COVID RESEARCH &DATA VISUALIZATION

ABSTRACT

This book explains the public health crises around the world and research covid variants and vaccines. Importantly It shows statistics graphs and visualization models using PowerBI and Microsoft Excel

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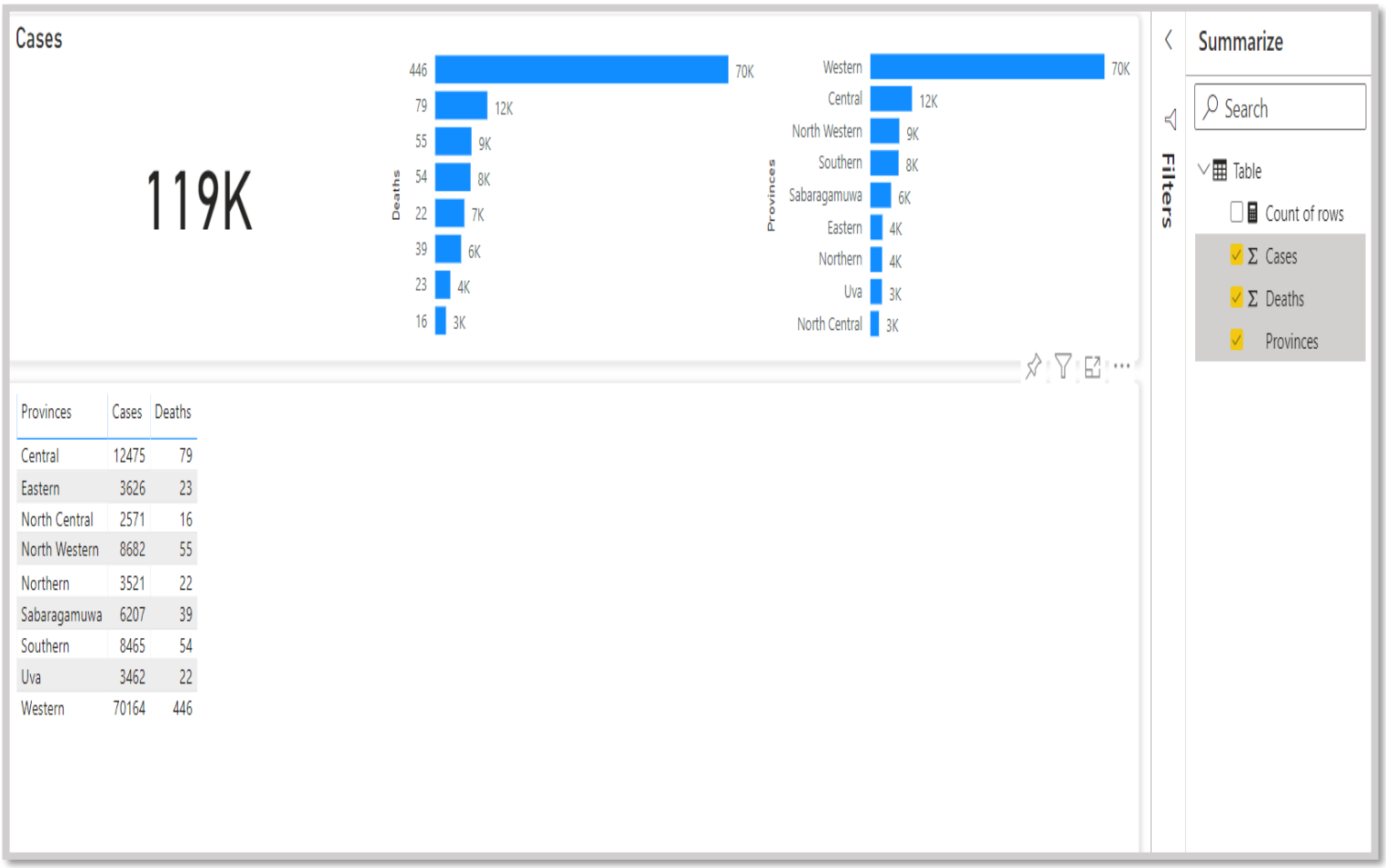
Covid -19 in Sri Lanka

On 2019 December 31, World Health Organization was informed of new diseases that spread vastly among the people of China mainly in Wuhan City. Provisionally it was named as (nCoV) Novel coronavirus before a permanent name is decided upon. Coronaviruses are a large family of viruses that cause health problems from a common fever to severe diseases. Sometimes it causes death if no proper treatment has given. On 30 January 2020, the WHO director declared the novel coronavirus outbreak a public health emergency of international concern.

If we consider our country, Covid-19 is one of the major threats since the beginning of 2019. Our economic, tourism and education sectors are fully damaged by the pandemic. If this continues, we have to face the severe condition of our lives than we have faced ever.

The graph shows the covid effect in Sri Lanka by provincial status. Western province is the most affected by the pandemic.



Picture1

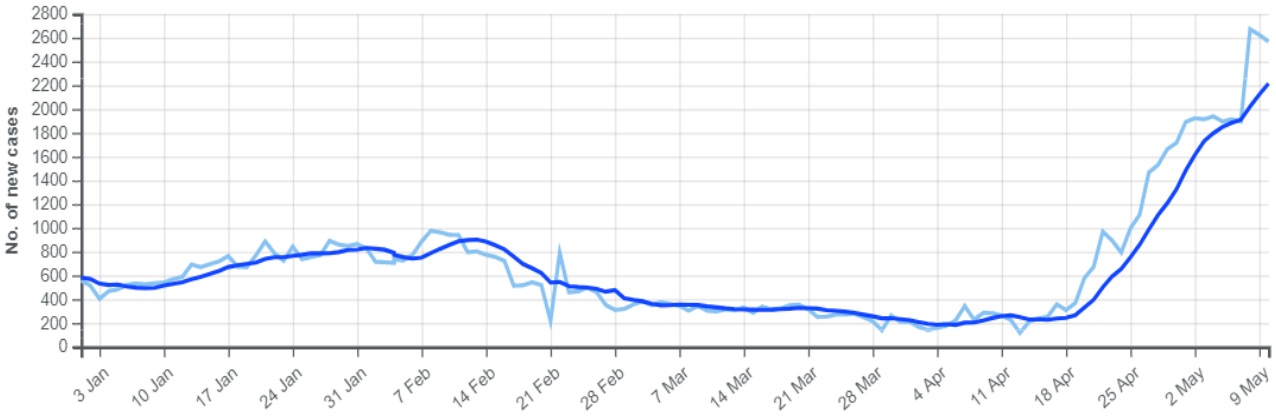
Despite the heavy toll of the COVID-19 pandemic on Sri Lanka's economy and therefore the lives of its people, the economy will recover in 2021, though challenges remain, says the newest International Bank for Reconstruction and Development Sri Lanka Development Update: Economic and Poverty Impact of COVID-19 released. The Sri Lanka Development Update (SLDU) notes that the country, hit with an unprecedented economic downturn thanks to the pandemic, is now on the road to recovery.

Sri Lanka's economic process is predicted to recover to three .4 per cent in 2021, mainly thanks to foreign investments also as normalizing tourism and other economic activities. However, the slow global recovery, including continued trade restrictions, economic scarring from the slowdown, and therefore the high debt burden may still affect growth. The report provides information on Sri Lanka's economy and outlook, highlighting the major devastating impact of the pandemic. Sri Lanka's economy contracted by 3.6 per cent in 2020, the worst growth performance on record, as is that the case in many countries fighting the pandemic.

The government acted decisively with steps like cash transfers and postponed tax payments. The Central Bank's introduction of a debt moratorium and other various activities to motivate lending also helped to reduce the adverse impact of COVID-19 on businesses and livelihoods. At an equivalent time, increased expenditures and lower revenues amid the pandemic contributed to a deterioration of the fiscal situation. Public and publicly guaranteed debt is estimated to possess increased to 109.7 per cent of GDP. Reserves declined to an 11-year low in February 2021, and therefore the rate of exchange depreciated by 6.5 per cent from January through St Patrick's Day, 2021.

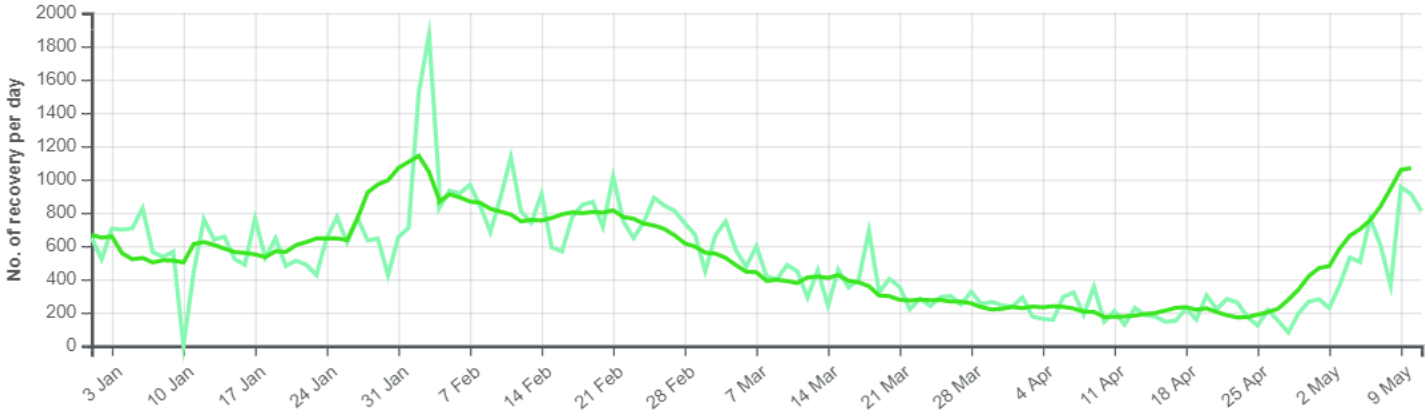
It suggests that more targeted social safety nets could help the authorities to proportion support to the poor and vulnerable quickly and effectively in times of crises. Investments in digital technologies and literacy also can help Sri Lankans find new economic opportunities. Sri Lanka Development Update may be an International Bank for Reconstruction and Development publication that discusses the country's recent macroeconomic developments and outlook, also as relevant development challenges. It also provides a more in-depth and deep examination of selected economic and policy issues.

i) Number of new daily cases, with a seven-day moving average.



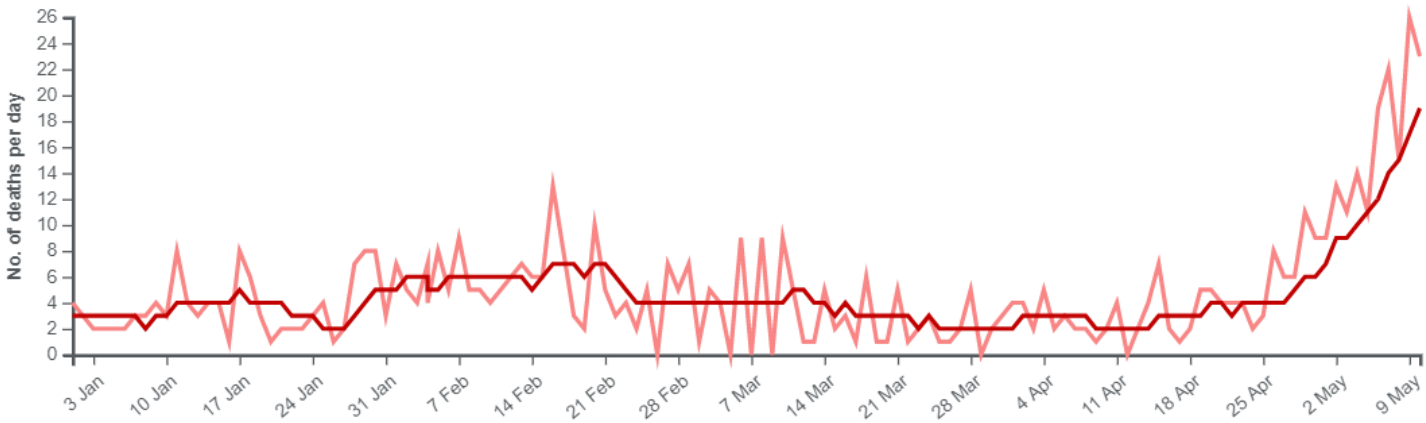
Picture 2

ii)Number of daily recoveries, with a seven-day moving average.



Picture 3

iii)Number of daily deaths, with a seven-day moving average



Picture4

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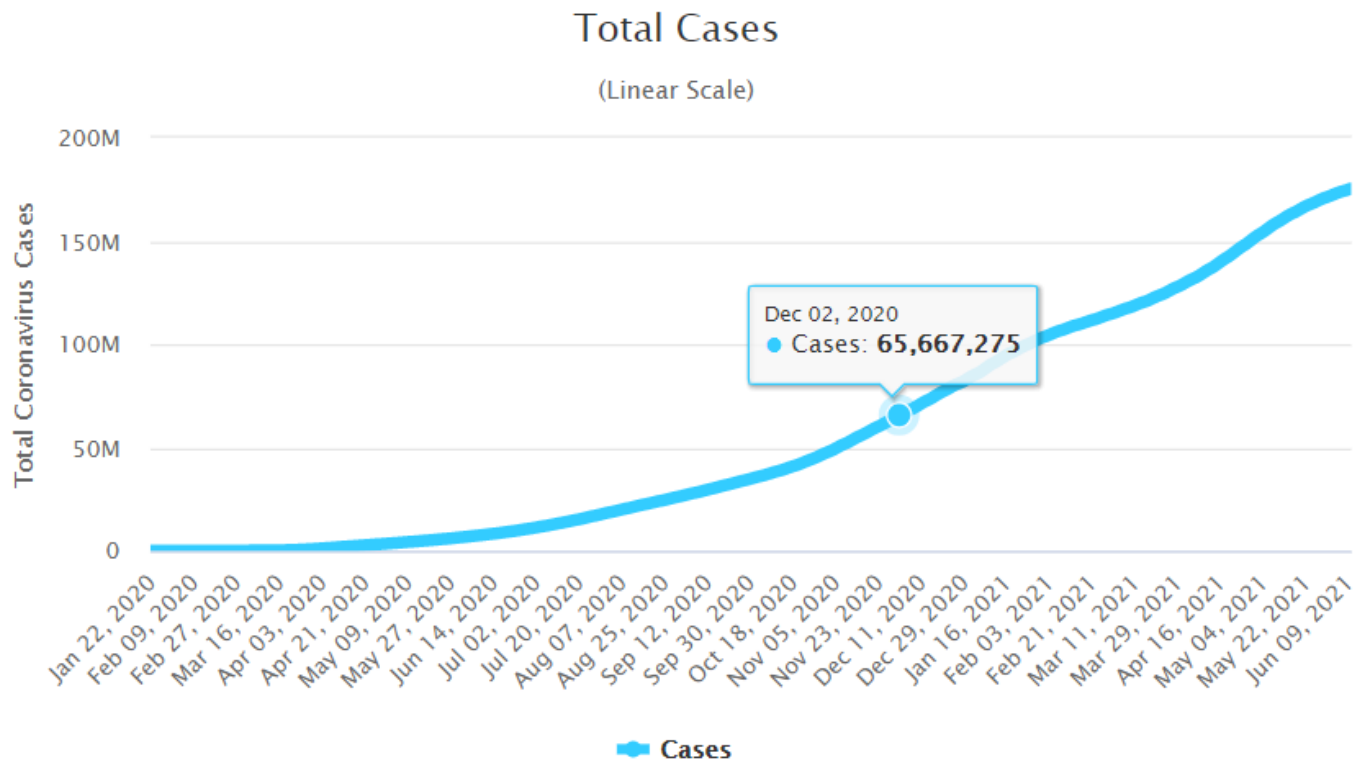
Covid -19 in the Global context

Covid-19 has improved communities and transformed everyday life around the world dramatically. Our present circumstances, as never before, are deeply shaped by the continuing social realities. That is concerns about rooted racial and economic inequality, the proliferation of misinformation and the potential of world democracies to face major crises. Deep social understanding will be essential to capturing the crisis and drawing a path forward.

This graph shows that how covid -19 spread the world speedily.



Picture 1

Some of the Covid -19 situation around the world.

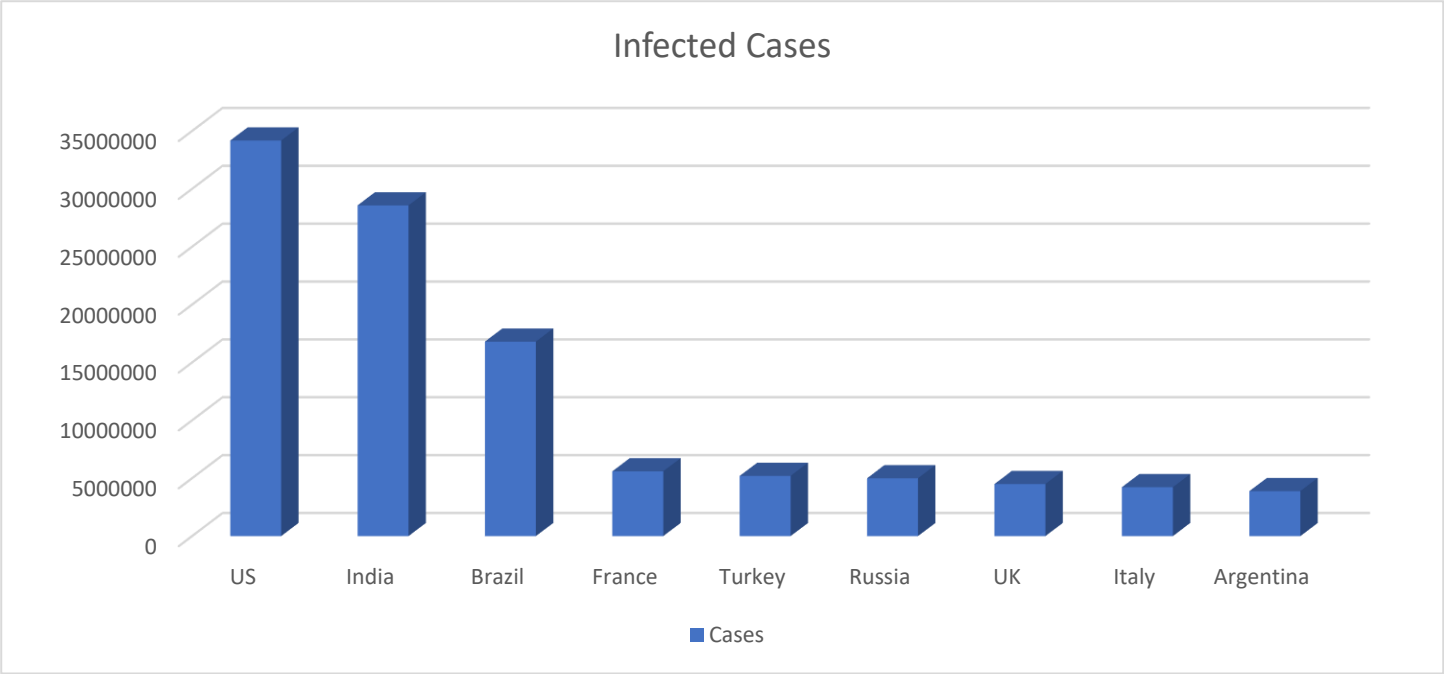
- Malaysia has reported 3,733 new cases, bringing the entire number to 440,677. There are 3,211 recoveries, bringing the entire number of recoveries to 401,934. There are 26 deaths, bringing the price to 1,683. There are 37,060 active cases, with 416 in medical care and 216 on ventilator support.

- New Zealand has reported two new cases, bringing the entire number to 2,642 (2,286 confirmed and 356 probable). the number of recoveries remains 2,589 while the price remains 26. There are 27 active cases in managed isolation.

- Singapore has reported 28 new cases including ten in the community and 18 imported, bringing the entire to 61,359. Out of the community cases, five of them are linked to previous cases.21 are discharged, bringing the entire number of recoveries to 60,933. The price remains at 31.

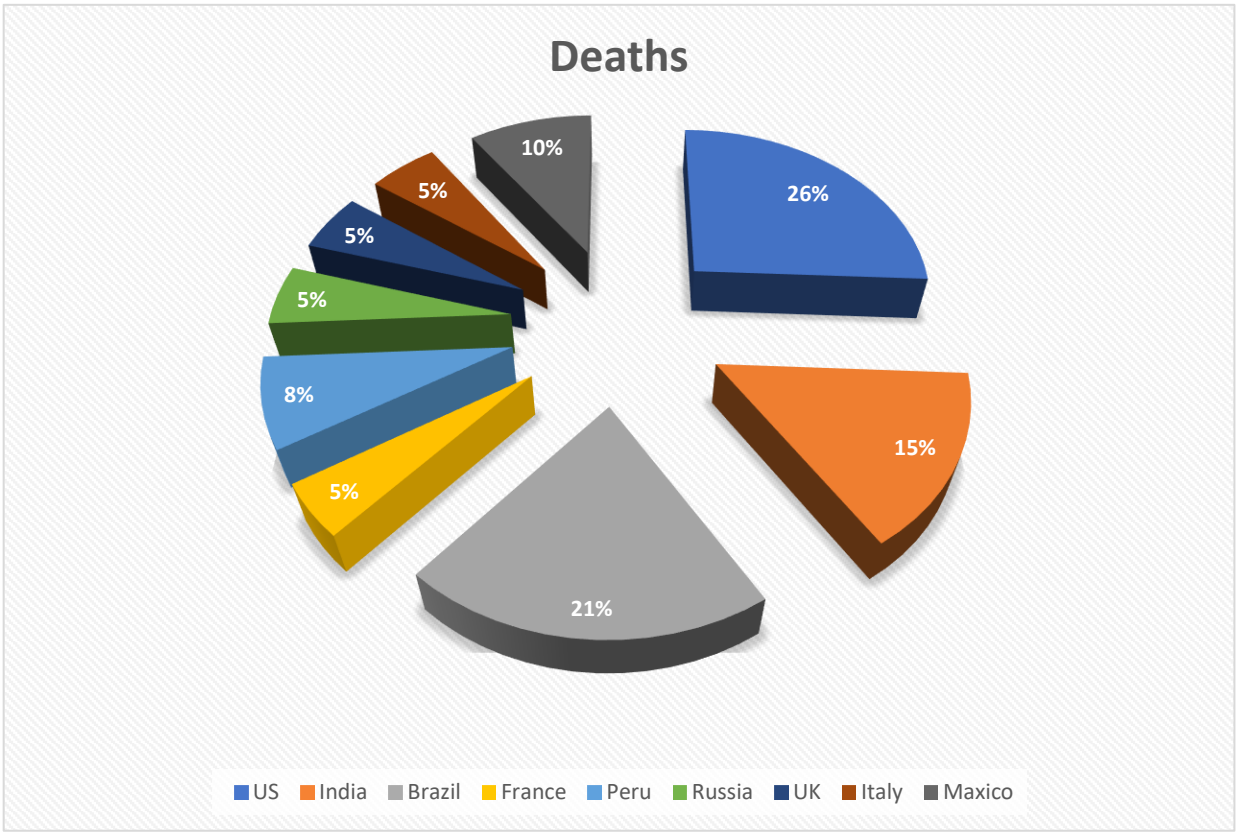
Regular updates on WHO's resource requirements and funds received to support countries in implementing the COVID-19 Strategic Preparedness and Response Plan 2021, WHO/PAHO procurement of critical supplies, and implementation of the Unity Studies. On 2 January, VOC-202012/01, a variant of SARS-CoV-2 first discovered within the UK, had been identified in 33 countries around the world, including Pakistan, South Korea, Switzerland, Taiwan, Norway, Italy, Japan, Lebanon, India, Canada, Denmark, France, Germany, Iceland, and China. On 6 January, the P.1 variant was first identified in Japanese travellers who had just returned from Brazil.

According to the John Hopkins University, the overall number of global coronavirus cases has surpassed the 172.9 million mark, while the deaths have increased to over 3.71 million. The US has recorded the world's highest number of cases and deaths at 34,174,752 and 611,611 respectively.



On the 4th of July 2021.

According to the John Hopkins University, the overall number of global coronavirus deaths. The top ten death due to covid -19 cases is in the following chart.



The United States, India and Brazil are the worst affected countries around the globe. It has recorded millions of infected cases and deaths. Frace, Peru and Russia are the following.

Finally, we have to understand how to overcome this challenge together, that’s how we can defeat this global pandemic. If we work together around the globe, we can overcome this pandemic and wipe this from our earth.

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Variants

On 2019 December 31, World Health Organization was informed of new diseases that spread vastly among the people of China mainly in Wuhan City. Provisionally it was named as (nCoV) Novel coronavirus before a permanent name is decided upon. Coronaviruses are a large family of viruses that cause health problems from a common fever to severe diseases. Sometimes it causes death if no proper treatment has given. On 30 January 2020, the WHO director declared the novel coronavirus outbreak a public health emergency of international concern.

Now it's been a year since the virus that threatens the world continuously. And also much livelihoods and poverty is going highly across the world importantly in African countries and the South Asian countries due to the prevention methods of each government of the countries. And our country also has affected by this pandemic. In the first wave of the pandemic our people handling best this and overcome it with few infected cases and deaths. But, due to some carelessness in following the health guidelines and other related kinds of stuff, now we are going on a severe path that we didn't go so far. One of the main reason for it the virus variants.

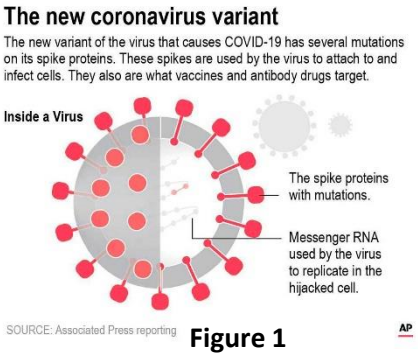
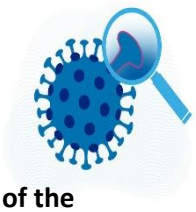


Figure 1

Actually, what is a variant? What meant by a virus variant? In Wuhan City that is the first covid patient identified, the virus was simply called the Novel coronavirus (nCov). And after nCov constantly change through mutation. A Mutation occurs when a DNA gene is damaged or changed in such a way as to alter the genetic message carried by that gene. When a mutation occurs, the result will be a different kind of DNA pattern than the first one, It can be harmful or beneficial based on the location or context. That's called variants. Mainly the mutations in the spike protein of the virus cause the new variant.

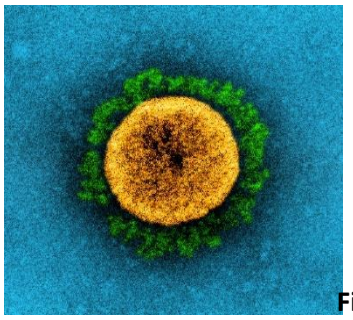


Spike Protein of the virus

Figure 2

Now we search deeply in the variants of Covid-19. Multiple variants have recently made headlines, including a UK variant known as 501Y.V1, VOC 202012/01, or B.1.1.7 lineage, a South African variant known as 501Y.V2 or B.1.351 lineage, a Brazilian variant known as 501Y.V3 or P.1 lineage, California variants known as B.1.427 and B.1.429, and the Indian variant known as B.1.617 and many others.

UK variant is known as 501Y.V1, VOC 202012/01, or B.1.1.7 lineage



This variant was identified in the UK in late 2020 and vastly spread to other countries. It has a large number of mutations throughout the genome, including a 69-70del mutation in the S gene, which is of interest to clinical testing labs as it may have an impact on the pattern of detection when using some molecular diagnostic PCR tests.

Figure 4

More likely than wild-type SARS-CoV-2 to be detected in November 2020 from a sample taken in September during COVID-19 infections in the UK; It began to spread rapidly in mid-December and is associated with a significant increase in SARS-CoV-2 infections in the country. This increase is thought to be at least partly because of one or more mutations in the spike protein of the virus. This variation is also significant for having more mutations than is commonly seen.

The image shows that how B.1.1.7 variant aggresses the world in March 2021.

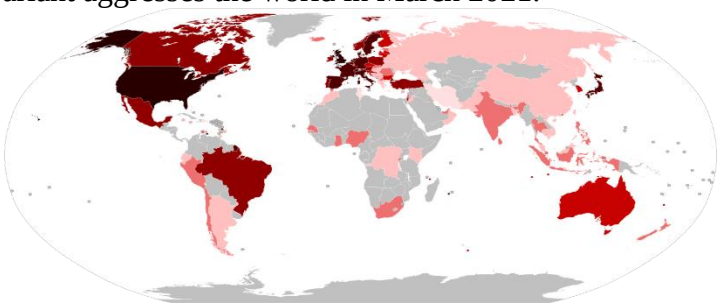
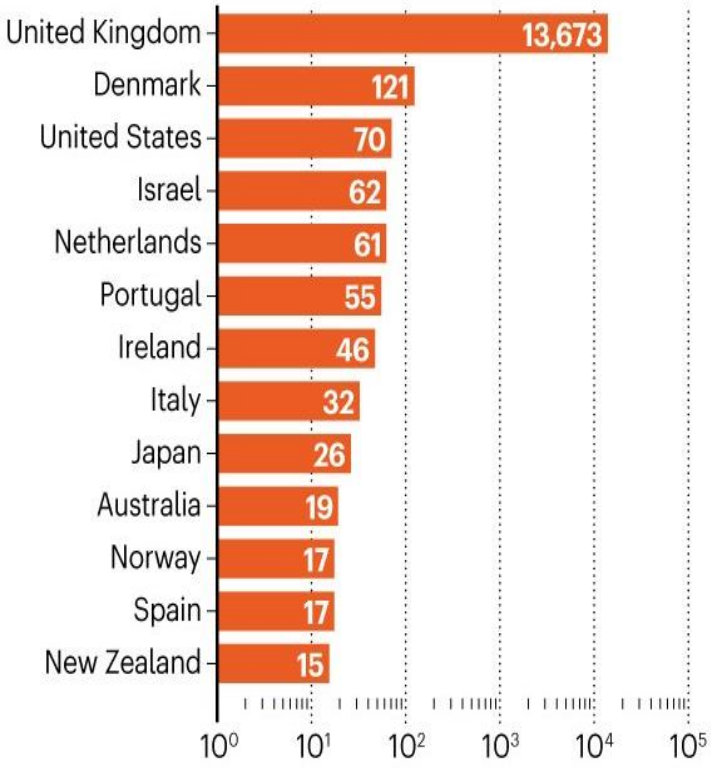


Figure 5



This graph shows how the B 1.1.7 variant spread across the world. It heavily spread in UK and then in Denmark and then in US. Isreal, Netherland and Portugal are the following.

B.1.351 lineage (501Y.V2 or South African variant)

The South African variant carries a mutation, called N501Y, that appears to make it more contagious or easy to spread. Another mutation, called E484K, could help the virus dodge a person's immune system and may affect how well coronavirus vaccines work. The research is not proof yet South Africa variant causes more serious illness for the vast majority of people who become infected. As with the existing version of the coronavirus, the risk is highest for people who are elderly or have significant serious health conditions. But there are concerns, it can spread more rapidly and vaccines may not work quite as well against it.

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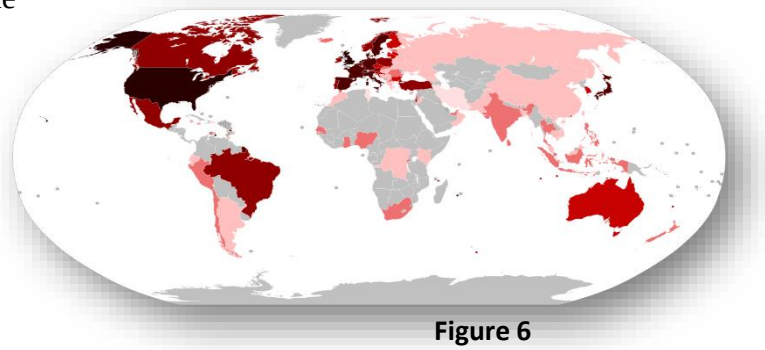
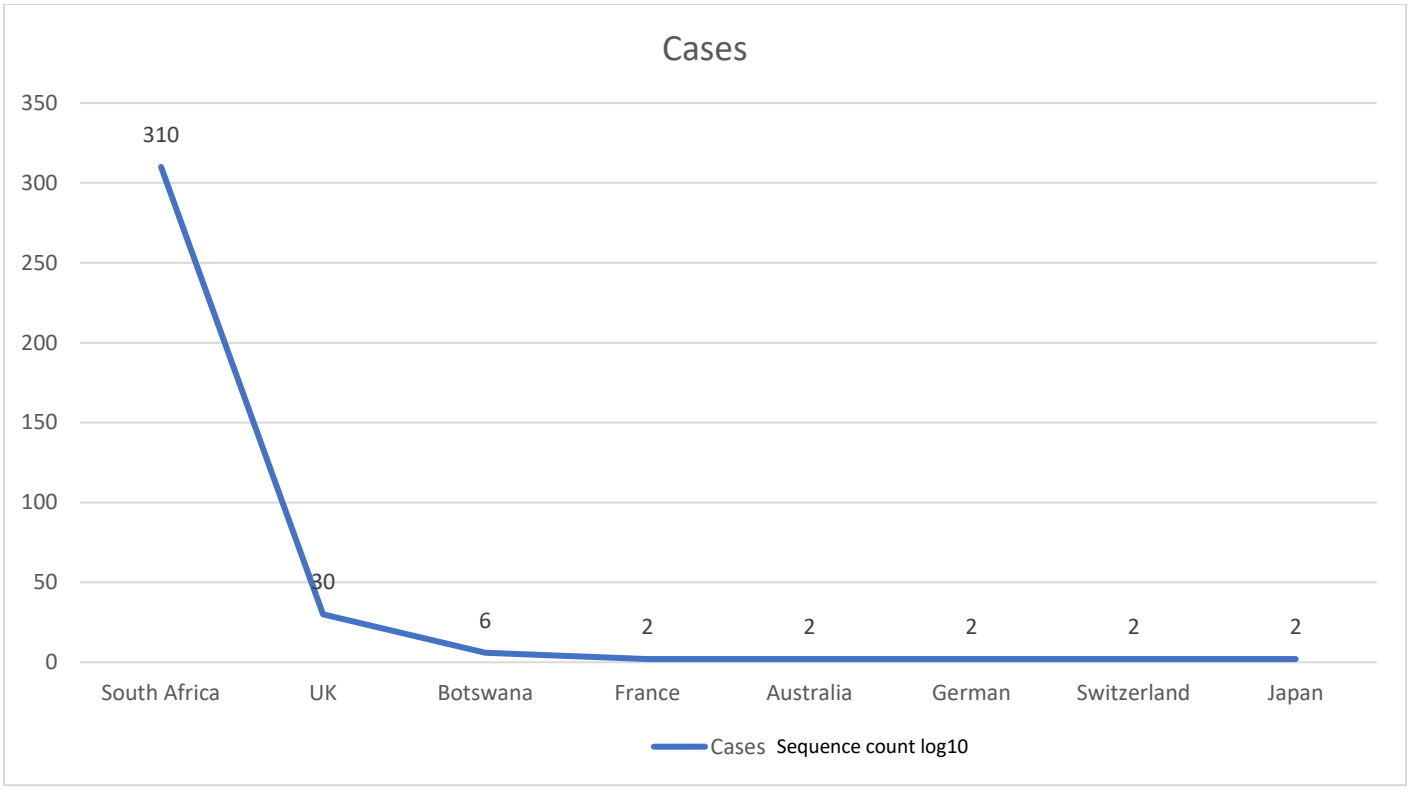


Figure 6



The researchers and officials said the prevalence of this variant is higher among young people who do not have basic health conditions and that it causes more frequent illness in such cases than other types. The South African health department also pointed out that this variant could trigger a second wave of COVID-19 epidemics in the country because the variant spreads faster than previous variants of the virus. There are three mutations of particular interest in the spike region of the B.1.351 genome.

- K417N
- E484K
- N501Y

The scientists noted that this mutation could be more easily linked to human cells due to three abrupt changes in the receptor-binding domain (RBD) in the virus's spiked glycoprotein: N 501 Y (from asparagine (N) to tyrosine (Y) amino-acid state 501), and K484K. Two of these abrupt changes, A484K and N501Y, are within the receptor-binding nucleus of the receiver-binding domain (RBD). The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the virus that causes COVID-19, the respiratory illness responsible for the Covid-19 pandemic.

Indian variant B.1.617

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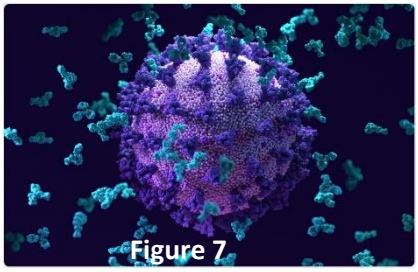


Figure 7

The B1.617, which was identified in October, is being closely and seriously watched by the world. It is now been found in at least 44 countries, including the US and our country. Due to the two concerning mutations, the variant from India has been given a scary name "double mutant". WHO said about this variant as a "variant of concern" due to its effectiveness and danger. But some expert says this variant has been detected most frequently in the US and UK may be the lineage associated with the highest transmissibility. Unlike other variants of concern, the one from India had a few mutations but not much else that initially concern him.

This image shows (Figure 8), how the Indian variant occupied India and other parts of the world. The Indian variant has the powerful immune system. You can know how it spread vastly. around in India. After 12 th of April 300000 daily cases were recorded.

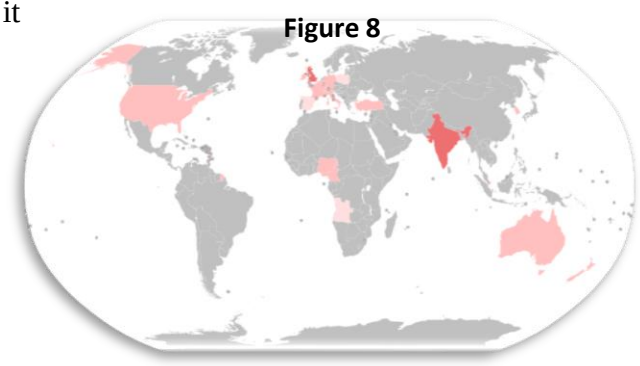
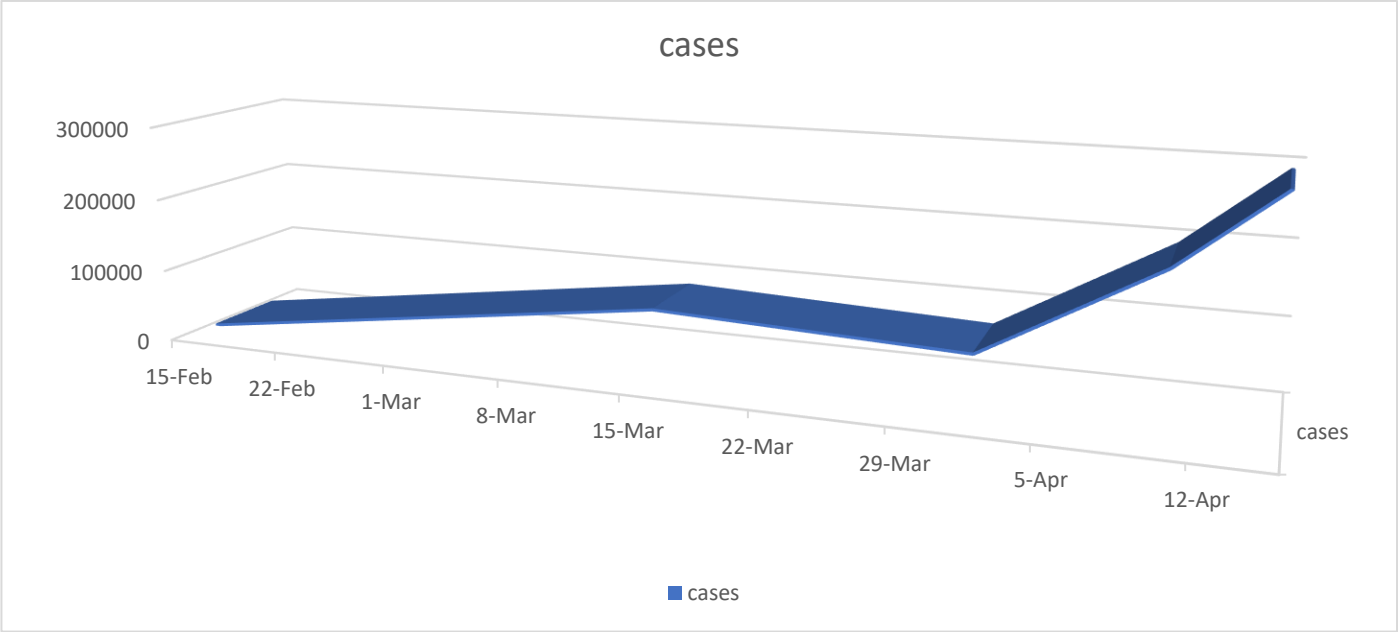


Figure 8



Up to the 9th of May 2021, the world has seen 80+ covid variants and more severe lives for everyone. I have mentioned a small number of highly transmissible and infected variants. Up to now, the world has seen 166 million infected cases and 3.43 million deaths. We, Sri Lankans, faced 155K infected cases and 1051 deaths. So we are going on the server path. We have to balance our daily life and health issues. So we have to beat this pandemic together as soon as possible.

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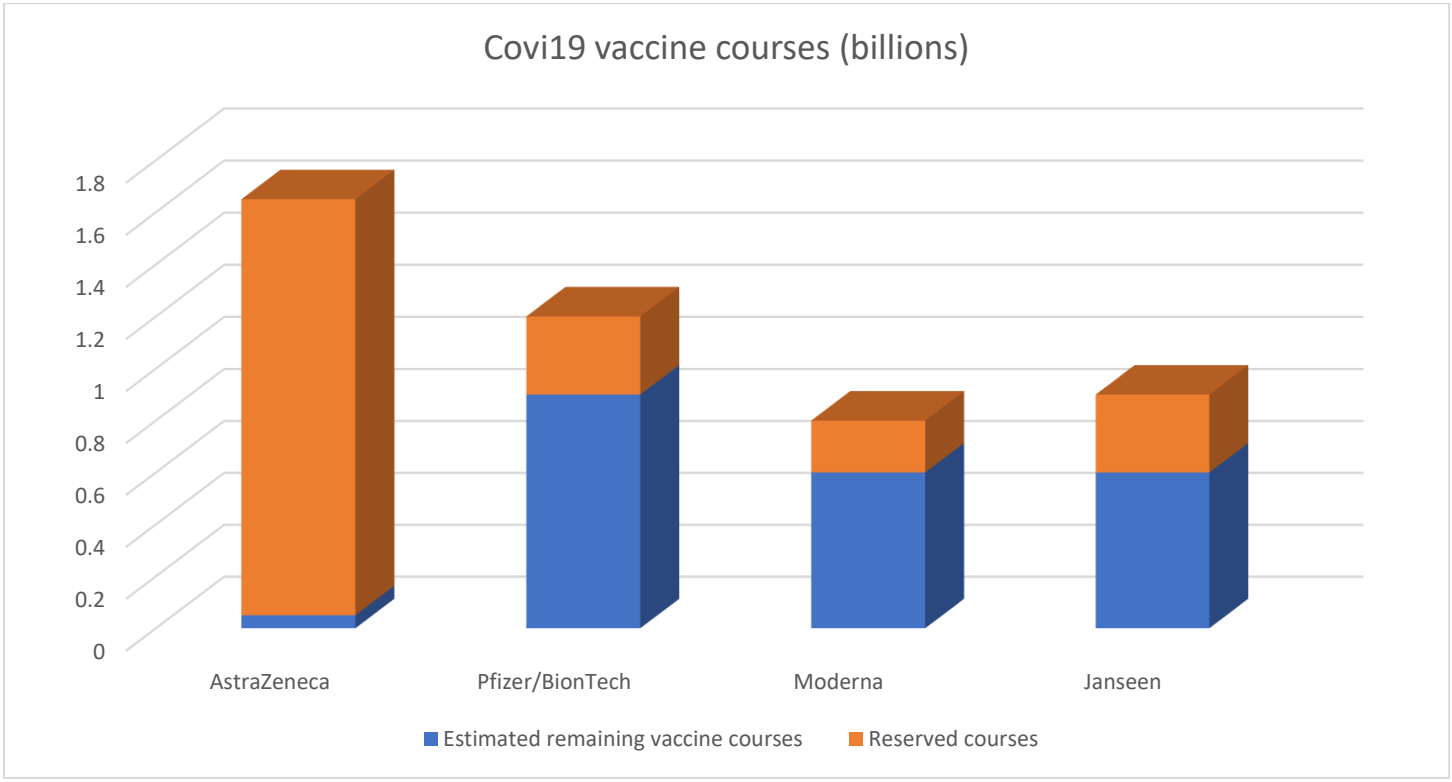
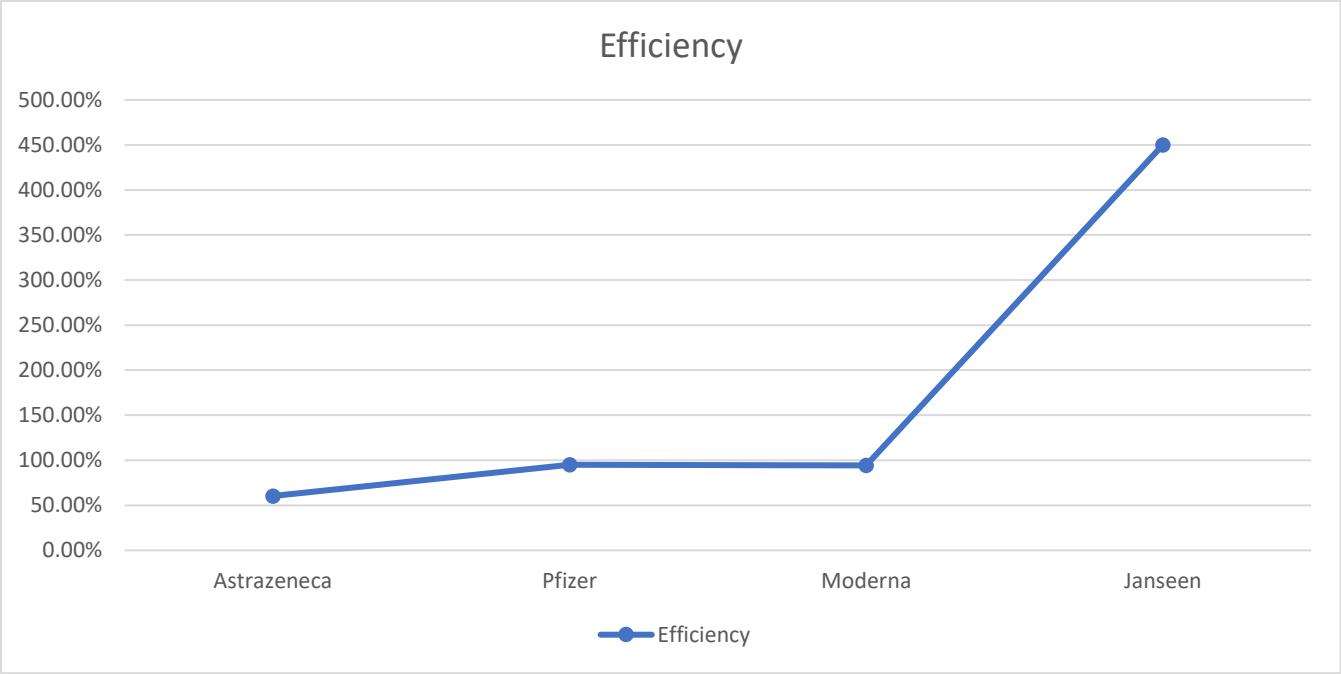
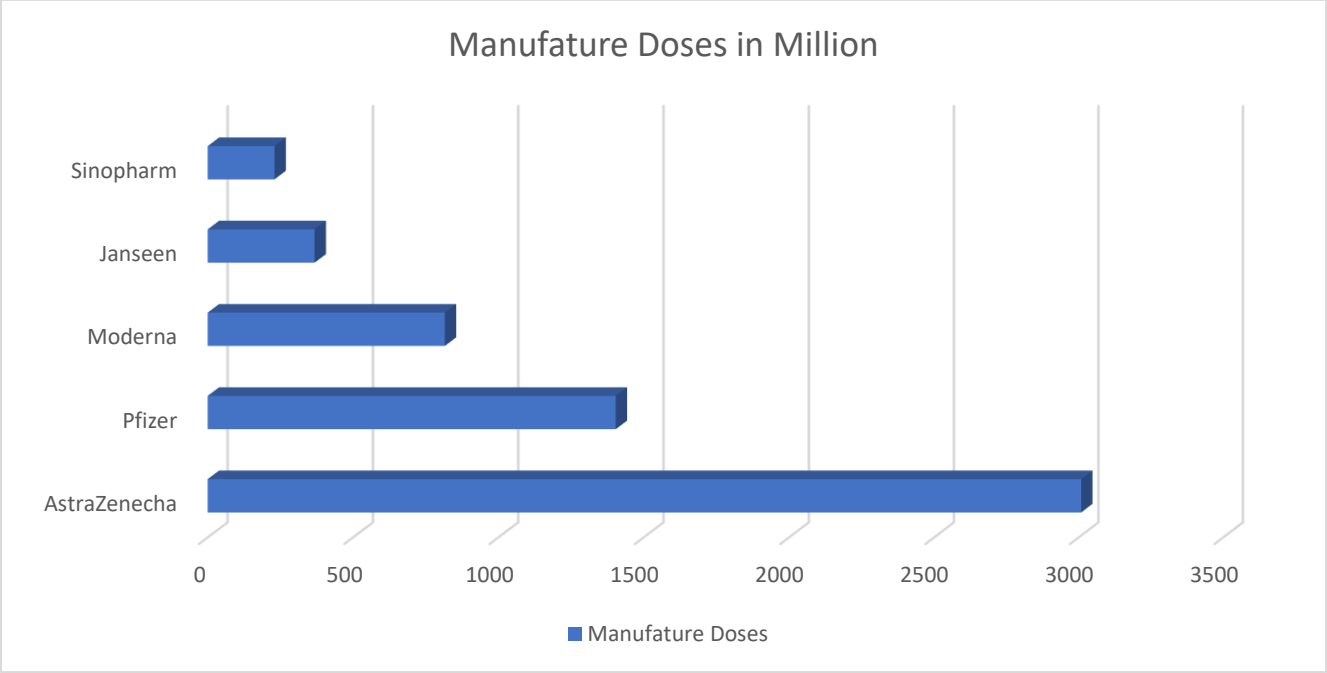
Vaccines

A vaccine is a biological preparation that provides an active immune system to a particular disease. It is introduced into the body to prevent infection or disease. The immune system of the body learns from the vaccine DNA formula to defend from diseases or pathogen. Unlike traditional pharmaceuticals, the vaccine immune system has lifelong protection for an extended period including prevention of diseases and/or related sequelae. The body's immune system produces an immune response to the disease by generating antibodies, killer cells.



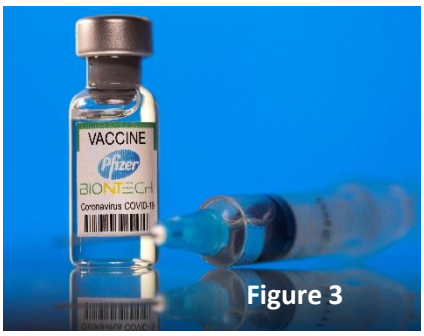




But the vaccines are different from each other. It can be the difference in the agent that has to be given to the patient, the efficiency of the immune power of the vaccine, the shots of the vaccine that has to be given to a particular patient.

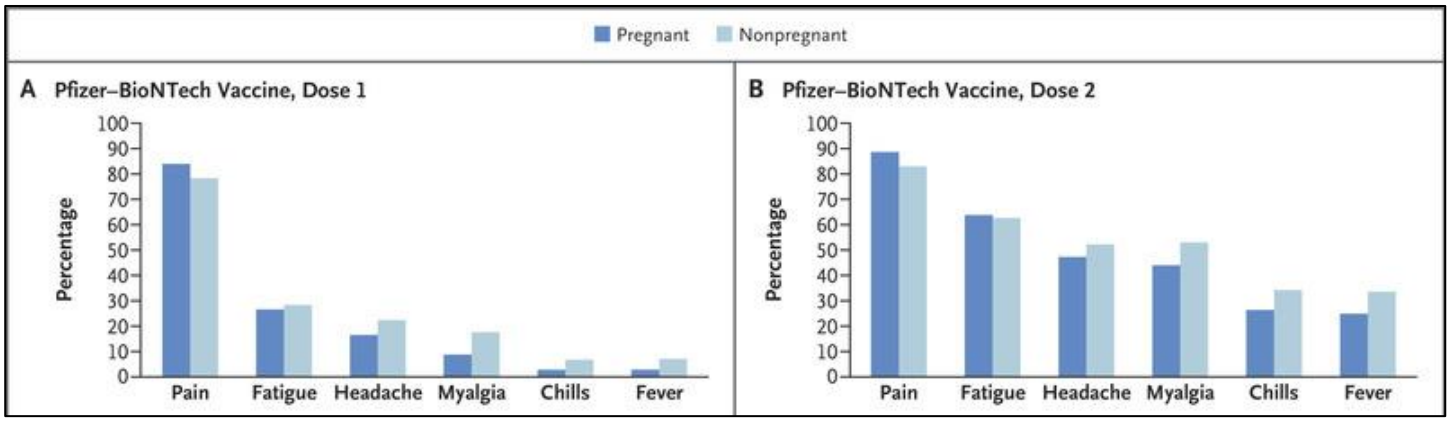
Figure 2

Pfizer/BioNTech



A German company, develop this vaccine with Pfizer, an American company, for support with clinical and medical trials, logistics and manufacturing. As of March 30, 2021, Pfizer and BioNTech aimed to manufacture about 2.5 billion doses in 2021. this vaccine's efficacy at preventing disease is 91%. The mRNA sequence of the vaccine is 4,284 nucleotides long. It consists of five-prim. It consists of a five-prime cap; a five prime untranslated region derived from the sequence of human alpha-globin; a signal peptide (bases 55–102) and two proline substitutions (K986P and V987P, designated "2P") that cause the spike to adopt a prefusion-stabilized conformation reducing the membrane fusion ability, increasing expression and stimulating neutralizing antibodies.

This chart shows that how Pfizer-BioNTech shows side effects in Pragnent vs non-pragnent womans.

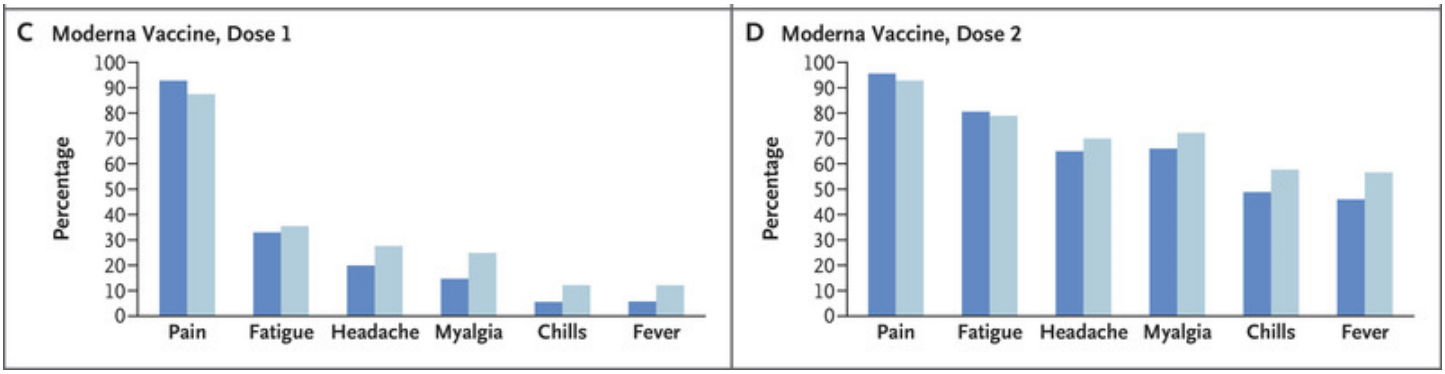


There is no major side effect of this vaccine. But in clinical treatment side effects deemed very common, like pain welling at the injection point, headache, muscle aches, chills, joint pain and fever. So far eleven cases per million doses given reported as a severe allergic reaction. The side effects are regularly reviewed by the European Medicines Agency for vaccination safety.

Moderna

Figure 4

The Moderna covid-19 (mRNA-1273) vaccine manufactured by Moderna, Inc. It is an American pharmaceutical company based in Cambridge, Massachusetts. It focuses on vaccine technologies in mRNA format. It inserts synthetic nucleoside-modified messenger RNA (Moderna) into human cells using a coating of lipid nanoparticles. This mRNA then reprograms the cells to prompt immune responses.[11][12] Moderna develops mRNA therapeutic vaccines that are delivered in lipid nanoparticle, using mRNA with pseudouridine nucleosides. Candidates are designed to have improved folding and translation efficiency via insertional mutagenesis



The modern vaccine is an MNRA-based vaccine. Based on a two-month average follow-up, SAGE was found to have an efficacy of 94.1%. Although the vaccine is administered in a multidose vial at -25 to -15 atC as a frozen suspension, vials can be stored at 2–8 at C for up to 30 days before the withdrawal of the refrigerated first dose, meaning that cold chain equipment is not always required to use the intra-vaccine.

AstraZeneca/AZD

Figure 5

The Oxford-AstraZeneca COVID-19 vaccine, its code name is AZD1222 and sold under the brand names Covishild and Vaxzevria. The important thing is this vaccine among others, a viral vector vaccine for the prevention of COVID-19. It is developed by Oxford University and AstraZeneca, it is given by intramuscular injection, using as a vector modified chimpanzee adenovirus ChaAdOx1. it has 76% efficacy at

preventing symptomatic COVID-19 beginning at 22 days following the first dose and 81.3% after the second dose.

Like other vaccines, this also has normal side effects including injection-site pain, headache, and nausea, all generally resolving within few days. The UK Medicines and Healthcare products Regulatory Agency (MHRA) has 268 reports out of 21.1 million vaccination. around 1 in 0.1 million cases have been associated with an increased risk of blood clots. blood clot means Blood clotting, or coagulation is an important process that prevents excessive bleeding when a blood vessel is injured. Platelets (a type of blood cell) and proteins in your plasma (the liquid part of the blood) work together to stop the bleeding by forming a clot over the injury.

Janssen/Ad26.COV 2.S

Figure 7

The Janssen or Johnson & Johnson COVID-19 vaccine is a COVID-19 vaccine developed by Janssen Vaccine in Leiden, Netherlandic is a viral vector vaccine based on a human adenovirus that has been modified to contain the gene for making the spike protein of the SARS-COV-2 virus that causes Covid-19. The body's immune system responds to this spike protein to produce antibodies. The vaccine requires only a single dose and does not require freezing. First clinical trials for the vaccine were started in June 2020, with Phase III trials involving around 43000 people.

The main difference between this vaccine vs others such as (Oxford–AstraZeneca, Pfizer–BioNTech, and Moderna vaccines), is administered as a single dose instead of as two separate doses. Inactive bottles can be stored at 9 to 25 ° C (48 to 77 F) for up to twelve hours, and this is possible for several months in a standard refrigerator. It is not shipped or stored frozen.

The most common side effects are pain at the injection site, headache, tiredness, muscle pain and nausea, affecting more than 1 in 10 people. Less than 1 in 10 people experience cough, joint pain, fever, runny nose, redness and swelling at the injection site. Sneezing, tremors, sore throat, rash, sweating, muscle weakness,

pain in arms and legs, back pain, weakness and general malaise occur in less than 1 in 100 people. Rare side effects (less than 1 in 1,000) include hypersensitivity (allergy) and itchy rash.

These are some vaccines that are used in major nowadays in the world. The United State of America nearly announced that if you are vaccinated, you don't need to wear the mask. And Israel was announced that nearly whole citizens of the country vaccinated. So call for a mask free nation. South Korea announced that put off your mask if you are vaccinated mandatory. So each country is now leaving slowly from the severe pandemic that we are facing for as long as two years.

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The future situation in Sri Lanka

On 2019 December 31, World Health Organization was informed of new diseases that spread vastly among the people of China mainly in Wuhan City. Provisionally it was named as (nCoV) Novel coronavirus before a permanent name is decided upon. Coronaviruses are a large family of viruses that cause health problems from a common fever to severe diseases. Sometimes it causes death if no proper treatment has given. On 30 January 2020, the WHO director declared the novel coronavirus outbreak a public health emergency of international concern.

If we consider our country, Covid-19 is one of the major threats since the beginning of 2019. Our economic, tourism and education sectors are fully damaged by the pandemic. If this continues, we have to face the severe condition of our lives than we have faced ever.

The graph shows the covid effect in Sri Lanka by provincial status. Western province is the most affected by the pandemic.

Tourism Industry

The Govt-19 epidemic has left the tourism industry dealing with an unprecedented situation around the world. Not new to the crisis, the Sri Lankan tourism industry is struggling with the catastrophic effects of the growing financial crisis on cancelled bookings, travel consultants, airport closures and all tourism businesses.

According to the XINHUANET news page, the Tourism industry dropped to 391 million US dollars at the beginning of February, in comparison to 475 million US dollars earned within the same period last year, local media, quoting official figures from Sri Lanka. The island's tourism industry has been hit hardest by the global Govt-19 epidemic, with industry revenues likely to be severely affected this year, industry experts said.

Particularly, the Sri Lanka tourism industry is a major contributor to the country's GDP, with its direct contribution being 5%. After Sri Lanka was named as the best country in the world to visit in 2019 by lonely Planet, tourist arrivals of the first quarter in 2019 increased compared to 2018. After the Easter Attack, the tourism industry dropped. Many countries advised the citizens not to visit Sri Lanka. After two years, the tourism industry was trying to speed up the recovery from the Easter attack. However, that momentum of recovering the tourism industry was halted with the emergence of the COVID 19 pandemic from March 2020. This was the second attack on the Sri Lankan tourism sector within one year.

This table shows that comparison of the year 2019 and 2020 (quarter)

Month	2019	2020	%Change
January	244,239	228,434	6.5
February	252,033	207,507	17.7
March	244,328	71,370	70.8

By the results of, COVID 19 pandemic the tourism and hospitality industry was severely damaged in terms of revenue. Sri Lanka's tourism sector has been hit hard as restrictions have been imposed on some countries due to disruptions to global travel and the spread of the disease. From April 2020, Sri Lanka closed its borders for essential passenger and domestic travel. And imposed travel restrictions. The tourism sector was closed permanently. Businesses faced a major crisis in survival. Therefore, they had to lay off their employees. This led to high unemployment in the industry. According to the Sri Lanka Tourism Development Authority (2018), the sector has more than 400,000 direct and indirect tourism and hospitality employees.

Education sector

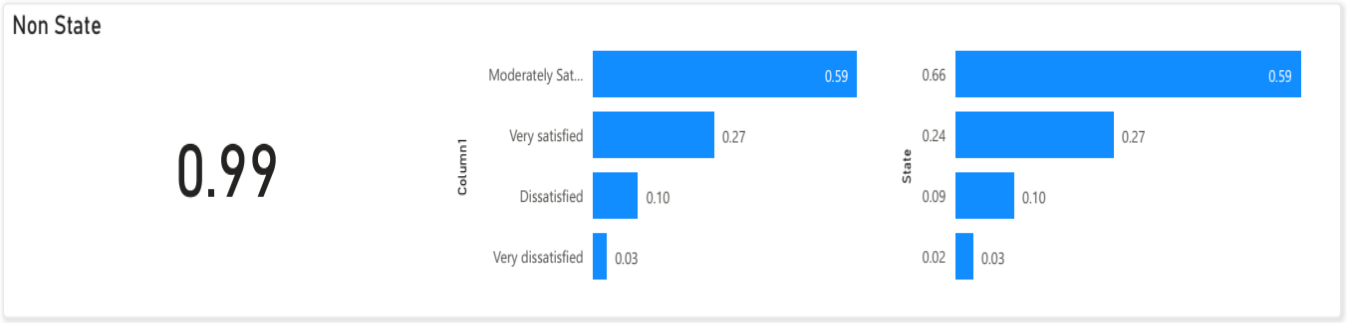
The COVID-19 pandemic has affected schools and Universities education worldwide. Most governments around the world have temporarily closed schools in an attempt to contain the spread of the COVID-19 pandemic. The academic closures impact not only students but carry high social and economic costs for people across communities.

With schools closed following the Govt-19 eruption and the sudden shift to online learning, poor children who do not have access to e-learning opportunities are still at risk of falling behind. According to the “economy next” journal, only 48% of Sri Lankan households with school-aged children owned a smartphone or essential services for education. At the start of 2019, and only 34% had an internet connection, a majority connected via mobile phones, survey data showed.

“According to the Computer Literacy Survey –2019 (DCS), only 22.2% of the households in Sri Lanka own a desktop/laptop computer (Urban: 38.3%; Rural: 19.9% and Estate: 3.8%). The use of smartphones, while growing would be limited particularly in rural areas.

Due to the Covid – 19 pandemic, all schools and universities have lifted their education system from physically, turn into virtually. If we take the higher education in Sri Lanka, according to the “ADB BRIEFS” article it shows the research that it has done in Sri Lanka, in various headings.

The research shows the satisfaction of state and non-state universities across Sri Lanka, during the pandemic situation, students interest in academic activities.



Column1	State	Non State
Dissatisfied	0.09	0.10
Moderately Satisfied	0.66	0.59
Very dissatisfied	0.02	0.03
Very satisfied	0.24	0.27

According to the report, state universities are more likely to learn physically than online. In response to Govt-19, it provided opportunities for Sri Lanka's tertiary education system to become more flexible in the face of unforeseen future challenges. "It may be a magical solution to the problems of higher education in Sri Lanka," one faculty member replied.

Still, many faculty see online education as an implementer of face-to-face learning, rather than something entirely face-to-face teaching. As mentioned earlier, almost all teachers had their first experience in providing online education during Govt-19. If Sri Lanka continues to build on the lessons learned in this crisis, this external trauma may be a catalyst for the emergence of open-minded attitudes and attitudes towards mixed learning.