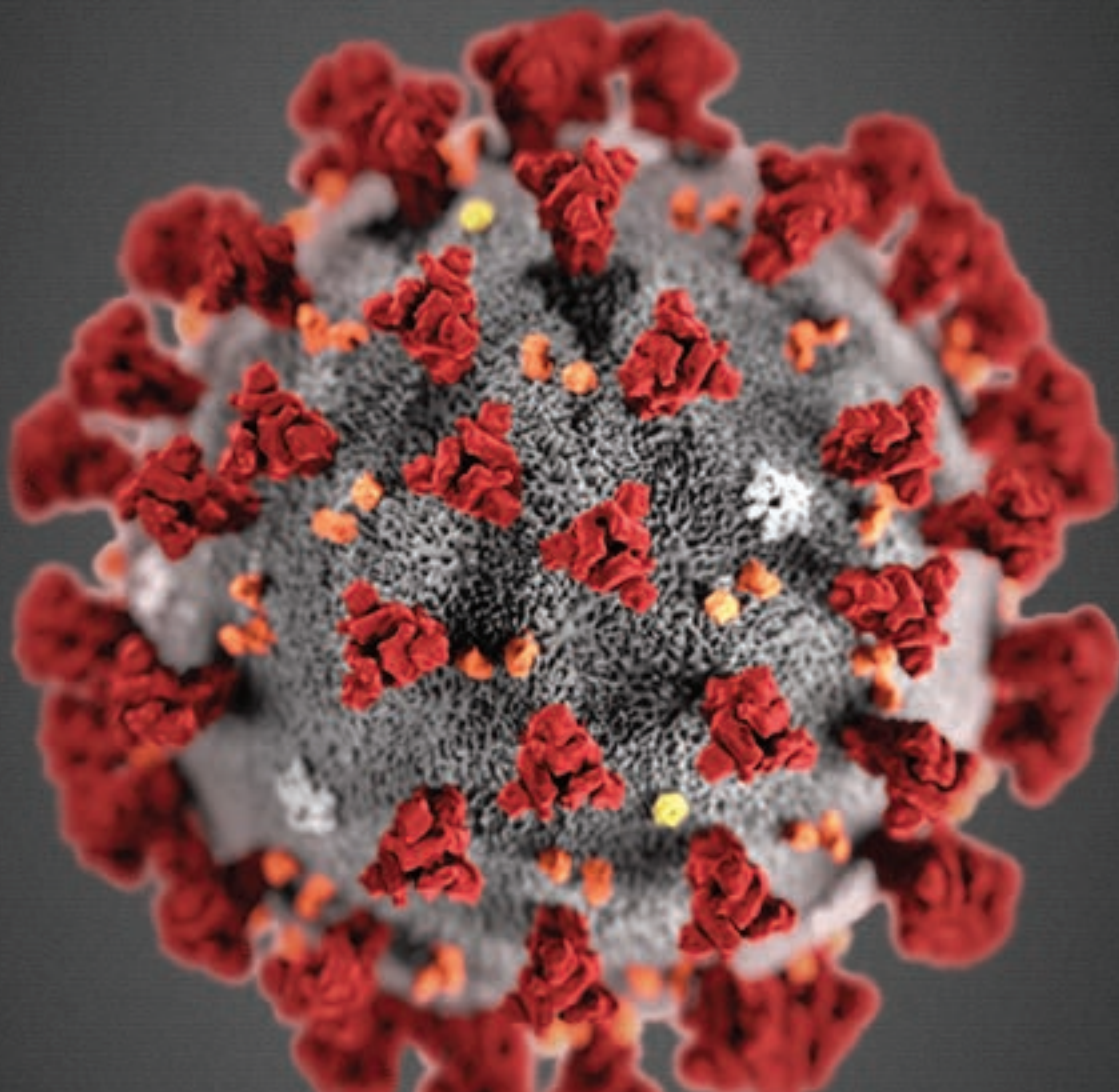


March 2020

**SCIENTIA**  
PAKISTAN



The Special Edition  
On VIRUS-Borne Diseases



# CORONAVIRUS

Global Economic &  
Social recession

Hepatitis Virus, an  
Overburdening toll  
on Pakistan

The technocrat strategies  
of Pakistani Media  
during Pandemic days

Virus a Critical  
Driver of  
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## Contents

Team and Contributors.....	2
<b>Editorial</b>	
Viruses are critical driver of human evolution .....	4
<b>Special Features</b>	
Coronavirus; Global Economic & Social recession .....	7
Novel Myths around COVID-19 .....	10
The technocrat strategies of Pakistani media in pandemic days .....	13
Your Ultimate Guide to Covid-19 .....	16
Humankind battles against Influenza, Flu, & now COVID-19 .....	23
All we need is empathy during the pandemic days .....	28
Social Distancing; United we Fall, Divided we Stand.....	31
<b>Interview</b>	
An Outclass conversation with Dr. Younas Khan on COVID19.....	35
A Teacher's take on getting the most out of online classes.....	38
A Talk with Dr. Mohsin Khurshid on Polio eradication in Pakistan.....	41
<b>Feature Stories</b>	
Viruses and their enigmatic structure .....	47
The Hepatitis virus; An over-burdening toll on Pakistan.....	51
How we achieved the feat of eradicating smallpox from planet earth.....	53
Battling against Poliovirus .....	57

Not every stool is worth a toilet; some save humanity!.....	62
HIV in Pakistan – An alarming Threat .....	66

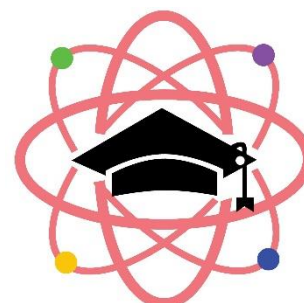
### Movie Review

Contagion: A Fictional Version of the Real-Time COVID-19 .....	70
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### Science Delight

How MERs and SARs are related to Covid-19...	74
Viruses = Villains? Not Always!.....	77
The Sinister Ebola Virus.....	79
A look at top researches on viruses .....	82

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**UVAS SCIENCE CLUB**



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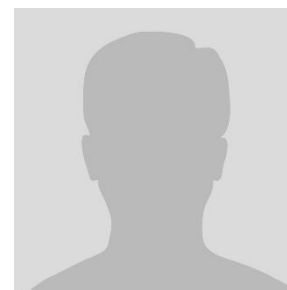
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*Editorial*

# *Viruses are a critical driver of human evolution*

*By Saadeqa Khan*

A painting depicts the horrors of plague in Italy in the 17th century



From Athens flue pandemic to the black-death and AIDS, these vast volumes set to offer a sociocultural, historical, and medical look at infectious diseases and their place in human history, from Neolithic times to the present. Nearly 300 centuries cover specific diseases like AIDS, Influenza, Malaria, Ebola, SARS, Corona, and now COVID19.

In the realm of infectious disease, a pandemic is a worst-case scenario when an epidemic spreads beyond a country's borders and causes an overwhelming threat or death toll worldwide or some major parts around the globe. Though contagious disease enlisted during pre-historic nomadic groups, nearly 10,000 years ago, when men started building communities, it resulted in a slight rise in epidemic outbreaks like Malaria, Plague, Leprosy, Influenza, smallpox and other fatal diseases. Over time, the more civilized humans become, building extensive infrastructure and forging trade routes to connect with the cities in different regions of the world, the more likely the pandemics become.

The primeval recorded pandemic occurred during **431- 450 BC when two power states** in ancient Greece, Athens and Sparta assaulted each other. After the disease passed through Libya, Ethiopia, Egypt and Athens, nearly two-thirds of the Athens' population, died due to this epidemic.

Scientists and researchers have agreed on that the widespread occurrence of disease over what might typically be expected in a geophysical region. Throughout the history, the plague has been a significant

threat to humanity, caused havoc and the most substantial death toll from 165 A.D. to 541 A.D. It not only changed the course of emperor's plans of massive economic struggle but at the same time, it credited with creating an apocalyptic atmosphere that spurred the rapid spread of Christianity and resulted in substantial social, moral and geographical changes.

Decades later, in the 11th century, leprosy overgrew into a pandemic in Europe. Though leprosy is slow-developing disease results in sores and deformities, now known as 'Hanson's disease,' it still grips millions of people each year and could be fatal if not treated at the initial stage with antibiotics.

Bubonic plague or Black Death is another pandemic that was responsible for the death of one-third of the global population in the late 12th and 13th centuries. It kick-started in Asia and through caravans spread through Sicily and entered in Europe. Meanwhile, England and France were so incapacitated by the plague that these countries called the cessation of hostilities. Still, the pandemic caused massive economic and demographical changes and resulted in the collapse of the British feudal system. The re-occurrence of the bubonic plague in the next two centuries killed **50 million people, around 26% of the total global populace.**

In 2019, research revealed that the death of some 56 million native Americans during the **16th and 17th centuries**, mainly through pandemics and many had altered earth's climate and vegetation growth on previous tilled

lands, drew more carbon dioxide from the atmosphere and caused a severe cooling effect. Correspondingly, 18th and 19th centuries have widely been recognized for cholera, plague, measles, HIV/AIDS, and different types of the harmful flu. Only Asian flu spread in 1957 in China and U.S. caused an estimated death toll of about 1.1 million, while AIDS killed 35 million people around the globe so far until it first appeared in 1920, and a cure is yet to be found.

So, with this rough bit of pandemic history, what does this recent Coronavirus outbreak holds on? While we are benefiting with the hype of biotechnology and artificial intelligence, a pandemic seems a little bit strange and disgusting. The recent COVID19 outbreak shows that men still need to learn the safest battle against pandemics/viruses. The constant battle between pandemics and humanity has long been recognized as a critical driver of social, moral, economic, and geographical changes that lead to human evolution.

In the past, scientists have not had the tools to look at the patterns of these pathogens and their hosts, but now they are applying big data analysis to unveil the extent of viruses' impact on the evolution of living beings, specifically on humans and mammals.

History tells us that whenever a pandemic occurred at some point in evolution, the population that was targeted by an epidemic either adapted or went extinct. The protein performs a vast array of functions that keep our cells ticking, a few small tweaks in protein shape and composition had helped humans to compete with the viruses when they hijacked an organism's body to replicate and spread.

A recent study shows that by learning which part of the cell has been used to fight against viruses in the past without detrimental effects on the organism, we can find insight on the pressure point that will lead to investigating more sophisticated and effective therapies.



## Special Features

# Coronavirus; Global Economic & Social recession

By Kaleem Ullah

The coronavirus pandemic is posing an exceptionally global threat – it has respected no border. It emerged from one particular location-Wuhan, but now more than 180 countries are suffering worldwide. According to Reuters news agency, globally confirmed cases have crossed the 390000 figure. This viral explosion is influencing nearly all domains: economy, society, politics – all are affected at a notable scale. Economic fall is near to cross its threshold: WTO warned that the virus outbreak can cause a more severe economic recession than 2008. As per Bloomberg's latest report, the global economy could suffer \$2.7tr which is equal UK total GDP. Social norms are also reversing drastically: people do avoid handshake, informal talks, and casual sports activities. Both socially and economically, this outbreak is becoming a massive challenge.

## Economic Impacts

A strong economy is considered a hallmark of a nation's progress. Growing economies ensure power and wealth, but when they get dwindled, everything suffers. Coronavirus is hitting the world's economy in general and developing countries in particular. It is disrupting the supply of goods on a global scale;



*As expected, the pandemic gave a severe hit to China. Image Source: Getty Images*

resultantly firms are in great trouble in meeting their targeted goals. The forecasters are predicting a looming recession which would be more disastrous than that of 2008.

In 2003, China's economy was around 4 percent of the world's GDP, and right before the Corona outbreak, it was marking 16.3 percent of the world's total. As expected, pandemic gave a severe hit to China: it alone faced a dramatic loss of about \$103bn or 0.8pc of its GDP – estimated by the Asian development bank. China and the US are the world's largest economies. Any shock to these countries may shake the world's market. Recently, the Wall Street stock exchange dropped over 13pc in a day due to virus fear. The UK Stock Exchange saw the most critical suffrage since 2008. Hot perils are knocking at the door as the IMF and WB are issuing new warnings to the economy. According to the Organization for Economic Cooperation and Development (OECD), the World economy could grow at its slowest since 2009.

Bloomberg forecasting that the global economy slides to 1.2pc which is far behind than that of the past year. The report further says that it may grow even slower than 1.0pc if the outbreak will keep on intensifying. Factories are facing complete suspension as workers prefer to stay at home to avoid the attack of COVID-19.



*Tourism Industry is at the risk of confronting pronounced blows in the coming days. Image Source: EPA*

Tourism is also affected by the coronavirus outbreak. It's been an income source for many countries but now has been drastically affected. Italy has blocked all of the tourist sites for an indefinite time. China, South Korea, and Japan have also issued warnings at tourists' resorts. Tourism Industry is at the risk of confronting pronounced blows in the coming days.

Trade enterprise is also declining due to COVID-19. Due to lockdown, more than 1.7 billion people have to stay at home, says Reuter. By observing this all, one can envision the extent of disruption in trade activities. China's global supply chain is experiencing history's worse difficulties

because China has put a shut over its trade corridors. Pakistan is among the top 20 countries that are being affected by China's trade halt. Pakistan's economy, says the Asian development bank (ADE), can suffer 1.7pc GDP loss due to the Coronavirus flare-up.

Unfortunately, due to some policies lapses, 956 cases with COVID-19 have been confirmed. If the government failed to handle the situation timely, Pakistan could go into complete lockdown. However, tables can be turned with intellect and wisdom.

In short, the global economy is under pathetic assault. World leaders and scientists are struggling hard to control the circumstances. The need of the hour is to put a pause on the outbreak flow; otherwise, losses would be irreversible.

## Social Consequences of Coronavirus Outbreak

History reveals that pandemics keep on reversing the norms. Social distancing is becoming an individual obligation. China,



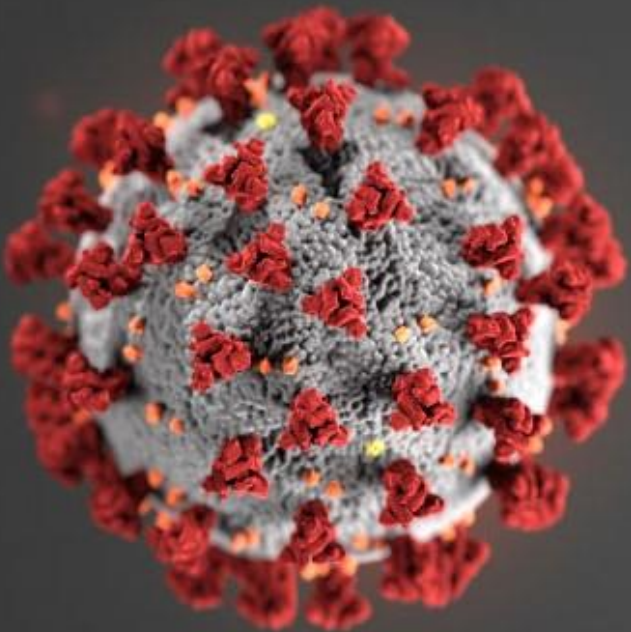
being an epicenter, is feeling segregated from the rest of the world. Every person views it as a criminal. Italy prohibited its citizens from all the non-physical and sexual activities. The hysteria of the virus spurt is affecting people's social activism. Social distancing, self-isolation, and fear have truly effected free socialization and the beauty of society.

Institutions, around the globe, are closed to prevent the spread. Academic activities are at a long hiatus. However, online classes may compensate, but only to those who are equipped with facilities and privileges. The academic break is extending for an indefinite period. Where the course of time will direct us, no one can predict with significant confidence.

COVID-19 has drastically impacted humanity. Chinese are at the center point of the world's aversion. One Chinese citizen was severely whipped by US citizens with the slogan 'go to China with Corona'. Countries abandoned their relations with Italy and China. Consequently, hate and discrimination are gaining ground. Our repulsive attitude will lead us nowhere.

Solidarity is the need of the hour. If nations exercise unification, peace and harmony will be maintained among them; otherwise, as the corona game will be over, a cold weapon pandemic may come into play.

*“This world is a Union Town, and its time to show that”-  
Bob Rose.*



# MYTHS BUSTED!

## Novel Myths around COVID-19

By Behzad Taimur

Pakistan is expected to be amongst the countries worst hit by the recent outbreak of the new Coronavirus, COVID-19. Community spread of COVID-19 has started in Pakistan, and the number of daily cases is spiking (as of March 26, the total number of confirmed cases had increased to 1,179, with 77 new cases in the past 24 hours (12 pm – 12 pm).

A key challenge in responding to significant disease outbreaks, especially of previously undocumented strains, is the lack of understanding of the disease as well as levels of public knowledge on the same. In an environment of sparse and incomplete information, it is often that misinformation, disinformation, and denial take hold in society at large.

At this time, and as the emergency situation is rapidly developing, it is absolutely crucial to provide accurate and reliable information to the general public, while at the same time, working to engage

and contest mis-/disinformation. Here is a small effort in this vein. I have tried to note and contest ten significant myths around the Novel Coronavirus.

**Myth: Coronavirus only affects old people.**

**Reality:** People of all ages can be affected by a coronavirus. Older people have greater difficulty in recovering from the disease. This may be because of frailty, less immune capacity, or a pre-existing condition. However, this does not mean that young people cannot get affected. People of all ages are susceptible and should take necessary precautions to protect themselves and others around them.

**Myth: Coronavirus is necessarily fatal, and all affected die.**

**Reality:** Coronavirus is not necessarily fatal. It is a severe disease, and some people need extensive medical care, including hospitalization. However, it



does not always result in a fatality, especially if necessary medical care is provided. The effects are more severe on older people or people with pre-existing conditions. While it is difficult to be guaranteed at this time, just under four percent of affected persons may ultimately die. Of these, about 80% may be expected to be persons 60 years and older. This means that very significant segments of any given population do not face a clear and present danger of dying.

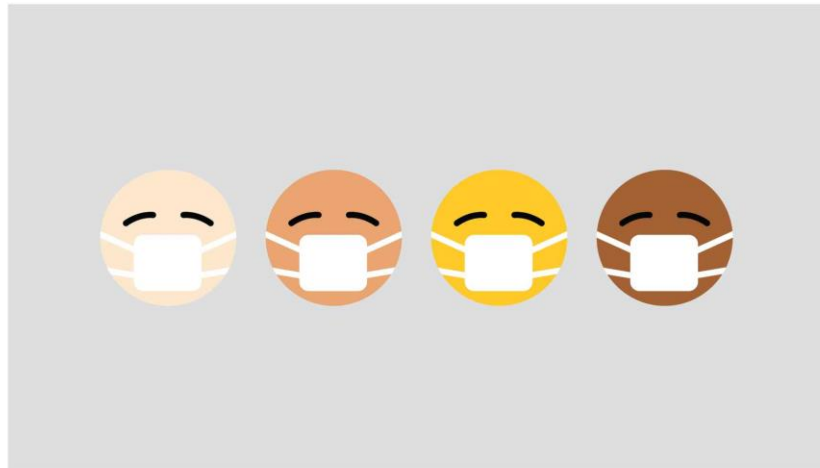
**Myth: Coronavirus does not spread through handshakes, and advisories against hand-shaking are incorrect.**

**Reality:** Coronavirus can spread through touch. Hands touch many surfaces and can pick up viruses. Once contaminated, hands can transfer the virus to your eyes, nose, or mouth or to someone you touch. From there, the virus can enter your or their body and can make a person sick. This will lead to rapid transmission and spread. Avoiding physical contact with other people and staying at least six feet away is essential and recommended.

**Myth: A face mask is a necessity and guarantees protection against Coronavirus.**

**Reality:** Yes, and no. Masks that tightly fit around a person's face (such as the N95) can protect healthcare workers as they care for large numbers of infected patients. For the general public, especially persons without respiratory illnesses, wearing lightweight, disposable, surgical masks is not necessary or recommended. Since such masks don't fit tightly, they may allow tiny infected droplets to get

into the nose, mouth, or eyes. Further, people with the virus on their hands and who happen to touch their faces under a mask might become infected.



On the other hand, people with a respiratory illness can wear these masks to lessen their chance of infecting others. Bear in mind that stocking up on masks makes fewer available for sick patients and health care workers who need them. Let's all be responsible.

**Myth: Closing public spaces such as mosques, restaurants, and cinemas, and imposing isolation will not stop Coronavirus spread.**

**Reality:** Coronavirus spreads when people cough or sneeze, releasing tiny droplets of mucus and saliva into the air that contain the virus. These droplets can land on all types of surfaces, including tables, chairs, doors, light switches, et al. Besides, they can land on other people as well. If the droplets land or are breathed in by another person, they can cause infection. Similarly, if the droplets land on a hard surface and someone touches that hard surface, they can get infected in that way as well. Therefore, it is essential to minimize contact between people so that it slows down the spread of the virus. In this, closing places that bring together large numbers of people and hold them together in tight spaces can help keep people apart and reduce contagious spread. This is a standard public health practice and has continually been implemented around the globe in multiple contexts with relatively high success rates.

**Myth: Eating garlic helps protect against Coronavirus.**

**Reality:** Garlic is a healthy food that has anti-microbial properties. However, there

is no evidence from the current outbreak that suggests eating garlic has protected people from the new coronavirus.

**Myth: Hot liquids kill off Coronavirus and should be drunk frequently.**

**Reality:** Staying hydrated is always essential, especially during infection, including novel coronavirus. However, there is no evidence to suggest that drinking hot or cold water (or gargling) prevents a possible coronavirus infection.

**Myth: Taking a hot bath helps protect against COVID-19.**

**Reality:** Taking a hot bath does not help protect against COVID-19. Actually, if people take this myth too far in their minds, taking a hot bath with boiling water can be harmful since it can burn you! The best way to protect yourself against COVID-19 is by frequently cleaning your hands with soap and water; or, with hand sanitizers. By doing this, you would eliminate coronavirus that may be on your hands. In turn, this helps avoid infection that may occur if people touch their eyes, mouth, nose, or someone else.

**Myth: Regularly rinsing your nose with saline water helps protect against Coronavirus.**

**Reality:** There is no evidence from the current outbreak that suggests regularly rinsing one's nose with saline water has protected people from infection of the novel coronavirus.

# The technocrat strategies of Pakistani media in pandemic days



By Fawwad Raza

Around 30 years ago, a great intellect Noam Chomsky came across some manipulating strategies the media often used, and these days, when we are having things like internet, Facebook, Twitter, and other social platforms, media can influence our lives more than ever, and this influence does not necessarily always positive. Newsmaker has many ways to manipulate our consciousness. It seems that many media outlets in Pakistan have been trying to push their own agenda that often results in the truth being bent. Let's check out the ways media misinterpret the fact in recent COVID19 outbreak.

#COVID19 –a novel virus from the coronavirus family has become a global pandemic in early March, more than 10 thousand people have died, and still there no break seems. Pakistan is also battling hard to counter the spread, and several preventive measures have been taken, including the closure of educational

institutes, closing intercity and inter-provincial transport service, and a partial lockdown by closing wholesale and retail markets. Meanwhile, quarantine centers have been established to isolate patients or suspects of this novel-coronavirus, to cease its rapid spread.

After the World Health Organization had declared COVID19 a pandemic, the economists are outlining it as a state of emergency just like in a war. In this scenario, Media have a grave responsibility for educating masses about the crisis, precautions, preventions, and medication processes?

While International Media have specific scientific research desks that deal with daily scientific News, and in case of some epidemic outbreak in any part of the world, the science desk staff takes the lead to cover the stories. Editorial is bound to consult with the science desk editor, so



only trustworthy News can be published or broadcast.

Unfortunately, in Pakistan, there have been fewer science communication activities, and none of our local universities is providing courses or education of science journalism. This identifies the need for the science desk in media outlets an extra expense.



*An empty market in Karachi during restrictions. Image Credit: AP*

Most of the news channels are working without the existence of a science desk. A few leading media outlets have science journalists, but they are also not well trained or well connected with the global science and health organizations.

There are some misinterpretations in Pakistan's media related to #COVID19 stories.

## Lockdown or Quarantine

Corona outbreak in China and the authorities decided to quarantine Wuhan, the epicenter of the epidemic. Following the term of “lockdown” **western media used for the situation either intentionally** or due to lack of knowledge, Pakistan's media adopted the same word as it is used by the west despite continuous opposition by some famous science journalists. Later the phrase lockdown becomes so much familiar, and when the virus spreads in Europe and various US states – The global media used the same for them as well. Although it's still not a technical term to tackle any epidemic, lockdown is generally a technical term that refers to a specific situation in wars like Germany, and other countries had witnessed during world wars.

## Coronavirus dies at a higher temperature.

Well, I am not **aware of the person who initiated this theory**, but it went viral, and the entire Pakistani media industry reported it without a fact check or having significant evidence from scientific data or research. The media made a perception that coronavirus will die on 30-degree centigrade or above temperature. Eventually, the virus never dies, they are de-activated or destroyed. The understanding brought Pakistanis in a relaxed mood, and they started enjoying the partial lockdown by the government. Even our PM Imran Khan quotes this in a presser.

## Patients or suspects

Initially, media reporters and desk's bigwigs got confused between suspects and patients of coronavirus. Anyone – who was tested by the authorities declared as patients. Later they realized that putting someone in isolation doesn't mean he/she is patient. But it was too late when they realized their mistake, now the entire nation falsely believes that one – who is quarantined is a patient.

## Epidemic study

As I mentioned earlier – Media outlets in Pakistan lack science desks, so we were unable to go through a **study or research article related to coronavirus** outbreak. We are having a severe deficiency of statistics that how much resources we need during a major city lockdown? Even the media doesn't have the actual figure that how many ventilators are available to patients in hospitals around the country.

## Rating gamble and click Bait News items/blogs

Our Media usually works on rating mechanism, and after the advent of digital media, the situation gets worsened, we witnessed leading News outlets of Pakistan working on creating every single information as a breaking News, their digital media wings adopt the same strategies like the click-bait news item in recent pandemic days, which shows a severe lack of professionalism in our media industry. Although Clickbait is considered a crime in the global digital media outlets, it seems that we are far above for these considerations might because our media outlets are running by DONS and wealthiest businessmen.

## Choice of a wrong panel

In prime time talk shows, we more than often spectacle politicians, clerics, TV stars, and even sports stars discussing the epidemic. Still, hardly we watch any medical scientist/expert or biochemist in such talk shows, and it merely happens, our TV anchors humiliate or create an unpleasant situation for the scientists due to severe lack of knowledge and scientific wisdom.

## Non-ethical Approach

Last but not least – when the first case of coronavirus reported in Karachi, we observe that several media outlets not only revealed the **identity of the patient but also published the hospital record with the patient's name**, his family identity, address, and other contact detail. This ridiculous act put the patients and their families in threat, and the administration had to provide them security.

A bit of this recent history in the pandemic shows an entire lack of professionalism, ethics, and non-scientific attitude adopted by major media outlets in Pakistan. We can cope with this nuanced situation only by educating our editors, journalists, and reporters about scientific wisdom, ethics, and essential roles of science reporting. The institutions like CEJ, IBA, Karachi University, NUST, LUMS, and COMSATS, should kick-start science communication courses, and these courses should mandatory for web editors of major media outlets of Pakistan.



# Your Ultimate Guide to Covid-19

By Fatima Zahra

The one word we have been continuously hearing this year is none other than the deadly coronavirus or Covid-19. It has managed to become one of the biggest pandemics of recent years and has affected more than 100,000 people around the world. With all the chaos going around, people have not really dived into what coronavirus actually is. So, here is your comprehensive guide about coronaviruses.

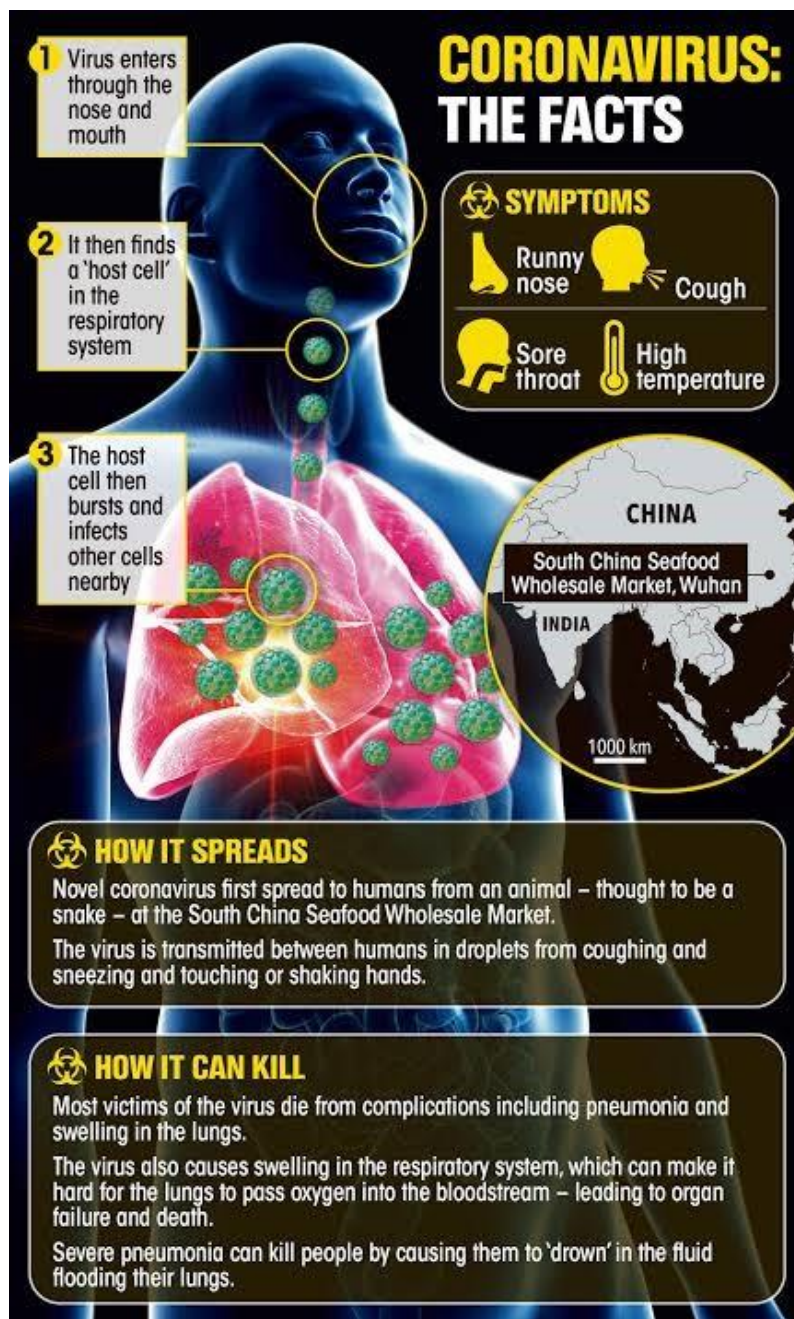
Coronaviruses (CoV) are an enormous group of infections that cause ailment going from the typical symptoms to increasingly serious sicknesses, for example, Middle East Respiratory

Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). An epic coronavirus (nCoV) is another strain that has not been distinguished in people until now.

Coronaviruses are zoonotic, which means they are transmitted among creatures and individuals. Itemized examinations found that SARS-CoV was transmitted from civet felines to people and MERS-CoV from dromedary camels to people. A few known coronaviruses are circling in creatures that have not yet tainted people.

Usual indications of contamination incorporate respiratory side effects, fever, hack, the brevity of breath, and breathing





and eggs. Keeping away from close contact with anybody indicating side effects of respiratory ailment, for example, hacking and sniffing, is also recommended.

## What is COVID-19, and how does it spread?

COVID-19 is the irresistible illness brought about by the most as of late found coronavirus. This new infection and malady were obscure before the flare-up started in Wuhan, China, in December 2019.

Individuals can get COVID-19 from other people who have the infection. The infection can spread from individual to individual through little drops from the nose or mouth, which are spread when an individual with COVID-19 hacks or breathes out. These beads land on items and surfaces around the individual. Others, at that point, get COVID-19 by contacting these articles or surfaces and touching their eyes, nose, or mouth.

Individuals can likewise get COVID-19 if they take in beads from an individual with COVID-19 who hacks out or breathes out drops. This is the reason it is critical to remain more than 1 meter (3 feet) away from an individual who is affected.

Individuals can get COVID-19 from other people who have the infection.

challenges. In increasingly extreme cases, the disease can cause pneumonia, intense respiratory disorder, kidney disappointment, and even demise.

Standard suggestions to forestall disease spread incorporate normal hand washing, covering mouth and nose when hacking and sniffing, completely cooking meat

## **Could the virus, that causes COVID-19, be transmitted through the air?**

Studies to date propose that the infection that causes COVID-19 is primarily transmitted through contact with respiratory beads as opposed to through the air.

## **Can a person acquire CoVID-19 from an individual who has no apparent symptoms?**

The fundamental way the infection spreads is through respiratory beads removed by somebody who is coughing or hacking. The danger of getting COVID-19 from somebody without any symptoms at all is extremely low. Be that as it may, numerous individuals with COVID-19 experience just gentle side effects. It is especially valid at the beginning periods of the infection. It is in this manner conceivable to get COVID-19 from somebody who has, for instance, only a gentle hack and doesn't feel sick.

## **Would one be able to get COVID-19 from the defecation of somebody with the malady?**

The danger of getting COVID-19 from the defecation of a tainted individual has all the earmarks of being low. While starting examinations recommend the infection might be available in dung now and again, spread through this course is not a fundamental component of the episode. WHO is surveying progressing research on the ways COVID-19 is spread and will keep on sharing new discoveries. Since this is a hazard,

nonetheless, it is another motivation to clean hands consistently, in the wake of utilizing the restroom and before eating.

## **What would one be able to do to ensure oneself and forestall the spread of sickness?**

Remain mindful of the most recent data on the COVID-19 flare-up, accessible on the WHO site, and through your national and nearby general wellbeing authority. Numerous nations around the globe have seen instances of COVID-19, and a few have seen episodes. Experts in China and some different countries have prevailed with regards to easing back or halting their flare-ups. Notwithstanding, the circumstance is capricious, so frequently check for the most recent news.

You can lessen your odds of being contaminated or spreading COVID-19 by playing it safe:

- Consistently and altogether clean your hands with a liquor-based hand rub or wash them with cleanser and water.

Why? Washing your hands with cleanser and water or utilizing liquor-based hand rub slaughters infections that might be on your hands.

- Keep up in any event 1-meter (3 feet) separation among yourself and any individual who is hacking or sniffing.

Why? At the point when somebody hacks or sniffles, they splash little fluid beads from their nose or mouth, which may contain the infection. On the off chance that you are excessively close, you can take in the beads, including the COVID-



19 infection, if the individual hacking has the sickness.

- Abstain from contacting eyes, nose, and mouth.

Why? Hands contact numerous surfaces and can get infections. When sullied, hands can move the infection to your eyes, nose, or mouth. From that point, the infection can enter your body and can make you wiped out.

- Ensure you, and the individuals around you, follow great respiratory cleanliness. This implies covering your mouth and nose with your bowed elbow or tissue when you hack or snuffle. At that point, discard the pre-owned tissue right away.

Why? Beads spread infection. By following great respiratory cleanliness, you shield the individuals around you from infections, for example, chilly, influenza, and COVID-19.

The fundamental way the infection spreads is through respiratory beads removed by somebody who is coughing or hacking

- Remain at home on the off chance that you feel unwell. On the off chance that you have a fever, hack, and trouble breathing, look for clinical consideration, and bring ahead of time. Follow the bearings of your nearby wellbeing authority.

Why? National and neighborhood specialists will have the most up-to-date data on the circumstance in your general vicinity. Bringing ahead of time will

permit your medicinal services supplier to guide you to the correct wellbeing office rapidly. This will likewise ensure you and help forestall the spread of infections and different contaminations.

- Stay up with the latest on the most recent COVID-19 hotspots (urban communities or neighborhoods COVID-19 is spreading broadly). On the off chance that conceivable, abstain from venturing out to places – mainly if you are a more established individual or have diabetes, heart or lung ailment.

Why? You have a higher possibility of getting COVID-19 of every one of these regions.

Assurance measures for people who are in or have as of late visited (recent days) regions where COVID-19 is spreading

- Follow the direction sketched out above (Protection measures for everybody)
- Self-confine by remaining at home if you start to feel unwell, even with gentle indications, for example, cerebral pain, poor quality fever (37.3 C or above), and slight runny nose until you recoup. If it is necessary for you to have somebody bring you supplies or to go out, for example, to purchase nourishment, at that point, wear a cover to abstain from contaminating others.

Why? Maintaining a strategic distance from contact with others and visits to clinical offices will permit these offices to work more successfully and help shield you and others from conceivable COVID-19 and different infections.

- If you acquire fever, hack, and have trouble breathing, look for clinical counsel immediately as this might be because of respiratory contamination or different genuine condition. Bring ahead of time and tell your supplier of any ongoing travel or contact with voyagers.

### **Would it be a good idea for one to stress over COVID-19?**

Ailment due to COVID-19 contamination is commonly gentle, particularly for youngsters and youthful grown-ups. Be that as it may, it can cause genuine sickness: around one in every five individuals who get it need emergency clinic care. It is in this way very typical for individuals to stress how the COVID-19 flare-up will influence them and their friends and family.

We can channel our interests into activities to secure ourselves, our friends and family, and our networks. As a matter of first importance among these activities are normal and exhaustive hand-washing and great respiratory cleanliness. Furthermore, keep educated and follow the counsel of the neighborhood wellbeing specialists incorporating any limitations set up on movement, development, and social affairs.

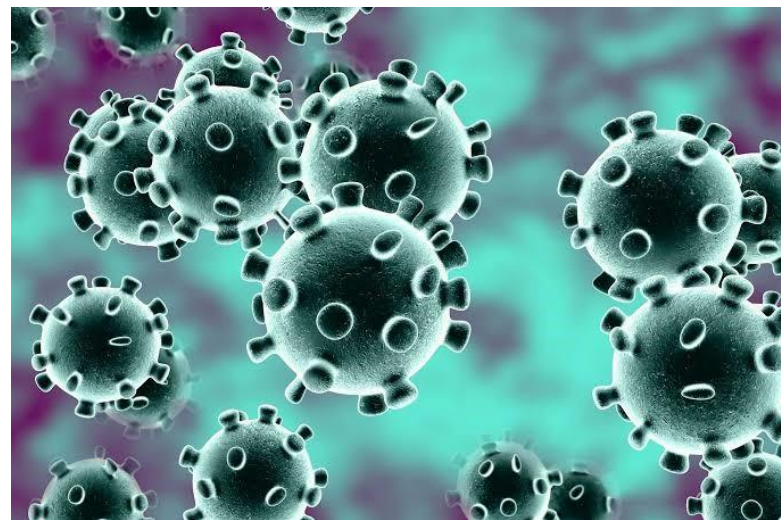
### **Who is in danger of getting serious sickness?**

While researchers are as of yet finding out about how COVID-2019 influences individuals, more seasoned people and people with previous ailments, (for example, hypertension, coronary illness, lung sickness, malignant growth, or

diabetes) seem to create particular disease more regularly than others.

### **Are there any drugs or treatments that can forestall or fix COVID-19?**

While some western, conventional, or home cures may give comfort and lighten manifestations of COVID-19, there is no proof that ebb and flow medication can forestall or fix the sickness. Self-prescription isn't recommended with any medicines, including anti-toxins, as avoidance or solution for COVID-19. Notwithstanding, there are a few continuous clinical preliminaries that incorporate both western and customary drugs. WHO will keep on giving refreshed data when clinical discoveries are accessible.



Until this point in time, there is no immunization and no particular antiviral medication to forestall or treat COVID-2019.



## **Is there an immunization, medication, or treatment for COVID-19?**

Not yet. Until this point in time, there is no immunization and no particular antiviral medication to forestall or treat COVID-2019. In any case, those influenced ought to get care to calm indications. Individuals with disease ought to be hospitalized. Most patients recoup because of steady consideration.

Potential antibodies and some medication are under scrutiny. They are being tried through clinical preliminaries. WHO is planning endeavors to create immunizations and meds to forestall and treat COVID-19.

The best approaches to secure yourself as well as other people against COVID-19 are to habitually clean your hands, spread your hack with the curve of elbow or tissue, and keep up a separation of at any rate 1 meter (3 feet) from individuals who are hacking or wheezing.

## **Is COVID-19 equivalent to SARS?**

No. The infection that causes COVID-19 and the one that caused the flare-up of Severe Acute Respiratory Syndrome (SARS) in 2003 are identified with one another hereditarily. However, the illnesses they cause are very extraordinary.

SARS was more destructive, however significantly less irresistible than COVID-19. There have been no episodes of SARS anyplace on the planet since 2003.

## **To what extent is the brooding time frame for COVID-19?**

The “hatching period” signifies the time between coming down with the infection and starting to have manifestations of the ailment. The hatching time frame for COVID-19 is from 1-14 days, most normally around five days. These evaluations will be refreshed as more information become accessible.

## **Would humans be able to get tainted with the COVID-19 from an animal source?**

Coronaviruses are an enormous group of infections that are regular in creatures. Sporadically, individuals get contaminated with these infections, which may then spread to others. For instance, SARS-CoV was related to civet felines, and dromedary camels transmit MERS-CoV. Conceivable creature wellsprings of COVID-19 have not yet been affirmed.

To secure yourself, for example, when visiting live creature markets, maintain a strategic distance from direct contact with creatures and surfaces in contact with animals. Guarantee high sanitation and regularly wash your hands. Handle crude meat, milk, or animal organs with care to maintain a strategic distance from tainting of uncooked nourishments and abstain from expending crude or half-cooked creature items.

## **To what extent does the infection remain on surfaces?**

It isn't sure how long the virus that causes COVID-19 stays on surfaces, yet it

appears to act like different coronaviruses. Studies propose that coronaviruses (remembering starter data for the COVID-19 infection) may endure on surfaces for a couple of hours or a few days. It may fluctuate under various conditions (for example, sort of surface, temperature or dampness of the earth).

On the off chance that you figure a surface might be contaminated, clean it with basic disinfectant to murder the virus and secure yourself as well as other people. Clean your hands with a liquor-based hand rub or wash them with cleanser and water. Abstain from contacting your eyes, mouth, or nose.



# Humankind battles against Influenza, Flu, & now COVID- 19

By Saher Shahid

Influenza, commonly known as Flu, has a prolonged outbreak history dating back to 2,400 years ago. The first evidence of the virus was observed in 1580, started in Russia and spread through western Europe and Africa. In Rome, it killed over 8,000 and destroyed many Spanish cities.

In the 19th century, Spanish influenza was considered as one of the severe virulent illness that killed almost 40 million people around the globe as the virus spread from city to city. Some reports indicate that total deaths were near 70 million. The epidemic covers fearful stories of people dying within a few hours of getting exposure to Flu. The mortality rate was highest among the adults aging in 50 who were for unknown reasons were more sensitive towards the strains of influenza.

It started in Kanas in the early spring of 1918, spread throughout Europe in the same season. Although Flu seemed less dangerous in the summer season, Spanish Flu appeared deadly. The infections travel through towns, cities, and continents crushing their hospitals and had devastating effects in Spain till the



autumn of 1918. Initially, it was thought that influenza is caused by bacteria, and there was no treatment or vaccine available. The virus affects reduced till 1920, but it keeps on circulating for decades among individuals with no proper medication; however, after a long time, scientists came across that 1918-1919 pandemic is caused by virus HINI influenza.

Decades later, a new virulent flu-type was observed in February 1957, a few signs of severe Flu was observed emerged from China. Influenza remained a yearly occurrence after the 1918 pandemic, but no new, virulent influenza type appeared until then. This Asian Flu resulted in around 2 million deaths in Asia and 70,000 deaths in the United States. In the meanwhile, Maurice Hilleman, a microbiologist, observed a large number of people affecting by a new type of virulent. He and his team studied the sample of the virus and found that people don't have antibodies protection for this influenza, which was H2N2 type.

However, certain people who survived the 1889-1890 influenza pandemic showed antibody response towards this 1957 influenza. Hilleman quickly started vaccine production by sending virus samples to manufacturers and insisting them to develop a vaccine in a short period of four months.

In winters of September 1968, the United States experienced the virus H3N2. The vaccine for this virus was formed quickly but was not quick enough as the pandemic caused 34,000 deaths in the United States. Some scientists observed that H3N2 similarity with Asian Flu protected people from the more harmful effect it may have caused.

Avian Flu, 1997, as the name indicates, caused by infected birds to humans. It aroused from Asia through H5N1 of avian Flu resulting in a massive proportion of death. The spread was inclined specifically in 2003-2004 by the end of millions and tons of poultry and waterfowls. Luckily, the virus was not contiguous but could only transfer from birds to humans, and through less interaction with birds, the proportion of spread was controlled. After the death of a large quantity of poultry flock, the threat to the virus was decreased to a more

significant extent. However, the scientist suggested that this deadly viral strain could result in a severe future pandemic that could be contagious.

In March 2009, Mexico experienced a massive death toll by a Flu. Many cases were also reported in California and Texas, along with other places. The scientist with a great deal of research identified that the Flu is caused by the influenza H1N1 virus, and its origin was majorly through pigs. The individuals over the age of 65 experienced 90% of deaths and children through seasonal Flu, and 87% of deaths were caused in individuals below the age of 65 through H1N1. It was noted that the people born before 1950 showed pre-existing immunity towards the virus because the virus type H1N1 was similar to the Spanish Flu of 1918. Some scientists also predicted that it was the same Spanish Flu circulating in the environment that resulted in Novel H1N1. CDC evaluated that 42 million and 86 million cases of 2009 H1N1 appeared in the US between April 2009 and February 2010. The evidence that people hospitalized due to H1N1 were 188,000 and 389,000 and the total death toll was 8,520-17,620 approximately.



Each year, the United States experiences a severe flu season. The 2017-18 season was the deadly and 2018-19 was one of the longest than the previous flu seasons. CDC reported that 6.4 million become sick with Flu, with 55,000 hospitalizations and 2,900 deaths. It was seen that 45 states, which almost form half of the regions in each country was under the

influence of influenza. During the 2019-20 CDC reported 14,000 deaths, 250,000 hospitalizations, and more than 26 million Americans have fallen sick because of Flu. The flu vaccine 2019-20 was developed against H1N1 and H3N1 influenza with two strains that circulated in the environment and made it difficult for the researcher to decide which vaccine they had to go with for the next flu season.

The human immune system which resists viruses attacks depends upon the exposure of the individual to the viruses itself or the vaccine. The immune system store the information for any viral attack on the body, and the next time when a particular virus attacks the body, it has already developed antibodies initially, which is the natural defense system of the human body to deal with the viral infection. It is important to note that influenza viruses can quickly mutate or change rapidly, and within a few years, it develops new strains. This process is known as “antigenic drift.”

If people get exposed to a known strain of a specific virus, the body will have a pre-existing immunity in the body that protects, and the ailment will be mild. However, if a different or mutated strain attacks the human body, which won't have the pre-existing immunity. This is called “antigenic shift,” and it causes severe widespread with serious illness. The first vaccine against influenza viruses was discovered in 1938 by Jonas Salk and Thomas Francis during World War II.

## KEY FACTS ABOUT INFLUENZA (FLU)

Influenza is known as Flu, is a contagious ailment caused by influenza viruses, which mainly affect the throat, nose, and sometimes lungs. The illness caused may be small to severe or even can lead to death. There are two main types of Influenza viruses, Type A and B. Influenza A viruses can be broken down into sub-types depending on the genes that make up the surface proteins. Throughout a flu season, different types (A & B) and subtypes (influenza A) of influenza circulate and cause ailments.

The common symptoms of influenza including cough, sore throat, runny and stuffy nose, fever, muscle and body ache, fatigue, headache, sometimes people also experience diarrhea and vomiting, especially in children than adults. However, it should be noted that fever is not a compulsion in the Flu. According to physicians, Flu usually spread by an infected person, coughing and sneezing or talking as it results in entering tiny droplets to others. Flu can also attack individuals by coming in contact with a surface or objects that had the influenza virus on it and then touching their mouth, nose, or eyes.

## KEY FACTS ABOUT COMMON COLD

The common cold or simple cold is a transmissible illness reported by experts is caused by more than 200 viruses. Still, the most common one is **rhinoviruses**, which belong to the genus Enterovirus in the family Picornaviridae. The three species of rhinovirus A, B, and C include



nearly 160 known and recognized types that differ based on their surface proteins. Common cold causes viral contagious disease of the upper respiratory tract, which mainly affects nose, throat, larynx, and sinuses are impacted. It observed that symptoms for cold appear less than two days initially, causing coughing, sore throat, runny nose sneezing, headache, and fever. Experts report that patients recover within seven to ten days or in an extreme situation for up to three weeks.

## HISTORY OF COMMON COLD

The history of regular cold dates back to 1950. The symptoms and treatment for the common cold are mentioned in the Egyptians “Ebers papyrus,” which is one of the oldest medical text presents today and was written before the 16th century BCE. It was named cold Flu because of its similarity with the symptoms to individuals exposed to cold weather. It recorded that around 200 years ago, a virus causing common severe symptoms appeared in humans and initiated in birds that have crossed the specie barriers.

In the United Kingdom, the medical research council established **standards cold unit in 1946**, and it was the place where rhinoviruses were discovered in 1956. In the 1970s, the collective cold units explained that during incubation phase treatment with interferon of rhinovirus infection protects somehow from common cold disease, but no productive treatment was founded. In 1989, after two years, the research completed with zinc gluconate lozenges in the prophylaxis can serve as treatment

of rhinovirus colds. This was considered as the only successful treatment in this virus history.

## DIFFERENCE BETWEEN INFLUENZA (FLU) & COMMON COLD

Flu and the common cold are both respiratory ailments, but they differ in the viruses that cause them. Also, as both have similar symptoms, it is difficult or even impossible to predict for Flu and cold based on symptoms. In general, Flu has more intense symptoms and worsen than a common cold. Also, Flu can occur in any season, but cold is prominently seen in winters. However, both can be treated with antiviral drugs and proper care, such as making soups, warm clothing, heating, and insolation during winters.

## DIFFERENCE BETWEEN FLU, COLD, AND COVID-19

It is observed that Flu, common cold, and COVID-19, commonly known as coronavirus, show more or less similar symptoms, but COVID-19 is more severe and intense in comparison to Flu and the common cold. The novel 2019 coronaviruses are a large family of viruses that can cause ailment from the common cold to severe Middle East Respiratory (MERS) infections and Severe Acute Respiratory Syndrome. The COVID-19 transmits mainly through physical contact among individuals when an infected person coughs, saliva discharge, or sneezes.

The symptoms for COVID-19 usually appear within 2-14 days like fever,

shortness of breath, cough, trouble in breathing, persistent pain, and pressure on the chest, bluish lips, and face. A person experiences severe chills and seizure if not reported timely to doctors and result in ventilation and ultimately cause death. The 2019 novel coronavirus (SARS-CoV-2) is a new strain in the viruses type and is not identified by humans before. Its spread was causing (COVID-19) a significant threat to the world and produced approximately 27,441 till March 29, 2020.

## CONCLUSION

Following steps are useful and need to follow when dealing with Flu, common cold and COVID-19:-

- Regularly wash your hands with anti-bacterial soap. It will protect you from getting infected through objects and person who is already infected or sick.
- Scrub your hands, wrist, between fingers, nails at least for 20-30 minutes.
- If you are an adult or child, you are more susceptible to getting infected through Flu, common cold and COVID-19 or other viral infections, using disposal face are very useful as they are inexpensive and give you protection against ailments.
- Get your children vaccinated against seasonal common flu strains and keep them in a home if they get infected though any viruses.
- When you experience common cold, try to make soups, tea, coffees and wear warm clothes and try to keep yourself in heating rooms.

As COVID-19 is a new strain with more severe effects than Flu and common cold and also, no vaccination is available for it. So special care is required to avoid ailment. Following steps would help prevent the spread of SARS-CoV-2 including:-

- Regular hand washing with anti-bacterial soap and water for at least 20 seconds.
- If water and soap are not available to use sanitizer to clean your hands.
- Avoid touching your face, specifically mouth area and nose.
- Cover your mouth and nose when coughing or sneezing with the inner elbow.
- Avoid crowded areas or physical contact people such as a handshake, hugs, etc.
- Keep your house or objects disinfected by spraying disinfectants.
- Stay at home if you are feeling unwell even if you are suffering from slight fever or cough.
- Especially avoid contact with people suffering from respiratory illness, including coughing or sneezing.
- If you suffer from fever, cough, and difficulty breathing, visit a hospital ASAP.

If symptoms of COVID-19 appear, self isolate and quarantine yourself and take precautions suggested by the doctor.



## All we need is empathy during the pandemic days

A man washes hand at Railway station. Credits AP Photo.

**By Hassnain Qasim**

In these days of trouble, one thing that we have to understand and make a strong effort toward solving is knowledge accessibility. There's no second opinion on the inefficacy of our education system, which has led to an immense social and economic disparity. It requires intervention on the scale of infrastructure, governance, and execution, but most importantly, it requires empathy.

Ever since the spread of SARS- CoV-2 (COVID-19) started making rounds on news and social media, public health organizations and government institutes started to undertake interventions that could contain the spread of the virus, treat infected people and protect the ones who could be at risk.

Prevention, at many times, serves as the best tool to fight against such outbreaks. This is why everyone started rallying around "Flattening The Curve," i.e., undertaking measures that will slow down the spread of the diseases, thus buying the first-responders a critical resource called time. Drastic measures have been taken to flatten this curve; countries have locked down, citizens put in quarantine, public gatherings have been banned.

Another essential campaign that started as an individual measure to help flatten the curve was washing hands with soap!

For us, knowing that we have a non-existent healthcare research ecosystem, which is translatory, individual and community-based measures such as physical distancing, washing hands, avoiding unnecessary contact with potentially harmful surfaces, covering

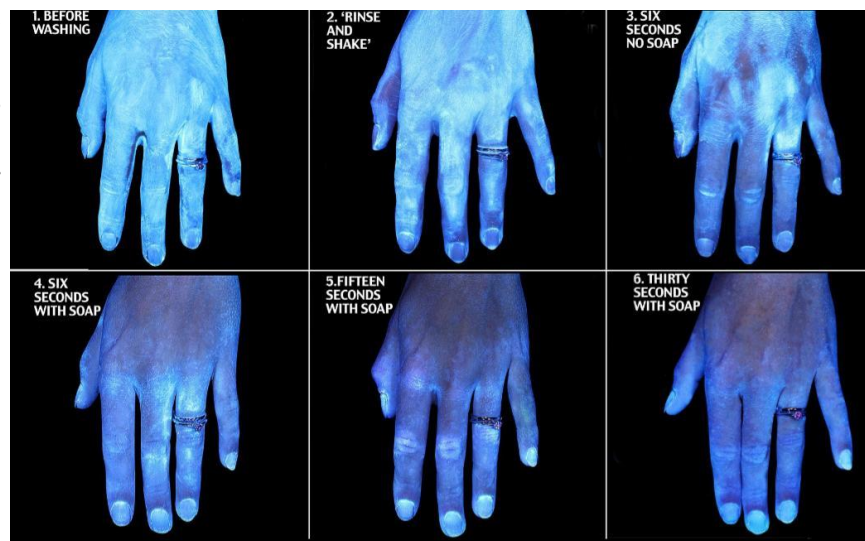


face while coughing and sneezing, are the only options to spread the virus. Our present healthcare system can diagnose a limited amount of patients, but what next? Do we have enough ventilators? No. Is our spending on Science & Technology coupled with a policy framework at a position where a therapeutic could develop, tested, and deployed? No!

While there have been several guidelines distributed by WHO to ensure that the public takes necessary precautionary measures for protection against COVID-19, these guidelines are in English, and in Pakistan, at best, these are in Urdu. These circumstances make a significant portion of the population that cannot understand English, increasingly vulnerable.

Our team at Genes & Machines decided to undertake a community effort to increase the accessibility of precautionary guidelines for local communities within Pakistan, along with general awareness to prevent infections and the spread of viral diseases. We translated precautionary guidelines from English to Urdu, Sindhi, Balochi, and Pushto. We were supported by several local organizations and initiatives in Pakistan such as Pukhtoogle, Thar Education Alliance, Scientia, Campaignistan, The Writers Lounge, OASIS, along with others in their capacities.

These partners helped in ensuring two things: The guidelines were accurately translated and they reached the people they were initially intended to. And we were glad that it happened, but this isn't enough. There are A vast majority of people who still are unaware of what to do at this point? There is a massive percentage of the population that does not have digital access. These translations are open and free to use. In this challenging time, we want to help in whichever capacity we can to help spread the message to help spread the awareness. If you're a content creator, a digital media agency, someone from the government, if you're at home worried about what to tell your family and friends, if you want to announce it to your neighborhood through your local mosque, use these! Also, this is a time where many people will go unnoticed, and these will be expected to affect the most by physical distancing and lockdowns, and also those who will not be able to afford the resources necessary to move to online education, help them out with the resources you have. We are all united, and together we can make a significant difference.



## ڪورونا وائرس

سے بچاؤ کے لئے

### احتیاطی تدابیر

#### ہاتھوں کی صفائی

- کھانے سے پہلے اور کھانے کے بعد اپنے ہاتھوں کو باقاعدگی سے صاف کریں۔  
- صابن سے ہتھیلی سے ہتھیلی، ہاتھوں کے پیچھے، انگلیوں کے بیچ اور سطح، اور ناخن کے اندر تک صاف کریں۔  
- ہاتھ ملانے سے پرہیز کریں۔  
- گندے ہاتھوں سے اپنے یا کسی اور کے منہ، آنکھوں اور چہرے کو مت چھوئیں۔  
- ہیٹ الخلا کا دروازہ ٹشو پیپر سے کھولیں تاکہ دروازے کی ٹوک پر موجود جراثیم آپ کے ہاتھوں کو متاثر نہ کریں۔



اپنے ہاتھوں پر صابن لگائیں  
پانی سے اپنے ہاتھ گیلے کریں  
گندے ہاتھ

اپنے ہاتھ پر صابن پھیلائیں  
ہاتھوں کو پانی سے دھوئیں  
ٹشو سے اپنے ہاتھ خشک کریں

یاد رکھیں کہ اچھی طرح ہاتھ صاف کرنے کے لئے 20 سیکنڈ تک ہاتھوں کو دھونا لازمی ہے۔  
یہ احتیاطی تدابیر آپ کو نہ صرف ڪورونا وائرس بلکہ اور بھی مختلف امراض سے محفوظ رکھنے کے لیے اہم ہیں۔



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Translated By: Zareef Baloch

## ڪورونا وائرس

آپ ڇه وٽا رڳھينگ ۽

### احتیاطی تدابیر

#### ہاتھوں کی صفائی

- وردن ورگ ۽ پيسر ۽ ڇه وردن ورگ رند دستاں شری ۽ بشود ات۔  
- دستانی دل ۽ توامین بند ۽ بوگانی همراھی ۽ لنککائی شمان ۽  
- گون صابناں بشود ات، ۽ ناخانی تها سپا بکنت ات  
- دست ملائینگ ۽ ڇه پھریز بکن ات  
- چل ۽ لیگاریں دستاں گون وٽن یا دکی کسے ۽ دپ ۽ دیمانی مرزگ ۽  
- مالک ۽ وٽہ بے رڳھین ات  
- کاٽس، پوھی ۽ غسل خانہ بانی دروازگانی بند ۽ پچ کنگ ۽ وهد ۽ دستنی ۽  
- دستانہ دستاں بکنت ات تاکہ شمنے دست دروازگ ۽  
- کڑیانی سر ئیے جراثیماں مه چن ات



لیکاریں دست  
چہ آپ ۽ وٽی دستاں تر پکن  
وٽی دستاں صابون ۽ مل  
صابون ۽ وٽی دستانی  
دستاں آپ ۽ سرا بشود  
گون ٹشو پیپر ۽ وٽی دستانی  
سرا بعمدست ۽ پچن

یات ہمار کہ لکائی ۽ دستانی ہلکار کنگ ۽ داں بیست سیکنڈ ۽ دستانی شوگ المی ایت  
احتیاطی تدابیر ترا کرونا چہ ابید ہم دکی نادراہی ۽ ڇه رڳھینگ ۽ واسنہ ارزشت داریت



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## نورول ڪورونا وائرس

کان بچاء جي لاء

### احتیاطی تدابیر

#### هٿن جي صفائی

ماني کان کان پھريان ۽ پوء پنھنجا هٿ چڱي طرح ڌوئو  
صابن سان پنھنجي هٿن جي ھٿيلي، هٿن جي پويان پاسا، آڱرين جي وچ ۾ ۽ نھن جي اندرين ٽرين کي چڱي طرح صاف ڪيو  
ماڻھن سان هٿ ملائڻ پاسو ڪيو  
هٿ خراب هجن جي صورت ۾ پنھنجن ۽ ٻين جي منھن، اکين کي ڪڏھن بہ هٿ نہ لاهيو  
ٻاٽرومر جو دروازو ٽشو پيپر سان کوليو ته جيئن هن تي لڳل جراثيم توهان جي هٿن تي نہ لڳن۔



عرب هٿ  
پانی سان پنھنجن هٿن کي اکيون  
پنھنجن هٿن تي صاف ڌو  
پنھنجن هٿن تي صابن کي چڱي طرح ملائو  
پنھنجن هٿن کي صابن کي چڱي طرح ملائو  
پنھنجن هٿن کي صابن کي چڱي طرح ملائو

یاد رکو تہ هٿن کي سٺي نموني صاف ڪرڻ لاء 20 سیکنڊ تائين هٿ ڌوڻ لازمی آهي۔  
اهي احتیاطی تدابیر توهان کي صرف ڪورونا وائرس کان نہ پر مختلف بیماریاں کان محفوظ رکڻ لاء ضروری آهن۔



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OASISpk  
OASISpk



Campaignistan  
Campaignistan

## ڪورونا وائرس

نه د بچ کيدو

### احتیاطی تدابیر

#### ہاتھوں کی صفائی

- ده خوراک نه مخکڻڻ او وروستو لاسونه پاڪ ووينڀي۔  
- صابون پاني ده لاسونو ورغوي، ده لاسونو شاته ده گوتو مينڀ او پاسه او نوکونو دننه پوري صفائي وکړي۔  
- لاس ورکولو نه خان وساتي۔  
- ناپاک لاسونه خپل او ده بل کس مخ ته وروري۔  
- ده تشناب/واش روم دروازہ، تشو په لاس کولو کړي، تر څو ده دروازي پسي نشي جراثيم تاسو ته نقصان درنگري۔



نایاک لاسونه  
اوبو پانی خپل لاسونه لاندہ کړي۔  
خپل لاسونه باندني صابون وميري  
خپل لاسونه باندني صابون  
لاسونه په اوبو ووينځي  
په تشو خپل لاس اوچ کړي۔  
خپل لاسونه باندني صابون

په یاد ولری چې خپل لاسونه مو د ښه صفا کولو لپاره شل سیکنډو لپاره ضرور ووينځي۔  
دا پورته احتیاطی تدابیر نه صرف تاسو کرونا وائرس نه بچ کوي بلکه نور هم مختلفو بیماریاں نه بچ کوي۔

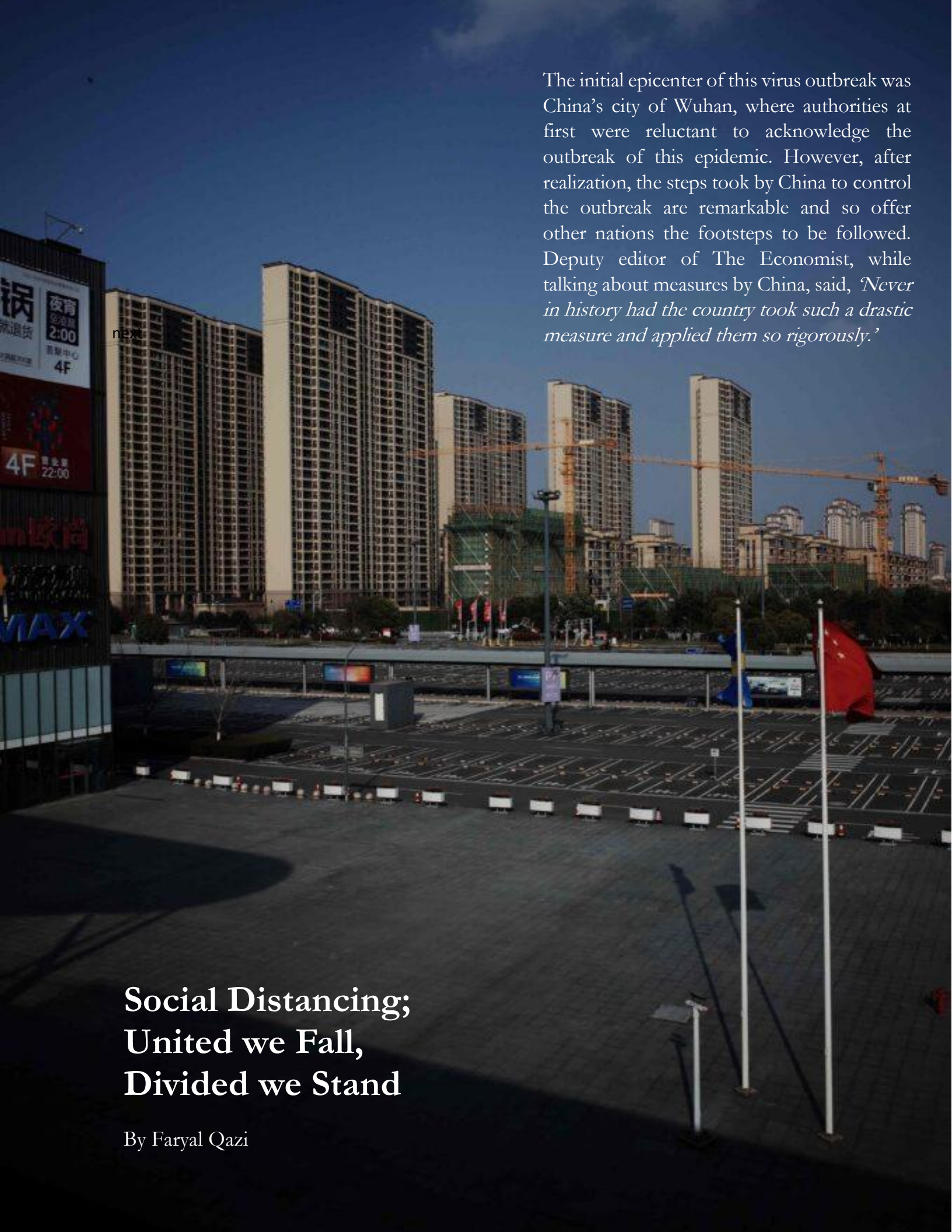


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The initial epicenter of this virus outbreak was China's city of Wuhan, where authorities at first were reluctant to acknowledge the outbreak of this epidemic. However, after realization, the steps took by China to control the outbreak are remarkable and so offer other nations the footsteps to be followed. Deputy editor of The Economist, while talking about measures by China, said, *'Never in history had the country took such a drastic measure and applied them so rigorously.'*

## Social Distancing; United we Fall, Divided we Stand

By Faryal Qazi



COVID-19 is caused by a new form of coronavirus. There exist many different kinds of coronavirus that are responsible for various diseases; however, this newly identified type is unique because it is contagious, which is believed to have been transmitted from animals to humans. According to revealed statistics from a research center of China in late February, there seem to be two main types of this virus –the ‘S’ type which infected about 30% of the population and emerged from animals while the second ‘L’ type is a changed form of the virus which is more robust and infected 70%.

However, research is still in progress and requires a sample of more than 150 individuals for any further investigation. This widespread virus is believed to have emerged in Wuhan city of China in a food market that brought in the notice of WHO authorities in China in late December when several patients were reported with pneumonia from an unknown virus.

Once the epidemic in China, which most countries did not consider a serious threat, is now a global threat and is not just affecting humanity very severely, it is also a pandemic for the economies of the world. In fact, the US has labeled this virus outbreak as its worst crisis after the Great depression of 1929. However, on the contrary, we are depressed and scared of thousands of people dying from the virus, and stable world economies are experiencing a slight recession, there are also positive vibes that require equal contemplation.



Photo by Jordan Hopkins on Unsplash

The initial epicenter of this virus outbreak was China's city of Wuhan, where authorities at first were reluctant to acknowledge the outbreak of this epidemic. However, after realization, the steps took by China to control the outbreak are remarkable and so offer other nations the footsteps to be followed. Deputy editor of The Economist, while talking about measures by China, said, *'Never in history had the country took such a drastic measure and applied them so rigorously.'* today, now as this pandemic is infecting other countries in the world the outbreak in China seems under control. For days there had been no reported cases of Covid-19, and the only reported cases are the imported ones upon which China has canceled all foreigners from entering its frontiers.

## A LOOK into CHINA'S EFFECTIVE MEASURES

As the threat of the outbreak of new disease seemed imminent, authorities in China rushed to contain its outbreak. **On January 23, it locked its city of Wuhan,** and 11 million people were in complete



lockdown within hours of the announcement. People were completely prohibited from entering or leaving Wuhan city, and eventually, 15 other cities were also locked down. The only rationale to put cities with Millions of dwellers under complete lockdown was **SOCIAL DISTANCING**.

There are only two key factors that contributed to China unlock its path to speedy recovery: First, imposing an overall Social distancing and Second, timely, and practical measures. According to China, the key to fight this disease was *speed, speed, and speed*.

Besides, China, we have other examples of Singapore and South Korea as well who followed China, and today they seem somewhat relieved from the virus's threats.

It is said that until there is a vaccine for the virus, the only logical approach is the Prevention from the virus and the only way you can prevent the virus is by maintaining a social or physical distance.

## WHAT IS SOCIAL/PHYSICAL DISTANCING?

The term 'social distancing' is a widespread outcry these days you may be hearing them from politicians, celebrities, scientists, experts, etc. the word simply means that you should not come in to contact with anyone and must limit yourself to your homes and unless it's indispensable you should stay at your homes. Whereas, if you go out for urgent or necessary work you must take precautions like wear gloves, avoid busy travel timings and above all should maintain at least 2 meters' distance.

When involved in any sort of monetary exchange, avoid direct touching of notes, for you never know that it might be touched by an infected individual. The people who really need to practice this social distancing the most are people above the age of 70, compromised or weak immune system, pregnant women, and patients of diabetes, cancer, or Aids. But everyone needs to practice it so the spread of the virus can be stopped for good. While the benefits of this distancing also include the reduced pressure on health care units, which is very much needed.

This social distancing was also among the key measures that were taken to fight the Spanish flu in 1918.

It seems ironic to rely on such an old method for Prevention from a viral disease in such a globalized and technologically advanced world. But agree or disagree, yet this the only weapon

we have to fight the disease. Although after trying to implement a policy of mitigation and avoiding severe measures like lockdown to put people at distances, many countries like UK, USA, and Italy finally came down to the administration of suppression. In mitigation, you simply put the infected patient in isolation, whereas, in the crackdown, you put everyone in isolation from everyone whether or not they are infected like in China.

While it might not seem like a potential step to fight against COVID19 or seems painful and irritating to be under imposed isolation, but it is the best way right now to deal with this pandemic. We have plenty of examples in the world right now who did not consider social distancing seriously or lockdowns in their countries as a severe warning, and today they are among some worst-hit nations by the deadly virus. One of the very first examples in Italy, then in Spain, the US, and the UK.

Italy at first seemed quite relieved of the threat and was hoping to get out this situation first in Europe. It delayed its response to the disease, and so the virus took the advantage and continued to infect the population. When the government shut down schools and education institutions, families simply went out on vacations! One can infer at least from this bit of information on how important it is to keep yourselves at home in isolation from other people and strictly follow your governments' guidelines. If we all cooperate with our governments, we can overcome this crisis, we do not

have to go through the horrors of this lethal and vicious virus.

We can look into the ongoing situation of Spain, which is expected to become the new epicenter of this virus in Europe, surpassing Italy. Spain made the same mistake as Italy. It locked down its cities and imposed strict social distancing measures to prevent the transmission of the disease when reported cases exceeded 6000+ and locked down on March 14.

Most of the politicians of the US, **including President Donald Trump did not take the threat seriously**, and until Trump announced a locked on March 22, the officials were still making baffling statements about the virus, and by April 2 it has 2,45,658 cases of positive covid-19 patients with more than 4000 deaths. Even now, the UK has been put under lockdown. It's Prime Minister Boris Johnson, and health secretary are both tested positive of Covid-19.

We have enough cases in time around the globe to know *how we can effectively deal with the pandemic & its aftermaths*. Where on the one hand, we have success stories like China, Singapore, and South Korea; we also have disturbing stories of Italy, Spain, the US, and the UK. Though the virus is new and there are a lot of uncertainties regarding its treatment and precautions, one thing is clear that ***unless we have a vaccine for it, the only way out for us is isolation or maintain Social Distance. Because if you are apart, you're alone.***



## Interview

# An Outclass conversation with Dr. Younas Khan on COVID19

By Shahzaib Siddiqui

In the realm of infectious disease, a pandemic is a worst-case scenario when an epidemic spreads beyond a countries borders and causes an overwhelming threat or death toll worldwide or some major parts around the globe. The recent COVID19 outbreak shows that men still need to learn the safest battle against pandemics/viruses, and people need to know more about the viral disease.

Dr. Younas is a famous science writer credited for the numerous excellent and informative articles, published in reputable Pakistani magazines like Global Science, No Nihaal, Taleem o Tarbiyat, and others. More often then not, he writes on Biology, Chemistry, and health issues, and elaborate facts from medical science in a simplistic manner that caught the overwhelming attention of layman in Pakistan. **Dr. Younas has done his MBBS from Dow Medical College Karachi** and currently practicing in the Dow School of health sciences.

Here, we are presenting a few excerpts of his recent conversation with Shahzaib Siddiqui, a science writer, researcher, and contributor to Scientia Pakistan.



Dr. Younas

**Shahzaib:** Please explain what is, first of all, a virus and whether it is living or non-living thing?

**Dr. YK:** Scientists are still feeling confused regarding the exact answer to this question. The virus does not fulfill the usual criteria for defining life. It does not reproduce; it has no metabolism and no protoplasm either. It is an obligate parasite, which means that it thrives on other living things only. It has a simple

structure and a size varying from 10nm to 300nm. It has no organelles. It is a briefcase of protein with DNA or RNA, any one of the two, and an external envelope of lipid. This lipid is the same as butter and oil and can steal from the host.

***Shahzaib: How does Coronavirus attack the cell?***

**Dr. YK:** Well, it can't move or fly or exhibit any other kind of locomotion. It is transferred from host to host. In the case of the Corona, it transfers via the respiratory system. It can transmit by coughing, sneezing, and even simple breathing. It is important to note that when a patient coughs or sneezes into his hands and then touches various objects like doorknobs and keyboards. It is very much possible that the virus can land on another person's hand when the same things are touched. And we touch our mouth and face with these infected hands, yes, the virus can be transmitted. This is an ideal and classical way for the spread of Corona. That is because maintaining distance from a visibly sick person who is coughing is easy, but you never know about the things you touch in daily life.

***Shahzaib: How is the virus? Can Coronavirus be upgraded or mutated?***

**Dr. YK:** In a normal evolution process, the mutations are prevalent. Cells have repairing systems. Since this virus depends on the host cell, its mutations are never repaired. So, a new strain or family evolves. The virus may be upgraded to form a new disease or sometimes be downgraded so that it becomes useless.

The chances of both are equal since it is a random mutation.

***Shahzaib: Is the panic created worldwide, worth it, or merely an overreaction?***

**Dr. YK:** It is both right and wrong. Right because the virus has a remarkable capacity to transfer between hosts, so it is dangerous. Wrong because the death rate due to it is comparatively less. Average 2 to 3 percent of patients are dying.

***Shahzaib: What is the role of age and immunity in being affected?***

**Dr. YK:** Well, anyone can be affected. As per available statistics in Pakistan, each day, more than 200 peoples are testing positive of COVID19. The disease is divided into four stages, and interestingly the first one is symptomless. The second one has mild symptoms like a cough, third is moderate while the fourth stage is severe, and fifth, the last stage is critical and life-threatening. The people above age 60 usually suffer in the critical stage.

***Shahzaib: Are the countries got rid of COVID19, like China, at risk of the second infection or a kind of annual attack?***

**Dr. YK:** Yes. As we have seen that China is now free of Coronavirus, but we should keep in mind that it was a single person who caused this pandemic and global threat. It can be spread again because people are not at all immune to it, and the world will have to be cautious for a long while. Clinically, respiratory infections will decrease in the future because people

have had it inculcated in their habits to be careful now.

**Shahzaib:** *Is it possible to make viruses in the lab? What do you think about the famous myth that Coronavirus is a biological weapon?*

**Dr. YK:** Some misconceptions and myths are prevailing in our society. We cannot make a whole virus as that would mean synthesizing and arranging the 30 to 40 000 nucleotides that its genome is comprised of, which is not possible. Although there may be an already existing virus that has a structural similarity with it, like SARS and MERS, in this case, we have Mouse Hepatitis Virus. Its structure matches that of Corona very much. It also belongs to the family of Coronaviridae. So, if we try to do some tweak in a virus gene in the laboratory, it is possible to make a strain. But a virus cannot be made from scratch.

**Shahzaib:** *The glycoproteins on its surface prove it to be natural. Correct?*

**Dr. YK:** Yes, protein synthesis in labs is not possible yet.

**Shahzaib:** *What do you think, will the ongoing pandemic end itself like MERS and SARS?*

**Dr. YK:** The infection capability of Coronavirus is very unlikely compared to other pandemics in the history of humankind. The virus can transfer from a very minute concentration of a respiratory fluid. SARS affected 8000 people, with 700 to 800 deaths reported. On the other hand, MERS affected the Middle East only, and there were 800 to

900 deaths. Scientists are working, and hopefully, a vaccine will soon develop. After that, the virus spread could be controlled if not ultimately ends.

**Shahzaib:** *What treatment do hospitals have for Corona patients that are not possible at home?*

**Dr. YK:** I have discussed the five levels of COVID previously. The mild to moderate levels can be treated at home as the treatment is symptomatic, e.g., if you have a fever, take Panadol.

In severe cases, oxygen is required. Medicines and antibiotics may be required because of the chances of getting a secondary bacterial infection. The patient can go in shock. In critical cases, a ventilator is needed. So, at these two stages, going to the hospital becomes necessary.

**Shahzaib:** *Once the virus entered the human body, how long does it take to get active? How long before the symptoms start showing?*

**Dr. YK:** This is called the incubation period and can vary for 2 to 14 days. This data is a month old now and already outdated. Now it seems that a mere 8 to 10 hours are also sufficient. It may exceed 14 days too. On average, 4 to 5 days, I would say.



# A Teacher's take on getting the most out of online classes

By Kaleem Ullah

The coronavirus pandemic has forced the education sector worldwide to go with the online learning process. Synchronous classes remained the only choice to minimize the effects of the pandemic on education. In Pakistan, the Universities are closed due to lockdown, and amid this critical situation. The Higher Education Commission(HEC) is also fighting tooth and nail to find viable and practicable solutions to this dilemma. Pakistan being a developing country, could turn the dream of online classes into reality? Are the universities capable enough to conduct online classes without compromising the standard of education? SCIENTIA PAKISTAN magazine has recently approached Dr. Muhammad Mustafa, Assistant Professor at School of Life Sciences, Forman Christian College University, and asked these questions.

**Dr. Mustafa is a MS and Ph.D. from Yonsei University,** College of Medicine, Seoul South Korea, and has 15 years of teaching experience in different institutions of Lahore, Pakistan. He has 5 years of research experience in the School of Biological Sciences, University of Punjab and has been conducting undergraduate and postgraduate classes in the field of life sciences at FCCU since June 2016. Dr. Mustafa has also been supervising MPhil research projects since



*Dr Mustafa*

June 2016. He has Conducted numerous research talks in national and international universities and promoted a love of science through the platform of Khwarizmi Science Society Pakistan. He is known for writing articles, published in national newspapers and magazines about complex scientific phenomena in a reader-friendly way for general audiences.

Here are some excerpts of his recent conversation with our team member Kaleem Ullah, a former lecturer of Sargodha University.

**An online instructor cannot gauge the mood, involvement and engagement level of his/ her students the way he/she can in a traditional lecture-based classroom. How are you dealing with this problem?**

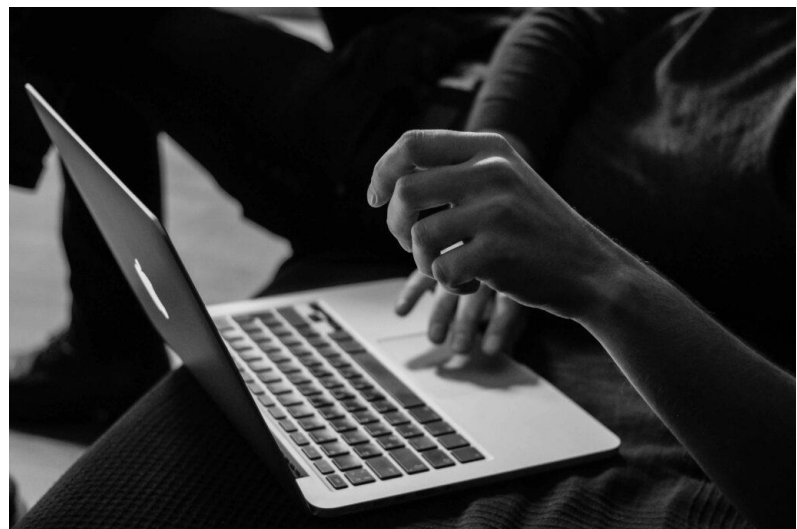
**Dr. Mustafa;** Well, it is right that the online instructor can't gauge the moods

and moral of the engagement of his/ her student, as compared to the traditional way of the classroom where the students are physically present. In a traditional classroom, instructors can quickly figure out whether he is delivering and communicating the knowledge well or not. In online classes, the best way to help your students to stay motivated and listen to you is to make your lecture slides interesting and in a more innovative way. You need to engage them in different activities. They should expect from you that sooner or later, you will be asking something related to the class. For example, to open up some internet resources, or to cross-check some statements on google, or directly engaging them in simple activities.

This is a kind of way I am learning and evolving in the meanwhile; I used to ask and encourage them to create questions. In addition to this, the teachers' experience is something that will help to imagine that he is in touch with the students or not. It also depends on the modes of lectures you are delivering. If you are dealing with recorded lectures, you need to speak ambiguously and will have to explain in a stair-way method. In that way, it's the responsibility of the teacher to predict questions that might be there during his/her lecture and address them according to the learning objective of the topic. If you are dealing with online classes in real-time, and you have the luxury to get questions from the students right away to steer the lecture in a better way. But we don't have that much-advanced internet access in Pakistan, so

usually teachers depend on the recorded lectures and other resources.

Summing up, a lot of innovations are required for online classes where students could stay motivated in close association with the contents. When you are in real-time class, you do have the option of creating different tasks and asking them to respond to specific questions. With the help of question-answer sessions and letting students speak in the class help



*According to Dr. Mustafa, in online classes, the best way to help your students to stay motivated and listen to you is to make your lecture slides interesting and in a more innovative way*

them to feel engaged and connected. The whiteboard, projector and your presence and body language all contribute to creating a strong student's engaging environment. All of these can be replaced with alternative means in online classrooms.

**In Pakistan, most educators aren't expertly trained to handle the technical details of an online class, and therefore students are complaining hard. We can not train teachers in a short time, so how can**

## **we improve the standard of online learning?**

**Dr. Mustafa;** This is a significant question, what are the things we need to look at when we want to train teachers. Teachers are supposed to prepare for teaching, but in the case of online learning, around 50% of the training is required to let the teacher know to use advanced modes of technologies. For example, how to use the internet and different software? How to deal with the recorded lectures and how to add, put together, and trim the videos in an excellent presentable manner? It might go more comfortable for one person, but at the same time would be disastrous for the other who is unfamiliar with the technology. It is demotivating for many good teachers and I know as a teacher most of us believe that we don't need to learn anymore which affects our evolution as online teachers a lot.

The next is understanding about the student's perspective. An online teacher should know what are the expectations of his/her student and what are the more efficient means of sharing data and knowledge with them. A well-planned question-answer session works like magic and remembers many students don't like to show up for questions. I suggest letting your students ask questions in different ways.

Furthermore, the most essential thing in online teaching is the online method of assessment of how to judge the performance of your students. Since they can use all the resources to answer the question, therefore the assessment

activities are quite different from the traditional mid-term/final term examinations. We need to educate the online instructors on how to judge the performance of their students, most of the methods are available and can be learned using the internet. There will be no midterm examinations and no final term exams. The assessment methods in online teaching should be small and unique to each topic. This method is divided into the following steps.

Teachers are supposed to assign things to the students in a way that they can use their online classes to create their responses. For example, I ask my students to watch a documentary after that; I do not ask them to write a summary of this documentary. Instead, I WANT them to answer my queries like what is the most interesting thing you noticed in that documentary? Is that application to another phenomenon, if yes then how?

Group discussions are the handiest way for teachers to assess a student's intellectual growth during online teaching. Assign a topic to a particular group of students, and have them speak on it for 5 to 10 minutes, see how they argue and counter-argue and make your assessments. These are just a few out of the many ways we can use to make assessments; the law is simple, divide your assessments into small parts for each topic make it more straightforward and understandable to your student with the help of rubrics and help your students to answer, the objective is student learning the grades are only figures.



# A Talk with Dr. Mohsin Khurshid on Polio eradication in Pakistan

By Saadeqa Khan

Dr. Mohsin Khurshid is working as an Assistant professor at the Department of Microbiology, Government College University, Faisalabad, Pakistan. He has completed his Ph.D. (Microbiology) research related to Antimicrobial Resistance at the Department of Microbiology, Government College University, Faisalabad, Pakistan, and Institute of Antibiotics, Fudan University, Shanghai, China. He has obtained his MPhil Microbiology from Quaid-i-Azam University Faisalabad and MSc Microbiology from the University of Karachi, Pakistan. He completed his BSc (Medical Laboratory Technology) from the University of the Punjab, Lahore, Pakistan, with “Clinical Microbiology” as a major subject. Previously he has served as Lecturer in College of Pharmacy, King Saud University, Riyadh, Saudi Arabia.

His research interest includes the bacterial Pathogenesis, antibiotic resistance mechanisms among bacteria, and the potential role of bacteria in cancer diagnosis and management. Dr. Mohsin Khurshid is actively involved in research work related to Antimicrobial Resistance, Probiotics, and the role of the microbiome in health and disease and has made high impact publications in international journals.

Here are some excerpts of his recent conversation with our Editor-in-Chief, Saadeqa Khan.



*Dr. Mohsin Khurshid*

**Saadeqa:** Can you give an overview of the poliovirus? And why do children more susceptible to it?

**Dr. Khurshid:** Polio, or poliomyelitis, is a disabling and life-threatening disease caused by the poliovirus. Most people who get infected with poliovirus will not do not have any visible symptoms. Around 25 percent of people will have flu-like symptoms like Sore throat, Tiredness, Fever, Headache, Nausea, and Stomach pain, and usually, these symptoms last for only 2 to 5 days and go away without any therapy. Few people infected with poliovirus develop severe

symptoms affecting the brain and spinal cord that includes the following

- Feeling of pins or needles in the legs known as Paresthesia.
- Inflammation of the covering of the brain and or spinal cord is known as meningitis, which occurs in around 1/25 polio virus-infected individuals.
- The weakness of the arms and or legs or paralysis occurs in about 1/200 people infected with poliovirus. Paralysis is the severest symptom of the poliovirus infections that can lead to disability or death.

The children who recover completely from this infection can develop muscle weakness, pain, or paralysis 15 to 40 years later in life known as post-polio syndrome. It is essential to understand that Polio or “poliomyelitis” is defined as “the paralytic disease”; therefore, only those individuals having the paralysis are considered to have the disease “poliomyelitis.”

Polio can affect at any age, but it mainly affects children less than five years old in parts of Asia and Africa. Poliovirus is transmitted through person-to-person contact. The infected individuals shed the virus into the environment through the feces. If the hygiene and sanitation conditions are poor, the Virus can spread through the community. In case, enough number of people are fully immunized in any community against Polio, the poliovirus does not find any susceptible host to infect and ultimately dies out. As younger children are not much toilet-trained, they can be a source of transmission. The older children, as well

as adults, are generally more hygienic compared to the younger children, they do not contribute much towards the transmission of poliovirus.

**Saadeqa: What are the primary reasons behind the fact that Pakistan couldn't eradicate poliovirus until now? Though Polio widely considers extinct around the globe?**

**Dr. Khurshid:** There are multiple reasons which contribute to the country's failure to eradicate Polio. In Pakistan, the low immunization coverage and several socioeconomic factors, such as poverty, illiteracy, and lack of access to immunization and community health services, contribute much towards this failure. All these challenges, together with diverse geography, which encompasses the mountain range, glaciers, deserts, and the harsh terrains, contribute to poor delivery of public health services. Furthermore, the huge differences in population density also make it difficult to expertly complete the polio vaccination campaigns, with densely-populated metropolitans, for instance, Karachi and Lahore offering a higher risk of fecal-oral spread compared with the less populated and mountainous regions such as Balochistan and Gilgit Baltistan.

There are also significant inequalities in the availability of resources and immunization coverage among the provincial and district levels with better coverage in Punjab and inferior coverage in Balochistan and FATA. Moreover, the implementation of vaccination campaigns is quite variable with reports of false compliance, lack of vaccination

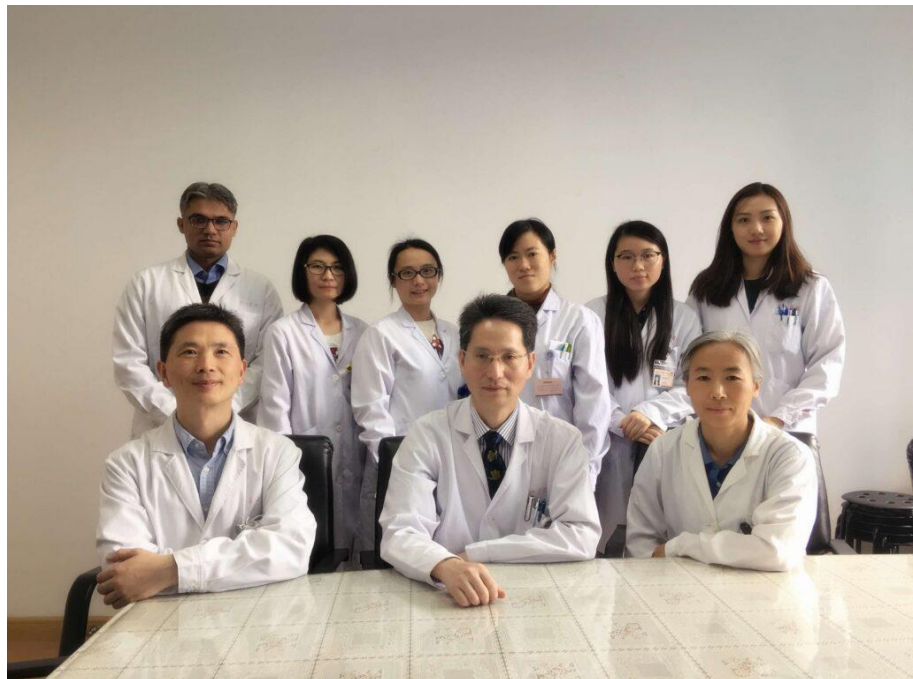
registration records, vaccinator satisfaction towards the financial incentives, or delays in salaries or payments. The power interruption and lack of equipment made it tough to maintain the cold chain necessary for OPV efficacy.

Vaccine hesitancy is another factor that is influenced by illiteracy, socioeconomic, cultural, and religious factors. Parental refusal is a significant hindrance to the vaccination campaign due to fallacies regarding the intensions of immunization, such as the common misconception that vaccines can sterilize children or contain derived pig products that are forbidden in Islam.

The number of polio cases has decreased by more than 90 % since 1994, even with the multiple challenges that the polio eradication campaign has faced in Pakistan. Such as Taliban insurgency FATA and KPK, displacement of millions of people, and negative propaganda against vaccination.

**Saadeqa: What are the reasons behind OPV failure? And why IPV prefer over OPV?**

**Dr. Khurshid:** IPV is not added due to the OPV failure. The choice of inactivated polio vaccine (IPV) or oral polio vaccine (OPV) depends on where and when you were born. For example, the people born in the USA after 2000 received an injection of the IPV, but the people born before 2000, have received



*Dr. Khurshid with his Chinese colleagues*

the OPV administered by mouth in the form of drops.

World Health Organization (WHO) recommended using both vaccines, particularly among the children born in polio-affected countries, although the debate among the scientists reflects that both vaccines (OPV and IPV) have different strengths and weaknesses. The IPV results in higher levels of antibodies in the blood compared to the OPV. Moreover, it poses no risk of reversion to a virulent form as it does not reproduce. However, it confers a low level of the immune response in the intestine and mucous membranes when administered solely. Therefore, it is less effective in preventing viral replication in the intestine.

Further, IPV is more challenging to administrate (because of injection) and more expensive compared to OPV. On



the other hand, the OPV provides better mucosal immunity (Intestine and mucous membranes) than IPV. However, OPV contains a live virus. Therefore there is a chance that it can replicate and revert to a virulent form.

The WHO, therefore, suggests using both vaccines to put a stop on the transmission chains for a polio-free world. Upon the WHO recommendations, the IPV started in the winters of 2015 by adding a dose of IPV at 14 weeks to the three doses of OPV already being used for routine immunizations.

**Saadeqa: In Pakistan, the polio immunization campaign is controversial for a long; what do you think is the primary reason behind?**

**Dr. Khurshid:** The primary reason behind the polio immunization complaints illiteracy and the proclivity of people toward the negative propaganda. The militants operating in Pakistan and few religious clerics have spread a myth linking the vaccination program to a western conspiracy to sterilize Muslims and have painted the vaccinators as US spies. This narrative got strength especially after the news that a fake hepatitis B vaccination campaign was funded by US CIA to trace Osama bin Laden in Abbottabad, which led to a profound distrust of the polio vaccination campaign, particularly in rural KPK and FATA having the highest rates of vaccine refusal and the most poliomyelitis cases.

These hurdles are being managed by the Government of Pakistan by involving religious leaders and social mobilizers and

by deployment the police for smoothly running the vaccination programs. The tendency of the public to avoid the vaccination due to a lack of awareness is far more dangerous in the eradication of Polio than handling the few people involved in anti-polio vaccination propaganda. Notably, the emergence of polio cases in the past few years necessitate further rigorous measures in the future.

**Saadeqa: We have best Researchers and well-equipped Laboratories in Islamabad and Karachi, so why do not our health experts locally analyze the controversial Polio vaccine?**

**Dr. Khurshid:** Our laboratories are not well-equipped and funded as required to analyze the vaccines in Pakistan that are mainly because we are not producing human vaccines locally. For the Polio vaccine, we do not need much this local testing even as the vaccine manufacturing companies have already gone through it. The vaccines manufacturing also includes a set of well-characterized testing for any potential contamination that requires exceptional quality control and quality assurance systems. Therefore the manufacturers are responsible for quality, efficacy, and safety. Even if we establish the vaccine quality control testing locally and start the trial, this is nothing to deal with illiteracy and misconceptions.

**Saadeqa: How can we change the mindset of our layman (parents) towards the Polio vaccine as they are reluctant to use?**

**Dr. Khurshid:** For an effective anti-polio vaccination and changing the mindset, we need to resolve the suspicion of the general public. The explanation by the health officials, especially about the higher number of doses of various vaccines as in Pakistan, the number of doses of various vaccines is more than being given in most countries that cause doubts. Moreover, increasing public awareness with the help of social media and religious leaders about the benefits of vaccination and addressing the misconceptions are of utmost importance.

**Saadeqa:** We are facing a total lockdown. What do you think the role virologist or microbiologist play in this time of trouble?

**Dr. Khurshid:** A microbiologist or virologist is specialized in the detection, identification, and containment of the microorganisms that may cause disease. A microbiologist is also involved in developing feasible interventions and solutions to reduce the spread of microorganisms in the community. In this lockdown situation, the microbiologists can help to analyze the samples being collected from the suspected patients for the contagions. Moreover, they can be involved in developing strategies for interventions based on findings. Microbiologists help educate the public regarding this pandemic regarding the safety measures for prevention.

**Saadeqa:** Recently it is announced that Pakistani researchers sequenced a genome of Coronavirus, and interestingly it is different in some

expects to that of Virus found in Wuhan, China, that indicates a fast mutation rate. What do you think, whether the coming months will be disastrous for Pakistan or we could manage safely?

**Dr. Khurshid:** Two different groups of Pakistani researchers from NUST and the University of Karachi have carried out the whole genome sequence of Coronavirus (SARS-CoV-2). It would be quite early to anticipate the outcomes of this pandemic, especially in Pakistan, as COVID-19 is a deadly pandemic sweeping the world. Pakistan would have to increase the COVID-19 testing capacity in the coming few days. There are two main reasons for testing people; to diagnose the individuals and to see how much COVID-19 has spread in the country. This information will be helpful for social distancing procedures. Let's say, if few people are infected, the lockdown must be continued, and if the Virus has already been spread to large numbers of people, then further lockdown will be less useful.

**Saadeqa:** Students around Pakistan are continuously demanding a semester break due to severe technical problems in Online classes. What would you suggest to students and teachers to better cope with this situation?

**Dr. Khurshid:** I think that the students are right in this matter. Although the higher education commission has directed the universities to engage the students through online classes or assignments that will be beneficial for the

students, however, this must not be a substitute for regular lectures. The main benefit of online courses is the flexibility to the student in terms of molding the class timing according to the student's schedule by selecting a time that works best for him or her. The on-campus educations have many advantages.

Especially learning discipline and motivation and face-to-face interactions with the teachers. In our system, the online system may not be successful due to the lack of internet facilities, particularly in rural areas. Therefore, on-campus education is still likely the better option.



Feature Stories

# Viruses and their enigmatic structure

By Muhammad Abdullah Khan

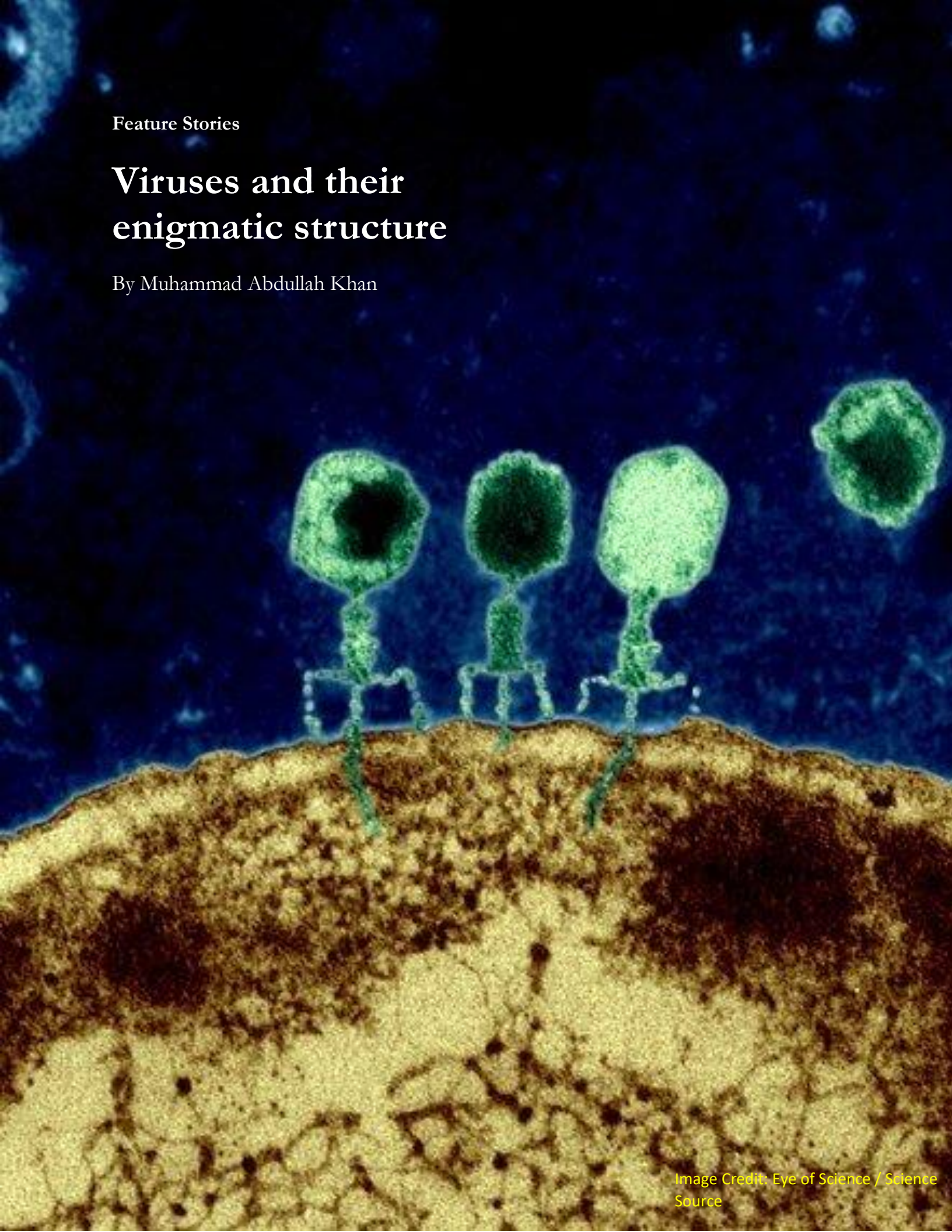


Image Credit: Eye of Science / Science Source

In the last few decades, scholars, theoreticians, and political scientists attempted to classify threats and challenges for the world in the twenty-first century. While these challenges ranged from trade wars, failed states, rogue states, non-state actors acquiring nuclear weapons or weapons of mass destruction, to rapidly deteriorating environmental and cybersecurity threats. Researchers and experts in world politics emphasized the threats of an emerging war-fronts due to advancements in Artificial Intelligence (A.I.) and robotics, especially in the era of fifth-generation and hybrid warfare.

But nobody thought that microbes could also put a question mark on humankind's survival in the coming years.

Amid the global scare which has caused since the COVID-19 (Coronavirus as it is generally called) emerged as *Pandemic*, resulting in lockdowns in 178 countries around the globe, suspension of flight operations, and border closures, the laity can be seen with a dire thirst to understand what the viruses are in reality? Are viruses living things? How the viruses spread? How do they reproduce and multiply? And can we defeat them?

### Viruses- Are they Living or Dead?

Viruses are the most magnificent and enigmatic microorganisms found in nature. They are the living embodiment of the “survival of the fittest.” They have been puzzling the scientists since they were first discovered in the 1890s. For over a hundred years, viruses have defined, redefined, and then after a

change of mind redefined again. The scientific community had to collectively change its mind repeatedly to define what a virus is? First, they were considered poison. Then they were classified as life-forms and later considered as biological chemicals. Now viruses have been placed by virologists in a grey area between living and non-living.

The word virus has its roots in the Latin term for “the poison.” Because of their varying characteristics and properties, it was challenging to classify them as living or non-living. With every lens applied to study viruses, they varied every time. Initial interest in viruses arose from the scientific understanding that they were associated with specific diseases such as rabies and foot and mouth and that they behaved like bacteria but were much smaller in size. Since the viruses had biological properties—RNA and genes for protein replication which is responsible for infection—they were classified as the simplest of all living things.

In 1935, Wendell M Stanley and his colleagues successfully crystallized the tobacco mosaic virus for the first time. They observed a stack of intricate biochemical which had no essential systems for carrying out metabolic functions. Since they lacked the biochemical activity of life, so the viruses were demoted from living organisms to just as inert chemicals.

Further research again puzzled the scientific community. Viruses had nucleic acids (DNA or RNA), just like all other organisms, but enclosed in a protein coat.



But they were still considered a chemistry set rather than an organism because they could not reproduce or replicate. But the troubling part was when a virus entered the body of another organism, called host after the infection. The behavior of the virus instantly changed, and it was no more inactive. The virus would shed away its protein coat and unleash its genes into the host cells. The viral genes would induce the replication machinery of host cells to replicate viral DNA or RNA and manufacture more viral protein. In this way, the viral infection would spread to other cells exponentially and eventually into the whole of the organism.

processing, and all other biochemical and metabolic activities, viruses are dependent on the host organisms. Even the multiplication and spread of viruses are dependent on the host organism. Thus, viruses can be deemed as the ultimate and perfect parasite.

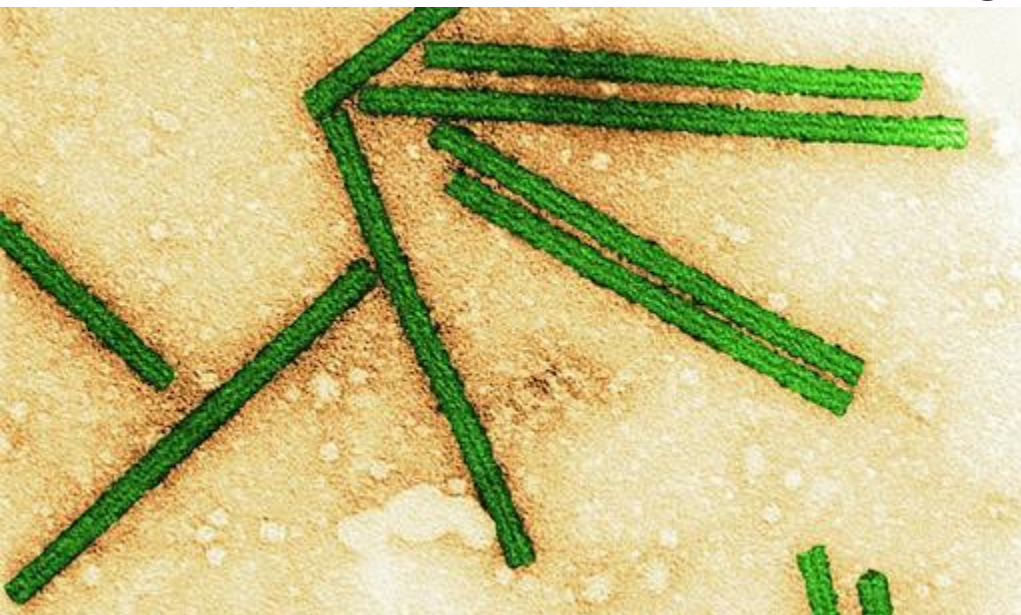
These varying behaviors of viruses led the scientists to believe that a virus is capable of fluctuating between living and non-living based on their external environments. Thus they were classified as living in a grey area between life and death.

The prominent **virologist Marc. H.V. Van Regenmortel of the University of**

Strasbourg explained the behavior of viruses in a poetic way. He said that viruses live a “kind of borrowed life.”

Interestingly, much data about the microbial world and modern microbiology were attained through the study of viruses. These unique magnificent creatures, who lived on the outskirts of life and had long been considered as mere stacks of complex biochemical, have various

useful applications too. Biotechnologists and virologists have extensively used them as carriers or vectors. Due to their capabilities of targeting specific cells, they used as drug delivery carriers in medicine. Being much more straightforward systems compared to bacteria and other organisms, they have also been used



*Tobacco Mosaic Virus*

Viruses were labeled as parasites as they depended on a host organism for all kinds of metabolic and bodily functions, which are the embodiment of life. From acquiring raw material and energy necessary for nucleic acids synthesis to transportation, protein synthesis,



extensively for DNA translation, replication, transcription, and protein formation.

Viruses have been using to modify crops genetically to increase their yields and used in various cancer prevention and control methods. Partially dead or weakened viruses have been used in the production of vaccines and have helped us control the pandemics of chickenpox, measles, and polio. Ironically, the vaccine for coronavirus depends on the virus itself.

We should not only consider the viruses as deadly and lethal pathogens and consider the blessing which they have provided to us in disguise.

Recent studies have shown that global pollution levels have been reduced all over the world, and the ozone layer is repairing itself rapidly due to lockdowns and reduced human activities. The virus has provided us with an opportunity to self-isolate, stay home, and carry out a global exercise to save not only ourselves but also our planet, our only home.



## The Hepatitis virus; An over-burdening toll on Pakistan

By Suhail Yusuf

With one in every twenty Pakistanis already infected, Pakistan has the second-largest burden of Hepatitis C infection globally. According to peer-reviewed published data, there are 11 to 13 million patients of Hepatitis B and C are breathing in Pakistan. The HCV shows a homogeneity across provinces, and over time its prevalence is strikingly persistent at a high level.

### Understanding Hepatitis

At present, there are six distinct types of this virus have been observed and dubbed as hepatitis A, B, C, D, E, and G, which identified via different viruses and infection procedure. Hepatitis B Virus (HBV), Hepatitis C (HCV) and Hepatitis D Virus or Delta Virus (HDV) are blood-borne viruses. Though all infections are dangerous, the B, C, and Delta can be chronic and fatal by leading to liver cirrhosis and liver cancer!

Acute viral Hepatitis-A is also a common infection among Pakistani kids as some 50 to 60 percent of children have chronically affected by HAV. According to the World Health Organization (WHO), hepatitis is generally a disease of liver inflammation. It emerges differently in different people and effect according to the virus pathways. In some cases, the epidemic stays self-limiting, but many hepatitis viruses progress to liver damage and even cancer.

### HCV rising toll

Hepatitis types B and C are colloquial in the world, but according to published data, Pakistan is possibly the **second-highest country in the world, having HCV patients** around 10 million individuals. HCV is one of the causes of several morbidities, including fibrosis, cirrhosis, and liver cancer, placing a stain in healthcare.

### Causes of Hepatitis

Just one or two objectives cannot be described as the leading cause of the whole spectrum. Unhealthy food, avoidable use of injections, unsafe blood transfusion, sharing of needles among drug users, inadequate sterilization of

medical pieces of equipment, and therapeutic vaccinations are the leading causes of the rapid growth of hepatitis cases in Pakistan.

Poor sanitary conditions and lack of hygienic practices lead to 90% of children being infected with hepatitis A and mother to baby infections is also the leading cause of this life-threatening disease in the country. Hepatitis A and E are typically caused by the use of contaminated food or water. Whereas, Hepatitis B, C, and D usually occur as a result of parenteral contact with infected body fluids.

### **A vehicle with dead bodies**

However, the number of hepatitis patients in Pakistan could be more significant, which is roughly 15 million. According to the WHO, some 23000 people died of this disease in Pakistan in the year 2016, which means a bus full of 64 people striking with an accident daily, and nobody stays alive. Now the death toll is higher enough as compared to 2016. According to some medical experts, the current death toll is between 300 to 400 people daily. According to the **Aga Khan University Hospital, the situation is very alarming.** A recently revealed data shows some threefold increase in liver cancer over the past 20 years.

However, it could bring under control by the early screening of vulnerable segments of society, for instance, the drug addicts, weak, and marginal layers.

### **Requires urgent measures**

Achieving WHO targets for elimination entails an in-depth and analytical characterization of Hepatitis epidemiology in Pakistan, both at national and regional levels, to develop cost-effective and targeted prevention and treatment interventions. Initially, we need to kick-start a nation-wide comprehensive program to control the epidemic on war footings. We have successfully launched an anti TB program with lab and X-ray facilities on wheels. A similar initiative of mass testing is much needed to curb the ailment giant sleeping in our livers. The recently available and highly efficacious Direct-Acting Antivirals (DAA) can treat the infection and reduces its threats.

The starting treatment of hepatitis costs only 25 dollars a month due to cheap medicines available in Pakistan as compared to developed nations. But the high end of the ailment will cost millions of rupees due to the fourth level of disease. Pakistan also needs efforts to come across cheap testing methods for checking out the viral burden in the country.



# How we achieved the feat of eradicating smallpox from planet earth

By Maham Maqsood

In almost every science textbook, the origin of the term “vaccine” and its development is paired with the disease smallpox. The two are very closely linked with each other, and surely the disease is one of the primary reasons we have the miraculous medical phenomenon of vaccine, which saves uncountable lives every year.

The story of how it all came to be is an interesting one and can be of hope in the dire times as now when we need not just one but several rays of hope to fight and get out of the crazy situation caused by the coronavirus.

So, let's dive into the history of this disease and how keen observation by one talented physician lead to one of humankind's greatest achievements.

## Vile Beginnings

The exact origin of how smallpox came to be is not known, but it dates to thousands of years ago. Excavated Egyptian mummies that belonged to almost 3rd century BCE were found to have rashes that were similar to the patients who had the disease. Some descriptions have also been found over the course of history in India and China. Ten thousand years ago, this deadly disease, caused by one of two virus variants, Variola major and Variola minor, also created havoc in Africa.

*Below: A crowd gathered for smallpox vaccination. Image Credits: Harvey Cushing/John Hay Whitney Medical Library, Yale University*



In 1350 B.C., the epidemic of smallpox hit the Egypt-Hittite war. It spread from prisoners to the people around and even killed the Hittite King. It continued to wreck other civilizations, aided by the extended trade routes and increased exploration during that time.

The virus causes lesions across the skin and body, rashes, and scars. According to the records, almost 30% percent of the patients passed away, and many recovered. Some even had to go through the danger of losing eyesight. The incubation period of the virus usually lasts a week to a fortnight, and no apparent symptoms appear on the patient. Initially, diseased individuals developed fever and body ache, which later transitioned into rashes, which were contagious. Lesions and scar may also have fluid in the middle causing extreme discomfort to the patient. Those who successfully fought it off, had scabs that fall off, leaving low to zero chances of contagion.

## Start of descent

Even though smallpox was quite a nasty disease, it did help a lot in the development of what we in the modern-day call “vaccine.” But, mind you, the process of its eradication didn’t start with vaccination. In 1022 A.D., a book called



3000 year-old mummy of the Pharaoh Ramses V, shows traces of smallpox pustules on the head.  
(Image Credits: WHO)

‘The Correct Treatment of Smallpox’ mentioned using smallpox scabs taken from a recovered patient and grinding it up to give to healthy individuals. This method was proposed by a Buddhist nun who developed it after noticing that the individuals who recovered from this disease never acquired it again.

This method was called “variolation” and was later used for many years after physicians would make slight changes and hone it. It didn’t really make everyone immune to the virus, but the disease development ratio decreased quite significantly.

The real success, however, is attributed to the work done by Edward Jenner. When he was 13 years old, Jenner worked as an assistant to a country surgeon in Sodbury and once heard a milkmaid claim that she will never have smallpox as she has already had cowpox and will never go through the phase of having a face marked with lesions. This was an intriguing statement for the young boy.

Cowpox is another type of skin infection that infects cows. The cowpox virus belongs to the same family of viruses as smallpox, called Orthopoxvirus. Cowpox itself is very similar to smallpox but is a much less severe and contagious form.



Jenner later analyzed the statement of the milkmaid when he became a physician himself and noted that what she said was right. When the cowpox virus infects a host different than the original one, in this case, humans, it was less virulent and not as deadly. He then decided to test if it could be used in the treatment of smallpox. So, on the historic day of May 14, 1796, he tested the fluid taken from cowpox blister of a milkmaid, Sarah Nelmes, on the skin of a young boy of eight named James Phipps. The latter developed a fever for a few days but recovered fairly soon.

hoping that it will overthrow the deadly sickness. After long discussions and reviews by the health establishment, vaccinations were finally approved. In the following centuries, the procedure was further improved, and scientists started to create new vaccines to fight other diseases such as tetanus, measles, polio, and many more.

## Global efforts

Extensive vaccination programs, that we commonly hear of today, were also initiated around the world to combat health scares. Various programs such as those under the belt of the World Health Organization and regional and local governments were launched to take control over such threats and ultimately perish them with combined efforts.

World Health Organization designed and introduced a campaign in 1959 to remove the virus, but the plan received several setbacks. Over the next few years, outbreaks were still occurring, and many people were getting infected with the virus. A more organized program was initiated almost eight years later, and the labs in endemic countries were tasked to produce higher quality vaccines that they successfully delivered. Along with that widespread campaigns, improved surveillance systems and medical equipment also helped to alleviate the problem. Soon, countries across the regions of North America and Europe started to report good progress, and finally, by 1977, smallpox was annihilated.



Some months later, Jenner injected in the boy matter from a smallpox scar, but remarkably the boy did not develop the disease. It meant that he was now safe from it and will never possibly acquire smallpox ever again. This successful method was used for further experimentation, and the physician summarized his work in his treatise "On the Origin of Vaccine Inoculation,"



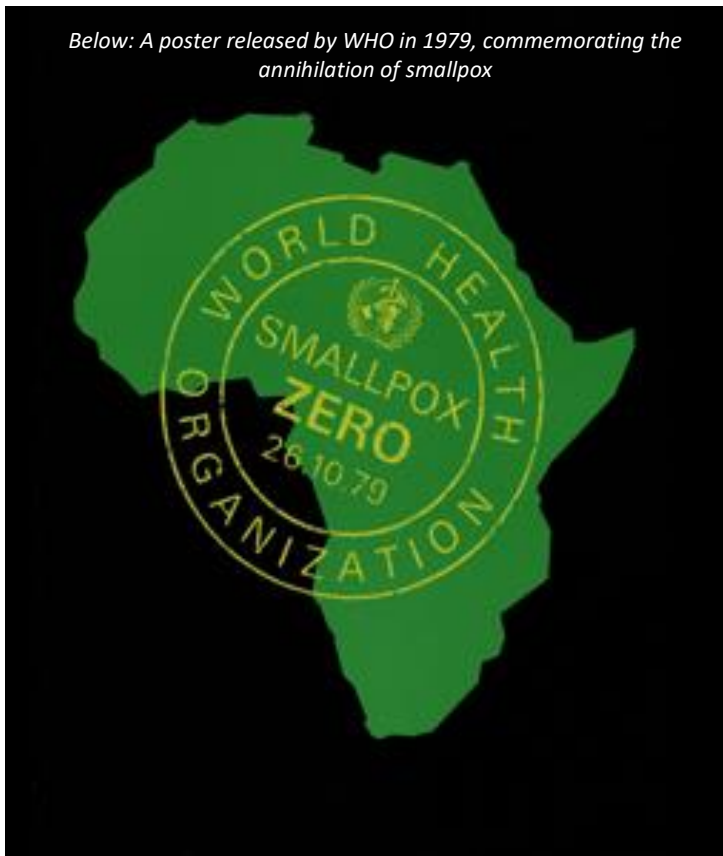
On May 8, 1980, the world was officially declared free of this ailment by WHO and was indeed one of the biggest conquest health-wise. But the stocks of the virus are still contained in some laboratories that claim to require them for research purposes. International consensus led to reduce and limit the number of stocks and only store them in centers with tight regulations and security so as to avoid any potential use in bioterrorism. The two locations that have the official WHO licenses to handle and store it are the Centers for Disease Control and Prevention in Atlanta, Georgia, and the State Research Center of Virology and Biotechnology (VECTOR Institute) in Koltsovo, Russia.

## Lessons learned

The impact of vaccination on controlling diseases is indeed very large and can't be explained in a few words. Diseases like malaria, polio, and measles, etc. that once threatened the lives of millions and took away many precious souls are now within our control, although some underdeveloped regions are still struggling, but the cause is more social and regional than medical. We are in a new wave with mind-blowing technologies and advancement in fields that have elevated the level of services provided and improved the overall quality of life.

With the looming threat of coronavirus, it is in our nature to be scared and intimidated, but we should not forget the achievements this same nature unlocked in previous ages and brought us to the most advanced period in history. If we work together, observe keenly, and put in our best efforts, without a doubt, we can bring this coronavirus down to its knees just like smallpox and every other epidemic in history. It is the matter of will to face it and the courage that should be kept ignited to show that WE CAN, and WE WILL crush it!

*Below: A poster released by WHO in 1979, commemorating the annihilation of smallpox*



A woman wearing a purple headscarf and a dark long-sleeved shirt is administering a vaccine to a young child. She is holding the child's head steady with one hand while using a small syringe to inject the vaccine into the child's mouth. The child is wearing a white shirt with a red collar and a red beaded necklace. The background is a blurred outdoor setting.

# Battling against Poliovirus

By Bashir Ahmad

Shabana, an eight-year-old girl in Bajaur district, was waiting for her sisters to return from school. Unlike other young kids who used to wait for their siblings in the afternoon, this isn't normal in any way. Girls have recently started going to schools in this part of the district. They are all full of zeal and committed to change; all are dreaming of a bright future with no handicapped. But Shabana is still stuck in her place.

She remembers when, a few years back, polio workers knocked on her gate, but her father chose not to get her vaccinated. Today she can not walk around without a wheelchair. All she does is to wait for her sisters to return from school. In a few years, her sisters will graduate and will go on with their lives. But Shabana will still be stuck there, at the gate waiting for her loved ones to return.

Doctors say that the Polio is barring Shabana to live a healthy life. Although it could have been prevented if she were given proper vaccines, and after this heart-wrenching situation, her father is now fully convinced that she should've been vaccinated. But this realization came at the cost of Shabana's future.

Polio – the monster that took Shabana's states of happiness away – is life-threatening' condition characterized by paralysis of a part of the body, mostly in the legs but can also involve muscles of the neck, head, and diaphragm. Caused by a tiny 'poliovirus,' it can infect the spinal cord, cause muscle weakness, and can disable a person for life or even lead to the death of the individual. Polio is also called infantile paralysis based on its

propensity to affect children. In those with muscle weakness, 5 percent of the children and 15-30 percent of the adults' infected die.

Poliomyelitis, as it's named in Pathology, does not exhibit symptoms in people with healthy immune systems. The only noticeable symptoms are abdominal pain, gastrointestinal disturbances, respiratory tract infections, and influenza-like illness. These are mostly ignored for being very common and trivial.

The poliovirus is an *Enterovirus* and possesses RNA as its genetic material. Viruses of this kind live in the gastrointestinal tract and particularly in oropharynx and intestines. It takes around 20 days for the virus to exhibit its symptoms, which is called its incubation period. Poliovirus is found in three serotypes, PV1, PV2, and PV3. Overall they produce the same symptoms, but PV1 is the most encountered form and associated with paralysis.

## **Vaccines and Eradication of Poliovirus**

Poliovirus existed from pre-historical age but first reported in 1789 in England. In the 1900s, its outbreaks in Europe, America, and Australia caught the eyes of the world. In the 1950s, it shaped the US' worst pandemic by killing 3,145 patients and leaving 21,269 paralyzed. Curing Polio had become the priority of all governments in the 20th century. Many scientists tried and came up with solutions to the problems.



*The two most commonly used vaccines are Sabin and Salk vaccines.*



Salk vaccine is the inactivated polio vaccine that came in use in 1955 and administered via injection (IPV). Sabin vaccine, on the other hand, is a weakened poliovirus vaccine that is administered orally. These vaccines are safe in use, can effectively reduce polio cases an estimated 350,000 by 1986 and 370,000 by 2016. It is due to these polio vaccines that the world has successfully eradicated Polio and is now only limited to Afghanistan, Nigeria, and Pakistan. Nigeria, too had destroyed the virus, but it resurfaced again in 2016.

### **Why is Pakistan Still Unable to Eradicate Polio?**

In the 1990s, Pakistan's annual polio cases reported were about 20,000. In 2014 there were 306, 54 in 2015, 20 in 2016, and 8 in 2017. The numbers were promising, and Pakistan seemed to have won the war against this tiny monster. But in 2019, the

annual cases reported sprung back to 146! This was a blow to all the vaccination efforts done by the government and respective departments. We are only three months into 2020, and 30 cases have already reported, most of which are from the provinces of KPK and Sindh. (Ref: [endpolio.com.pk](http://endpolio.com.pk))

Low immunization completion is mostly due to unfavorable socioeconomic factors in addition to conflicts, such as illiteracy, poverty, and difficult access to immunization service and community health. Here we take a look at the factors involved in hindering Pakistan's efforts to eradicate Polio.

### **Ineffective vaccination Campaigns**

In the 1970s, Pakistan started the Expanded Program of Immunization (EPI) to combat vaccine-preventable diseases. In 1980 it had immunized only 2% of the population. In 1990 it had successfully vaccinated 54% of the community, and Pakistan expected to eradicate Polio in the next few years. But the rate of immunization slowed down, and Pakistan couldn't eradicate Polio in time. People were not getting appropriately vaccinated. The under vaccination of the population had many reasons. People were mostly uninformed about the disease and prevention. Many also considered it as an unimportant practice. Most of the time, vaccination centers would be far away; thus, people had to travel long distances to get their kids vaccinated. To solve these problems, other international organizations stepped in and urged to develop door-to-door

vaccination campaigns and an intensive eradication program.

## Faulty Healthcare

### Infrastructure

Pakistan spends only 2% of its GNP (gross national product) on healthcare that is unable to provide adequate health infrastructure and service delivery in many parts of the countries, especially northern areas that are too remote. Although these efforts enjoy financial support from foreign organizations, their efficiency is compromised by the lack of transparency. Most of Pakistan's remote areas are already affected by natural disasters or war against terror that pushes immunization efforts to secondary places. Some EPI centers don't even have computerized records and logbooks of their activities that further complicates the process. Proper check and balance could have kept these centers alive, and eradication of Polio would have been more manageable that way.

### Lack of Awareness/Illiteracy

Areas that have still have polio cases surfacing from are mostly those with meager literacy rates. These people don't usually know about the disease and its severity. They don't realize how handicapped their children can be, in case they get the disease. Government and Immunization firms first need to work on developing a sense of concern in parents. People can be easily convinced to vaccinate their kids if religious scholars are told to talk about this issue. Most of the time, the common public chooses to follow them, and this can be helpful here too!



*A young female child was displaying a deformity of her right lower extremity. Photo: CDC*

### Oral vaccine Efficacy

Mostly in remote areas, it's hard to keep the vaccines at the optimum temperatures required for its storage due to power outages. Some of the time, human errors also harm the vaccine. These harmed vaccines that contain weakened poliovirus can cause Polio if administered to children. Such incidents can raise suspicions about the vaccine's efficacy among the public.

## Misconceptions About Polio Vaccines

Apart from rare polio cases caused by expired polio vaccines or wrong administration of the said, a large part of Pakistan's population is also skeptical about its side effects. Infertility, body weakness, and even deaths are associated with wrongly with polio vaccines. Effective vaccination campaigns must also include clearing these misconceptions and raising awareness among the public. Parental refusals are mostly due to these misconceptions and others alike. Some even think that these vaccines contain monkey or pigs derived products. The repetitive pattern of administering vaccines is also doubted, and parents often feel that either these repeated visits are being done to ensure that the kids get sterilized, or somehow substandard vaccines were used for the first time.

## Security situations

One of the most significant factors involved, especially in former FATA, is the insecurity and continuous conflict in the region. Conflicts pushed vaccination down in the priorities list, and the dispersed population in those areas were not only mostly left unvaccinated but also unaware of the disease and its consequences in the first place.

Immunization efforts from 1998 to 2005 resulted in a sharp decrease in poliovirus cases, but these started rising year by year after 2006 with Taliban insurgency.

## Negative Propaganda Against Polio Vaccine

The most commonly presented example is that of the CIA funded a fake hepatitis B campaign in Abbottabad. This campaign was used to trace Osama bin Laden. Most of the time, polio vaccination campaigns are associated with such spy activities too, and the vaccinators are thought of as US spies. It is saddening that vaccinators are getting shot in the streets, and the government has to provide them with security. Some people even quote *fatwas* against polio vaccines from so-called clerics.

These are a few of the reasons that have been hindering Pakistan's efforts against this tiny monster. Finally, out of conflicts and focusing on rebuilding its economy, Pakistan should also focus on its healthcare and develop a wholesome policy that concentrates on vaccination and especially the eradication of Polio. Because in this age of development, we need to make our coming generations safer!



# Not every stool is worth a toilet; some save humanity!

By Rida Nayyab

Science is a fascinating field. The more you dig yourself into the mysteries of the world, you understand how magnificently it is wrapped with the complexities of molecules and compounds together in a stable manner. Unraveling these mysterious is another beauty. If we read the history of science, we understand how more prominent phenomena were discovered through precise understanding surrounding us. Indeed, to every question, we have an answer, but it is up to us how we investigate them.

We all are well familiar with how the open window of the Louis Pasteur lab led him to discover penicillin, which is now the leading drug across the world. But, have you ever thought when does the idea of killing one entity from others discovered for humanity apart from the regular Human world wars? Yes, you read this right did you ever thought how the theory of war between viruses and bacteria to kill one another originated?

If not, then doesn't worry as Felix d'Herelle not only discovered this phenomenon back in 1917 but also put forth the basis of the first successful bacteriophage therapy.



Felix d'Herelle was  
born in 1873

## Felix d'Herelle – Early experiments of a naïve scientist

The French-Canadian microbiologist, Felix d'Herelle was born on April 25th, 1873. In his early years, he moved across various countries and studied different niches until he was 24 years of age with a daughter at home. Living in Canada, his father's friend paved his way into microbiology, advising him that "[\*Pasteur\*](#) got a good beginning through fermentation."

This got stuck in the head of the young lad who built a laboratory at home and started working in the field of microbiology, fermentation, distillation, etc. He worked in the General hospital in Guatemala City as a frontline worker

defining treatment strategies against yellow fever and malaria.

However, over his career, he worked on numerous other departments including,

- Publishing an article on carbon is a compound, not an element
- Developed whiskey from banana
- Studied fungal infection and their treatment for the coffee plant through soil acidification
- Utilized the own locust pathogens to prevent crops from the attack

## A journey from Pasteur fermentation to d'Herelle phage treatment

Even though he had various inconsistent achievements in the line of Pasteur fermentation, what made Felix d'Herelle, a name to remember, was his discovery of the minute organism capable of killing bacteria. During World War II, while treating the French army in 1917, d'Herelle reported that there is some minute agent present in the faeces of the French soldier who is capable of inhibiting the bacterial growth of *Shigella bacillus* by bacterial lysis. He reported his results on the experiments carried out by isolating the agent from the faeces that,

- It can't be seen under a simple microscope

***"From the faeces of several patients convalescing from infection with the dysentery bacillus, as well as from the urine of another patient, I have***

***isolated an invisible microbe endowed with an antagonistic property against the bacillus of Shiga."***

- The agent is only present when there are the bacteria in the body

***"In convalescent cases, ...the antagonistic microbe disappears very soon after the disappearance of the pathogenic bacillus...I have never found this antagonistic microbe in...normal subjects."***

- The agent is host-specific

***"I have never obtained an activity against other microbes: typhus and paratyphoid bacilli, staphylococci, and so on."***

- The agent is a living system

***"The antagonistic microbe can never be cultivated in media in the absence of the dysentery bacillus...This indicates that the antagonistic dysentery microbe is an obligate bacteriophage."***

Through his paper, d'Herelle named this agent bacteriophage meaning "bacteria-eaters."

## Was d'Herelle the actual discoverer of the bacteriophage?

Though the literature suggests that d'Herelle has a profound work in bacteriophages treatment strategy against bacterial infections, yet Frederick W.

Twort holds the title of discovering these minute agents. During his research on the smallpox vaccine in 1915, he found that contaminating bacteria allowed the smallpox vaccine to survive. But his further results showed that the agent could pass through the porcelain filter and require bacteria for growth. These were the characteristics features of bacteriophage, d'Herelle re-investigated, but Wort believed that these are not any living entity but any enzyme of the bacteria with bacteriolytic capability. Unfortunately for Wort that he couldn't make it to the final position, yet the famous controversy of Jules Bordet re-emerged the name of Wort associated with bacteriophage.

## **Bacteriophage – the viruses eating bacteria**

As suggested by d'Herelle and with further studies on the minute agent, the bacteriophage is a DNA or RNA based virus whose nucleotide varies from few thousands to hundreds of thousands. Being the most abundant species on earth, the bacteriophage may have a protein or a lipoprotein called as capsid surrounding its genome. The typical T4 bacteriophage studied in detail has an icosahedral head and a capsulated tail for attachment and penetration of the genomic particle.

## **· The Mode of action of bacteriophage**

On entering the cell, the bacteriophage has two fates either it goes for

1. Lytic cycle
2. Lysogenic cycle

### **Lytic cycle**

By the name it indicates, the bacteriophage results in the lysis of the bacterial cell, thus destroying the massive regeneration.

### **Lysogenic cycle**

This is a generally host-guest cycle where the bacteriophage enters the bacterial cell stays there regenerate with the bacterial reproduction until it decides to go the destruction pathway.

## **Bacteriophage as the possible treatment strategy**

In 1919, d'Herelle used the bacteriophage isolated from the chicken suffering from the plague of chicken typhus and treated another chicken suffering from the same disease. This was the first successful treatment strategy that boosted confidence in d'Herelle to go for a human trial.



In the same year back in Paris, d'Herelle treated the first human case of dysentery through the bacteriophage, and the successful results allowed d'Herelle to put-forth bacteriophage as the most significant turn over in the field of science.

## **Broad-spectrum applications of phage treatment**

The discovery of bacteriophage was an interesting turn of events, especially for the broad range of applications.

Some of them included,

- Wound site infection prevention
- Effectiveness against osteomyelitis
- Phage therapy superiors strategy for burn injuries
- Phage therapy against food-borne diseases
- Phage therapy against water-borne diseases
- Bacteriophage use in bioterrorism

Indeed, every discovery has a story, and every story is as exciting as the discovery led to the changes in the fields of science. It is all about investigating the nature and questioning the unknown.

# HIV in Pakistan – An alarming Threat

By Sabeeka Zafar

During this pandemic outbreak, as we all are frightened by the upsurge spread of coronavirus in our communities, some other viruses will soon be an alarming threat to all of us if we continue to keep an ostrich-like attitude towards them; HIV is one of them.

According to the recent reports of UNAIDS, Pakistan is ranked as the 11th country with a high prevalence of HIV/AIDS. According to the available data of 2018, 160,000 HIV cases had been reported, and out of these, around 110,000 were men; 48,000 women; and 5,500 children under the age of 15, having a provincial distribution of

1. Punjab – 75,000,
2. Sindh – 60,000,
3. Baluchistan – 5000,
4. KPK – 15000.

The marginalized communities are the main target of this epidemic, including sex workers, drug addicts, transgender, and homosexuals. The poverty and hunger that prevail in our society have increased the prostitution rate, forcing young girls to work as sex workers, sent to the middle east by the mafias, where they contract AIDS and then become a means for the spread of disease. Transgender people are also the victim of the devastating economy of this country that compels



*Source: Clinical Advisor*

them to work as sex workers and contributes to 7.6% of AIDS-infected patients. Homosexuals are another target and add almost 85,000 patients of AIDS.

But, unfortunately, even this statistical estimate is not compelling enough to open the eyes of authorities, urging them to break the taboos, making people take it seriously and talk about it when its annual spread has reached 20,000 patients per year. Instead of taking substantial measures to combat the spread of this detrimental disease, our federation is busy playing the blame game, making the figure of patients a dispute between provinces; that whether the highest number of AIDS patients are in Punjab or Sindh. In 1987, a National AIDS Prevention and Control Programme (NACP) was launched by the federation, with the main target of blood screening along with health promotion and HIV education activities for the general public. Still, it ended up being a total flop because of the lack of funding and proper strategy needed to run the program. No special funds are allocated

for the treatment of HIV patients, and people are not even aware of this virus or about its spread. This is the root cause of why the number is effectively declining in other countries but keeps on aggravating in our country by leaps and bounds.

## What is HIV?

HIV (human immune deficiency syndrome) is a virus that attacks cells of the body (CD4 cells, often called T cells) fighting against the disease, damaging the immune system, making it vulnerable to life-threatening opportunistic infections.

There is no effective cure for HIV; once you get it, you have to live with it your whole life. The only treatment for HIV is antiviral therapy (ART) that can prolong the life span, effectively make the viral load undetectable with no risk of transmitting HIV to an HIV-negative person.

## Stages of HIV

If HIV is left untreated, it progresses in stages, getting worse with time. HIV mainly has three stages

### Stage 1: Acute HIV infection

Being the earliest stage, it develops within 2 to 4 weeks after infection, with mild symptoms of flu, fever, headache, and rash. The level of HIV in the blood greatly increases during this stage, attacking and destroying the CD4 cells of the immune system and multiplies rapidly throughout the body, increasing the risk of HIV transmission.

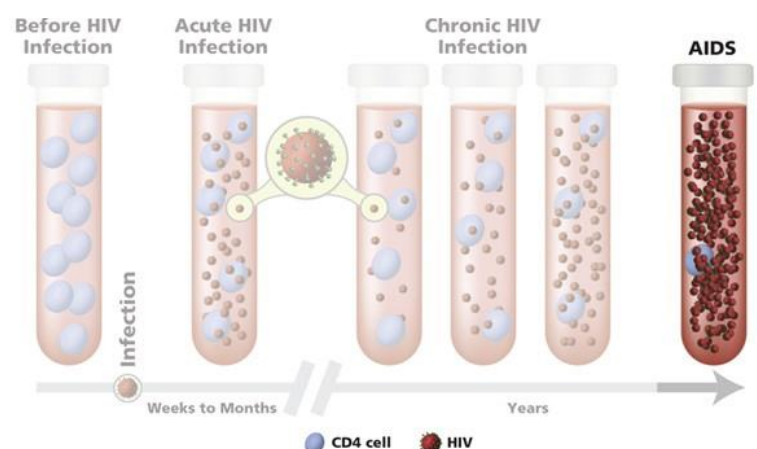
### Stage 2: Chronic HIV infection

During chronic HIV infection (also known as symptomatic HIV infection or clinical latency), the virus spreads slowly with the patient having not any particular HIV related symptoms. People being treated with ART can remain in this stage for decades, and having an undetectable viral load makes them less to nearly non-prone to transmit the virus to an HIV-negative partner through sex. But those without ART may get AIDS in 10 years or longer depending on the progression of the disease.

### Stage 3: AIDS

AIDS is the final stage of HIV, chronic; potentially life-threatening infers when HIV completely damages the immune system, making the body prone to all opportunistic infections (Infections that affect the body having a weak immune system rather than having a healthy one). People having AIDS have a CD4 count of fewer than 200 cells/mm<sup>3</sup>. People diagnosed with HIV have a very high viral load, with a significant risk of transmitting it to others. The patient's survival rate is not more than three years if left untreated.

*There are several stages in HIV infection. Source: NIH*





## How HIV spreads?

HIV can only be transmitted via certain body fluids from a person having a detectable viral load. These fluids include

- Blood
- Semen (*cum*) and pre-seminal fluid
- Rectal fluids
- Vaginal fluids
- Breast milk

The fluids that have HIV get into the bloodstream of an HIV negative person via a mucous membrane (found inside the rectum, vagina, penis, and mouth.), cuts, or direct injection for transmission to occur. Major activities that lead to its transmission include unprotected sex; through sharing injecting equipment, from mother-to-baby during pregnancy, birth, and breastfeeding; and through contaminated blood transfusions.

## How it hijacks the immune system?

*“HIV is like a jack-in-the-box,” says Sriram Subramaniam, a biophysicist at the National Cancer Institute who peers at HIV with electron microscopes.*

HIV has a round-shaped shell studded with spikes that encapsulates the genetic material of the virus. Virus's genetic material needs to get into the cell to infect it, which requires the shell to pop open. When HIV enters the body, it bumps into the T4 cells, the primary target of HIV. T cells got finger-like projections, including one CCR5 that fixes on HIV spikes, exploits its machinery, and uses it to multiply inside the host cell. At the initial stage, the body copes against the virus by

increasing the production of CD4 cells. But when it fails to produce enough amount of CD4 cells, the amount of virus multiplies in the body to an amount that becomes uncontrollable. Then the virus destroys the patient's immune system, making it unable to fight the infectious diseases, leading to sickness.

## How to contain the spread of HIV?

As it is evident from the statics that the number of patients is snowballing every single day and if we continue to act ignorant to the threat this virus has posed on us, we will soon have to deal with an uncontrollable catastrophic situation.

But it is still not too late if especially our government shows an act of responsibility and takes some preventive measures, their vital role can prove very efficient in eradicating this virus- making it an HIV free environment for us. Some important actions the government should immediately take are

- Reuse of syringes should be wholly banned instead replace them with auto-disable syringes
- The government should announce an extra budget for HIV/AIDS patients along with the reservation of a fixed number of beds for these patients in every hospital.
- In high schools, colleges, and universities, there should be a compulsory drug addiction test of students. All drug addicts must be screened for AIDS; those with a positive test should be sent to treatment centers.

- The government should strengthen the NACP department by providing them with proper funds and keeping it under appropriate check and balance.
- The special program should be launched by the government that looks after all the factors involved in the spread of this disease and takes the necessary measures needed to eliminate them from society.
- Print and Electronic media should be used effectively to spread awareness of this virus among the masses.

No government can alone combat this deadly virus if each of us will not play our due part. Like polio, we cannot own another virus for the coming decades when the rest of the world has eradicated every single trace of it from their land. Pakistan is a third world country with the two-third of our population below the poverty line, we have far more severe issues to deal with, where we are not ready to face another catastrophic situation like this. It is the need of the time to take this issue seriously, take all the effective measures to prevent this virus from consuming us all wholly.



Movie Review

# CONTAGION

**A Fictional Version of the Real-Time COVID-19**

By Syeda Laiba Tayyab





How is a movie released ten years ago so relatable in the current scenario? Contagion, the 2011 thriller about the fictional MEV-1 pandemic, is unsurprisingly the piece that everyone is rewatching at the moment. It might be because all the new movies are delayed, but mostly because of how the story is jaw-droppingly similar to the conditions across the globe today.

Contagion has gone viral again, its theme of rapid sweeping of a novel virus called MEV-1. The movie shows a rapid spread of the deadly virus that kills 26 million people worldwide. The virus spreads through coughing and sneezing, just like the Covid-19. Many other pandemic movies have recently been seen rising to the top again, but none has received as much renewed success as Contagion in these days. This documentary cum movie released in 2011 made by director Steven Soderbergh stars Matt Damon, Kate Winslet, Gwyneth Paltrow, and many others. It is an anxiety-inducing biological disaster horror with terrifying scientific plausibility.

Here I break down just how realistic Contagion is, as it is based on real-world scenarios, so we can learn the right lessons from this and hopefully avoid making the mistakes as done by the characters in the fictional.

The film opens with a patient zero, in this case, Paltrow, as Beth Imhoff, on day two of the outbreak. In a brilliant move, the movie's final sequence will show us day one, so with the opening sequence, the director Soderbergh and screenwriter Scott Burns are already giving a visual

road map for how Contagion will be a unique epidemic-outbreak film than other less realistic movies in the genre.

Imhoff, is shown in the beginning looking rough, sweating, coughing, and eating peanuts from the Airport bar (not a very good idea). In the sequence, Soderbergh uses some clever camera work lingering on close-ups of inanimate objects, the peanuts, Beth's card, and the touchscreen. Later in the movie, we would find out the scientific term for these i.e., "fomites"-shared surfaces where viral infections can spread from one person to another. These fomites are shark fin in the water, the invisible threat that the movie returns to, repeatedly. Real-life experts have compared the pandemic in this movie to the current Covid-19 situation and they grade the movie high for focusing on fomites. And in their review, they also point out that the turnaround time would need to be longer more than a few days for the virus to shed from Beth's respiratory tract or saliva to be spread to anything she's touching.

The fictional disease in Contagion is called MEV-1. Burns and Soderbergh conceived it while researching the H1N1 Flu pandemic in 2009, the 2003 SARS outbreak, and many other similar diseases. They consulted with researchers like Larry Brilliant, known for his work in eradicating smallpox, Ian Lipkin, a WHO specialist, and author Laurie Garrett. These are the people who have dedicated their lives to studying real outbreak scenarios and conceiving hypothetical nightmare situations like one presented in this film. Beth dies two days later. MEV-1 moves super-fast, and that is the big part

of the danger. Infected characters do not have much time after exposure to react or educate themselves, do self-quarantine, etc., before they accidentally pass it on to someone else. By comparison, Covid-19 seems to have a more extended incubation period reported as 14 days by WHO.

Another big difference appears to be the mortality rate. MEV has the mortality rate of between 20-30%, and by the end of the movie, it ends up killing twenty-six million people worldwide, which of course, is insanely high but not as high as the 50 million people who died in the 1918 Spanish Flu! The covid-19 mortality rate is still being determined, but as of March 3rd, it is mentioned to be 3.4% of reported cases. And the number will keep on fluctuating with time.

The disaster response in *Contagion* is roughly accurate to the one these days. In the movie, WHO deploys an epidemiologist Dr. Orantes to Hong Kong to try to identify its source; meanwhile, the CDC deploys CIS officer, Dr. Mears, to the cluster region in Minneapolis and to try to contain it. While all this happens, more terms are thrown to help the audience understand this disease.

Dr. Mears explains how one sick person is likely to infect others,  $R_0$  (reproductive rate of the virus). In the movie, this value is two and later jumps to four. The value for covid-19 is estimated at approximately 2.5, and again, that doesn't make it deadlier; it is just a lot more infectious than the seasonal flu that comes every year.



The movie also introduces the CDC scientist Dr. Hextall who breaks down the MEV in the form of colors. She explains that the sequence of the virus contains both bat and pig sequences. The final scene of the film reveals the near accidental day one event. It shows Beth's mining company, which deforests a jungle and displaces some bats that eat bananas. A banana chunk drops in a pigpen, a pig eats a banana and ends up in the kitchen. And from one thing to the next, the chef touches pig's mouth, doesn't wash his hands, affects Beth, and Beth becomes a deadly carrier. And if you are having a hard time understanding the need for social distancing, you must get it now why it is being recommended around the world.

The science in the movie is mostly accurate, which is something to be appreciated as most of the movies don't really consider that. Another notable research by Burns is on ecotones. Humans invade remote areas and expose the food chain to microbes, and their immune systems aren't biologically prepared. Covid-19 stems from a family of beta Coronaviruses that all have their origins in bats.

Returning to the story, Dr. Hextall knows that for developing a vaccine, it'll take months and months to reach human trials and FDA approval. This pushed her to take an enormous risk, and she ends up testing a vaccine strain on herself. Luckily it worked! This particular moment is an homage to physician *Barry Marshall* who inoculated himself with *Helicobacter pylori* to prove it was the cause of gastric

ulcers. He was awarded the Nobel Prize in 2005 for his heroic contribution.

The genius of *Contagion* is the way it tackles the crisis with a large team of people working in various fields. Disease outbreaks make a community of specialists work together while the rest of us are obliged to listen to them and to abstain from freaking out too much. The characters of this film are super smart; they make a lot of great heroic decisions. However, there are also occasional bad decisions, and the least heroic among them is Allen Crum Weedy, a social media influencer. He first breaks the footage of an early infected person and uses his following to spread conspiracy theories and pedals snake oil cures like the homeopathic treatment called Forsythia. Misinformation spread by people like Crum Weedy is the true *Contagion* of *Contagion*. Indeed, nothing spreads like fear.

So, folks, these disease outbreaks are messy, and a bit scary. The looting of grocery stores and pharmacies in the movie may echo what we today are seeing at checkout lines. This is just the way we humans react when we're afraid. But *Contagion* is a cautionary tale to take advice from sources beyond social media like CDC and WHO and other authorities because those people are more than just a bunch of nerds risking their lives to keep us safe and healthy. They are recommending 20 seconds hand washes, no face touching and social distancing that should be good enough for us. And if we don't want to end up like those who suffered in the movie, we better listen and act now!



## How MERs and SARs are related to Covid-19

By Arooba Azeem

The pandemic disease named Corona Virus Disease 2019 (Covid-19) was originally identified in a city of China, “Wuhan,” and it is responsible for causing respiratory problems, including pneumonia. This coronavirus was first characterized in December 2019, among the people who ate seafood and visited the animal market in Wuhan City, China. As it is a zoonotic disease, so it can easily spread from person to person.

This coronavirus is closely related to Severe Acute Respiratory Syndrome (SARs) and Middle East Respiratory Syndrome (MERs) as they all are caused by the viruses of the same family.

### Covid-19's relation with SARs

Covid-19 and SARs are closely related to each other because of their causation agent, symptoms, pathway, and their country of origin i.e., China. Covid-19 is caused by the virus strain named as Severe Acute Respiratory Syndrome Coronavirus 2 (SARs-CoV-2). The viruses belong to the same family, and SARs Coronavirus usually spreads very

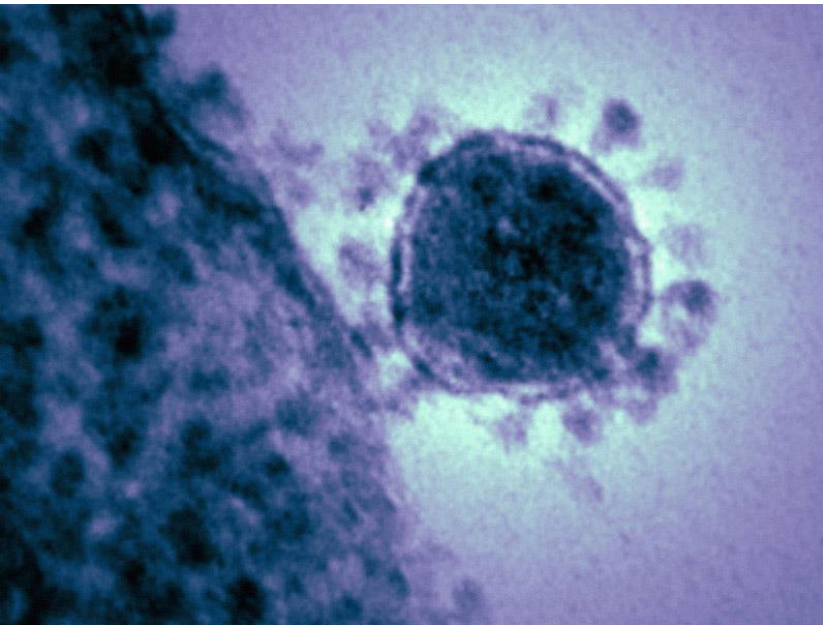
quickly but is less deadly. SARs was first observed in China in 2002, and like Covid-19, it is also considered as a zoonotic disease. To observe whether the new strain is related to SARs – Coronavirus or not, scientists observed their genomes, and they found many similarities in both.

Both SARs- CoV (causative agent of SARs) and SARs-CoV-2 (causative agent of Covid-19) are single-stranded, positive-sense RNA. And they both have been found to infect humans via bats.

After sequencing genomes, and a phylogenetic tree was constructed to find out the mutation history of a family of coronaviruses. At the start of 2020, 5 genomes of SARS-CoV-2 had been extracted from Wuhan. And these numbers increased from 5 to 42 by the end of January. Upon phylogenetic analysis, scientists found out that the SARs-Cov-2 genome is highly related to SARs-CoV but has seven mutations than that of their common ancestor.

The International Committee on Taxonomy of Viruses (ICTV) finally declared, on 11 February 2020, that according to the hierarchical relationships among coronaviruses based on their five conserved sequences of nucleic acids, it is enough to declare that nCoV-19 belongs to the same species,

irrespective of their few differences. Therefore, they called this strain as **severe acute respiratory syndrome-related coronavirus** or **SARs-CoV-2**.



*MERs first appeared in 2012 in Saudi Arabia*

Both of these viruses use angiotensin-converting enzymes 2 receptors (ACE-2) to get entry into the host cells, specifically epithelial cells within the lungs, and perform its replication. Recently proved that SARs-CoV-2 have a higher affinity to bind with the ACE-2 receptor than its original strain.

This maximum genome similarities and the same ACE-2 receptor helps scientists a lot in developing the vaccine against Covid-19 based on three different strategies. The first strategy is to make the whole virus vaccine, which contains an inactive or dead virus strain. The second strategy relies on developing a subunit vaccine that usually involves the use of certain subunits of the virus. The third

strategy is to make a nucleic-acid based vaccine that generally involves the use of DNA or RNA in making the vaccine.

But older people can't respond to these vaccines very effectively because of age-related degradation of lymphoid cells and also because of their weakened immune system. So, interleukin 7 is added along with the vaccines for aged individuals that ultimately reduce the degradation of these cells by boosting their immunity and reduces the risk of death.

### **Covid-19's Relation with MERs**

MERs-CoV, like Covid-19, also causes a zoonotic disease and has a positive-sense, single-stranded RNA virus with an envelope on its surface. The SARs-CoV-2 host includes bats and humans, while the MERs-CoV host includes bats, camels, and humans. Initially, because of the clinical similarities in both viruses, it was considered that both viruses use the same receptors for entry into host cells. But later on, it was found that they use different receptors to bind to host epithelial cells; the Covid-19 virus uses the ACE-2 receptor, while MERs-CoV uses Dipeptidyl peptidase 4 (DPP4) receptor to enter into host cells. They both have different countries of origin. MERs first appeared in 2012 in Saudi Arabia, while Covid-19, as we all know by now, in China. Unlike SARs-CoV-2, MERs-CoV has fewer chances to be transmitted from person to person.

Initially, SARs-CoV was initiated from civet cats that are sold in an animal market, but scientists found that it probably originated in bats that later infected the civet cats. People who ate

camels that are infected with MERS-CoV are more likely to get this syndrome, and again that coronavirus is transferred to camels from bats.

Currently, no vaccine or any other specific treatment available but is in the process of development.

To keep yourself safe from this virus, avoid social contact, visiting markets, or other places. If you want to go for urgent matters, then make sure to wear masks and wash your hands properly for 20 seconds. And make your best effort to stay at home as much as you can.



# Viruses = Villains? Not Always!

By Aniq Mazhar

As astounding as it may sound, not all viruses are villains. Nature created all forms of life in balance. While some strains are hazardous and fatal, there are several which offer a benefit to humankind!

Let's take a look at the **TOP TEN beneficial viruses**.

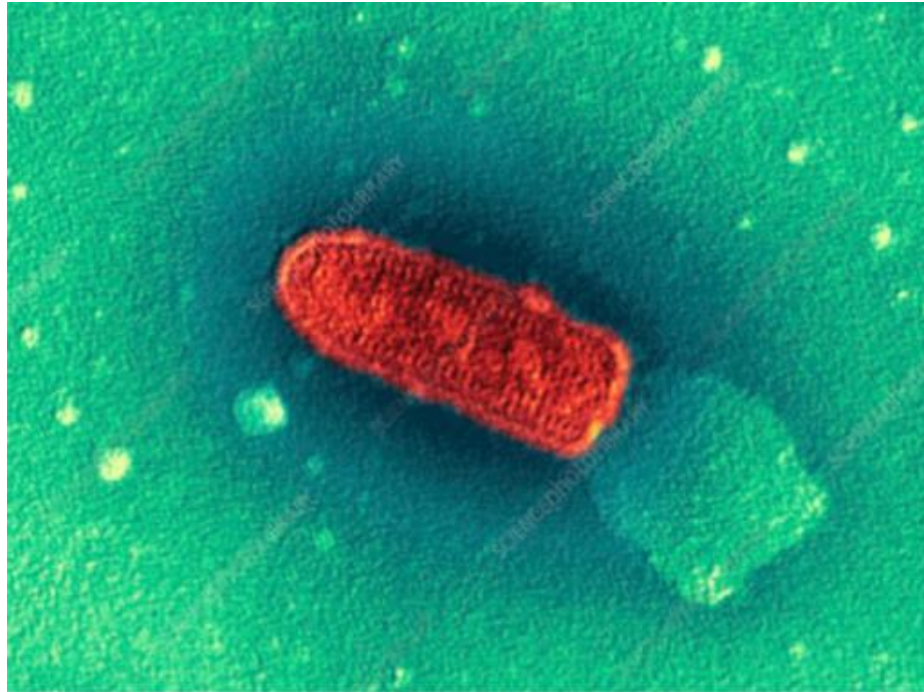
## Bacteriophages

These viruses infect bacteria, as their name implies. They are found everywhere in the soil and environment as well as in the human gut. They have the potential to be used as therapeutics against many pathogenic bacteria and replace antibiotics.

## Heat-resistant viruses

A particular virus which infects a grown fungal endophyte on grass has shown to give this grass the superpower of resisting extra high temperatures.

Scientists experimented with this virus on other plants and gained success. Tomatoes with them can grow at a temperature of 60 degrees Celsius, while those with no virus were not able to survive.



*Vesicular Stomatitis Virus are one of the villains for horses*

## Vesicular Stomatitis Virus

This is a virus that basically pathogenic for horses and other animals. It may be transmitted to humans and cause blisters in the mouth, but it has made it in the headlines for its oncolytic capacity. It is a promising treatment for cancer as it is non-pathogenic in the case of humans.

## Adenoviruses

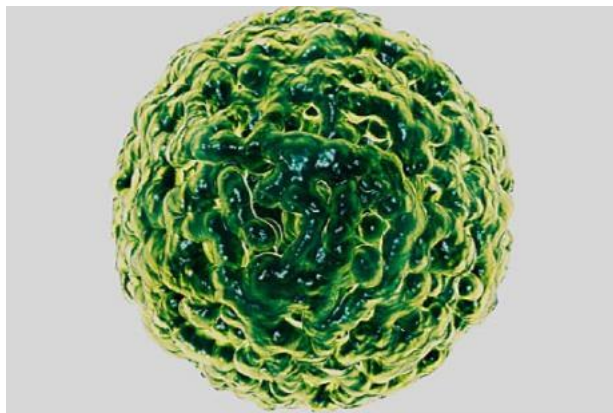
These are a group of common viruses that cause mild and temporary symptoms. Some of them cause Bronchitis, Pneumonia, cold, and stomach infections.

On the other hand, researchers have stepped across a particular strain, HAdV-52, which binds to carbohydrate moieties on the surface of cancer cells and renders them unable to proliferate.

This point offers a promising strategy to fight off cancer as well as stimulate one's own immune system against cancer.

## Norovirus

These viruses are of particular interest to virologists. In experimentation with mice, some strains have shown to help in the making of immune T cells as well as decrease the effect of pathogens that cause diarrhea and damage to gut bacteria.



## Ancient Retroviruses

Some endogenous retroviruses may be the reason human beings don't lay eggs. Baffled? Let me explain. Some scientists believe it to be true that, along the journey of evolution, a primitive human ancestor contracted such a virus, which caused mutations in the genetic code that enable us mammals to give live birth.

## Gamma-herpesviruses

Infection with one of the strains, MHV-68, has shown to increase resistance against *Listeria monocytogenes*, the bacteria which causes food poisoning.

## Cowpox

This virus helped Edward Jenner develop the concept of vaccination in 1796 when he noticed that milkmaids who had contact with cows were safe from smallpox. His vaccination helped achieve the milestone of smallpox eradication two centuries later, so it does not indeed belong to the category of villains!

## GBV-C

This is a member of the Flaviviridae family and also called hepatitis G. The odd bit about this little guy is the fact that, if it infects a person alongside HIV, AIDS progress very slowly and improves chances of survival.

## Arc gene virus

This gene is responsible for learning processes in human beings. It communicates via sending genetic material from one neuron to the other. This method is similar to that of a virus, and it seems that we inherited our ability to learn and form conscious thoughts because of the genetic material of some ancient brain virus! More research is going on.

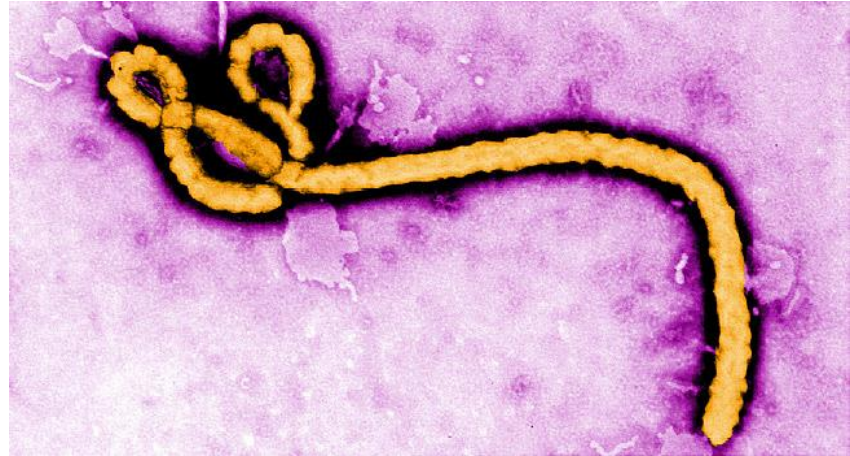
“Viruses are, without a doubt, the coolest things I have ever encountered. They do truly amazing things with very little genetic information. I was always a little disturbed at the bad rap they get, so it was stimulating of me to find good ones,” says Marilyn J. Roosenick, American Society for Microbiology.

# The Sinister Ebola Virus

By Iqra Bibi

Our world is currently shaken to the core by the coronavirus, but it is certainly not the first time viruses have had created havoc. Although the current outbreak is one of the biggest in history, there are many other sinister viruses that have affected people badly. One of them is the deadly Ebola virus.

World Health Organization (WHO), in collaboration with other health authorities, surveyed to know about the experience of Ebola survivors. Health workers were found to be more affected due to a lack of protective equipment and professional training at the early stage of the outbreak. Rebecca Johnson was a 28-year-old nurse from Sierra Leone who has survived Ebola. She acquired the disease while treating the Ebola patients at the Police Training School center in Sierra Leone's capital. Rebecca shared her experience of sickness and how she was paralyzed with excessive vomiting, diarrhea, and fever with a painful muscular spasm. Despite all this suffering, she eventually recovered from this deadly Ebola virus disease, but the effects did not completely vanish. Rebecca also said to the team that even after recovery, she had to carry her hospital discharge certificate with her at all times to prove her good health as she was stigmatized for getting infected. She managed to tackle such situations wisely and started to help other colleagues in the treatment of



victims. She also talked about the economic and social effects of EBV on the country, saying that “I want Ebola to finish so we can get back to normal. My country is drowning – no schools, the economy is in ruins. It’s not easy.”

When there is a will, there is a way, and by following precautionary measures and taking good care of personal hygiene, they survived Ebola. Scroll Below to get some insight into Ebola Virus Disease, symptoms, treatment, and more.

## How it all began

In 1976, it firstly emerged in West Africa, where it affected the millions of humans and other primates. Initially, it was thought to be a new strain of ‘*Marburg virus*’. The word “Ebola” is linked to the Ebola River, which is present in the Democratic Republic of Congo, South Africa. There is a wide variety of strains known to date with a 30-40% difference in nucleotide sequences.

In 2015, World Health Organization (WHO) reported more than 26,000 cases of Ebola virus when the outbreak began in the mentioned year in the regions of



Guinea, Sierra Leone, and Liberia where more than 11,000 deaths occurred.



*Strict precautionary measures must be followed to avoid the spread of this disease*

Ebola virus (EBOV), belongs to the filoviridae family that is also termed as “filoviruses”. These invisible viral entities serve as causative agents of hemorrhagic fever disease in humans and other mammals. Morphologically, it is a filamentous and enveloped virus whose genome is comprised of single-stranded RNA (ssRNA) of almost 19 kb. It is further transcribed and translated to different proteins responsible for various structural and functional roles. These proteins include:

- Nucleoprotein (NP)
- Two virion proteins (VP35 and VP40)
- Surface glycoprotein (GP)
- Two additional viral proteins associated with the membrane (VP30 and VP24)
- RNA- dependent RNA polymerase (L)
- Non-structural soluble protein (sGP)

## Mode of transmission and symptoms

Ebola is primarily transmitted from bushmeat and then person to person through body fluids, including blood, sexual fluid, sweat, tears, vomit, saliva, and mucus, etc. After entering the human body, the virus replicates in immune cells circulating in the bloodstream, such as monocytes and macrophages. Once replicated and produced in enough, viral particles get transfers to other regions of the body, including the liver, kidneys, spleen, lungs, etc. leading to the failure of the affected organs.

Symptoms appear almost 2 to 21 days of disease onset that include:

- Intense fever
- Malaise
- Chills
- Nausea
- Retrosternal abdominal pain
- Diarrhea with blood
- Fatigue
- Myalgia

These symptoms usually appear in combination and lead to severe on various body parts, including the gastrointestinal tract, respiratory organs, as well as neurological indications and uncontrolled bleeding that lead to blood disorders such as anemia. The first week of onset is very critical for personal health as the condition of the patient may either

get worst or get better leading to death or survival, respectively. As the lethality rate is higher for Ebola almost 83 to 90% hence, the disease severity mostly increases, followed by the death of patients.

### **Treatment and Control**

The high mortality rate associated with the Ebola virus has grabbed the attention of the researchers and pharmaceutical companies to increase the pace of developing efficient and effective therapies against the Ebola virus. Currently, Merck has introduced the vaccine termed as “Ervebo” against the Zaire species of Ebola. After successful trials during an outbreak of 2015, more than 25000 patients were protected by using this vaccine. Currently, they had successfully got the vaccine licensed by the European Medicine Agency (EMA) and applied for prequalification by the World Health Organization (WHO).

After the WHO prequalification, it will be commercially available at the end of 2020.

As “Prevention is better than cure” hence strict precautionary measures must be followed to avoid the spread of this disease. The infected person must be socially isolated soon after the disease onset that is although hard to maintain, one of the best approaches to limit the disease progression. Everyone needs to take proper care of personal hygiene to prevent Ebola virus disease or any other disease as well. There is also a need to consume a healthy diet along with medication to fasten the recovery.

# A look at top researches on viruses

By Amna Masood

Viruses are pathogenic particles containing genetic material known as the core, which is surrounded by a protein coat called a capsid. They are metabolically inert nature because they lack the enzymatic machinery, which is necessary for the production of viral proteins. It compels them to live, reproduce, and survive only inside the host body. They are tiny in size ranging from 20 to 300 nm and can only be studied through an electron microscope. Broadly they are categorized into two types based on their genome, either DNA viruses or RNA viruses. Since viruses are infectious and are involved in causing several diseases in living organisms, scientists are doing extensive research to understand all aspects, including their structure, classification, evolution, and interaction with host organisms for their survival through disease causation. Viruses have been studied under the field of biological sciences termed as 'Virology.' The following are some of the top researches on viruses.

## Coronavirus

Firstly, the biggest problem that the whole world is facing nowadays is COVID-19 pandemic. Scientists have been working continuously in laboratories to find an efficient and effective vaccine against the Coronavirus. Recently, genetic sequencing on viral samples of Italian patients has been

performed by two groups of scientists from the National Institute of Infectious diseases and Forensic Division of the Department of Biomedical Sciences and Public Health in Rome and Ancona University respectively. Already sequenced sample of the virus taken from the original city of the outbreak, Wuhan, was considered as a reference genome for comparison.

Results of the comparison showed that genetic variation between two viral samples was minor with the appearance of only five new variants in the later Italian samples. Researches have revealed the slow mutation rate of the Coronavirus. Concludingly, it's good news, especially when we are familiar with the quick rate of mutation in most of the viruses, that has always remained one of the most significant challenges during vaccine development. We are hopeful that whenever the vaccine is introduced, it will be effective broadly.



*Extensive researches are being done on COVID-19. The image is an illustration of the novel Coronavirus, SARS-CoV-2, Aylin Woodward Mar 26, 2020.*



## Herpes simplex virus type 1

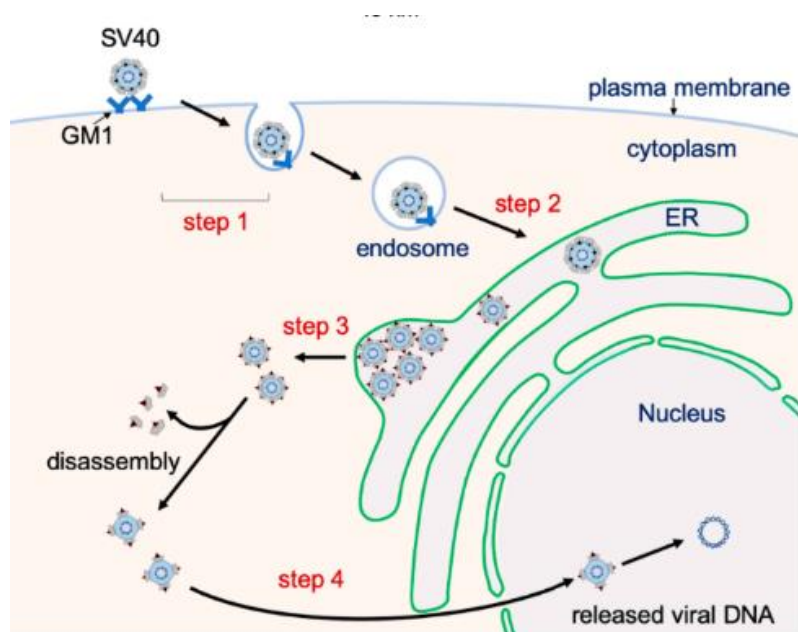
Herpes simplex virus type 1 (HSV-1) affects 80% of young adults throughout the world. Its symptoms include mainly cold sore and, in some cases, encephalitis. Inflammation in the brain can become fatal if it remains untreated. Virologists from two of the Chinese universities have infected mice and human nerve cell lines with HSV-1 for in-vitro experimentation. High expression of Egr1 cellular protein was observed in both cell lines and brains of mice that were infected earlier. When the levels of Egr1 protein was decreased by using different methods, it reduced the number of mice deaths by decreasing encephalitis condition and viral load. The blockage of this particular protein can be a new approach for preventing encephalitis during viral infection based on this research.

## Simian virus 40

Simian virus 40 (SV40) is a DNA virus having the capacity to cause tumors in animals. It had been used as a model eukaryotic virus for studying DNA replication and transcription processes. It attaches itself to lipids instead of binding to a protein receptor in the plasma membrane of the host. After understanding their way of interaction with the host, virologists discovered their unique behavior of using fats as a source for communication. The virus creates connections with a huge number of fat molecules, which causes a change in the shape of the host's plasma membrane. This deformation favors endocytosis of virus molecule through vesicle formation that buds off inside the cell favoring its entry. The deformed membrane holds the virus tightly in such a way that there remains hardly any space between them.

In this way, it is able to exert a strong force on the host's membrane without seeking help from any of the cellular proteins.

The figure below shows the entry of the virus through its binding to the host cell receptor on the plasma membrane called ganglioside GM1. This event triggers the formation of an endosome that leads the virus towards endoplasmic reticulum from where it breaches the membrane to release itself into the cytoplasm. It further moves to the nucleus and releases its genome. Then it starts using host machinery for the production of its genome and causes infection ultimately.



One of the top researches includes work on SV40. The image shows entry of the virus through its binding to the host cell receptor on the plasma membrane.

## Hepatitis C virus

As we all know, the hepatitis C virus (HCV) causes hepatitis C that leads to liver infection. It results in liver cirrhosis and liver cancer in case of chronic infection. Global numbers can assess the severity of a disease according to which it affects 1% of the population per year. The HCV diagnosis method used currently involves two stages. The first step is to find specific HCV antibodies, and the second step requires a PCR<sup>1</sup> assay for the detection of the presence of the viral RNA in the blood that confirms chronic infection. The major problem is its early diagnosis in some asymptomatic patients with traditional screening methods that are limited and expensive in developing countries.

According to the researches of 2018, a team of scientists developed a less costly assay in collaboration with the company 'Genedrive.' This new device allows PCR to be performed, enabling the necessary completion of 40 cycles more quickly than in a conventional platform. The analysis can be completed in approximately an hour. Assay's performance and authenticity were checked in the institute of France and the National Health Service UK. Results showed 100% specificity with no false-positive results.

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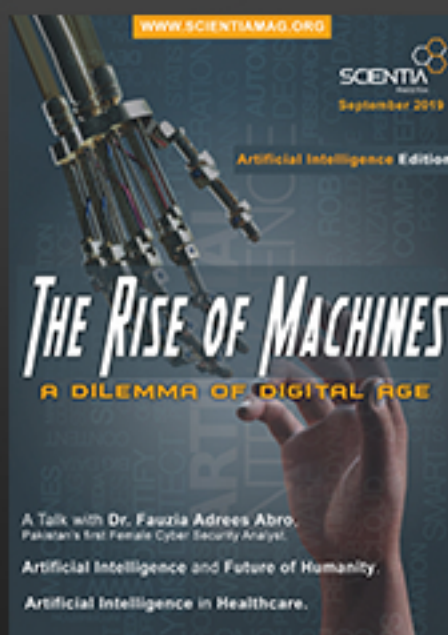


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