

Sars-Cov-2 vaccines for India

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Fighting Covid-19 is the need of the hour

- ▶ In January we were hearing about problems in China
- ▶ In February we started worrying what would happen if it came here
- ▶ In early March we were writing policy papers on India in Covid 19
- ▶ By late March we had lockdowns.
- ▶ While a lot has changed, the fact remains that fighting Covid-19 is a very important problem.
- ▶ The financing, contracting and scientific achievements on vaccines are near-miraculous.

At the end of 2020, analyse cost, benefit, incentives of various actors

- ▶ We are now at the end of 2020
- ▶ It is a good time to take stock of the costs and benefits of various paths
- ▶ And look for incentive-compatible solutions.

Population-scale government-led rollout

Elements of thinking on large-scale rollout

- ▶ Nandan Nilekani wrote *How to vaccinate a billion people* and *How to secure India against Covid-19*, in the *Hindustan Times*, at the end of August 2020.
- ▶ The key idea was to build a new organisational structure, intensively use IT systems for management, emphasise leadership and control in the government, use the methods that UIDAI used in its startup phase as opposed to conventional government operations.
- ▶ Nandan Nilekani, R. S. Sharma, etc. got us all thinking about these problems by August 2020.
- ▶ Government of India has built a major rollout plan and elements of this are in motion.
- ▶ Many other countries have important experiences: E.g. US government: buy from producers, UPS/Fedex to CVS/Walgreen.

Smallpox?

A population-scale success story!

But:

Cold chain Not required from 1971 onwards.

Timescales Chipped away over a long time period, in 1970-1973 down to a few states, the last push was a special mobilisation: 1973-1975.

Scale Mar-Nov 1976: 330k households/day were searched for new cases.

Testing Case worker only had to look at the face of a person.

External dimension Part of the global push towards smallpox *eradication*, role of WHO.

State capacity It worked, in the state capacity of that age.

Big attempts on malaria and polio in the following years, less exciting results.

State capacity constraints

Limitations of administrative capacity for a state-led rollout

- ▶ A state-led program to get two doses, with a cold chain, to 1.3B people, has never been done.
- ▶ At present, we struggle to achieve full immunisation for \approx 30M women and similar number of infants per year.
- ▶ Highly heterogeneous conditions:
 1. Bombay/Kerala are vastly different from UP/Bihar.
 2. Most of health is in the State list of the Constitution
 3. A lot of the operational capability is in state/city governments
 4. The bulk of health care is now in the private sector.

Constraints in the State system

- ▶ State structures lack a cold chain in urban India.
- ▶ Concern: Will a mission mode focus on Covid-19 adversely impact on other regular immunisation work?
(example: Covid-19 health care at the expense of other health care; Jan Dhan Yojana at the expense of normal banking work).
- ▶ Phlebotomists at the last mile are largely in the private health care sector.
- ▶ Process maturity required to get two doses precisely 28 days apart.
- ▶ Existing state system is oriented towards infants. Covid-19 should lay foundations of a sound adult vaccination system.

Cold chain for drugs/vaccines vs. cold chain for milk

- ▶ A box of milk must be cold from farm to fork
- ▶ When the milk is mishandled along the way, the customer perceives this with some probability p , as spoilage
- ▶ This exerts pressure through the normal feedback loops of the market economy
- ▶ With drugs and vaccines the customer has no way of knowing that she was given a dud
- ▶ The path to trust is the abstract concept of the brand name of the provider. Do I trust that a vaccination run by X organisation will have benefited from rigorous quality control every step of the way?

Hesitancy

Vaccine hesitancy

Person-specific estimates of p_1, p_2, p_3 are required:

	Sick	Side effects
Vaccine	p_1	p_2
No vaccine	p_3	0

Information hesitancy

- ▶ Data about individuals in the hands of the state has started generating resistance from the citizenry.
- ▶ Data about a private person in the hands of a private firm is more accepted in the citizenry

State coercion will generate civil disobedience.

Vaccination as a stepping stone to herd immunity

Two perspectives on vaccines

Vaccines as a population-scale treatment We get enough vaccination into the population so that $R_0 < 1$, there can be isolated cases, but the epidemic burns out.

Example: US FDA threshold of 50% effectiveness.

Example: Smallpox campaign started at 80% coverage and then put out specific fires.

Vaccines as protection for the individual When vaccines are highly effective they can be rather interesting to protect one person at a time.

The dynamics of the private market for vaccines

Today's bulk pricing

Firm	Price
AZ	€1.78
J&J	\$8.5
Sanofi/GSK	€7.56
BioNTech/Pfizer	€12
Curevac	€10
Moderna	€18

(Rs.500 is €6 or \$7).

How the supply curve and the demand curve will shift

Supply curve	Demand curve
1. Multiple firms will get through to approvals in OECD countries	1. As herd immunity sets in (through disease + vaccination), the threat perception of customers will go down
2. Great focus on getting manufacturing up to scale	2. The willingness to pay will go down
3. The cost function will shift, the supply curve will shift right.	3. The demand curve will shift left.

Demand curve will shift left, the Supply curve will shift right, the price will collapse.

The way forward

Costs and benefits of a union-government led population-scale program

- ▶ It is hard to do
- ▶ The gains are small.

Intuition from Bombay

- ▶ The slums have achieved herd immunity
- ▶ The buildings have not
- ▶ The gains from the vaccines are in the buildings
- ▶ Here there is an ability for private persons to pay Rs.2000 per person to a private firm.

Design principles

Distributed energy Harness leadership, management and energy from numerous persons/teams all over India.

Diversification Diversify across multiple pathways to the desired destination, do not have all our eggs in one basket.

Local control Place functions at local communities and organisations, as the political/management leadership will be accountable to their people.

Maximal inputs Harness capabilities / resourcing wherever it can be found.
Rs.2000/person for the population is Rs.2.7 trillion, is a lot.

Reduce state legibility Respect information hesitancy, reduce the amount of information about individuals going to the government.

Element 1: Better data

- ▶ **Every city and every state in India should** run monthly longitudinal survey-based measurement of seroprevalence (with additional questions on vaccination and Covid-19 tests/symptoms).
- ▶ Link up to a rich array of household characteristics
- ▶ This will yield statements about the level and time trajectory of seroprevalence
- ▶ It will show the pockets of the population which is still available for the disease as dry kindling
- ▶ Micro data should be released in the public domain (without identities!)
- ▶ Researchers will build web interfaces where a person in (say) Vishakhapatnam will be able to supply individual/hh characteristics, and get a predicted probability of having antibodies.

This involves the use of state funding + contracting.

Element 2: Transparency by private health care providers

- ▶ Private health care firms will import vaccines, or buy locally, and setup service provision
- ▶ **State power should be used** to force them to do a high level of transparency, releasing comprehensive details about *how* they are organising themselves to do vaccination.
- ▶ **Can (say) Moderna be paid** to run a system in India where *they* take samples from the last mile, and assess the state of purity of their vaccine as it is rolled out by multiple private health-care firms? This is incentive-compatible for them.
- ▶ **State funding should** go to academic researchers (public or private) who will study these offerings and write articles in the public domain about the strengths and weaknesses of each private provider
- ▶ Example: Can we trust the cold chain of firm X?
- ▶ Example: Is Moderna or Pfizer or AZ the best for a woman?

This involves the use of state coercion, state funding + contracting.

Element 3: Occupational provision

- ▶ Employers should be encouraged to do bulk purchases from private health-care firms of immunisation services for their employees and family members.
- ▶ Some employers may choose to go further, to contractors (e.g. Uber drivers?) and to customers (airlines?)
- ▶ **There are many government organisations** (e.g. IITB, CRPF, ITBF, DEA), which should also think similarly. There are $\approx 30\text{M}$ employees, $\approx 120\text{M}$ family members in all, quite a big problem.
- ▶ Employers working for employees is incentive compatible. E.g. NPS works pretty well because civil servants are customers. At each employer, great attention will be paid to the cold chain that's used by a certain vendor, to accurate implementation of 2 doses across 28 days.
- ▶ **The encouragement should be in the form of** publicity and prizes for best employers. Not coercion.

This involves the use of state funding + contracting.

Element 4: Vouchers

- ▶ Suppose the public health authorities in Pondicherry see a low-income community with low seroprevalence
- ▶ Where the gains from the vaccine could be large.
- ▶ Suppose the public health authorities are convinced that there is a category of private persons that are unusually important (e.g. school teachers?) but the Rs.2000 per person is an infeasible expenditure.
- ▶ Similar ideas would apply for MoH priorities - health care workers, the elderly.
- ▶ The simplest intervention is to **use public money and give vaccine vouchers**.
- ▶ Harness the energy and capabilities of the private health care industry for last mile delivery.

This involves the use of state funding + contracting.

A portfolio of initiatives

- ▶ In the backdrop, the system is progressing towards herd immunity
- ▶ This is an approach with many elements, a diversified portfolio of effort, a self-organising system.
- ▶ Multiple initiatives of this nature will kick the system into $R_0 < 1$ in various communities in India, and the epidemic will die out.

Thank you.

<http://www.mayin.org/ajayshah>

<http://blog.theleapjournal.org>

Some related work

Dodging a bullet?, Business Standard, 6 February 2020.

Responding to the new coronavirus: An Indian policy perspective, NIPFP working paper, 11 March 2020.

Indian health policy in the light of Covid-19: The puzzles of state capacity and institutional design, India Policy Forum 2020 (forthcoming).

The market for Covid-19 vaccines and the tipping point to herd immunity, The Leap Blog, 27 September 2020.

How the vaccine story will play out, Business Standard, 30 November 2020.

The path to normalisation through herd immunity, Business Standard, 14 December 2020.