# Lessons from COVID experience: National scenario

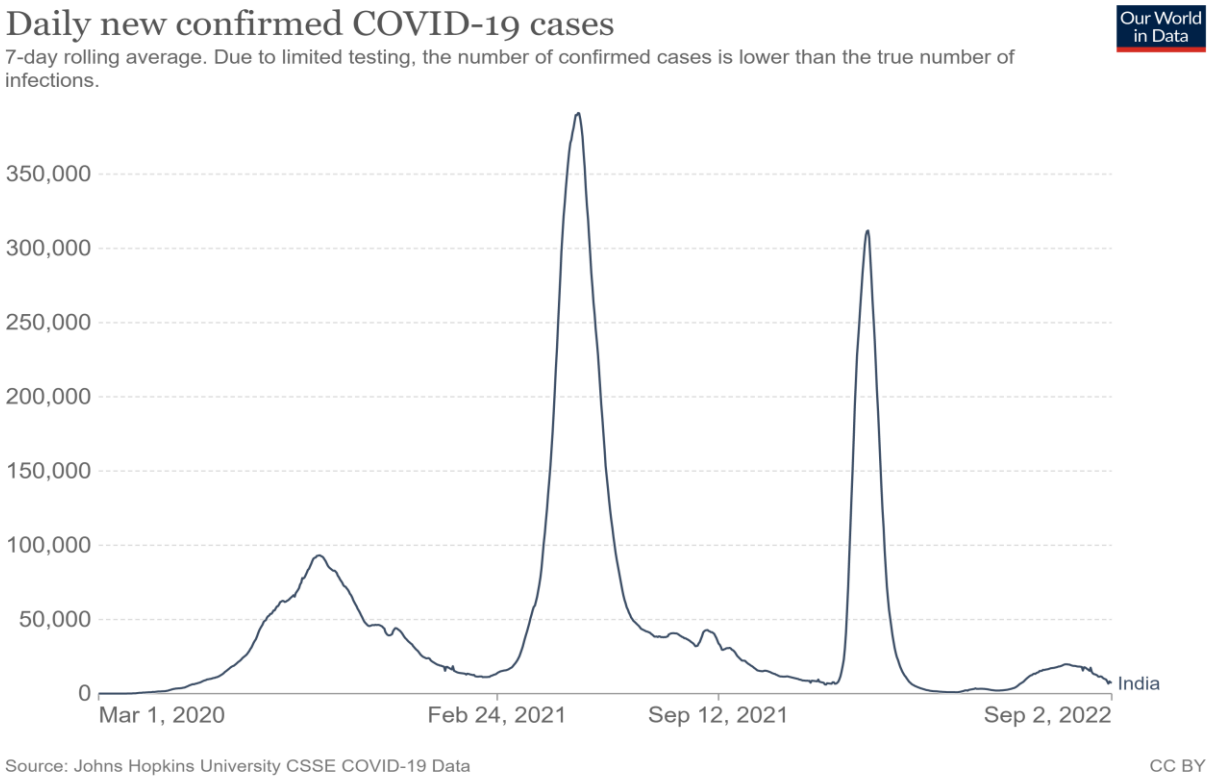
Manoj Murhekar
National Institute of Epidemiology
(Indian Council of Medical Research)
Chennai, India

# Overview

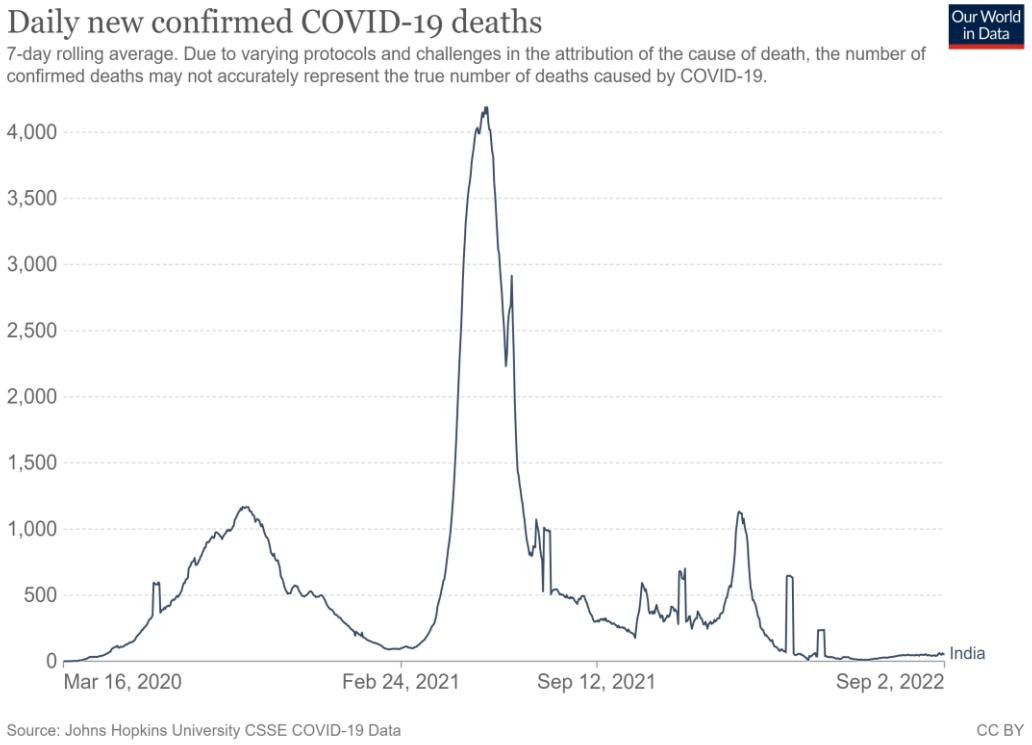
- COVID-19 scenario
- Response to COVID-19 pandemic
- Key lessons

# Reported number of cases and deaths

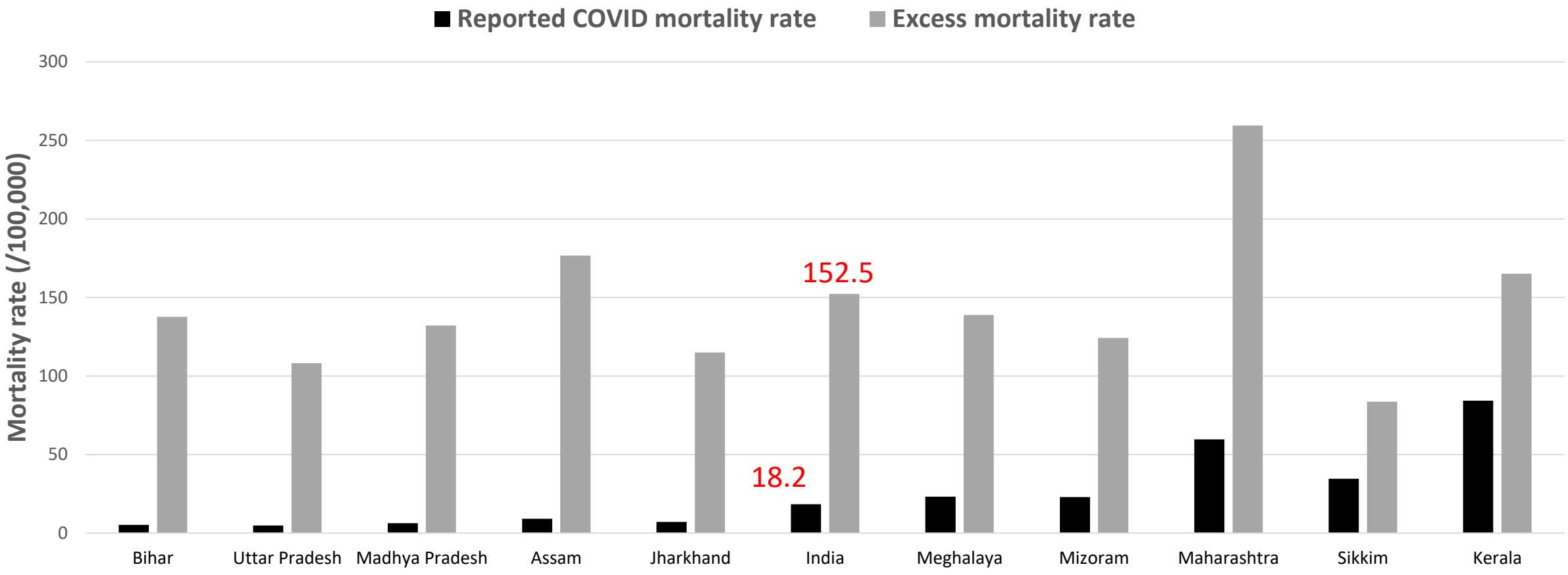
Total cases: 445, 53,042




Total cases: 528,429



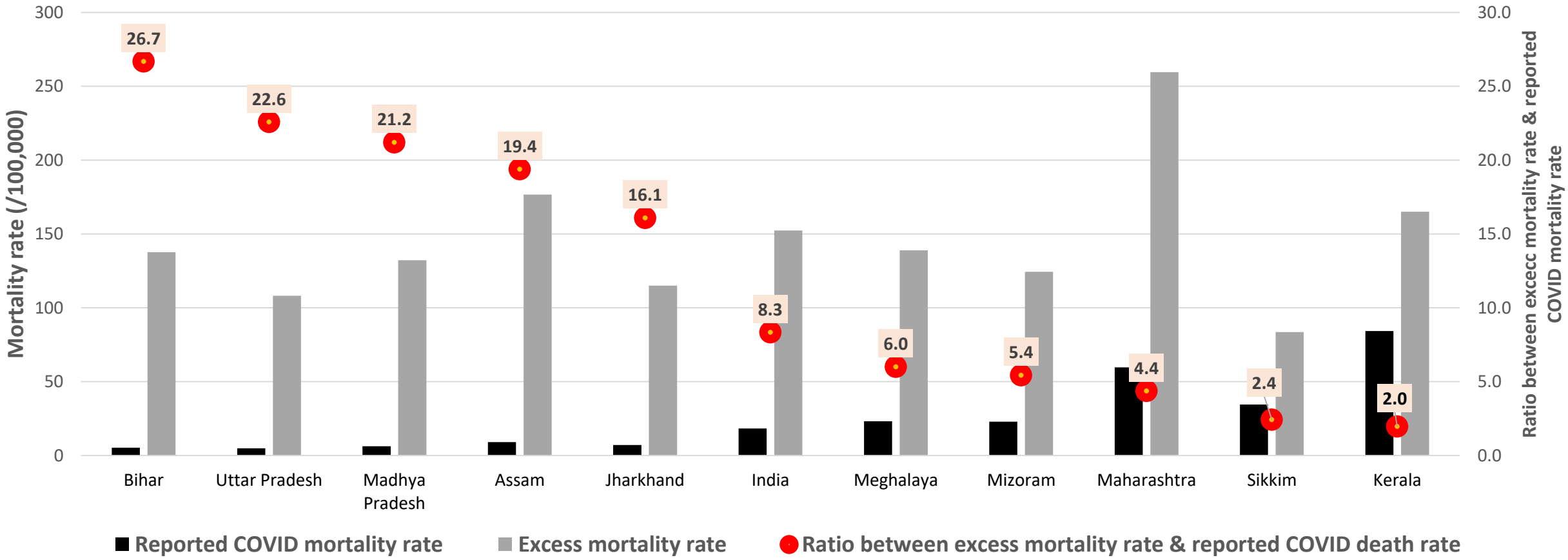
# COVID-19 excess mortality



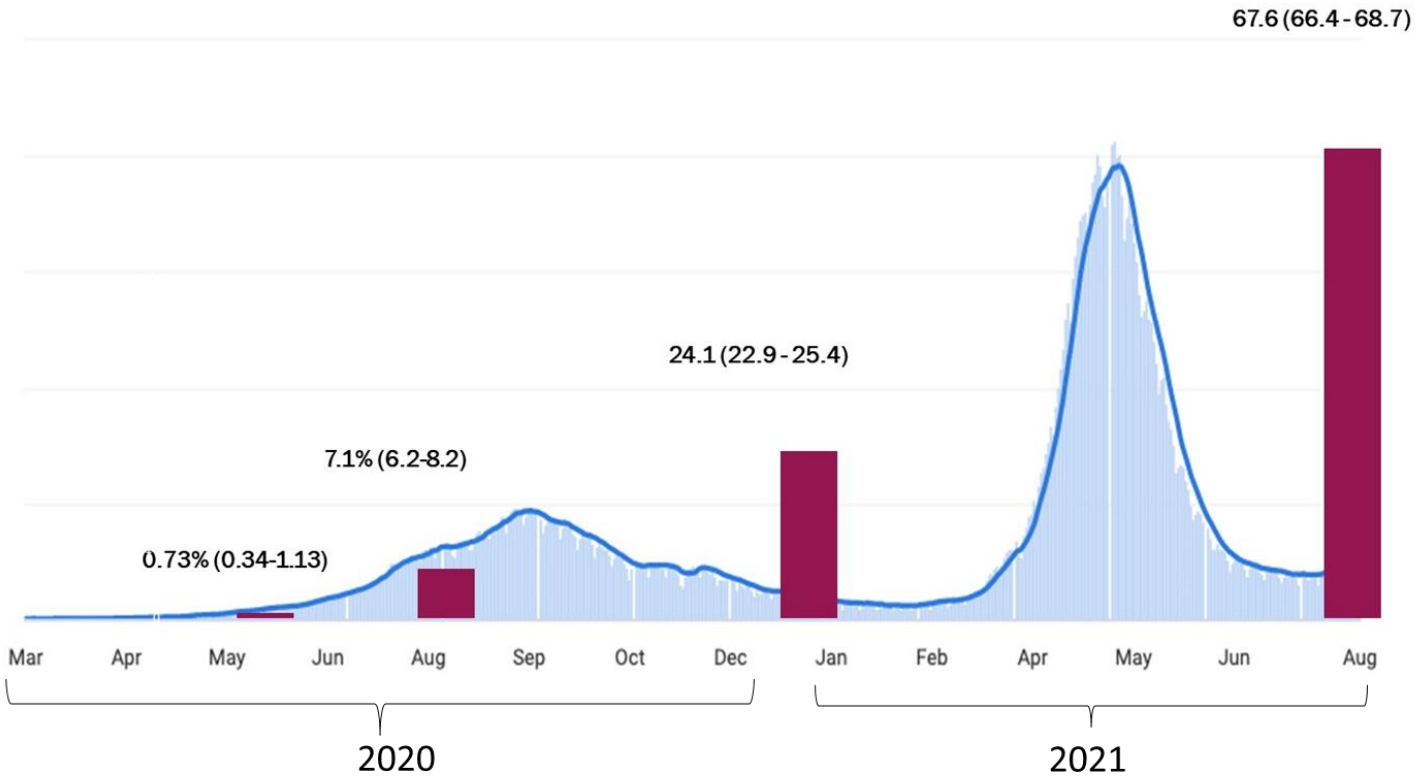


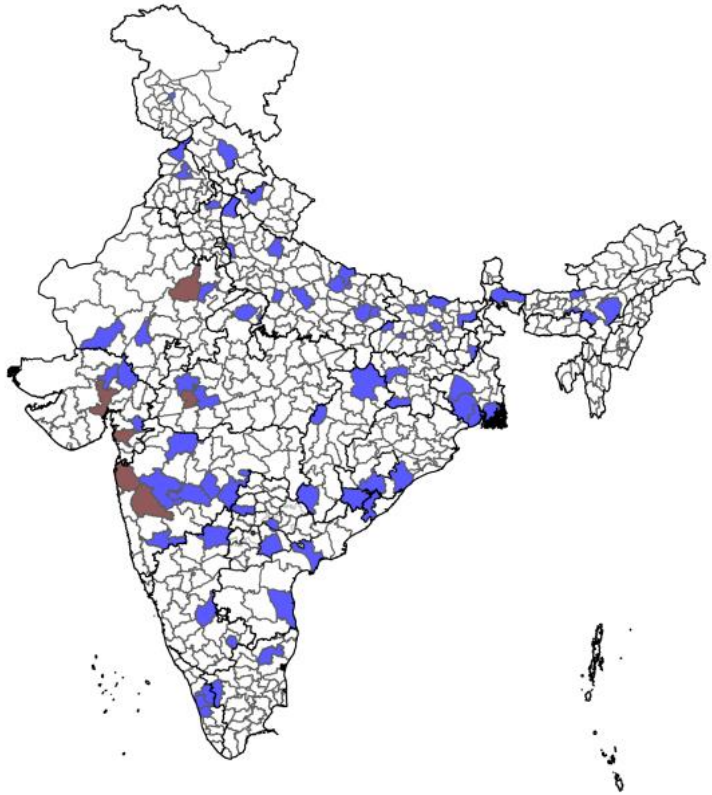

Lancet, 2022; 399: 1513-36

# COVID-19 excess mortality

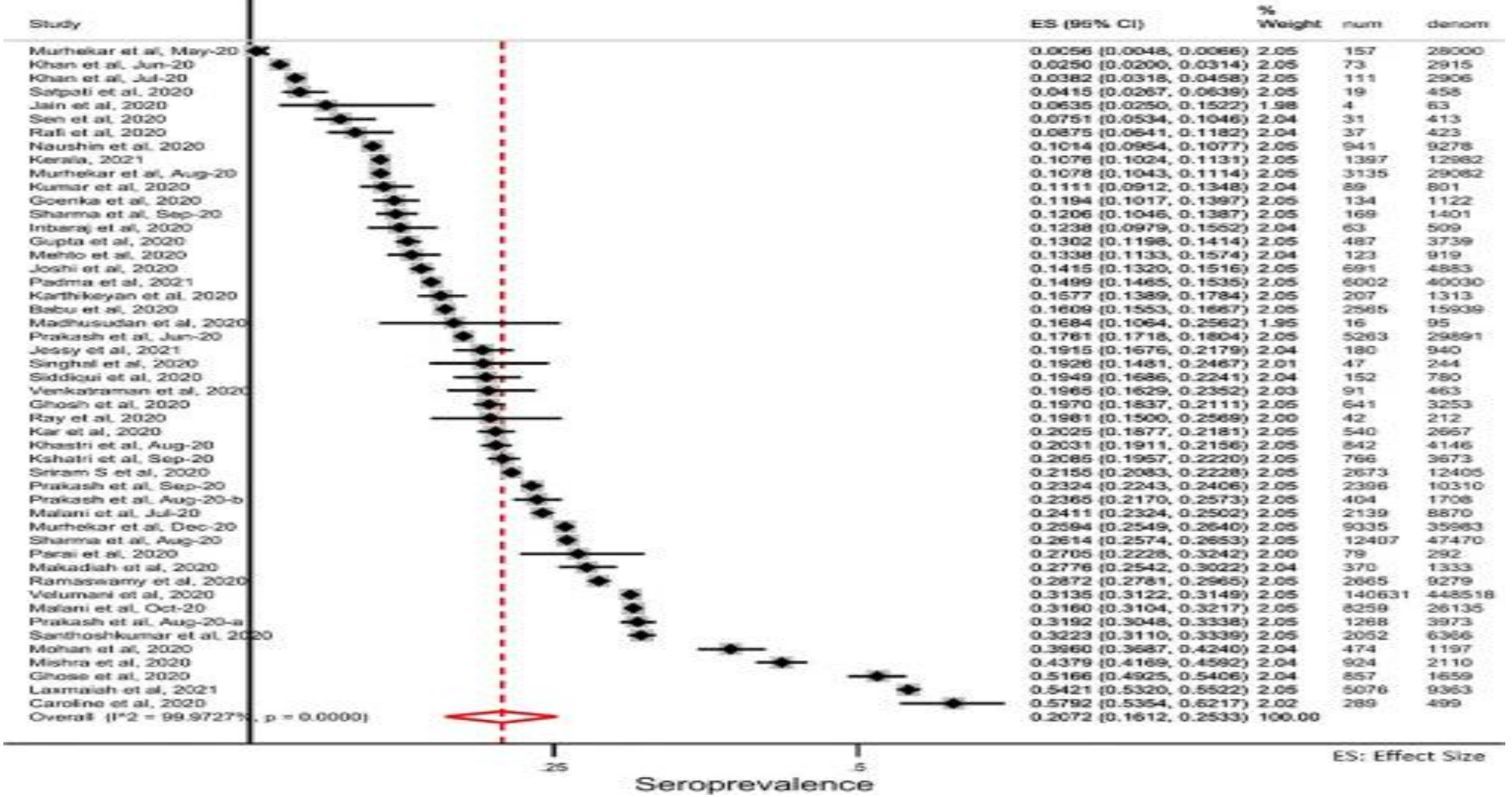


# SARS-CoV-2 infections



IJMR 2020, LGH 2021, IJID 2021, PLOS Med 2021




- Seroprevalence:
- 1st wave: **20.7% (95% CI = 16.1% to 25.3%)**
- 2nd wave: **69.2% (95% CI = 64.5% to 73.8%)**



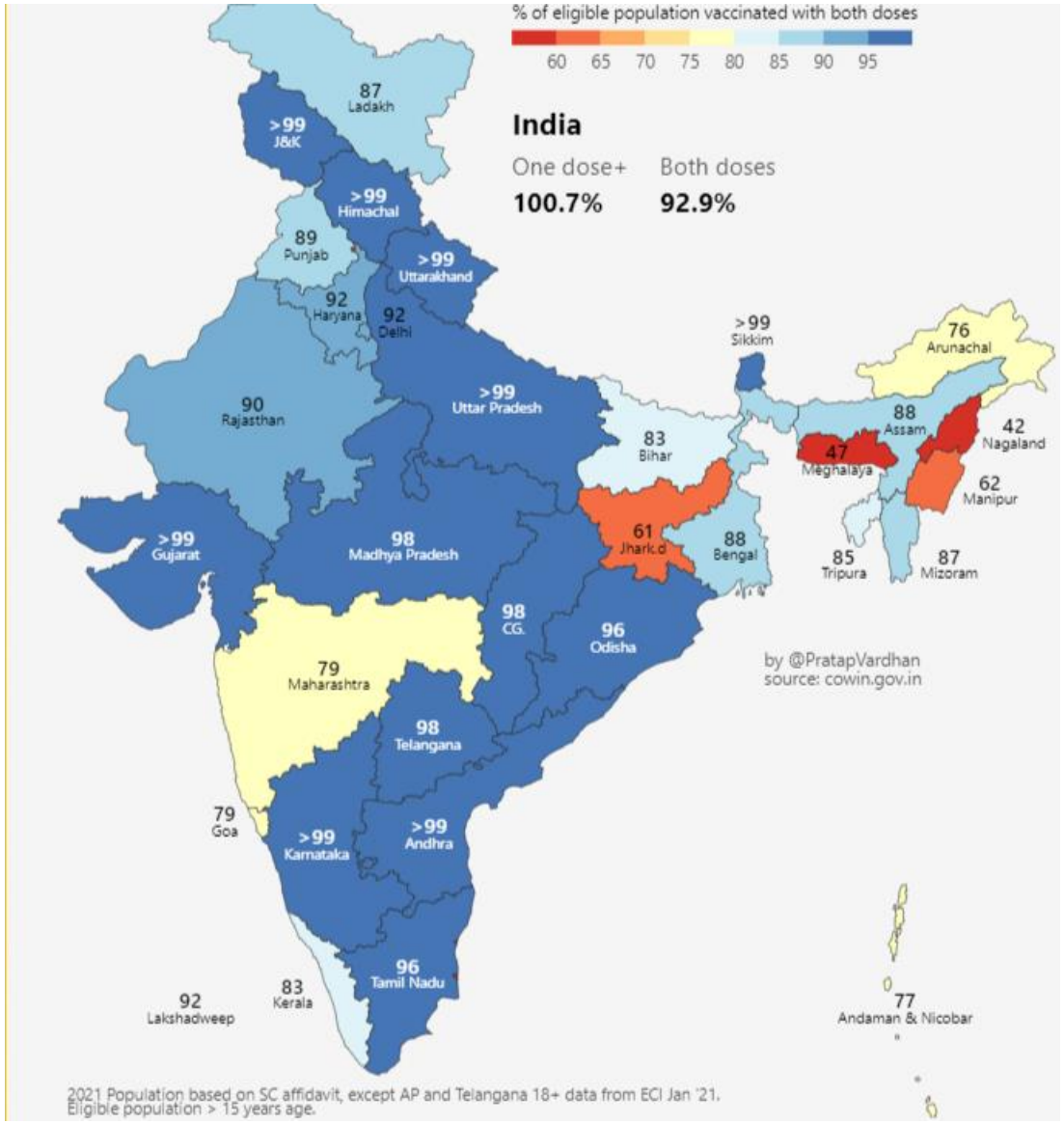
IJID, 2022

# Vaccination

Total Vaccination Doses

**2,17,06,36,946**

| Dose 1 | Dose 2 | Precaution Dose |
|---|---|---|
| 1,02,59,80,963 | 94,70,24,578 | 19,76,31,405 |



# National response

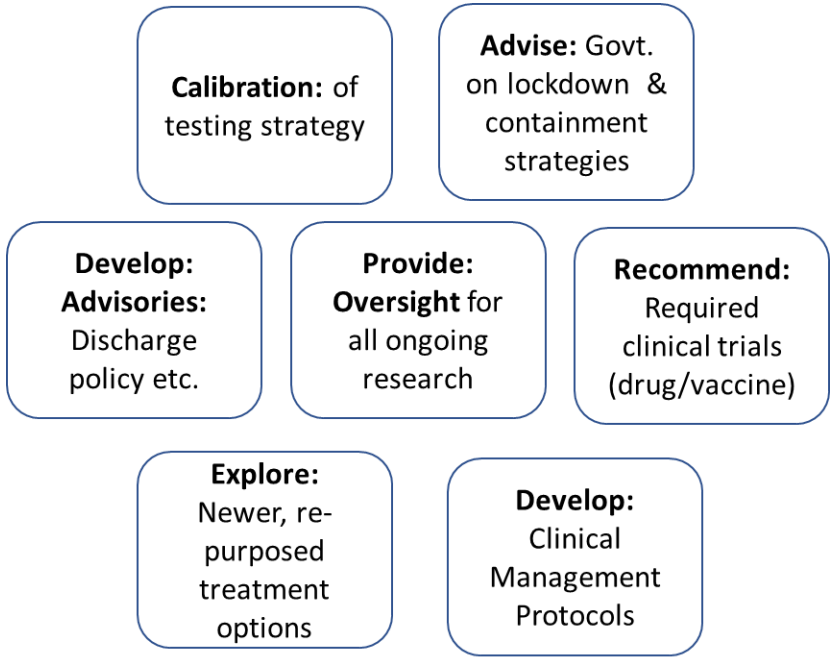
# National response

- Declared COVID-19 a notified disaster  (14 March 2020)
  - Allowed states to spend State Disaster Relief funds
- National lockdown (24 March 2020)
- Test, Trace & Treat

# Coordination of COVID-19 response

- 11 empowered groups (29/3/2020)
  - Emergency management plan,
  - Hosp availability/surveillance,
  - Medical equipment/PPE,
  - HR capacity,
  - Supply chain and logistics,
  - Coordination with private sector,
  - Economic and welfare measures,
  - IEC
  - Data management,
  - Strategic issues related to lockdown

## National Taskforce (18/3/2020)

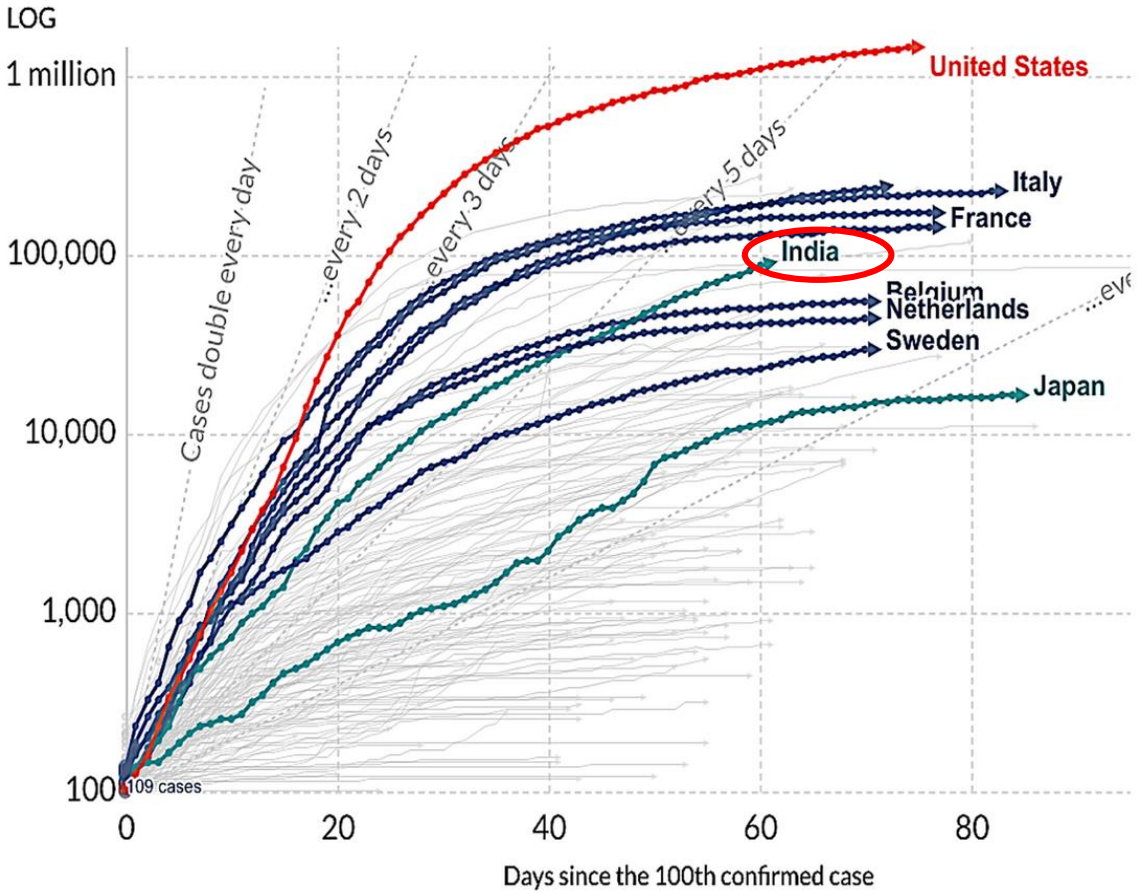



## NEGVAC (12/8/2020)

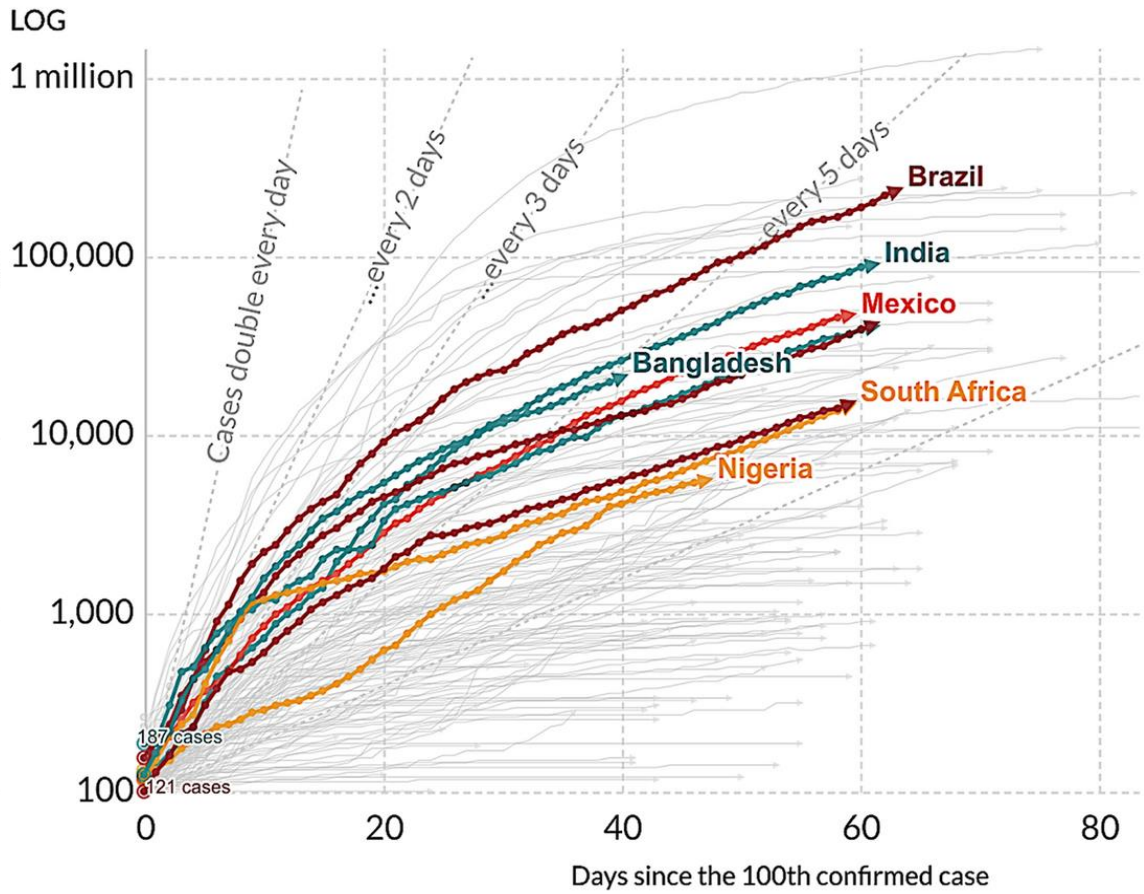
- Advice and guidance on COVID-19 vaccination
- Prioritization of population groups in the country
- Deciding procurement and inventory management procedure etc

# National lockdown, 2020

- <500 cases, mostly from a few cities
- Initially 3 weeks, extended till 31 May 2020

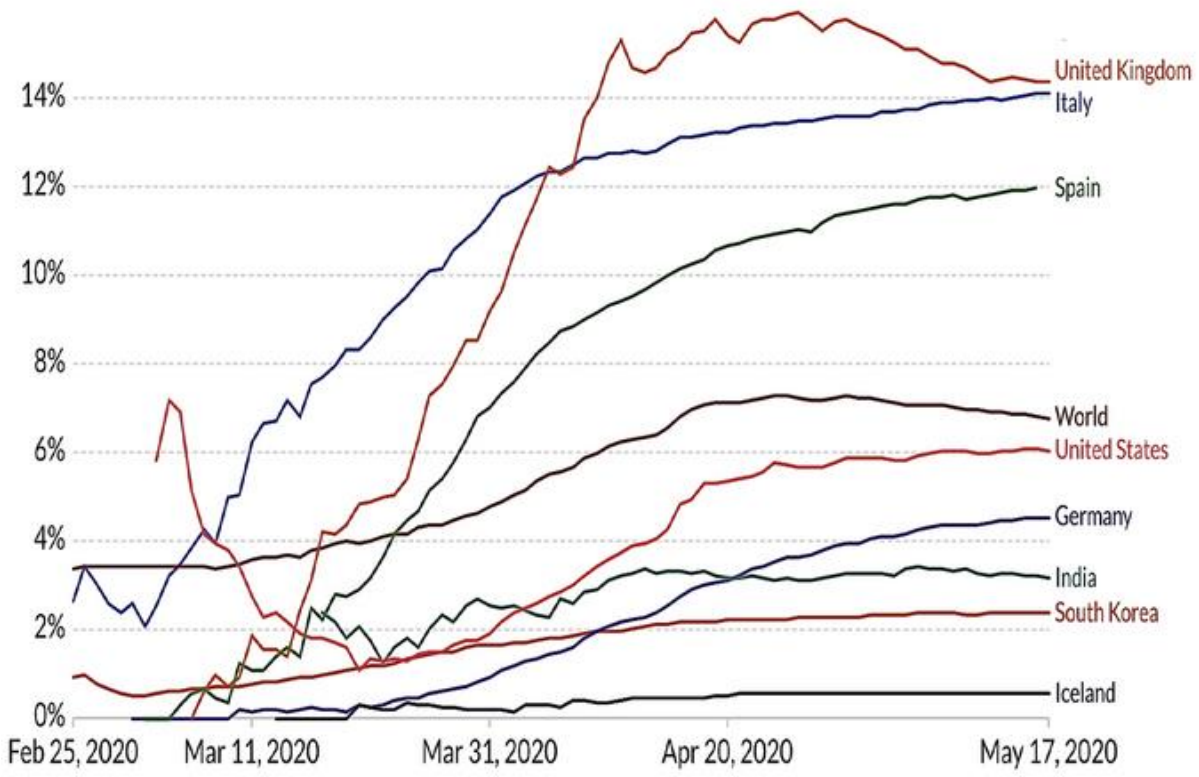



**(a)** India and Developed

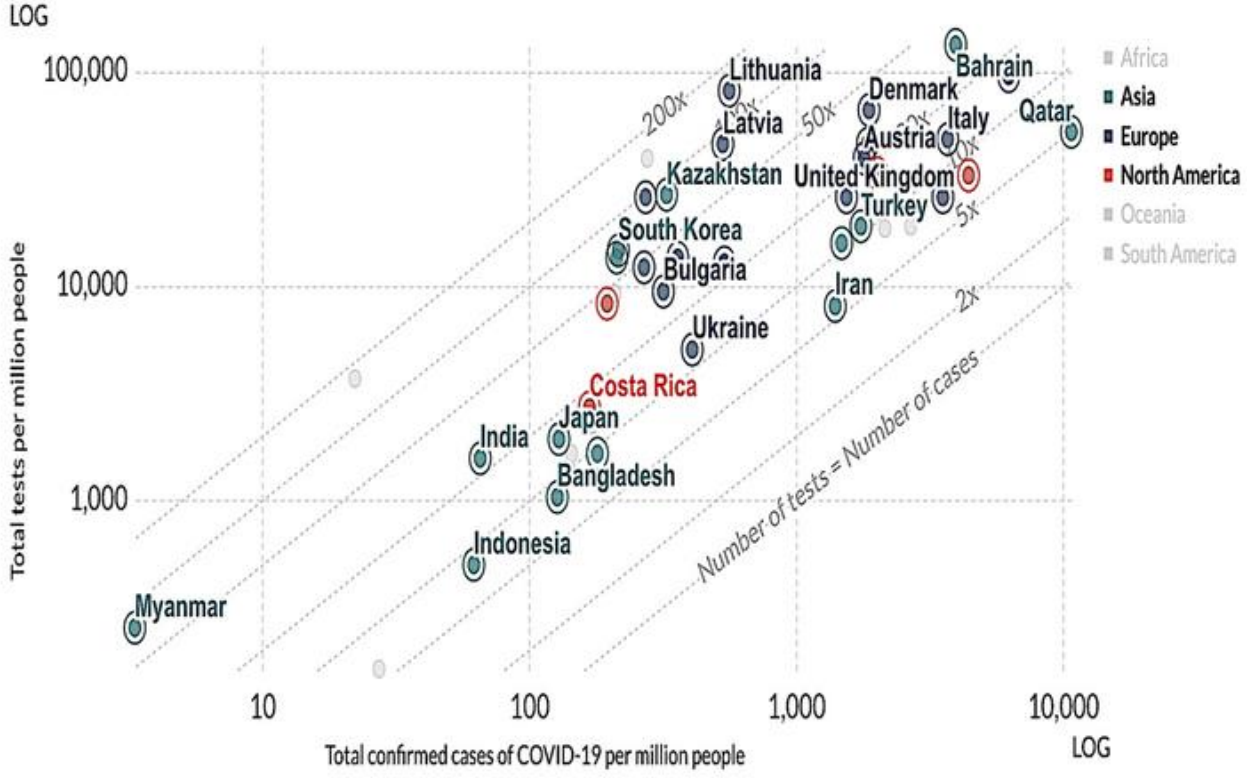



**(b)** India and Developing

# National lockdown, 2020




(a) CFR




(b) Testing and Cases

# National lockdown, 2020

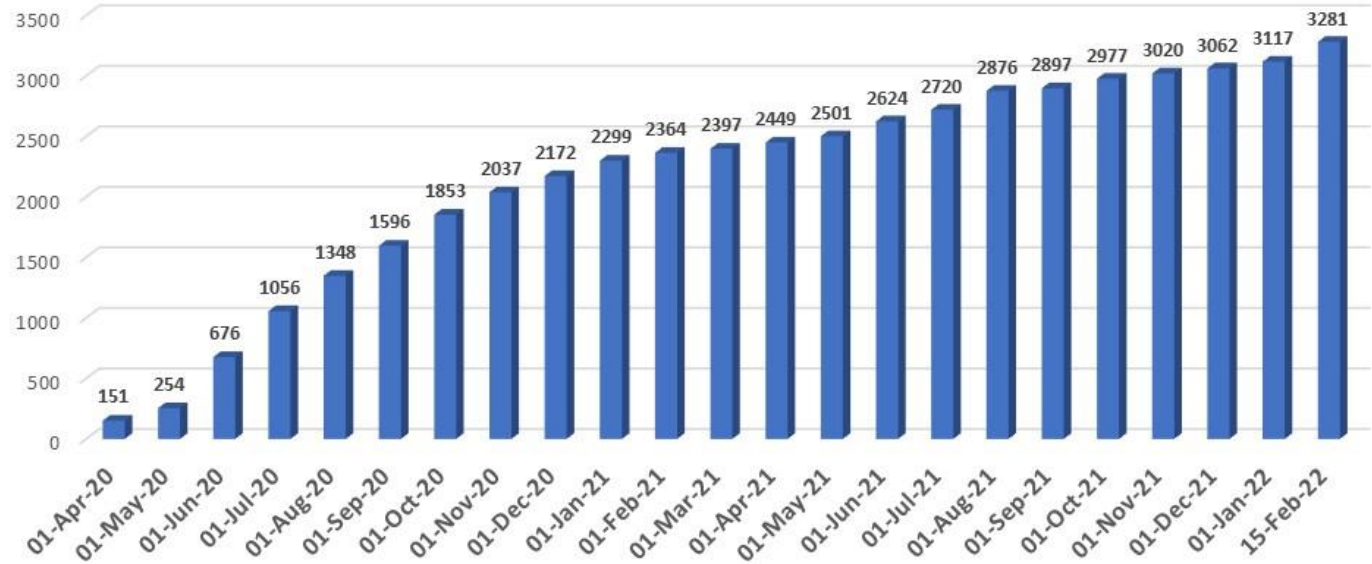
- > 40 million migrants were affected by the lockdown (World Bank)

- 50,000 to 60,000 migrated from urban to rural areas
  - led to large-scale exposure of COVID-19 in rural settings.



# National testing network

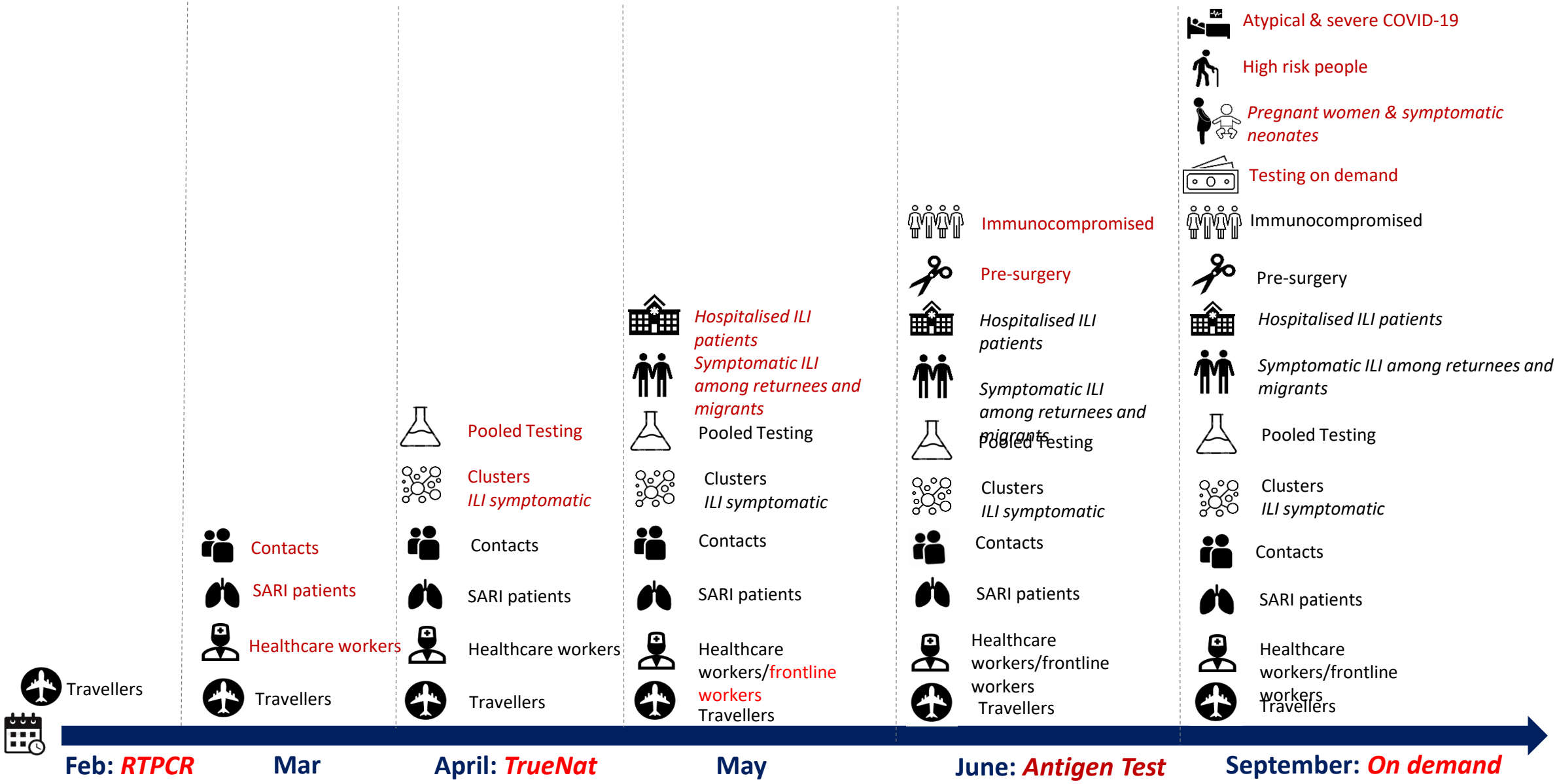
- Testing labs
  - ICMR-NIV, Pune
  - VRDL Labs
  - Medical Colleges/S&T lab
  - Private labs (21/3/2020)-NABL accredited



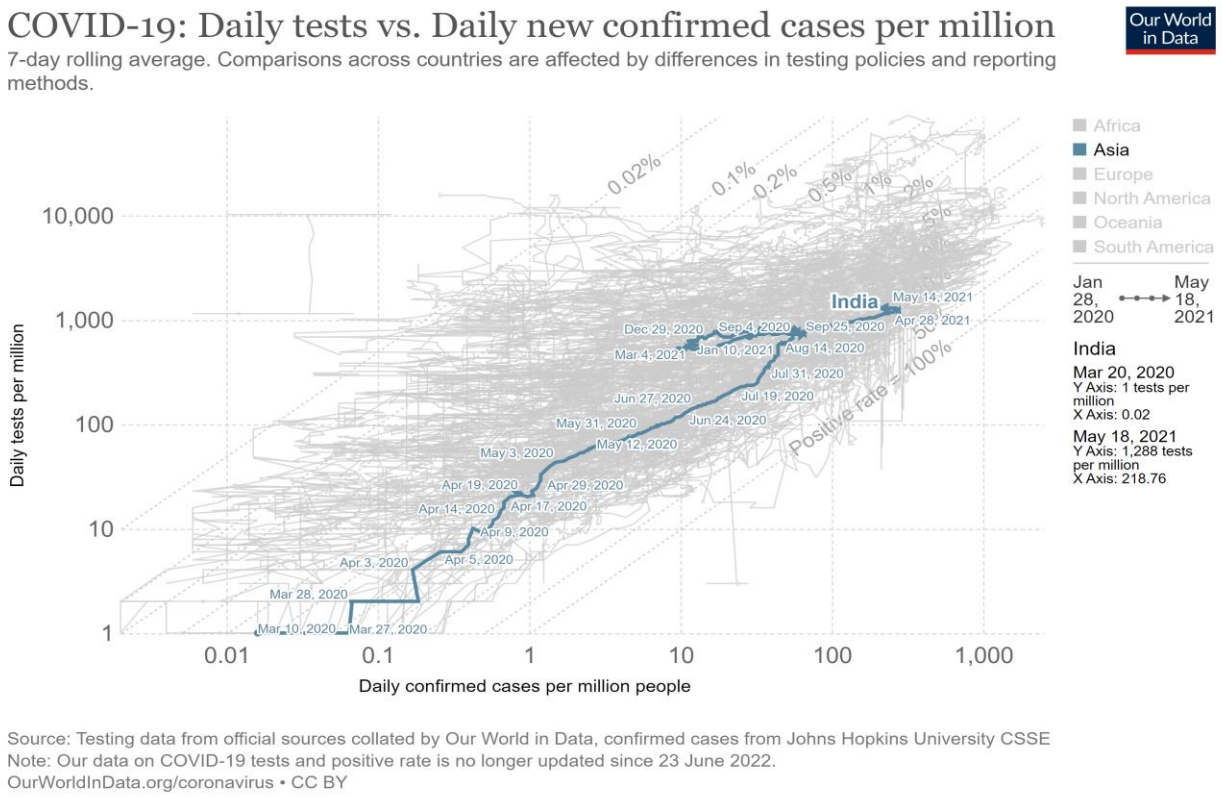

- Tests
  - RT-PCR
  - TrueNat/CBNAAT
  - Antigen-based tests

- 534/536 Medical Colleges equipped
- 664/741 districts have RTPCR testing labs
- All districts have RAT testing facility

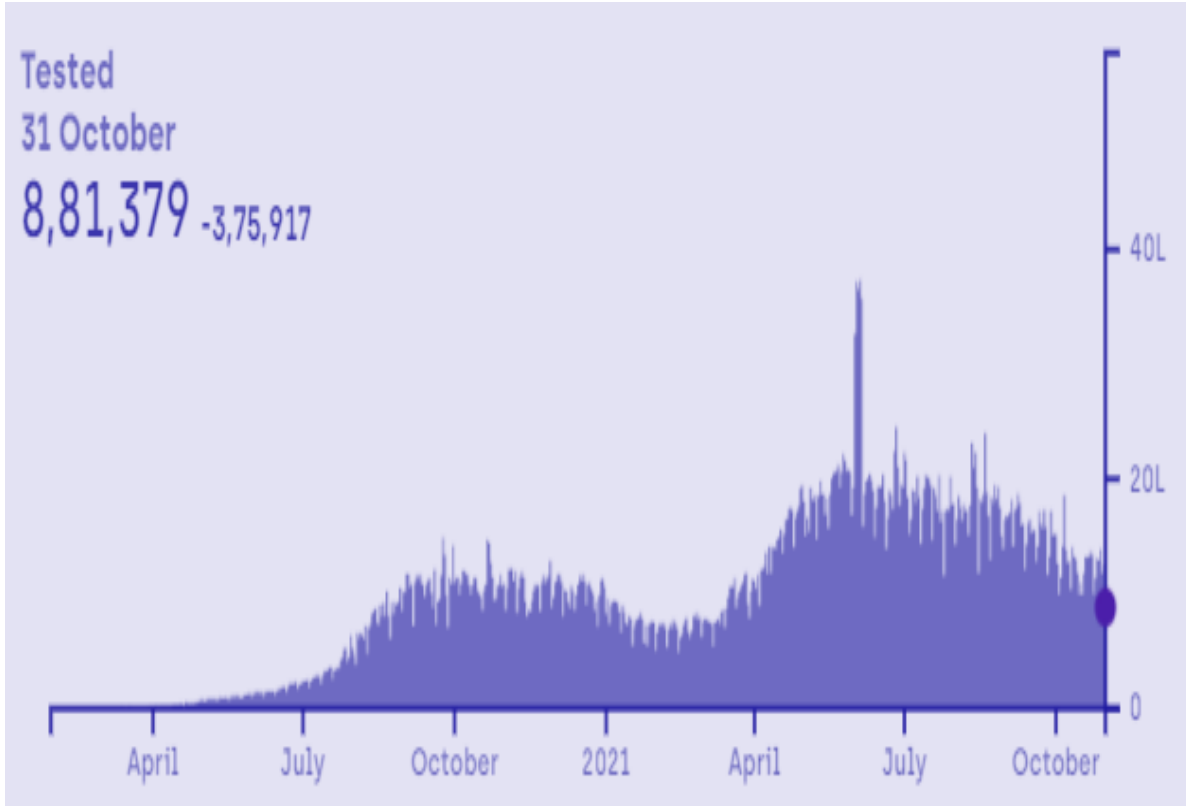
# 2020: Calibrated Expansion of Testing



# Testing rates




Source: Testing data from official sources collated by Our World in Data, confirmed cases from Johns Hopkins University CSSE
Note: Our data on COVID-19 tests and positive rate is no longer updated since 23 June 2022.
OurWorldInData.org/coronavirus • CC BY

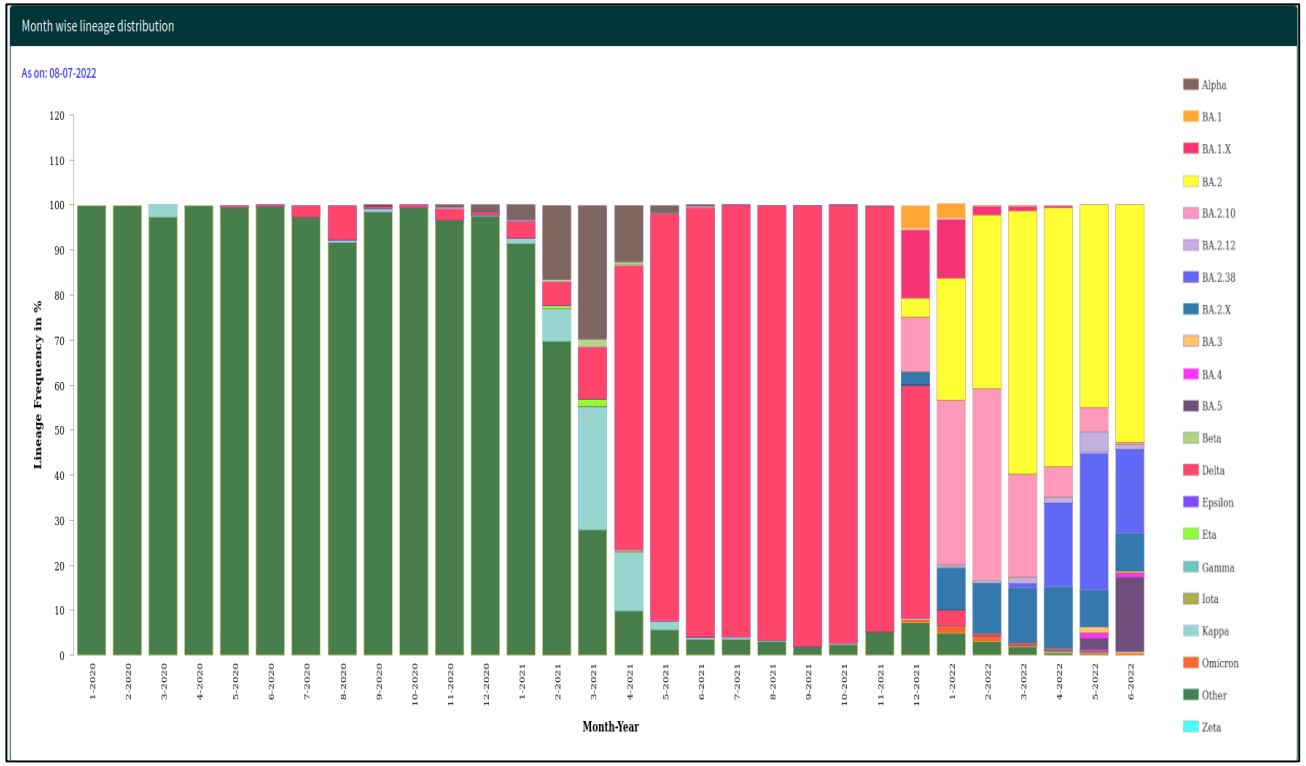


# Guidelines for COVID-19 response

- Surveillance
  - Contact tracing
  - Isolation and quarantine
  - Containment zones
  - Lockdown/un-lockdown
- Clinical management
  - COVID-19 treatment guidelines
  - Discharge
- Vaccination

# Indian SARS-CoV-2 Genomics Consortium (INSACOG)

- Objective
  - Assess SARS-CoV-2 variants
  - Correlated WGS data with clinical/epidemiological data
- Strategy
  - International passengers
  - Community samples
    - Sentinel sites
    - Surge surveillance
- 10 labs → 38 labs

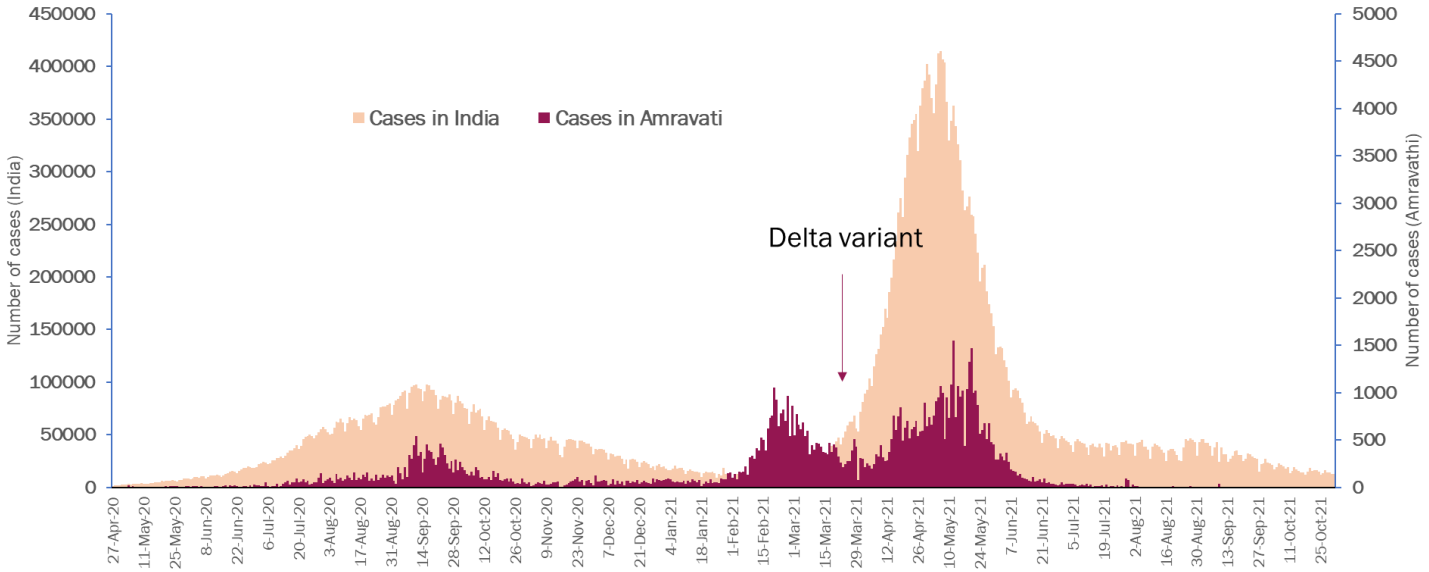



Current report July 2022

Dec 2020

# Genome surveillance

- Real-time nature of data
- Clinical/epidemiological linkage

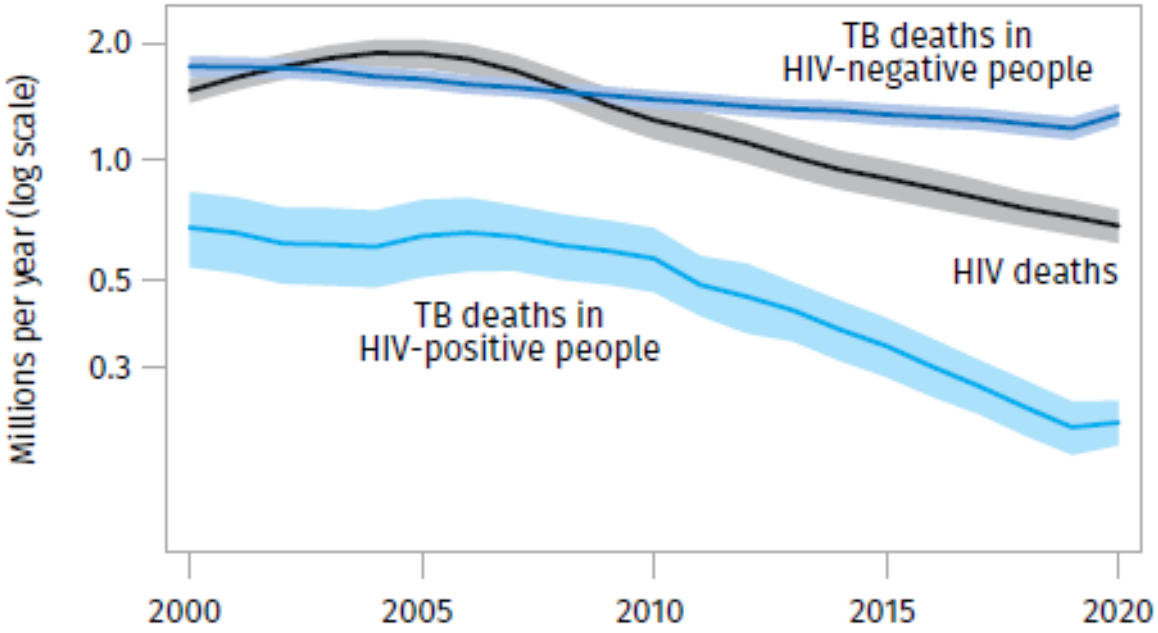


# Lessons from COVID-19

# 1. Building health systems resilience

# Impact of COVID-19 on health systems

- Health systems were overwhelmed
  - Increased number of COVID-19 cases
  - Response activities
- Disruption of essential health services
  - Excess non COVID-19 morbidity & mortality (e.g. NCDs, TB)




**Global trends in the estimated number of deaths caused by TB and HIV, 2000-2020**

**1.3 million deaths among HIV-negative people in 2020, compared to 1.2 million in 2019**

# Strengthening health systems

- Primary care
  - Cornerstone for achieving universal health coverage
  - 150,000 HWC for providing comprehensive primary health care

- Surge capacity
  - Network of public hospitals with planned excess of beds, staff, equipment
  - Placing private hospitals under public authority
  - Purchasing additional capacity from private sector (insurance)
  - Domestic capacity for medical technology

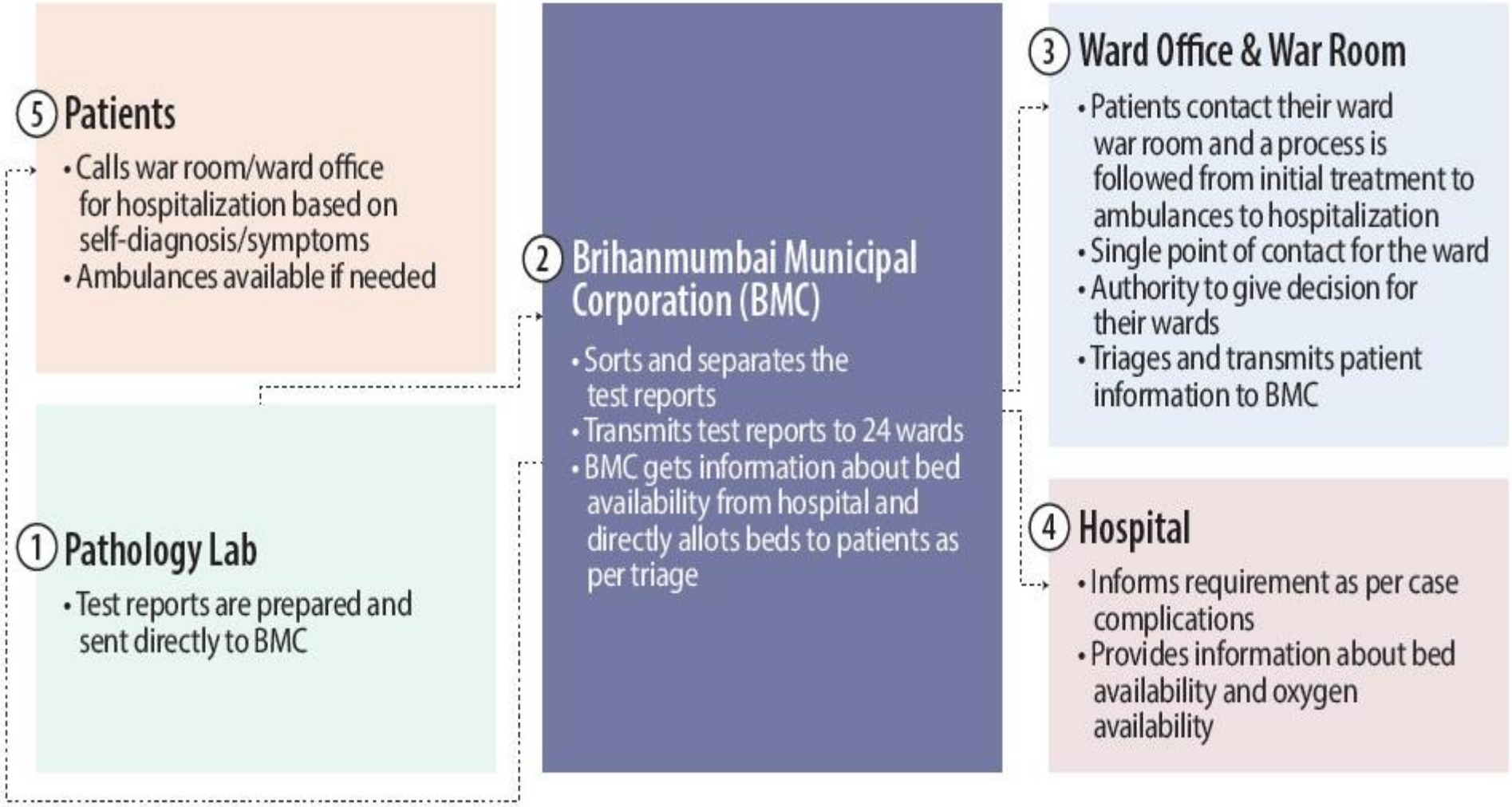
# Strengthen health systems

- Disease  surveillance systems
  - Mortality Surveillance
- Lab systems
  - Sustain the lab network created for COVID-19
- Human resource capacity
- Funding and financing mechanism

- After Action Reviews

# 2. Role of private sector

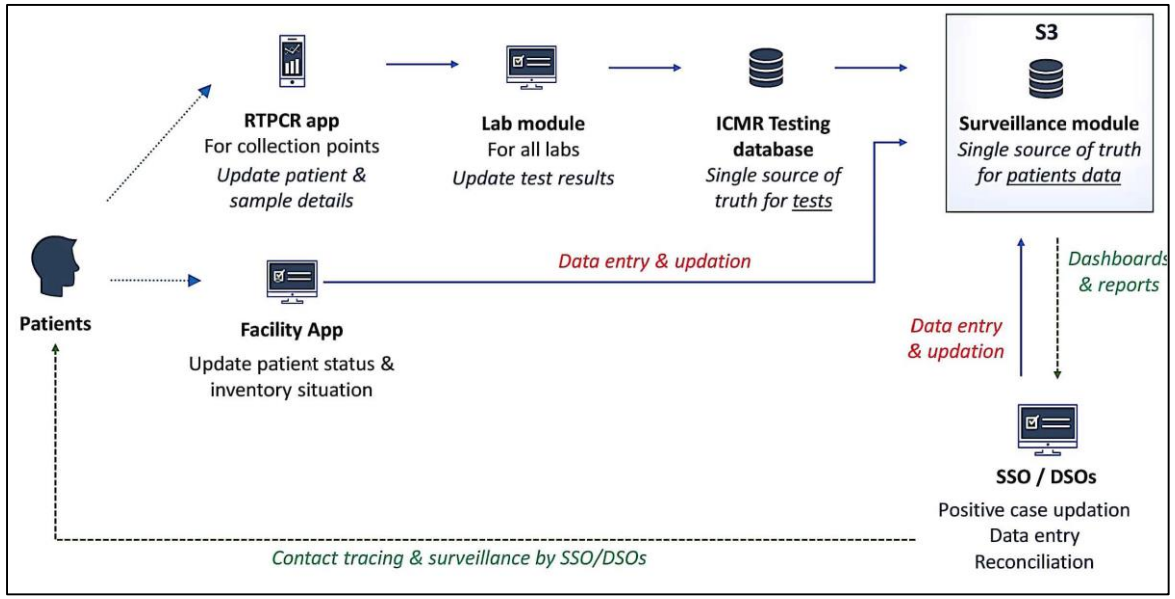
# Mumbai model of COVID management

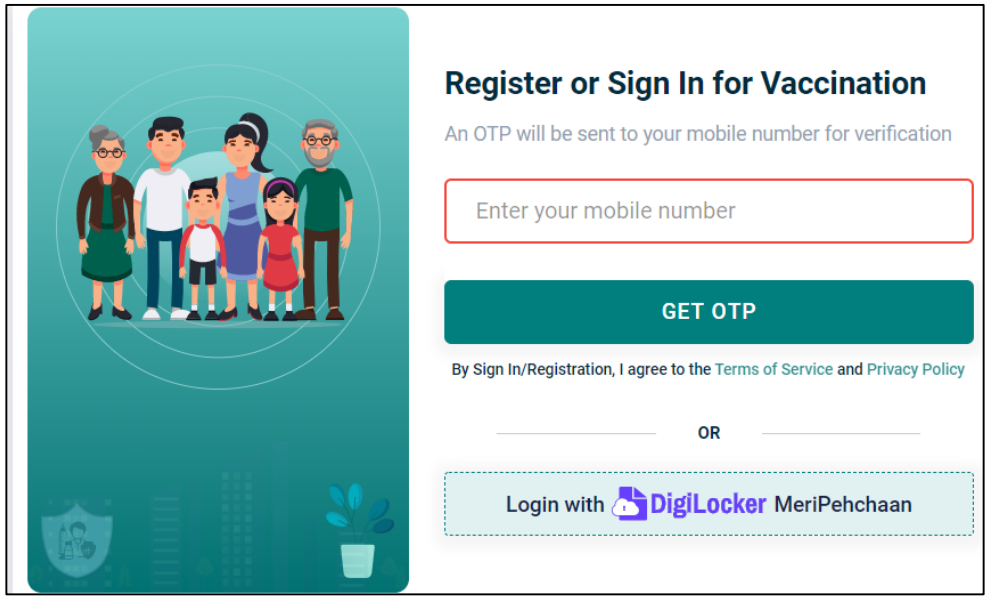



- 24 ward war rooms
  - 10 dashboards,
  - 10 doctors,
  - 10 medical teams
  - 10 ambulances, 10 tel operators, 10 teachers
- Took over beds from private hospitals
- Jumbo facilities

# 3. Data systems

# COVID-19 surveillance



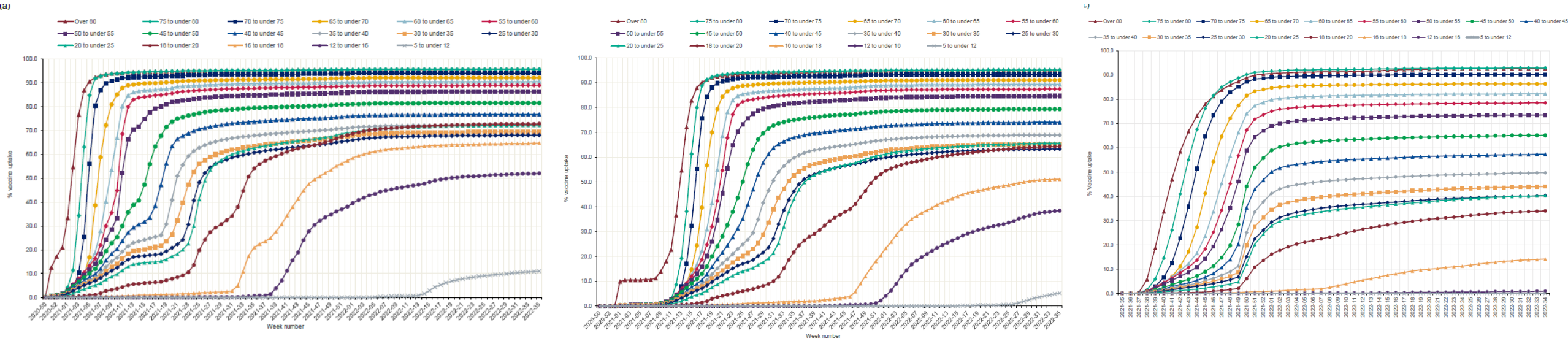

- Linkages with different databases/surveillance systems
  - Timeliness/Completeness

# UKHSA–COVID-19 vaccine surveillance strategy

**Aims**

- Monitor vaccine coverage in targeted populations
- Rapidly detect and evaluate possible adverse events associated with vaccination
- Estimate vaccine effectiveness
  - Preventing a spectrum of disease outcomes
  - Against different viral variants,
  - Duration of any protective effect
- Identify risk factors for & outcomes of vaccine failure

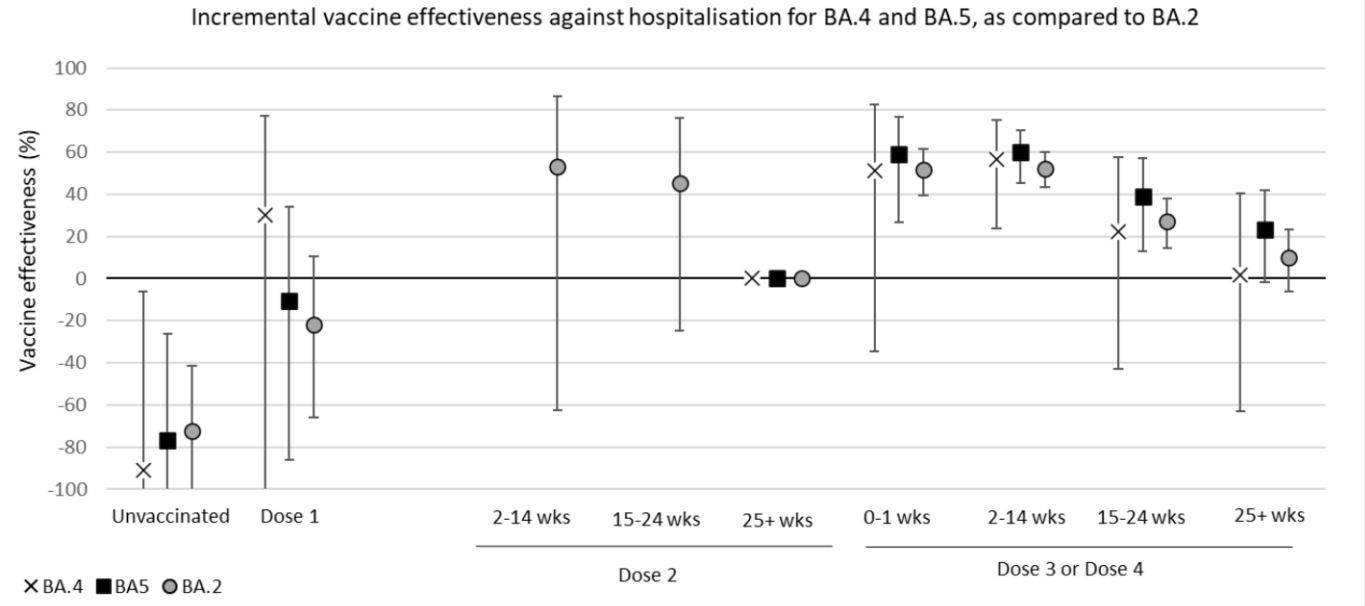
- **National Immunisation Management System**
- **Linkage with COVID-19 surveillance and vaccination data**
- **Cohort/Test negative case-control studies**




Vaccination coverage of (a) one, (b) two and (c) three doses

| Outcome | Vaccine effectiveness* | | |
|---|---|---|---|
| | Pfizer-BioNTech Cominarty | AstraZeneca Vaxzevria | Moderna Spikevax |
| Infection | 75 to 85% | 60 to 70% | |
| Symptomatic disease | 80 to 90% | 65 to 75% | 90 to 99% |
| Hospitalisation | 95 to 99% | 90 to 99% | 95 to 99% |
| Mortality | 90 to 99% | 90 to 95% | |

VE against delta




VE against Omicron variants

# 4. Evidence-based decision making

# Clinical management and population health decisions

- Several guidelines issued during the pandemic
  - Based on the best available evidence at that point
  - Dynamic in nature
- Treatment protocol
  - HCQ, Ivermectin, Remdesivir, Convalescent plasma
- Vaccination
  - Interval between primary series and precautionary dose (9 months)
- Non-pharmaceutical interventions
  - Night curfews, weekend lockdowns

# Using local data for decision making

- National lockdown during the first wave
- District level lockdowns during the second wave
  - Test positivity (>10% in the previous week)
  - Bed occupancy (>40% for Oxygen beds)

# 5. Policy relevant research

# Studies on COVID-19

- Solidarity trial
- RCT of Convalescent plasma
- COVID vaccines
  - Pre-clinical studies and RCT
- Determinants of severe disease
- National serosurveys
- VE studies

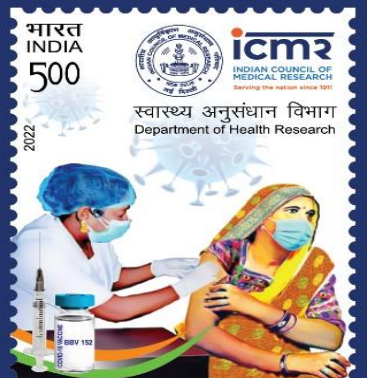
- Large cohorts of vaccinated/ infected individuals
  - Interval between booster doses, re-infections, durability of immune response, long COVID
- Vaccine effectiveness
  - type of vaccine, duration after vaccination, variants
- Disease modeling

# 6. Public-private partnership




# COVAXIN®
# THE JOURNEY

- India's first indigenous COVID-19 vaccine
- Developed by the Indian Council of Medical Research (ICMR) - National Institute of Virology (NIV) and Bharat Biotech International Limited (BBIL).
- 2-dose vaccination regimen given 28 days apart.
- Vaccine with no sub-zero storage, no reconstitution requirement, and ready to use liquid presentation in multi-dose vials, stable at 2-8°C




## 2020

**March**
SARS-CoV-2 virus isolated by ICMR-NIV, Pune

**April**
ICMR-NIV Pune signs an agreement with BBIL

**May**
ICMR-NIV transfers the virus strain to BBIL
Characterizes the vaccine through in-vitro experiments and electron microscopy studies.

**June**
Approved for clinical trials in India

**June–August**
Experiments in small animals (mice, rats and rabbits) and hamsters established safety and immunogenicity

**July**
Phase I and II clinical trial begins with 755 participants

**September**
Results from studies in Rhesus macaques establishes safety and protective efficacy

**November**
Phase III clinical trials are initiated

**December**
Phase I and II trials show its safety and efficacy

## 2021

**January**
Indian government grants Covaxin emergency authorization

**16 January**
India rolls out phase-wise COVID-19 vaccine administration

**27 January**
Ability to neutralize alpha variant strain of SARS-CoV-2 established.

**3 March**
Interim results of Phase III trials of COVAXIN

**7 May**
Ability to neutralize Kappa variant strain of SARS-CoV-2 established

**17 May**
Ability to neutralize Gamma variant strain of SARS-CoV-2 established

**16 June**
Ability to neutralize Beta and Delta variant strain of SARS-CoV-2 established

**3 November**
WHO EUL granted

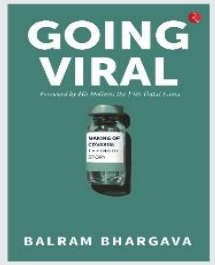
**29 December**
Receives approval for emergency use in Children 12 - 18 years of age.

## 2022

**8 January**
Impact of a third (booster) dose of Covaxin established

**16 January**
Commemorative Postal Stamp released

**20 January**
Gets Full Market Approval from Indian Government




**GOING VIRAL**
Foreword by His Holiness the 14th Dalai Lama
By : Balram Bhargava

# 7. Community engagement

# Community engagement

- Fundamental component during outbreaks
  - Ebola, Cholera
- Top-down vs bottom-up approach
- Examples
  - Community-based volunteers in
    - Contact tracing
    - Purchasing ration for families under quarantine
  - Community kitchens
    - Food for migrants, destitute
    - Quarantine and isolation centres
  - Corona-care centres (Maharashtra)
    - Run by local PPs and NGOs, funded by CSR



# Summary

- Health systems resilience
- Private sector
- Data systems
- Evidence-based decision making
- Policy-relevant research
- Public-private partnership
- Community engagement

# Thank you