

# Impediments to Universal Covid-19 Vaccination\*

Partha Mukhopadhyay

**\* This is based on a forthcoming contribution to the UNDP Policy Brief Series.  
Their support is gratefully acknowledged**

# 1-minute summary

- *The world has the ability to produce and the capacity to pay for sufficient vaccines to vaccinate all the eligible persons on the planet. The challenge is to organizationally implement such a global program and critically to convince people to get vaccinated.*
- This claim has the following premises.
  - A number of vaccines are swiftly securing regulatory approval.
  - Vaccines are available at various price points and especially at the lower end,. they appear to be broadly affordable for public procurement, Even for private sale, the indicative prices are affordable for some segments of the population
  - There appears to be sufficient capacity (existing or in development) to vaccinate the eligible global population
  - The vaccines can be transported to national delivery points – especially now that the ultra-cold chain is only needed for one vaccine
  - BUT,
    - A substantial minority of people do not appear to be willing to be vaccinated if it is on offer
    - Even if people are willing, last mile is challenging
      - Spatially uneven distribution of pandemics but not reflected in vaccination

# Framework of analysis

## Supply

- **Approval**
  - Trials
  - National regulatory processes
- **Production**
  - Available doses
- **Delivery**
  - Distribution Rules
    - COVAX Allocation
  - Logistics
  - Human resources

## Demand

- **Affordability**
  - Private affordability
    - Pricing
  - Public affordability
    - Budgetary allocations
- **Acceptability**
  - Concerns about vaccination

# Vaccines in use\* in at least one geography

WHO ID	Vaccine platform description	Type of candidate vaccine	Number of doses	Dosing schedule	Route of administration	Developers	Capacity
9	RNA based vaccine	mRNA -1273	2	Day 0 + 28	Intra-Muscular	Moderna + National Institute of Allergy and Infectious Diseases (NIAID)	1 bn
10	RNA based vaccine	BNT162b (3 LNP-mRNAs )	2	Day 0 + 28	Intra-Muscular	BioNTech / Pfizer	2 bn
4	Viral vector (Non-replicating)	ChAdOx1-S - (AZD1222) (Covishield)	2	Day 0 + 28-42	Intra-Muscular	AstraZeneca + University of Oxford	2 bn
6	Viral vector (Non-replicating)	Gam-COVID-Vac Adeno-based (rAd26-S+rAd5-S)	2	Day 0 + 21	Intra-Muscular	Gamaleya Research Institute ; Health Ministry of the Russian Federation	1.4 bn
19	Inactivated virus	Whole-Virion Inactivated SARS-CoV-2 Vaccine (BBV152)	2	Day 0 + 14	Intra-Muscular	Bharat Biotech International Limited	400 mn
7	Viral vector (Non-replicating)	Ad26.COV2.S	1	Day 0	Intra-Muscular	Janssen Pharmaceuticals	1 bn
1	Inactivated virus	SARS-CoV-2 vaccine (inactivated)	2	Day 0 + 14	Intra-Muscular	Sinovac Research and Development Co., Ltd	
3	Inactivated virus	Inactivated SARS-CoV-2 vaccine (Vero cell)	2	Day 0 + 21	Intra-Muscular	Sinopharm + Beijing Institute of Biological Products	
5	Viral vector (Non-replicating)	Recombinant novel coronavirus vaccine (Adenovirus type 5 vector)	1	Day 0	Intra-Muscular	CanSino Biological Inc./Beijing Institute of Biotechnology	
8	Protein subunit	SARS-CoV-2 rS/Matrix M1-Adjuvant (nanoparticle vaccine adjuvanted with Matrix M)	2	Day 0 + 21	Intra-Muscular	Novavax	600 mn

# Public Affordability at \$10 per person (without international aid support)

Country	Govt. Final Consumption Expenditure \$ bn	Vaccine cost at \$10 per person \$ bn	Vaccine cost as Share of Govt. Exp.	Per Capita Govt. Health Expenditure \$	Increase in PCGHE at \$4 per person
Afghanistan	2.51	0.39	15.50%	3.4	294.12%
Bangladesh	17.42	1.65	9.45%	6.1	163.93%
Bhutan	0.42	0.01	1.90%	72.1	13.87%
Brunei	3.28	0.004	0.12%	636.7	1.57%
Cambodia	1.21	0.17	13.80%	19.5	51.28%
China	2297.62	14.39	0.63%	249.8	4.00%
India	300.94	13.80	4.59%	18.8	53.19%
Indonesia	93.88	2.74	2.91%	55.6	17.99%
Laos	2.21	0.07	3.30%	21.8	45.87%
Malaysia	42.86	0.32	0.76%	194.3	5.15%
Myanmar	13.94	0.54	3.90%	8.6	116.28%
Nepal	3.39	0.29	8.58%	10.7	93.46%
Pakistan	36.85	2.21	5.99%	14.1	70.92%
Philippines	41.77	1.10	2.62%	42.4	23.58%
Singapore	37.51	0.06	0.16%	1262.3	0.79%
South Korea	277.61	0.51	0.18%	1310	0.76%
Sri Lanka	8.07	0.21	2.65%	68.5	14.60%
Thailand	81.81	0.70	0.85%	188.1	5.32%
Vietnam	15.87	0.97	6.13%	63	15.87%
Afghanistan	2.51	0.39	15.50%	3.4	294.12%

# Other issues

- **National regulators**

- Many have been authorising use of vaccines beyond those authorised by WHO
  - Use of results in phase 3 trials elsewhere, without local immunogenesis trials
  - *Concerns about ability to combat variants, e.g., South Africa*

- **Logistics**

- *COVAX is not prioritising by current infections and this is an issue for geographies like Latin America*
- Spare air capacity by repurposing idle passenger fleet
  - Vaccines are not voluminous but accessories can prove to be a bottleneck
- Regulatory approvals for import/export
  - Export from India has been a case by case approval so far
- *Bio-hazardous Waste disposal*

- **Indemnity**

- COVAX has negotiated indemnities for manufacturers but some reportedly want more protection

# The Current Status on vaccines

## Supply

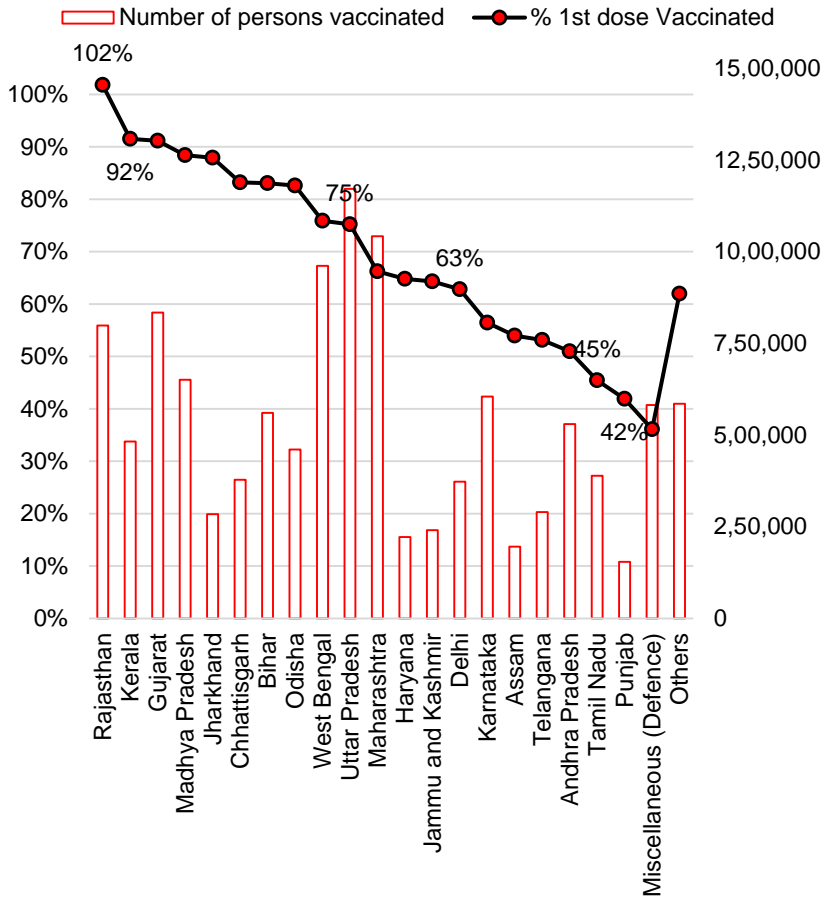
- **Approval**
  - Trials proving to be successful
  - National regulatory processes are broadly accommodative
- **Production**
  - Available doses are rising as capacity of manufacturers are repurposed/ contracted
- **Delivery**
  - Logistics benefits from absence of commercial passenger travel
  - Human resources

## Demand

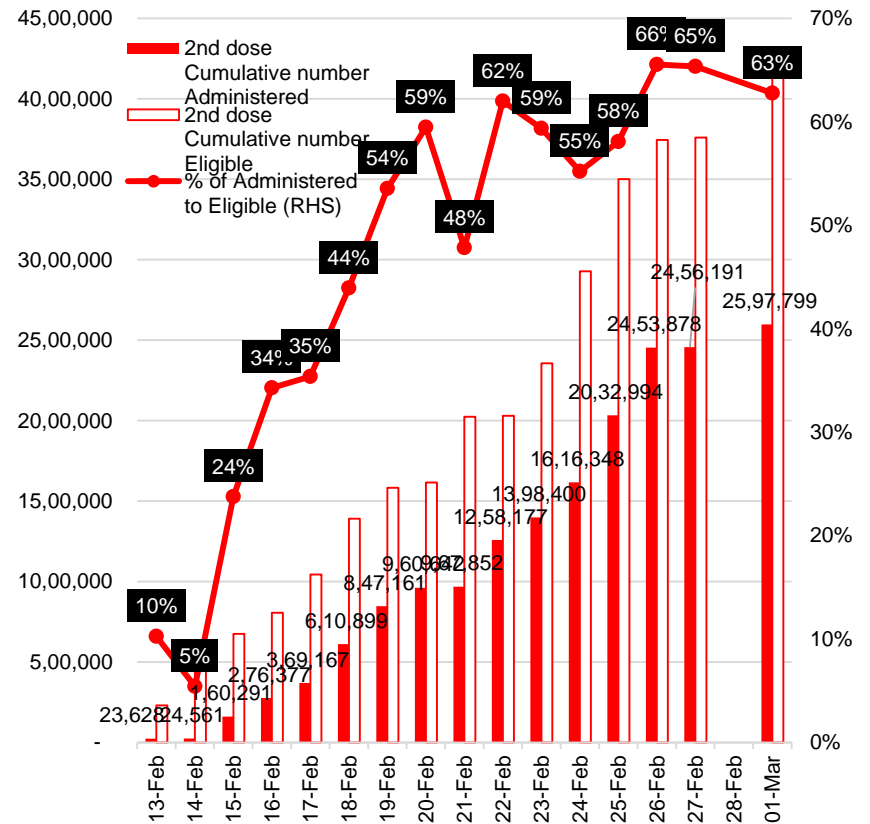
- **Affordability**
  - Public affordability
    - Budgetary allocations are not completely out of reach
    - Global commitments are forthcoming
  - Private affordability may be feasible for the top quintile? of the population
    - Pricing
- **Acceptability**
  - Concerns about vaccination but will not bite until later in the year, after the willing have been vaccinated

# There is no scramble for vaccines

## Share of healthcare and frontline workers vaccinated in India (Feb 28)



## Second doses administered to eligible healthcare workers (Mar 1)



Source: [https://twitter.com/CPR\\_India/status/1366624192997715969](https://twitter.com/CPR_India/status/1366624192997715969)



# Vaccine demand

- **Vaccine hesitancy surveys indicate a large number in the wait and see category**
- **Initial data from India shows that substantial minority (and a majority in some states) of healthcare and frontline workers have not got themselves vaccinated**
  - This, in a country, with substantial numbers of infections and deaths but low numbers of cases at the current time
  - Not a supply constraint
  - Many who have taken a first dose have not shown up for the second dose
- **What would be the demand from countries where the pandemic has not had a severe impact (Africa) / was controlled by state action (South East Asia)?**

# Other Decision points

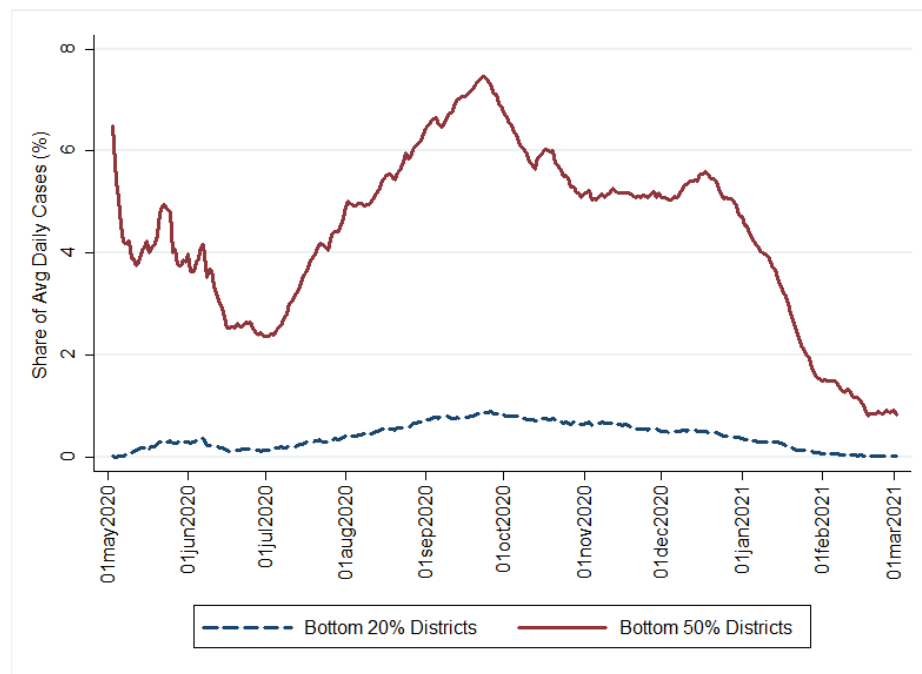
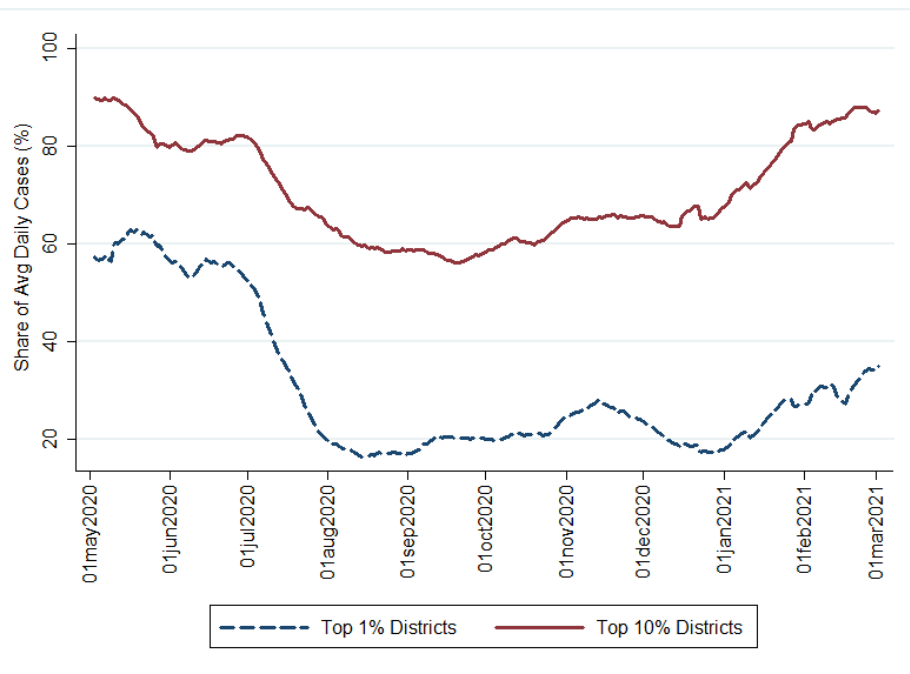
- **Buy now or later**
  - Single / Double dose
  - Effectiveness against variants
    - May be available by mid-year, but capacity may be pre-empted by the developed countries
- **Use of double dose as single dose / extended intervals between doses**
  - Impact on speed of vaccination rollout
    - Extent of protection appears high
    - Duration of protection is unknown
- **People to vaccines or vaccines to people**
  - People to vaccines may be affected more by vaccine hesitancy

# How to take spatial differences into account?

## Share of cases in top 1% and top 10% of districts in India (May 2020 – Feb 2021)

## Share of cases in bottom 20% and bottom 50% of districts ((May 2020 – Feb 2021)

Over 80% of the cases, ~12-13k out of ~14-15k are in the top 10% (63) of districts, whereas about 1% (~150) of cases are from the bottom 50% (300+) districts, less than a case a district (which has an average population of 2 million).

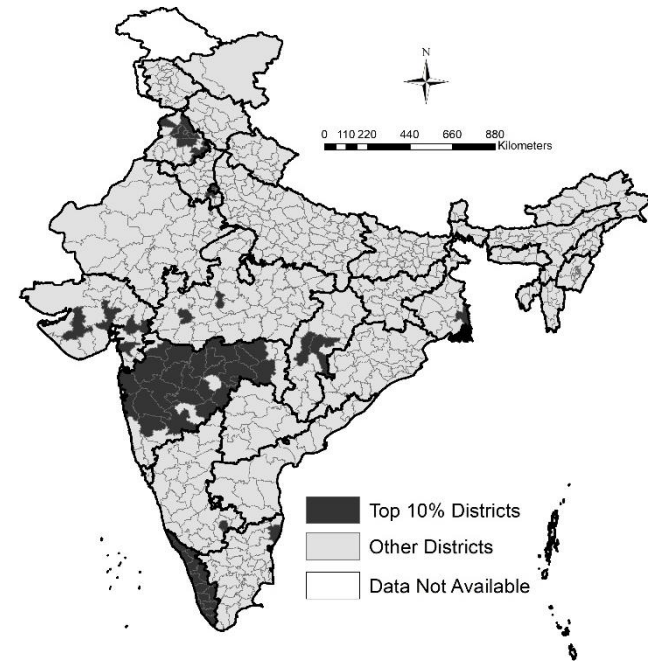
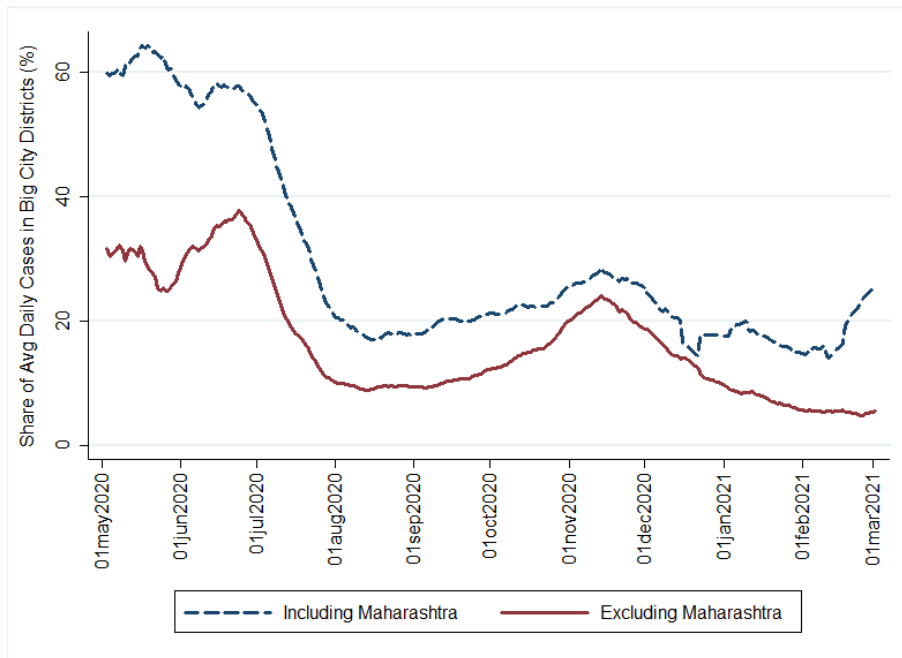


# How to take spatial differences into account?

Share of cases in top 8 cities of India (Mumbai, Pune, Thane in Maharashtra) May 2020 – Feb 2021

Spatial Distribution of Cases across districts as of March 1

Over 80% of the cases, ~12-13k out of ~14-15k are in the top 10% (63) of districts, whereas about 1% (~150) of cases are from the bottom 50% (300+) districts, less than a case a district (which has an average population of 2 million).



# People to vaccines

- **Spatial prioritisation is not receiving enough attention**
  - By population at risk / current infections/ past load?
  - Within countries, should one prioritise (large?) cities?
    - Easier to distribute, Higher risk of infection (caveat: sero-positivity?), but can it be politically communicated?
- **Age and co-morbidity are being used but not gender**
  - Increasing segmentation increases costs in terms of how long vaccination infrastructure has to be in place or a system of pop-up vaccination sites needs to be instituted
- **Delivery costs**
  - Injectable delivery costs similar to cost of vaccine in India but linear (constant average cost) till relatively high levels of coverage (enough for herd immunity?)
  - How much is additional to existing infrastructure / personnel costs?

# Vaccines to people

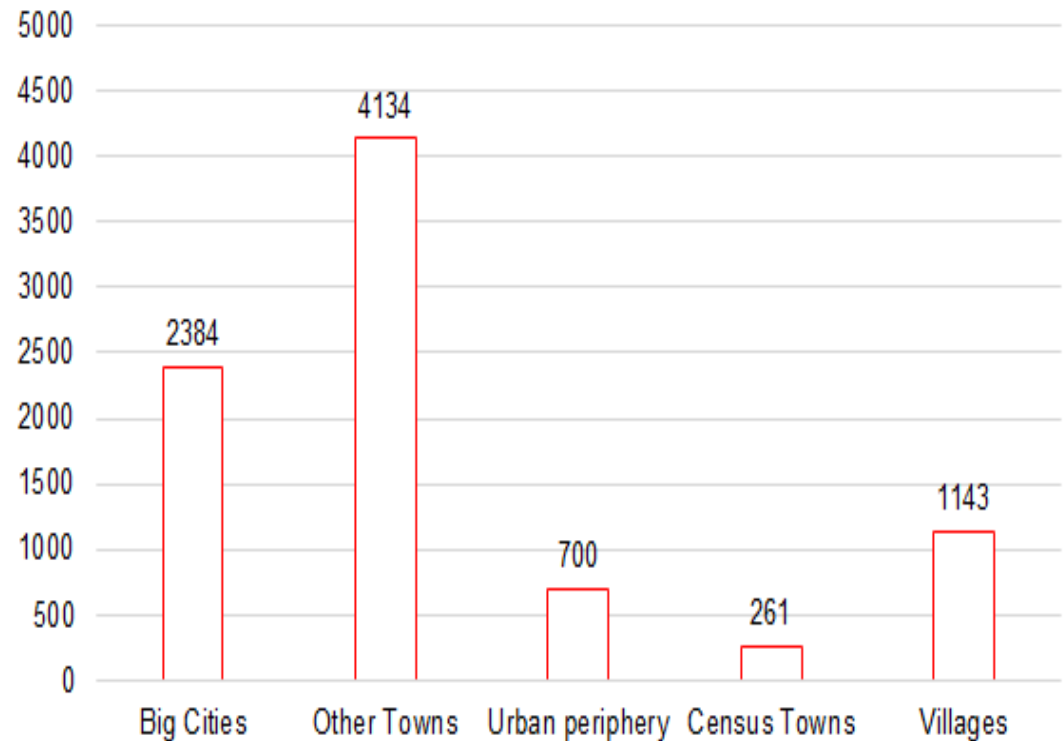
- **A full-fledged *doorstep* vaccines to people is not infeasible but may be exceedingly expensive**
  - Multiple house to house campaigns for syndromic surveillance were conducted during the pandemic
- **Mid-way: Increase the number of sites**
  - Large well-located sites (mega centres) vis-à-vis distributed sites
    - India currently using existing health infrastructure facilities
  - Trade off vis-à-vis time, cost (including lost income), inconvenience incurred to be vaccinated and its effect on vaccine demand
    - Should one experiment with delivery models?
- **Ability to identify unvaccinated population**
  - Ability to use IDs verifiable against public lists
    - Election IDs in countries like India but not being used at this time
  - Doorstep checks post-vaccination for vaccination certification (digital)

# Private sector

## Why and How?

- **Fiscal reasons**
  - Separate additional source of supply
    - Different segment of the price curve
  - Self-targeting of population
    - Need vs. Income
  - Price Regulation?
- **Delivery reasons**
  - Expansion of sites
    - May be uneven spatially
  - Price Regulation?

## Location of private Indian vaccination sites concentrated in urban, but so is the pandemic



Source: [https://twitter.com/CPR\\_India/status/1366624565179256834](https://twitter.com/CPR_India/status/1366624565179256834)

# In sum

- **Getting the vaccine is not the binding constraint**
  - Based on evolving situation
  - Limited control variable from the POV of country
    - Trade off between cost and availability of vaccine
- **Deciding on buy now or later (variant-effectiveness; single/double dose)**
  - Flexibility with the dosage schedule?
- **Getting enough people to agree to take the vaccine**
- **Getting people to the vaccine**
  - Adjusting for the spatial inequity in the pandemic
  - Role for the private sector – fiscal / delivery
  - Minimise the number of vaccines to be taken to people, but pop-up vaccination sites may be needed
- **What is the “acceptable level” of mortality from Covid-19 in an endemic situation?**



# Thank You

[partha@cprindia.org](mailto:partha@cprindia.org)



[www.cprindia.org](http://www.cprindia.org)

CENTRE FOR POLICY RESEARCH