symptoms to develop, which makes the detection of infections very difficult. As a consequence, the number of confirmed cases does not accurately represent the spread of the virus. Many countries also lack the resources to detect the infection at an early stage. It is thereby very difficult to ascertain the extent to which a population has been infected until it is very late.

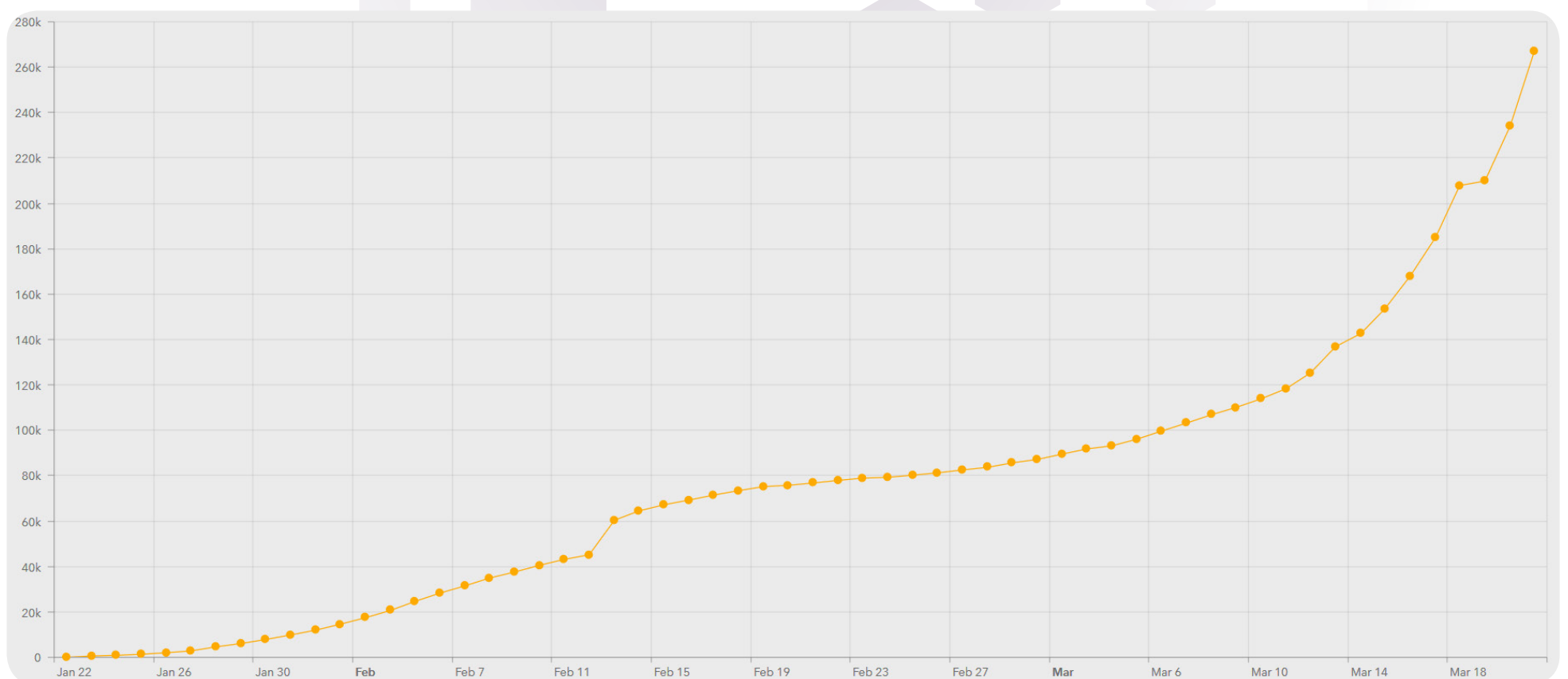
The behavioural nature of the virus is also not very well known. Analysing data from past pandemics, it can be assumed that this pandemic will gradually wane in the hotter months and reappear in the winter with greater potency. Nevertheless, the exact seasonality is still unknown.

Herd immunity is developed when a large percentage of the population becomes immune to an infection. When enough susceptible hosts are not available, the virus will eventually perish. Herd immunity therefore plays a crucial role in the elimination of a disease. Generally, members of the family Coronaviridae (Corona viruses) do not induce long-term immunity in a host. That is why the common cold is still not eradicated. It is currently not known whether herd immunity is possible in the case of COVID-19.

Despite the shortcomings, multiple studies have been conducted, mostly in China, modelling the transmission of this virus. Even though the numbers do not converge, they all agree that the virus is spreading rapidly. Uncontained, it could inflict severe damage. Social distancing is currently the most effective strategy to maintain a check on the disease. The exponential curve flattens sooner with no susceptible hosts available. Most countries have already employed measures to isolate the sick from the healthy members of the population. The countries that reacted quicker have seen fewer cases than those that were late to respond.

It is difficult to say with certainty how and when this pandemic will end. But it is upon each individual to follow all precautions and to reduce chances of transmission to see this through at the earliest.

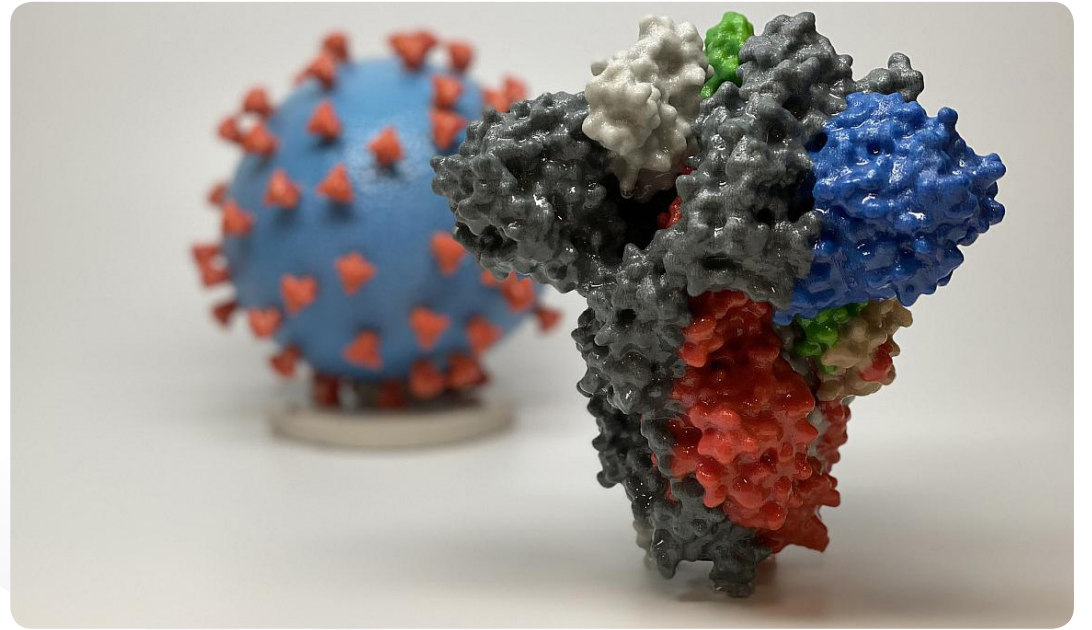
– Subrabalan Murugesan, B'17
Sources: [1](#), [2](#), [3](#), [4](#), [5](#), [6](#), [7](#)



The Story So Far ([source](#))

Vaccines: A Ray of Hope

The formidable COVID-19 has directed the attention of people worldwide towards the development of a vaccine. Generally, immunizations are achieved by a weakened or dead form of the virus. The former method has its problems as the live form could regain its virulence and infect the recipient. Some COVID-19 vaccine projects have come up with other strategies like extracting the genetic code behind a protein on the virus' surface called the spike protein and integrating it with a bacteria's genome to use the bacteria as a protein-producing factory. The human body could raise antibodies against this protein. Since the spike protein enables the virus to enter human cells, an immune response from the body against this protein could prevent the virus' entry into our cells.



“The World Health Organization is working with scientists across the globe on at least 20 different coronavirus vaccines in record time – just 60 days after sequencing the gene. This record speed is mainly due to the success of the Chinese scientists in sequencing the genes of the novel virus and their immediate sharing of the sequence with the scientific community across nations”, said Dr. Jithesh. An experimental vaccine has been developed using an mRNA genetic platform. Human clinical trials have begun at Kaiser Permanente Washington Health Research Institute (KPWHRI) in Seattle.

The vaccine has to undergo an array of clinical trials and procedures before being introduced to the general public. Mass production of the vaccine and ensuring equal access across the globe will continue to pose severe challenges.

– J. Vishwathiga, B'19
Sources: [1](#), [2](#)

Masks: Who and How?

The only time you should wear a mask is when:

1. You have tested positive for COVID-19.
2. You have symptoms of fever, cough, difficulty breathing.
3. You are healthy, but are caring for an infected person.
4. You are a health care worker.

You do not need a mask if you are healthy. There is no evidence that healthy people wearing masks prevents them from being infected. In fact, when people wear masks, they touch their face more often and this can increase the chance of infection. The general public unnecessarily buying masks has led to a shortage of masks for doctors and health-care workers (who are at a high risk of infection).

If you need to wear a mask, follow the proper procedure. Masks alone do not prevent infection.

How to use a mask:

1. Before putting on a mask, clean your hands with an alcohol-based hand rub or soap and water.
2. Avoid touching the mask while using it; if you do, clean your hands with alcohol-based hand rub or soap and water.
3. Replace the mask with a new one as soon as it is damp. Do not reuse single-use masks.
4. To remove the mask: remove it from behind (do not touch the front of the mask); discard immediately in a closed bin; clean your hands with alcohol-based hand rub or soap and water.

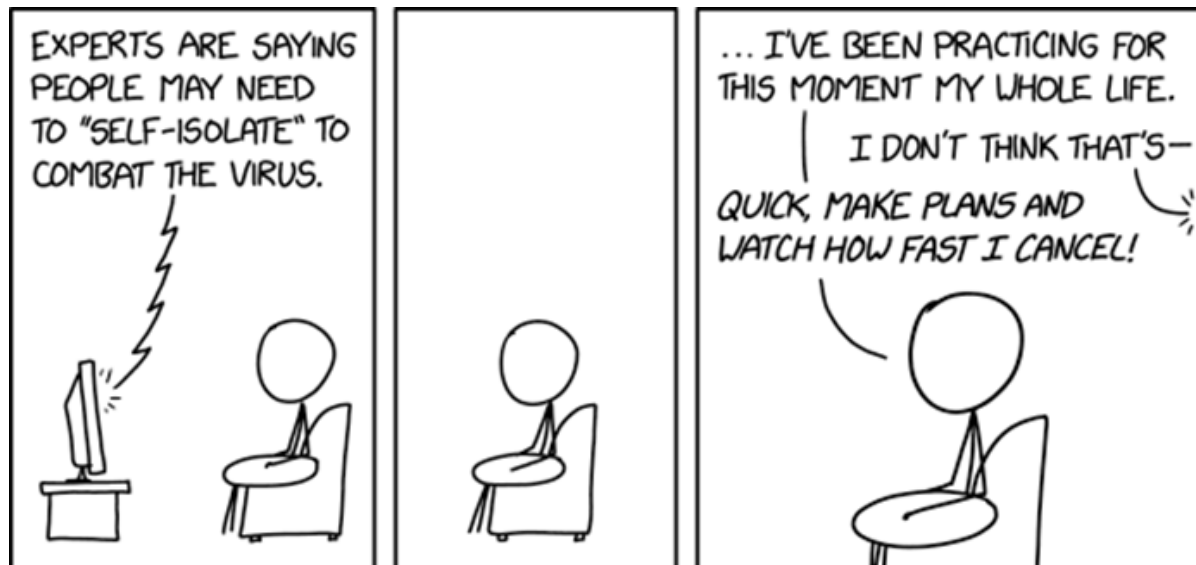


– Ira Zibbu, B'19
[Source](#)

Isolation and Mental Health

Self-Isolation and Social Distancing

An important guideline to be followed as we witness the COVID-19 pandemic unfold is self-isolation and social distancing. In general, it is advisable to self-isolate, that is to avoid physical contact with people as much as possible and stay at home for at least 14 days if you recently visited a place where there has been an outbreak, if you have symptoms of coughing, fever or breathing problems, if you're old or immunocompromised. It may just be a case of common cold, but because of circumstances surrounding COVID-19, it is strongly advised that you isolate yourself from others for the prescribed period for the safety of others as well as yourself. In the case of COVID-19, it has been found that you may not even show any symptoms of having the disease but may still contract the virus and spread it to others around you.



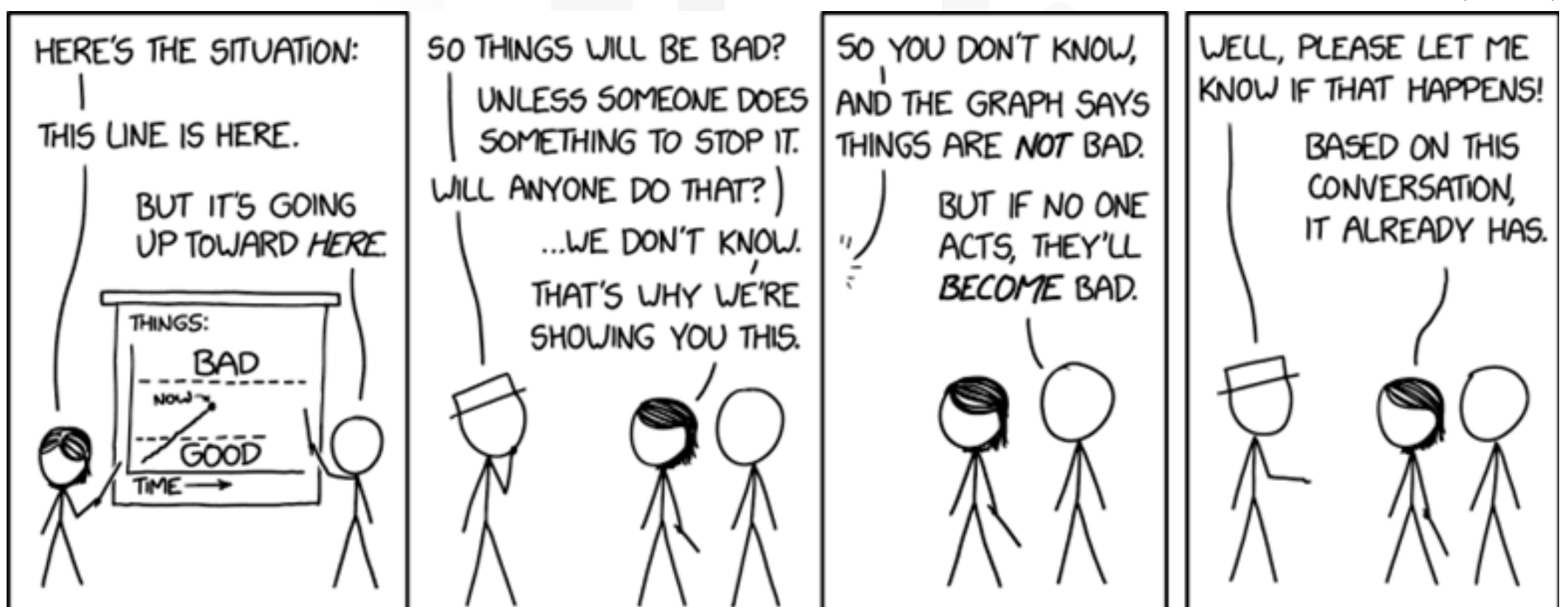
However, it is not necessary or even desirable for everyone to observe self-isolation since it is a bit of an extreme measure that can potentially affect one's mental health and also impact societal functions. So for anyone who does not fall into the above criteria, it is strongly advised that they observe social distancing, meaning they put a stop to all non-essential outdoor activities, maintain a safe distance when interacting with other people, avoid physical contact, wash hands with soap regularly, and maintain general hygiene.

Importance of Mental Health and Emotional Support



The massive outbreak of COVID-19 may cause stress and anxiety among people, and seeking ways to cope with stress can not only help the individual feel better, but also enable them to help those they care about and the community in better ways. One may feel distressed by the constant stream of news and the increasing number of cases and casualties, or in the case of people who have been isolated due to suspicions of being infected, one may feel lonely, ignored or depressed. Pre-existing mental health issues such as clinical depression or dementia may be further exacerbated during this crisis. In these situations, the importance of getting emotional support in any form cannot be emphasised enough. It is advised that we do not stigmatize COVID-19 or suspected patients, and instead be empathetic towards them and treat them with dignity. It's possible to protect ourselves while at the same time being supportive of others. There is much more to be said on this topic, since mental health issues are often misunderstood, not taken seriously or stigmatized. The reader is therefore encouraged to go through the following links on how to handle mental health during the COVID-19 outbreak: [1](#), [2](#), [3](#).

– Hari Krishnan, iPhD B'18
[Source \(comics\)](#)



Importance of Mass Testing

Currently, 360 people in India have been identified as being the carriers of the coronavirus (as of March 22, 2020). This number seems to be low for such a tightly packed country with a population of 1.32 billion. This can be due to one of two reasons—

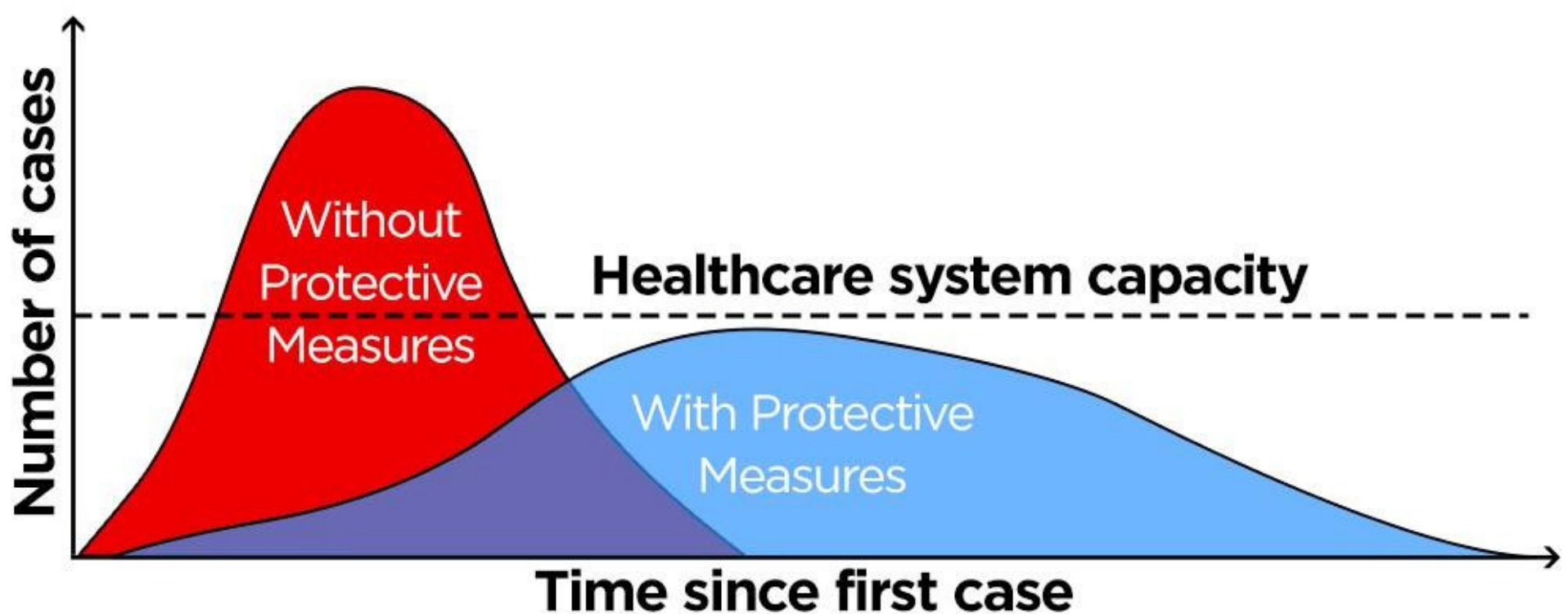
- 1) The number of people infected is, in fact, low.
- 2) Not enough people are being tested.

Of these two reasons, the latter seems to be more likely. In India, only 5 people are tested per million, which is not enough for our population. The actual number of cases may be much higher. A greater number of people need to be tested to get a better picture of the outbreak in India. South Korea managed to minimize the number of deaths by conducting a higher number of tests (3,692 per million), and taking appropriate measures.

The Indian government has decided to expand its laboratory capacity by authorising some private labs to test for COVID-19. Until now, tests were mainly focused on people who had travelled from affected countries or had come in contact with those who had. The major cause of spread in India is local transmission (where people pass the infection on domestically without having travelled to affected countries themselves); hence, randomized testing is also critical.

It must also be kept in mind that India is not equipped to deal with a pandemic like this if it gets out of control. So, our best shot at minimizing the number of deaths is testing more people and avoiding community-based spread of the virus.

– Akshita Mittal, B'19
[Source](#)



Adapted from CDC / The Economist

Stay healthy! Stay safe!