A COVID-19 Vaccine Deployment Strategy for India

A strategy to vaccinate 80% of India's population by December 2021

Takshashila Discussion SlideDoc

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Steps for Vaccine Deployment

India should vaccinate 80% of the population by 31st December 2021 at a cost of Rs 50K crore – 250K crore*

Follow an Essential-First Approach for estimating need

Prioritise vaccine recipients based on how essential the occupation is for managing the pandemic. This group is easy to identify, reach and vaccinate

National Manufacturing of the Vaccine

Obtain vaccine in adequate quantities, with local manufacturing, through government action to ensure technology access and guaranteed demand

Delivery channel should not become the bottleneck

Large-scale logistics and decentralised delivery necessitate a combination of Election Commission machinery and State government's Public Health administration

Post-market Surveillance

Use an Aadhaar-enabled, separate database to track vaccine recipients and adverse events

* The cost range is based on options for the Oxford candidate (INR 50,000 cr) or the Moderna candidate (INR 2,50,000 cr)

Estimate Need

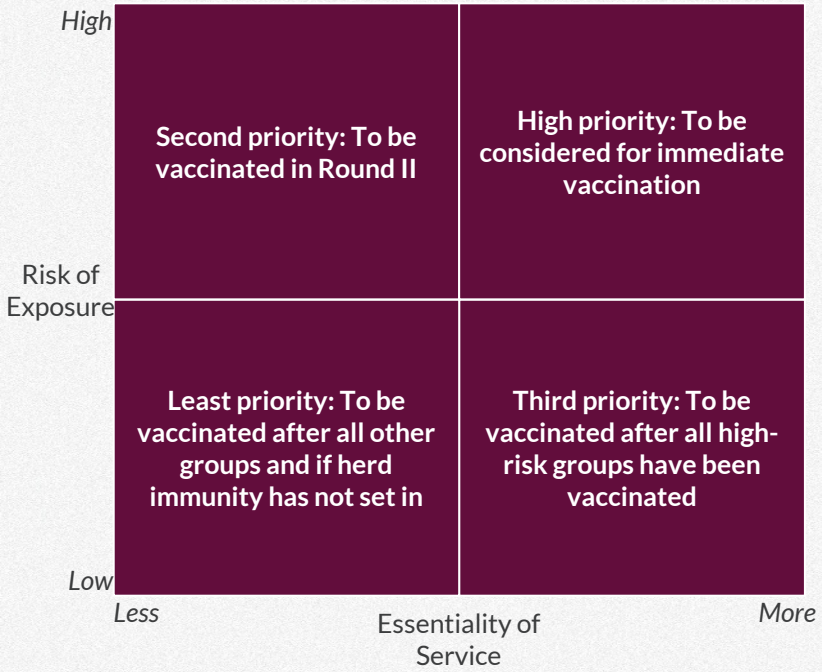
Considerations

Randomisation is the best way to achieve equity.

However, randomisation is not possible in the initial phases of vaccine deployment as the demand for COVID-19 vaccine is going to be significantly higher than the initial production capacity. The ultimate goal would be to vaccinate the proportion of people required to confer herd immunity.
In the first few phases of vaccine deployment, production capacities will act as a bottleneck. Hence, there is a need to devise a **prioritisation strategy,** that will be perceived as fair.

Creating priority lists of vaccine recipients will also help in choosing a vaccine best suited for India's demand, design a deployment strategy, and estimate costs of vaccine deployment. The next three slides present a prioritisation framework.

Strategy 1: Essential-First



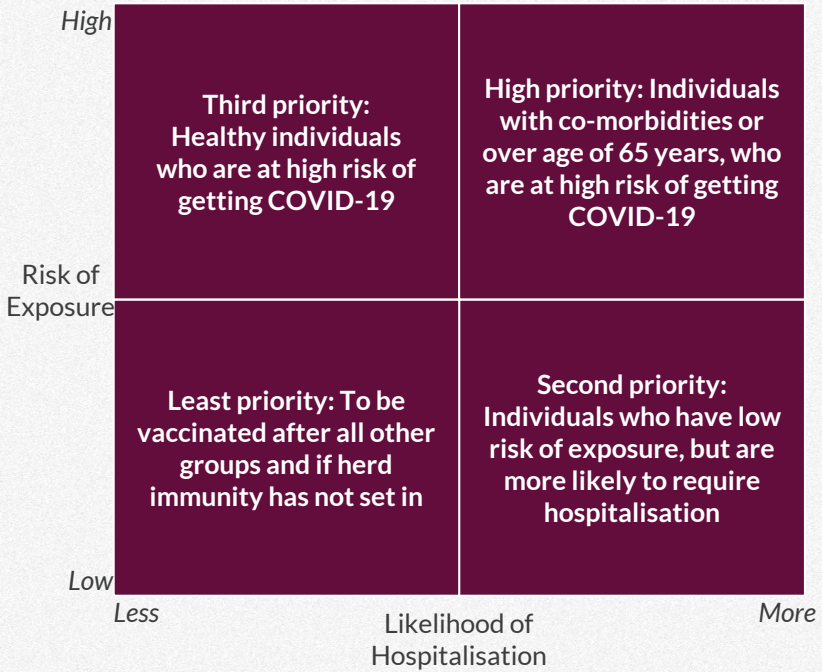
Takshashila recommends this strategy

This strategy categorises individuals based on **the essentiality of their occupation** and **the risk of that occupation exposing them to COVID-19**.

Considerations:
It will be easier to identify and target individuals using this approach.

Expected Outcomes:
Minimise COVID-19 infection risk for service professionals and maintain business continuity of services essential to the economy and society.

Strategy 2: Demography-First



This strategy categorises individuals based on the probability of requiring hospitalisation and risk of exposure to COVID-19.

Considerations:

1. It is not yet clear if the vaccine would work effectively in those over 65 years or with co-morbidities
2. Identification of individuals for vaccination will be difficult, and thus complicate demand forecasting.
3. WHO determines the population over 65 years + co-morbidities is roughly 20%, which corresponds to 260 million people.

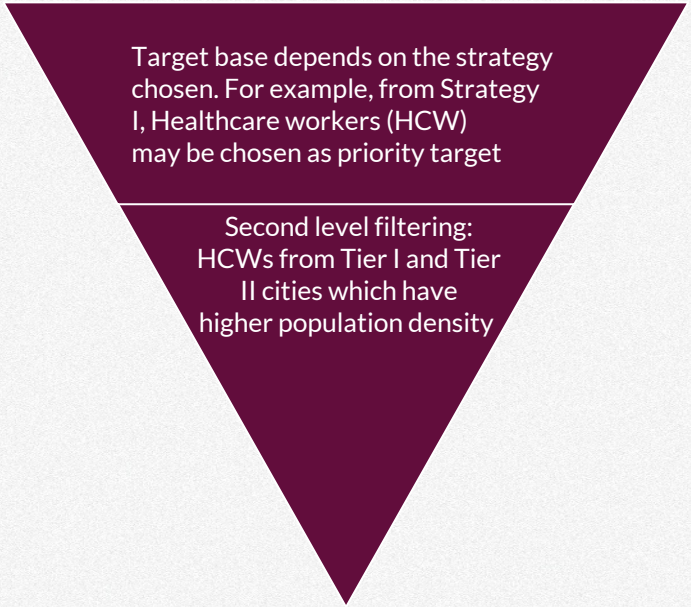
Expected Outcomes:

Reduce mortality rate and burden of COVID-19 on health services.

Comparison of the two strategies

Strategy	Advantages	Disadvantages
Essential-First	• Easy to identify individuals through existing occupational IDs • Keep essential economic and health functions running • Smaller population target group to begin vaccine roll out with	• Unlikely to cause immediate reduction in mortality rates • Those over 65 years of age may not be covered • Those in the unorganised sector might be difficult to cover
Demography-First	• Reduction in mortality rate • Likely reduction in hospitalisation rate	• Huge population to target in first phase • Uncertainty of whether the vaccine will work in target population

Prioritisation Funnel



Using either of the above two strategies will still require vaccinating a minimum of 30-50 million people in the first phase.

It would not be recommended to delay vaccine roll out if required number of doses are unavailable.

Therefore, we would recommend a tiered funnel that can help prioritise people, based on the available vaccine doses.

For the second level of filtering, parameters such as population density of the area or age/co-morbidity status of the individual may be considered.

Secure Vaccine Supply

Considerations

Once the demand for the initial phases of vaccine deployment are determined, the next step would be choose the vaccine best suited for Indian demand.

Apart from **cost** *of the vaccine, we envision the following criteria to be important in the decision to choose a vaccine.*

Supply chain constraints

For example, nucleic acid based vaccines would require cold chains of extremely low temperatures.

Validity of Clinical trial data

If clinical trial data is not from India, it will be important to assess the quality control mechanisms used in the clinical trial.

Dose requirements – single or multiple doses

Single dose vaccines are preferable and would make tracking of vaccine recipients easier.

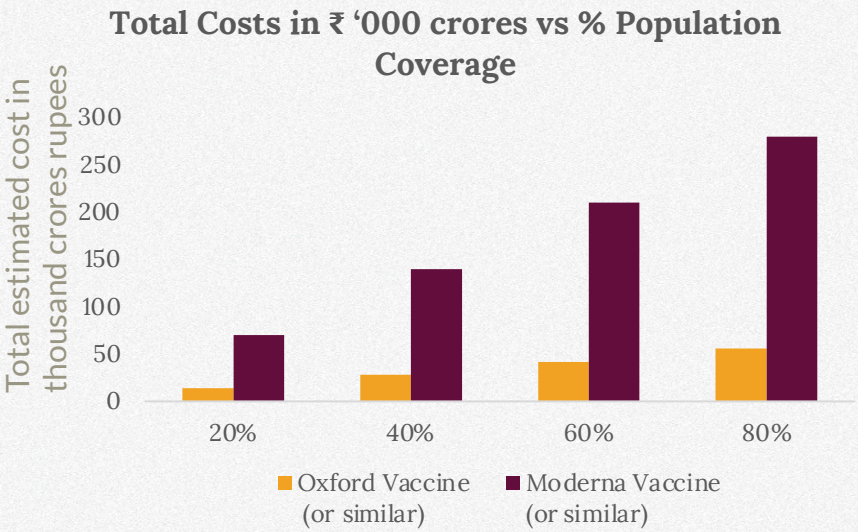
Vaccine delivery method – Injectable or oral

Delivering injectable vaccines would require development of a trained workforce.

Vaccine variants

We will likely have to deploy 2 or more vaccines depending on production, cost and effectiveness of the vaccine.

Cost of Vaccine Deployment



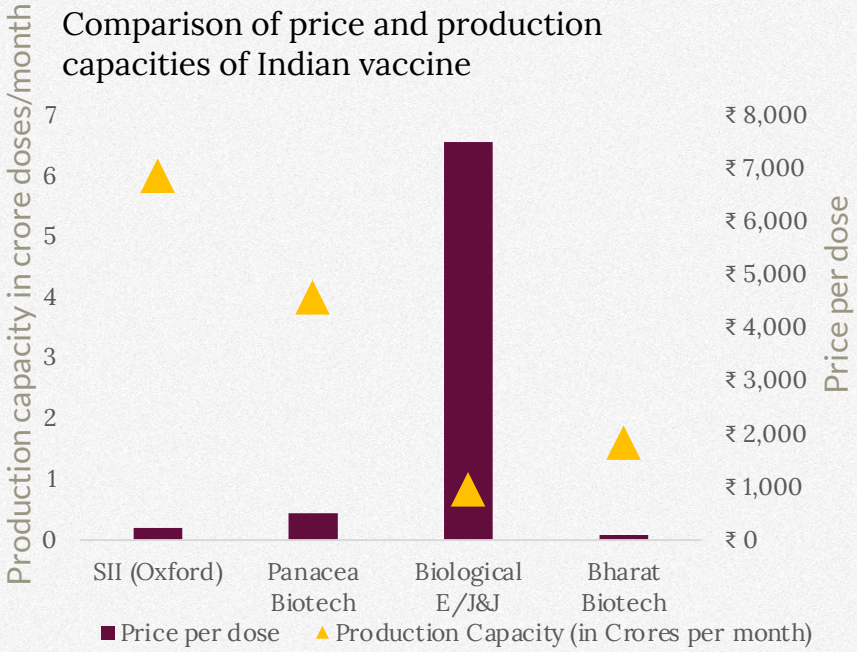
Takshashila recommends that 80% of India's population be vaccinated

Oxford (or a similar vaccine) will cost ₹50,000cr.
Moderna (or similar vaccine) will cost ₹250,000 cr.

Following assumptions have been made for calculating the cost:

1. 2 doses per individual
2. India's population is 130 crores
3. Oxford vaccine price = $3/ dose and Moderna vaccine price = $15/ dose
4. $1 = Rs. 75
5. Distribution cost ~ 20% of vaccine price
6. This cost estimate does not account for costs required to ramp up vaccine manufacturing in India. The cost of vaccine deployment would include the cost of procuring a combination of approved vaccines, distributing them (cold chain logistics and administrative costs) and any costs associated with incentivising increased vaccine manufacture in India.

Relative production capacities for vaccines



At our current production capacity, vaccinating 80% of the population will require 20 months

At 80% target coverage,
2 doses for 104 crore population= 208 crore doses.
Adding 15% wastage that occurs during usual vaccination drives = 240 crore doses
Current Local Production Capacity = 12.3 crores per month

Total deployment period = ~20 months

To scale up deployment, **we need to source vaccines from other companies/ countries and incentivise increased manufacturing in India.**

Ramping up vaccine supply

Takshashila recommends ramping up vaccine supply to vaccinate ~80% of Indian population in 12 months

Attract foreign vaccine companies	Incentivise Indian vaccine research	Facilitate vaccine manufacturing
• Enter into agreements (using model contract) with additional pharmaceutical entities developing vaccine candidates • Incentivise foreign companies to set up manufacturing in India	• Fast track vaccine applications * • Build incubator with BSL2/3 facilities for startups • Facilitate partnerships between research institutions/small to mid-size startups and clinical trial units/manufacturers • Create a safe clinical trials framework • Incentivise R and D through double tax deduction	• Speed up government processes for vaccine manufacturers (import of equipment and ingredients, certification of manufacturing facilities, access to capital) • Defer utility payments • Do not recommend price ceiling • Clear tax refunds and reimbursements immediately

These recommendations were first made in Takshashila Institution's Proposal: Biotech 2025 – From lifesaver to economic engine.

Vaccine Procurement

Once a vaccine (or a combination of vaccines) has been chosen, the next step would be to set up a procurement pathway.

We recommend a transparent ***model contract*** *that will build manufacturer and public confidence.*

Publish the main terms of a "model contract" for vaccine procurement that covers:

1. Guarantee of certain market access (e.g., minimum revenue or order size)
2. Dispute resolution guarantees (e.g., compulsory arbitration)
3. Control over and access to outcome data
4. Terms for manufacturing partnerships with Indian vaccine manufacturers
5. Terms for technology transfer (e.g., limited term IP license of the vaccine for India, to expire at end of pandemic; terms for follow-on IP)

Choose the Delivery Channel

Financing Models

Either a priced at zero or market priced with DBT approach can be used to finance the vaccine deployment. Takshashila prefers the second approach.

Strategy	Advantages	Disadvantages
1. Priced at Zero Approach	• Vaccination is a public good • High Coverage • Low transaction costs	• Distorts the market • Chances of pilferage and corruption • Government bears the entire cost
2. Market Priced with Direct Benefit Transfer Approach	• Lower immediate cost of roll out • Targeted subsidy to the needy • Well-off households pay fair share	• DBT database/mechanism needed • Coverage is affected for those who cannot make initial payment
3. Market Price Only Approach	• Competitive pricing as more vaccines are approved. • Households bear the entire cost	• Inequitable distribution • Cannot achieve herd immunity at practical prices • May exclude many

Current mechanism of vaccine distribution

Vaccine distribution currently occurs through the Universal Immunisation Programme (UIP). UIP has evolved to target children and mothers with a select repertoire of vaccine and depends on trained ASHA workers and voluntary organisations for its execution.

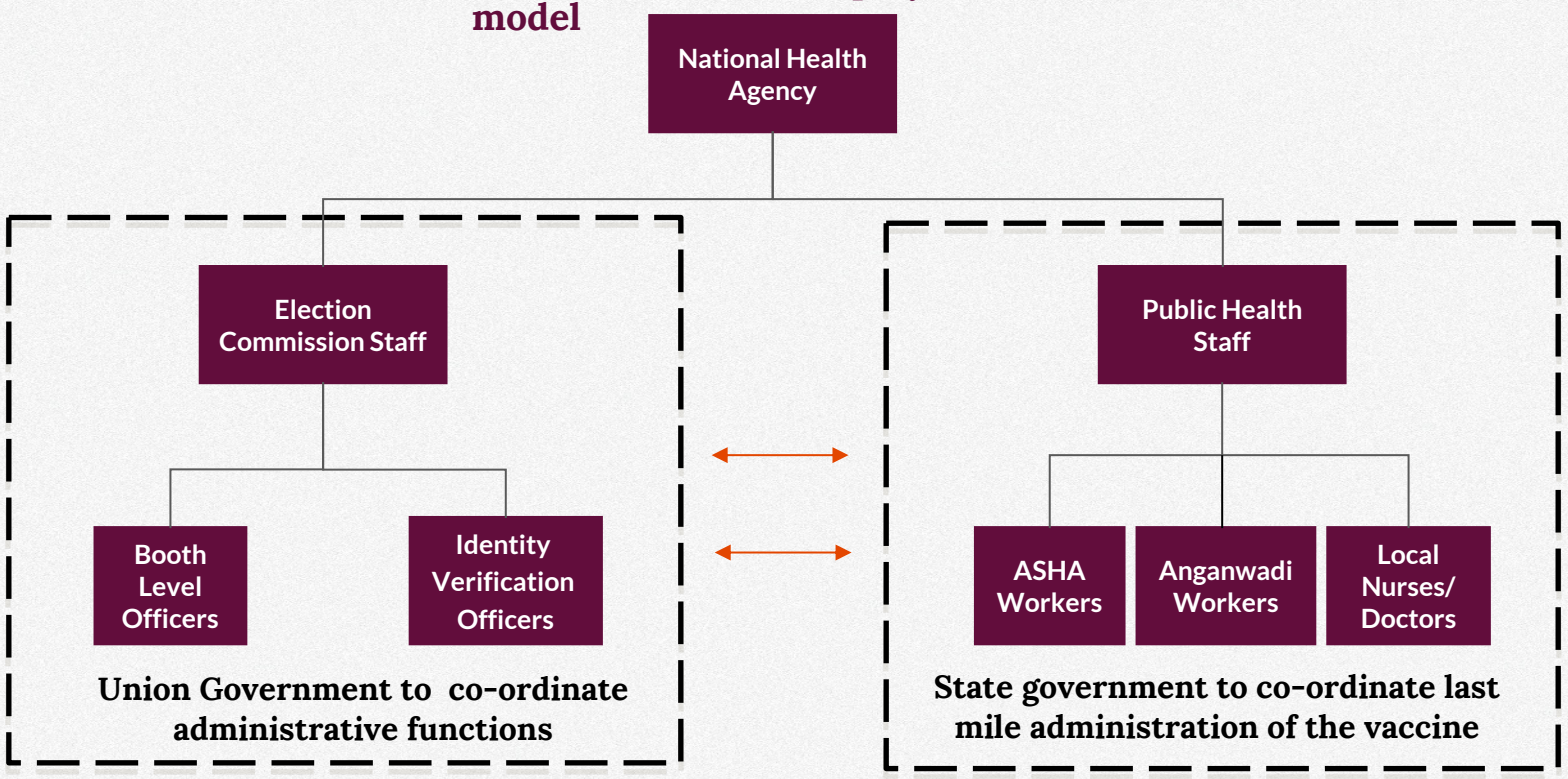
However, this programme needs to be strengthened to achieve COVID-19 vaccination because:

- Target Population is larger
- Roll out needs to be quick
- Supply will be constrained and not uniform.
- Overcrowding at vaccination points needs to be avoided.

COVID-19 vaccine distribution will require a nation-wide decentralised machinery capable of quick deployment when necessary taking vaccines to people.

Organisational Structure

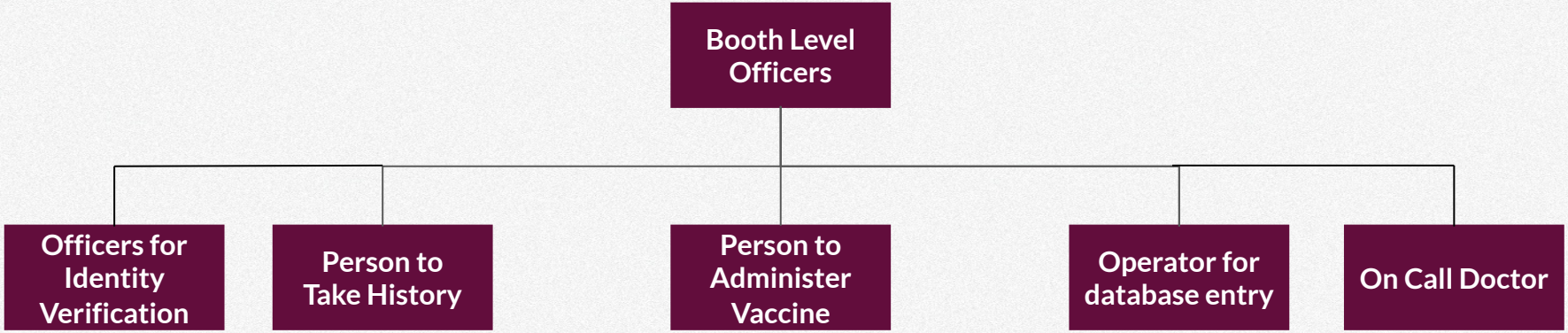
Takshashila proposes the below organisation structure to execute vaccine deployment in a mission-mode model



The use of Election Commission for overseeing administrative functions will require a law to change scope. This law can be first passed as an ordinance and later converted into law as per Parliamentary procedures.

Personnel Requirement at Vaccination Booths

Last mile delivery can be planned through booths catering to 1000-1200 people per day



Minimum Personnel Requirement at Vaccination Booths

Points to Consider:
At least 20 min would be required per person to be vaccinated.
Social distancing will have to be maintained at all booths.
Security may need to be deployed to maintain law and order at the booth.
Emergency equipment will have to be maintained in case of medical emergency.

Conduct Post-market surveillance

Post-market surveillance

A separate database, enabled by Aadhaar as an identifier, would need to be created to track vaccine distribution and adverse events.

A programme of this scale will need an independent and robust database to document vaccine recipients as well adverse events.

Features of the Vaccination Database:

1. A separate database housed in the NHA and allows Aadhaar or any national ID to be used as identifier
2. Track details of vaccination used along with Lot # and post vaccination telemedicine follow up
3. Be encrypted and used on user request to authenticate vaccination
4. Takshashila also recommends the use of election ink to mark individuals who have received the vaccine.

Considerations for usage of Aadhaar-enabled database

1. If the vaccine recipient status of an individual is not tracked, they might get extra doses accidentally administered. The health risks of taking higher than recommended (and clinically trialled) dose of the vaccine are unknown.

2. If the vaccine is found to ineffective or faulty after it has been administered, it will be easier to reach the recipient and take corrective action.

3. Aggregated, anonymised data based on identifiers can help determine vaccine performance.

4. The usage of Aadhaar should meet the three-point test of necessity, legality, and proportionality.

5. The National Health Authority (NHA) should be the owner of this database.

Features of the Vaccine Database

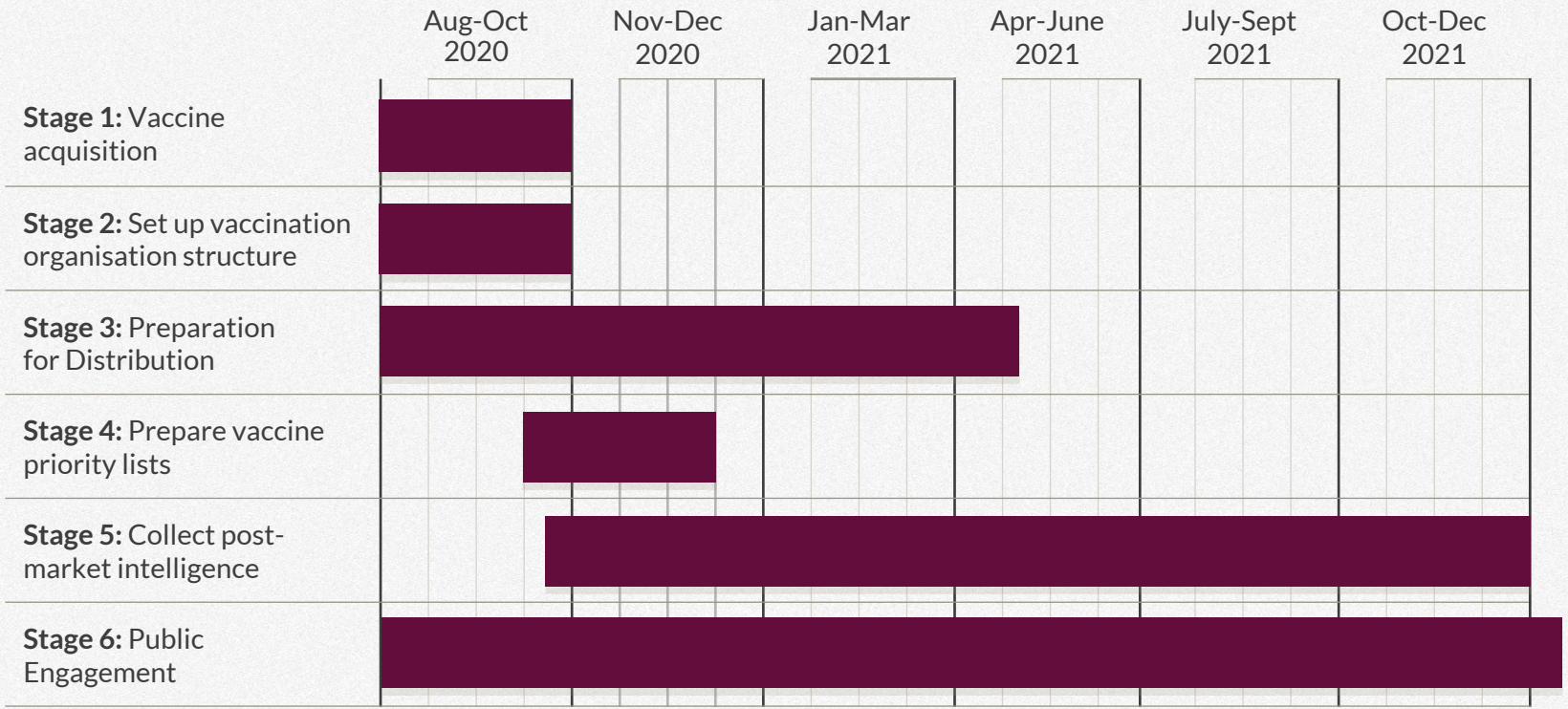
Define objectives for data collection	Ensuring delivery of vaccine as per prioritisation Ensuring correct dosage as per vaccination protocol Determining vaccine efficacy and any negative impacts
Establish mechanisms for anonymisation	Use Aadhaar's tokenisation method Use of secure multi-party computation for privacy-preserving determination of outcomes.
Define sunset period for data storage	Whichever of the three is earlier: • End of public health emergency in India • End of post-market surveillance as warranted by the vaccine • Five years from the start date

Implied versus Informed Consent

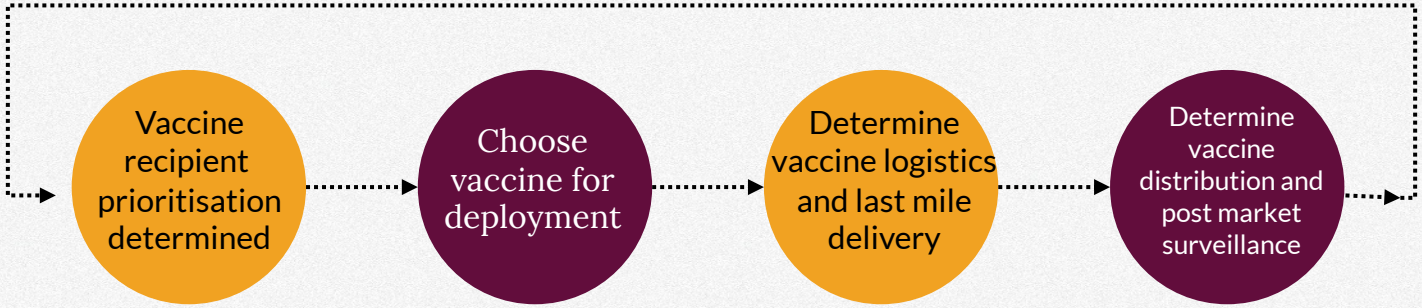
COVID-19 vaccination programme needs informed consent of the public.

Announce for public consumption	Prioritisation Criteria Age groups to be vaccinated Strategy and timeline of delivery
Publish at vaccination booths	Rejection Criteria List of Possible adverse reactions and display at each site Vaccine Trial Data prior to/alongside regulatory approvals
Train staff at booth	Make vaccine recipients aware of vaccine risks and the addition to personal data to the vaccine database and its purpose Staff to have GCP (Good Clinical Practice) training

Timeline


Aug-Oct 2020
Nov-Dec 2020
Jan-Mar 2021
Apr-June 2021
July-Sept 2021
Oct-Dec 2021
Stage 1: Vaccine acquisition
Stage 2: Set up vaccination organisation structure
Stage 3: Preparation for Distribution
Stage 4: Prepare vaccine priority lists
Stage 5: Collect post-market intelligence
Stage 6: Public Engagement

Overall Workflow



- Communicate to states and local authorities
- Communicate vaccination prioritisation strategy and criteria to public

- Place advance orders with manufacturers
- Communicate expected timelines to public

- Tie-up with local private and public sector players to manage delivery

- Design mechanism to create a database for capturing data on vaccine recipient, vaccine received and any adverse event associated with vaccination
- Estimate and train required workforce for distribution of the vaccine

Conclusion

Major Recommendations

Follow an Essential-First Approach for estimating need

Prioritise vaccine recipients based on how essential the occupation is for managing the pandemic.

National Manufacturing of the Vaccine

Obtain vaccine in adequate quantities, with local manufacturing.

Financing the Vaccine

A cost-free or market-priced with a DBT model can be used to finance the vaccine. Takshashila prefers the market-priced with DBT model.

Delivery channel should not become the bottleneck

Large-scale logistics and decentralised delivery necessitate a combination of Election Commission machinery and State government's Public Health administration.

Post-market Surveillance

Use an Aadhaar-enabled, separate database to track vaccine recipients and adverse events.

End