PRAXZINE

Fortnightly Newsletter by Praxeis

ALLIANCE UNIVERSITY

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FEATURED PIECES

Vaccine Efficacy

Comparing Covid-19 vaccine efficacy numbers can be misleading. The best Covid-19 vaccine for you is most likely still the first one you can get.

Detroit Mayor Mike Duggan at the start of the march of 2021 turned down 6,200 Johnson & Johnson vaccine doses for his city. “Johnson & Johnson is a very good vaccine. Moderna with efficacy 94% and Pfizer with efficacy 95%, are the best,” Duggan said in a news conference. “And I am going to do everything I can to make sure that residents of the city of Detroit get the best.”

Scientists have reasons to believe that the efficacy is not the best way to judge the effectiveness of a vaccine. According to which the Jhonson and Jhonson vaccine with an efficacy rate of 66% is inferior to the other two vaccines. This is a wrong way to judge a vaccine and a misleading understanding of how a vaccine should be viewed.

How some of the Covid-19 vaccines compare

Company	Doses	Storage
RNA		
Pfizer (BioNTech)		-80 to -60°C (6 months) and 2 to 8°C (for up to 5 days)
Moderna		-25 to -15°C (6 months) and 2 to 8°C (for 30 days)
Viral vector		
Oxford-AstraZeneca		2 to 8°C (6 months)
Sputnik V (Gamaleya)		-18.5°C (liquid form) 2 to 8°C (dry form)
Johnson & Johnson (Janssen)		2 to 8°C (3 months)
Inactivated virus		
CoronaVac (Sinovac)		2 to 8°C
Sinopharm		2 to 8°C
Covaxin (Bharat Biotech)		2 to 8°C
Protein-based		
Novavax		2 to 8°C

Source: Wellcome Trust, BBC research

Such actions are especially worrying at the current stage of the pandemic. Reports say there are more than 4000 deaths per day in India, and while new cases seem to be declining, the virus is still spreading, new variants are gaining ground. In clinical trials, the vaccines produced by All major Vaccine manufacturers reduced the fatality rate of Covid-19 by 100 percent compared to their placebo groups. They also kept all recipients out of the hospital. That means they can potentially downgrade Covid-19 from a public health crisis to a manageable problem.

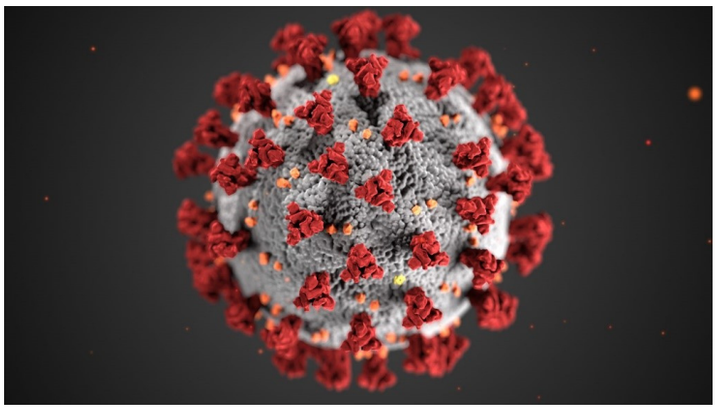
The goal of a vaccine is not what you think it is. The goal of a vaccine was really to defang or tame this virus, to make it more like other respiratory viruses that we deal with. In other words, a vaccine is supposing to keep you out of the hospitals and keep you alive without any severe medication or life support. But in popular belief, the gap in efficacy rate is fueling the perception that some vaccines are more effective than others with respect to their efficacy rate.

In addition, health officials have been emphasizing that the most important numbers are, how well the vaccines prevent hospitalizations and deaths, are consistent across the board, and are arguably more comparable. Even after these vaccines have begun distribution, researchers are finding that Covid-19 vaccines are doing a remarkable job of keeping people alive.

Why the difference in Efficacy? Johnson & Johnson found that vaccine efficacy shifted depending on the country in which it was studied. The vaccine was found to have a 72 percent overall efficacy after four weeks in preventing Covid-19 symptoms in the US. Under the same benchmarks in South Africa, where a coronavirus variant with worrisome mutations that help it escape vaccines has been spreading widely, the company found a 64 percent efficacy.

Covid-19 Mutation

As long as the pandemic goes on there will be more mutations and many will make the virus more dangerous.



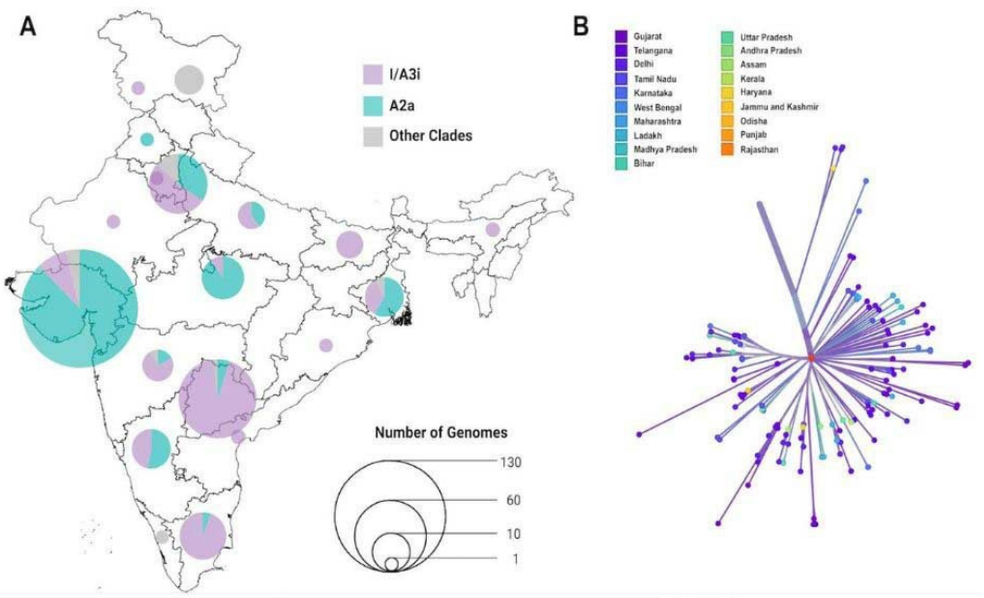
Initially the covid 19 genome, when researched looked different then what it looks now. Covid 19 like any virus changes at a rapid rate, most of the mutation does absolutely nothing but some make it deadlier and more contagious. Researchers are more worried about one mutation in particular.

The new studies ask a question, is Covid 19 more dangerous? The answer is not simple, there are multiple ways a virus mutates but 2 ways make it more dangerous, firstly if the virus is more contagious, and secondly if the virus is more deadly.

Majority of the cases the virus is just genetic code bundled inside a portion shell with a hook like structure on the shell to make it stick to surfaces. The aim of a virus when it enters the body is to multiply while doing this it makes mistakes in the genetic code, these mistakes are mutations and this mistake can vary and go into multiple directions, some are just silent mutations.

The one particular mutation the researchers are worried about is for a spike of amino acid and is called D614G. This particular mutation changes the spike structure of the virus. The actual change is the number of the spikes on a cell, it increases the number of the spike making the virus more likely to attach itself and increases the likelihood of multiplying.

Initially, this change is found in Germany in late January and then spread from there. This mutation mixed with the mutation from Africa and Asia. Now the virus that we are facing is a mix of all the mutations that happened in due course.



The figure to the right shows the spread of the mutant strains in India, the color represents the perticilar strains and the proportion of the multiple strains in there corresponding areas is shown by the size of the circles, with a percentage distribution.

- AMAN GARG

Vaccine Cold-Chain Distribution in India

India's Universal Immunization Program is one of the world's best, but vaccine logistics continue to be an obstacle. COVID-19 Vaccination is one of the most difficult problems that India faces, as the country witnessed the highest case count since the pandemic began. Let us see how India is managing its COVID-19 vaccine supply chain.

How are vaccines being supplied to the states?

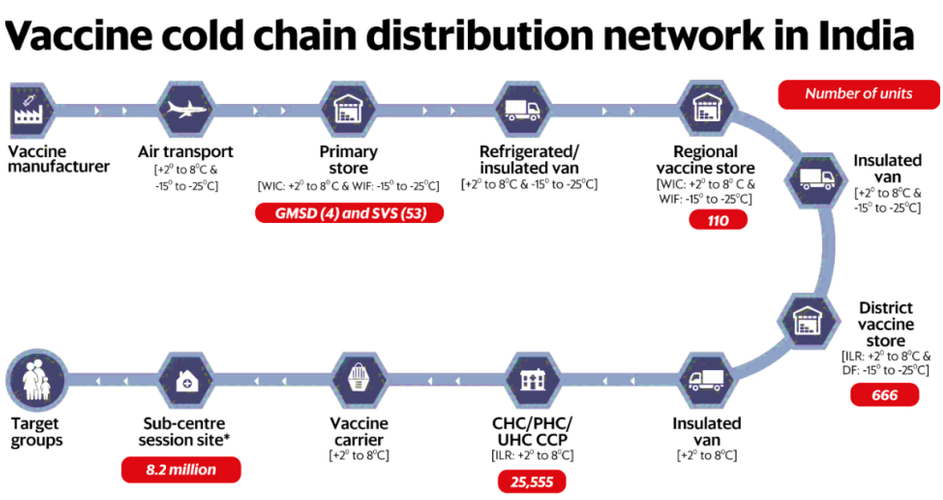
Both Covishield and Covaxin were directly supplied to the states by the Centre for phase 1 (health services and frontline workers) and phase 2 (people above the age of 45). Under the current Liberalised Pricing and Accelerated National Covid-19 Vaccination Strategy, the vaccine manufacturers - Serum Institute of India (SII) for Covishield and Bharat Biotech for Covaxin - will supply 50% of their monthly produced doses to the Government of India and the rest to state governments and private hospitals at discount.

What are the Centre's criteria for allocating vaccines to states for 45+?

The Government of India, from its share, would assign vaccines to States/UTs based on performance standards (speed of administration, average use, degree of infections, and a number of active Covid cases). Wastage of vaccine will also be included in the criteria which will harm the allocation. State-specific quotas will be determined and shared in advance based on the guidelines outlined above.

How are the vaccines getting transported from manufacturing facilities?

Serum Institute of India and Bharat Biotech begin by shipping their vaccines from their manufacturing facilities in temperature-controlled trucks as the vaccines are to be store at a temperature of 2-8°C. These trucks ship the vaccines to the airports from where the vaccines are flown to various nodal hubs around the country.



The Centre and state governments coordinate to monitor the transport to the storage facilities. According to the Union Health Ministry, the vaccines are first transported to the Government Medical Store Depots (GMSD) from these nodal locations, and then the vaccines are transported in refrigerated or insulated vans to state vaccine stores. There are 37 state vaccine stores, which are meant for bulk storage

Where are the vaccines transported to after they arrive in state stores?

When a consignment of vaccinations arrives at a state vaccine shop, it is the duty of the individual state governments to ensure that the vaccine vials arrive safely and with little or no waste at the final vaccination center. The district and sub-district stores and primary health centers are the next destinations.

The district vaccine stores, like the state vaccine stores, are temperature regulated. Throughout the vaccine's journey, data is fed into the Co-WIN (Covid-19 Vaccine Intelligence Network) digital portal and smartphone device.

During transportation, real-time data on vaccine quantity and storage temperature is fed into the digital platform. This allows program managers to warn appropriate authorities if a certain storage point has a temperature that is less than optimal.

How are the vaccines taken to the vaccination or session sites?

The vaccines are delivered in the last mile using ‘passive' devices such as iceboxes and vaccine carriers that do not use electricity. The previous storage points were either powered by electricity or by solar energy. There is also a provision for checking the temperatures of iceboxes and carriers.

What is the set-up of a vaccination site or session site?

According to the Union Health Ministry, a vaccination site should, as far as possible, have a different entrance and ideally, there should be three separate rooms for waiting, vaccination, and observation.

These rooms should be well ventilated and the waiting space should be set up in accordance with physical distancing norms. To maintain secrecy, only one person should be allowed in the vaccination room at a time. Meanwhile, beneficiaries are asked to stay in the observation room for 30 minutes after injection to watch for any moderate or severe side effects or harmful effects.

- SURYA DHAR

Israel
The first country to go mask-free!

Even in these daunting times, a country has emerged victorious with its rigorous ideas and thoughtful immediate actions.

How did they do it?

At the end of 2020, Israel quickly stood out in signing purchase agreements with vaccine manufacturers like Pfizer and Moderna, ensuring that the availability of the vaccine.
The transporting and storing of the vaccine was easier for Israel due to its geographical advantages even though the vials were supposed to be stored under -60 degrees Celsius. Nearly 61.89% of the country's population received first dose of vaccine in the early stages. The vaccine drive started on the 19th of December 2020. The policy allowed family members of the patients to avail the vaccine. This ensured faster distribution of the vaccine.

Israel's ministry of health functions as the primary authority on healthcare policy making. This was crucial as instructions were clearly laid out for the groups responsible. The target groups were also in the clear ensuring that bottlenecks were limited at the vaccination centers.

Besides that Israel also introduced "green passports". This was a phone app that shows if an individual has been immunized or has recovered from the virus. This allowed the people with the green passport to go to gyms and swimming pools, etc. And the ones who did not have a green passport but still visited such sites were heavily penalized.

According to the new report, over 80% of the population over 16 years of age have been given both doses. Israel also, recently reached out to help India to provide for the oxygen tanks. This shows how Israel is always on its feet to safeguard their country and also helping other countries during these times.

- HEENA SHARMA

Oxygen Shortage
Supply chain Perspective

Amid shortages in a number of states, the Centre has set about plans to import 50,000 tones of medical oxygen.

As India touches 16 lakh active Covid-19 infections, many states have reported shortages of medical oxygen for a growing pool of patients in need of oxygen support. India plans to import 50,000 metric tones of medical oxygen to cater to the rising demand.

How much oxygen is produced, where and what are the constraints on supply?

Oxygen has applications in the iron and steel industry, hospitals, pharmaceutical units that manufacture vials, and the glass industry. Currently, most states have diverted their entire oxygen production for medical use.

Industry experts said India has the capacity to produce more than 7,000 metric tones of medical oxygen. The major manufacturers are Inox Air Products, Linde India, Goyal MG Gases Pvt Ltd, National Oxygen Limited. The largest of these, Inox, produces 2000 tones per day. “We are currently contributing to 60% of the total medical oxygen requirement in the country. We have stopped nitrogen and argon gas production and diverted all resources for oxygen production,” an Inox official said.

During the first wave of the pandemic last year, smaller manufacturers that produced industrial oxygen, too, were allowed to produce medical oxygen by changing certain specifications. This has helped expand the medical oxygen production capacity.

Manufacturers prepare liquid oxygen with 99.5% purity, which is stored in jumbo tankers and transported to distributors in cryogenic tankers at a specified temperature. At the distributor level, a process of regasification is followed to convert the oxygen into gaseous form and fill it in jumbo cylinders and dura cylinders. These cylinders then go to smaller suppliers or directly to hospitals. “The problem is demand is high, but there are not enough cylinders and tankers to store and transport oxygen,” an industry expert said.

It is impossible to immediately set up new oxygen manufacturing plants or expand existing ones. Inox started 2 plants in West Bengal and UP to produce 200 and 150 tones of oxygen respectively per day.
The process of installing 1 plant took 24 months. An Inox official said they have plans for more plants in MP, UP, Tamil Nadu, and West Bengal.

The Centre has been trying several measures to address the oxygen shortage. Several new Liquid Medical Oxygen (LMO) production plants have commenced, and industrial oxygen is being routed for medical use. While the timely LMO production has provided some, albeit limited, relief to meet the demand, transporting the produced oxygen to demand locations remains a logistical challenge. According to a recent government press release, as of April 21, the Centre has allocated 6,822 tone per day against the demand of 6,785 tone per day of LMO from 20 States. However, with the growing Covid-19 cases, the need for transporting LMO has increased dramatically, almost leading to an oxygen-logistics crisis.

What are the hurdles in transportation?

India does not have enough cryogenic tankers to ensure 24×7 road transport of medical oxygen. Now when oxygen is being transported from one state to another, the travel time it takes from the manufacturer to a patient's bed has increased from 3-5 days to 6-8 days. The smaller a hospital or the more remote its location, the longer the time taken for the oxygen to reach there. Smaller suppliers have also complained they do not have enough jumbo and dura cylinders to keep the flow steady.

The increase in cost for transport and logistics has increased the cost of refilling cylinders. A cylinder that would earlier cost Rs 100-150 for refiling, now costs Rs 500-2000.

Using real-time tracking, we are monitoring the movement of oxygen tankers," Additional Secretary, Ministry of Home Affairs said today while addressing a press conference in Delhi. The government has also directed hospitals for judicious use of oxygen and to plug leakage, if any, amid shortage faced by Covid-19 patients.

- AASIM AHMED

GREEN CORRIDOR- COVID-19

With the onset of the second wave of COVID-19 in mid-February, the country has been grappling with hospital beds, ventilators, oxygen cylinders, and basic drugs which have been proven effective against the virus. Under these grim circumstances, the supply chain & logistics division has also been disrupted. The pivotal nature of logistics has been highlighted by the ongoing crisis from getting PPE kits to healthcare workers, replenishing stocks in healthcare facilities & supermarkets. The challenges are imposing since capacity is evaporated & there has been inventory chaos too. Real-time visibility into logistics is a major challenge for supply chain entities.

Amidst such tumultuous circumstances, the creation of green corridors became the beacon of hope for mankind. A green corridor is a delineated, cleared route that ensures that the vehicle carrying essential supplies escapes the traffic congestion and reaches the destination in the least possible time via the shortest path. The country is in a situation where its population is gasping for air. The creation of Green Corridors to ensure hassle-free oxygen supply to places in dire need has strengthened our fight against COVID.

Oxygen Express Train - Oxygen express train, through green corridors, is being used to transport liquid medical oxygen & oxygen cylinders across the country.

Delhi Police created a green corridor to curb oxygen shortage.

On April 20, 2021, Delhi Police created a green corridor to clear the path for two oxygen tankers that were heading to a hospital in Paschim Vihar. Through this initiative, about 235 patients whose oxygen levels were below the critical mark got the survival gas.

Oxygen Tankers get signal-free movement in Bengaluru.

On April 24, 2021, Bengaluru traffic police created four green corridors for seamless movement of oxygen tankers for a distance of 50 kilometers. The traffic police also helped nearly 1200 Ambulances to get fast clearance by creating green corridors.

Setting up a Green Corridor is a tedious process since it involves multiple stakeholders. It requires concentrated efforts from Medical facilities, local police, traffic police, railway authorities, etc. However, it can be achieved through operational readiness and support from the general public.

Together, we can make a difference!

- SAKSHI DUBEY

Vaccine Wastage

What is Vaccine Wastage?

Vaccine Wastage is an expected component of any large vaccination drive, and a vaccine is procured from the maker with an estimated wastage. For each vaccine type, the wastage has to be within recommended limits.

In India the vaccine wastage is higher than the recommended limits, therefore the following has happened- High vaccine wastage inflates vaccine demand and increases unnecessary procurement

Vaccine wastage is one of the key factors to be considered for vaccine forecasting and needs estimation. The number of Covid-19 vaccines required in a month in a catchment area (state/ district/ block/ sector) for a month is calculated from the formula:

Requirement = (Total population to be covered in the catchment area) × (% of the population to be covered in this catchment area/no. of months of the campaign) × 2 doses × WMF.

Here-> (WMF- wastage multiple factor)

How does the wastage happen?

Each Covishield vial has 10 doses in total, while a Covaxin vial contains 20 doses — each dose being 0.5 ml (for one person). Once opened, all doses have to be administered within four hours, otherwise, it goes to waste and the remaining doses have to be destroyed. Since the vaccines need to be utilised within four hours of being opened, vaccinators need to coordinate the flow of beneficiaries.

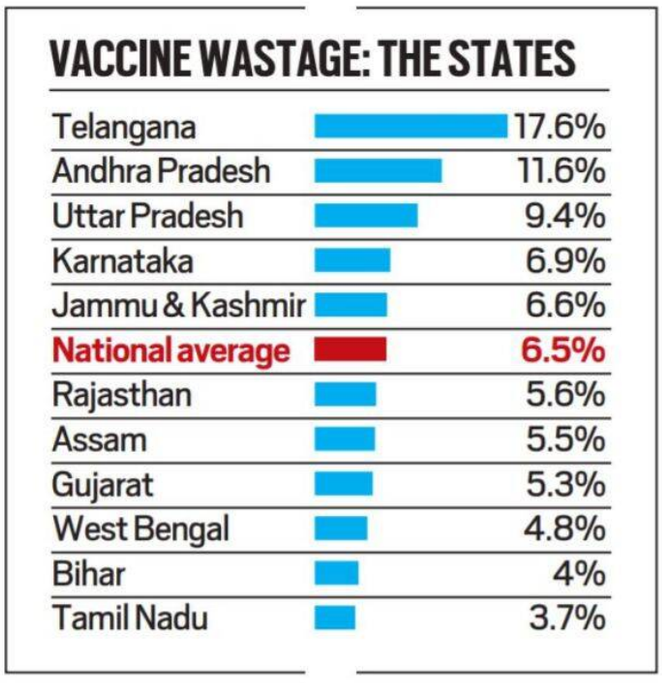
It happens in two ways which are explained below:

In Unopened Vials

- If the vaccine has crossed the expiry date
- If it is exposed to heat
- If the vaccine has been frozen breakage
- Missing inventory and theft

In Opened Vials

- While discarding leftover doses
- Not able to draw out the number of doses
- Vials submerged in water
- Suspected contamination
- Poor vaccine administration practices



Steps to reduce the Vaccine Wastage across various points included in vaccine supply and distribution

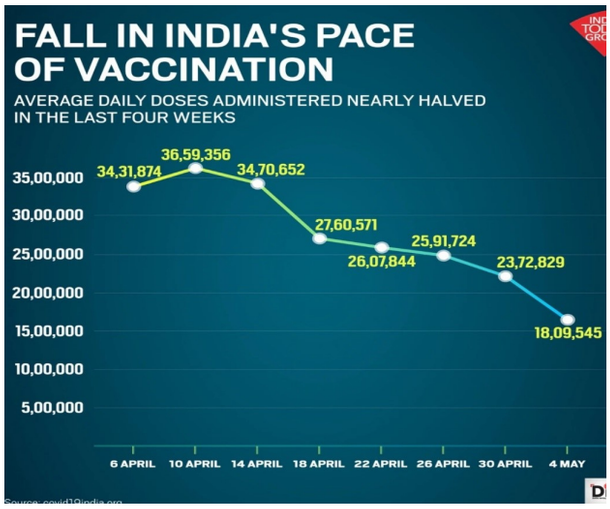
- At all times, the issue of vaccine doses should match the registered list of beneficiaries
- Vials with earlier manufacturing dates should be prioritized
- Supply frequency should be monitored closely
- Vaccine supply sessions should be planned well
- Each vaccine session should serve a maximum of 100 beneficiaries
- The Central government has advised not to open vials if sites do not have a minimum of 10 people
- Train vaccinators, as some of them end up drawing only nine doses against 10

Some Facts about the wastage of vaccines in India

According to available data, at least three lakh (300,000) or 6.5% of Covid doses have been wasted so far out of the 7 Cr vaccines provided by the central government and 3.46Cr have been administered. Among major states, Tamil Nadu, Assam, Manipur, and Haryana account for most of the waste, according to the Ministry of Health and Family Welfare.

In Contrast, states like Kerala have come up with innovative ways to reduce wastage, Kerala had received 73,38,806 doses of vaccine from GoI. They provided 74,26,164 doses, even making use of the extra dose available as wastage factor in each vial. It has led to a reduction in the pace of vaccination across the country.

Some Indian start-ups have come up with solutions to provide last-mile delivery for the vaccine storage and supplies- one such company is Manipal-based Blackfrog Technologies with their product **EMVOLIO**.



Conclusion

According to World Health Organization (WHO) data, over 25% of vaccines go to waste globally even before reaching the doctors and patients while many lose their efficacy by the time, they are administered due to lack of a quality supply chain and logistics management system. This is posing a major challenge for the governments as well as public health agencies working to expand immunization coverage.

- KESHAV YADAV