

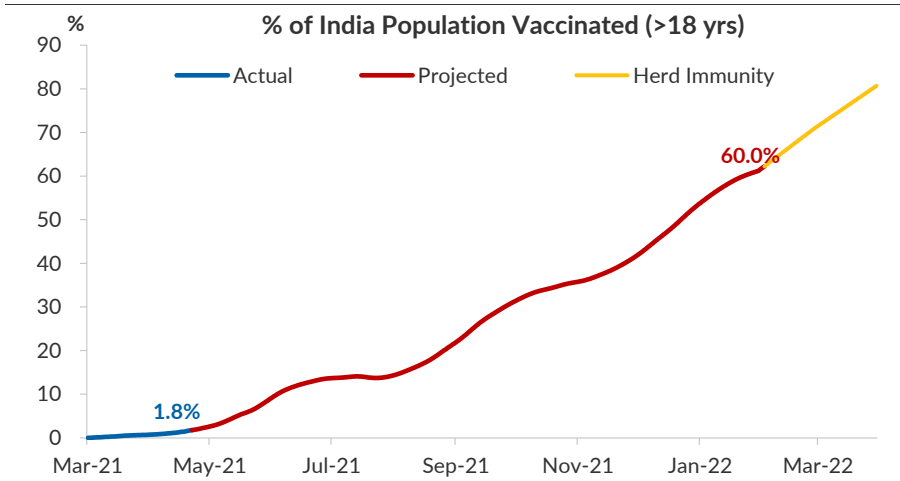
India's Path to Herd Immunity

We see 40% of India's adult population likely to be fully vaccinated by November, largely through indigenous vaccine production. By January 2022, another 20% is likely to be vaccinated, thereby covering 60% of the adult population. By the end of this fiscal year, around 80% of the adult population will be vaccinated. It is pertinent to note that the vaccination threshold for herd immunity as defined by one of WHO's chief scientists, is 60-70% of the total population.

India's teething troubles of vaccination coverage are likely to persist over the next month, owing to raw material scarcity for domestic manufacture. Shortage if severe, can dent vaccination drive with 7.5cr of population to be prioritized for second dose (who will be due after stipulated 7 weeks of first dose), putting the first dose to halt and derailing the future vaccination run-rate.

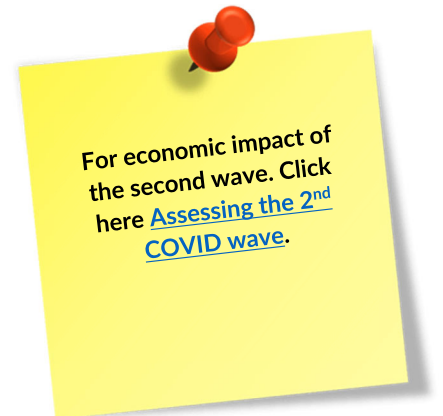
However, vaccine production should ramp up, June onwards, given that manufacturers are boosting capacities and the US government is likely to ease export restrictions on vaccines and raw materials following the vaccination of significant native populace, over the next 45 days. Considering that India's adult population of 1bn will account for largest market for US vaccines, we see 20-25% of US vaccine exports heading to India.

Exhibit 1: India to be largely immune to COVID by January 2022



Source: YES Sec - Research

Note: Herd Immunity is termed as 60-70% of the Population vaccinated as per WHO norms



HITESH JAIN
Lead Analyst

hitesh.jan@ysil.in



HEMANT NAHATA, Co-lead Analyst

hemant.nahata@ysil.in

BHAVESH GANDHI, Lead Pharma Analyst

bhavesh.gandhi@ysil.in

AMAR AMBANI, Sr. President, Head of Research

amar.ambani@ysil.in

Exhibit 2: Domestic capacity and vaccine production should ramp up from July, imports to augment supply

Monthly Figures (mn)	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
Capacity											
Serum (Current Capacity: 70mn)	75	90	100	100	100	100	100	100	100	100	100
Bharat Biotech (Current Capacity: 10mn)	15	25	40	60	60	60	60	60	60	60	60
Sputnik V (RDIF)		10	15	20	30	45	60	65	65	65	65
Cadila				5	10	15	20	20	20	20	20
Aurobindo						5	15	20	22	22	22
Total (mn)	90	125	155	185	200	225	255	265	267	267	267
Production											
Serum	60	72	80	80	80	80	80	80	80	80	80
Bharat Biotech	12	20	32	48	48	48	48	48	48	48	48
Sputnik V (RDIF)	-	8	12	16	24	36	48	52	52	52	52
Cadila	-	-	-	4	8	12	16	16	16	16	16
Aurobindo	-	-	-	-	-	4	12	16	18	18	18
Total	72	100	124	148	160	180	204	212	214	214	214
Exports											
Serum		7	16	16	16	16	16	16	16	16	16
Bharat Biotech											
Sputnik V (RDIF)		6	8	11	17	25	34	36	36	36	36
Cadila					2	3	4	4	4	4	4
Aurobindo						-	6	8	9	9	9
Total		13	24	27	35	44	60	64	65	65	65
Wastage	4	5	6	7	8	9	10	11	11	11	11
Total Supply											
Domestic availability	68	82	93	113	117	127	134	137	138	138	138
Imports		9	12	15	18	19	19	19	19	19	19
Total	68	91	105	128	135	146	153	156	157	157	157

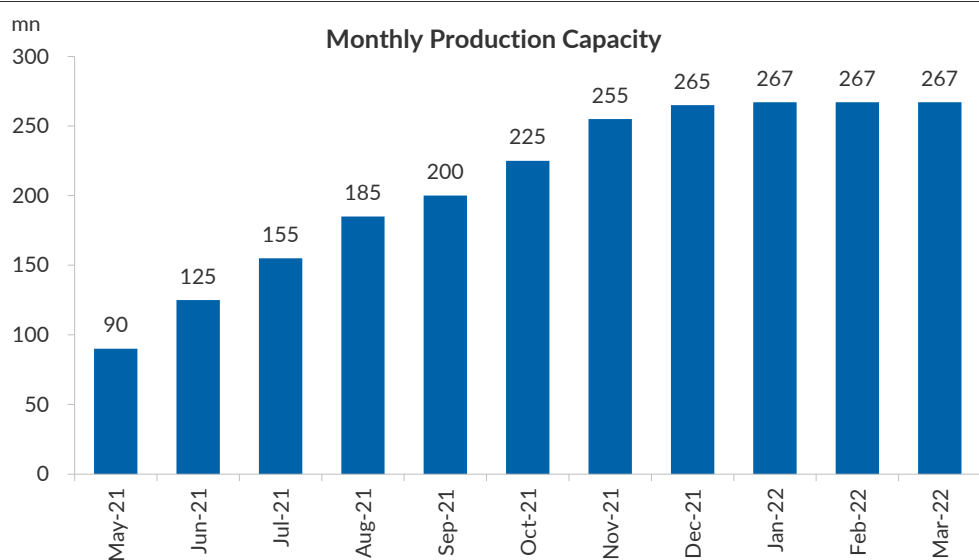
Source: Media Reports, YES Sec – Research

Exhibit 3: Our Key Assumptions

Sr No	Assumption	Rationale
1	Above 18 years population as a target for immunization	All COVID vaccines till now are designed for population above 16-18 years. While clinical trials for children have commenced, it is estimated that such vaccine will be approved and available in 2022
2	Shortage of Raw Materials to ease by end of May-2021	We expect more than 80% of US adult population to be fully vaccinated in next 45 days, implying that their requirement of vaccine raw materials will reduce sharply and thereby, supply should ease
3	Uniform capacity utilization of 80% considered for all manufacturers	Although some producers are projecting 100% capacity utilisation in the months to come, we have considered 80% for all manufacturers on a conservative basis
4	Serum to scale up capacity from 70mn to 100mn doses	Government grant of Rs30bn will help Serum in ramping up capacity. Serum has guided for capacity of 100mn doses till July. We have assumed a phased increase
5	Bharat Biotech to ramp up annual capacity to 700mn doses	Government grant of Rs650mn grant and usage of repurposed facility in Bangalore will aid in scaling up output gradually. We have assumed a phased increase
6	RDIF capacity of total 750-800mn doses	RDIF has tie-up with 6-7 players for total 750-800mn doses; Initial India doses distributed through Dr Reddys'. Media report suggests RDIF might earmark 250mn doses for India, out of tied up ~800mn doses
7	Cadila production capacity of 240mn dose capacity annually	Cadila to file for its vaccine in June; has talked of 240mn dose capacity annually. We have assumed a gradual rise
8	Aurobindo to have annual capacity of 260mn viral vaccine doses by July' 21	Aurobindo has specifically incurred Rs2.5bn for a greenfield capacity and will act as a contract manufacturer. Once the capacity is commissioned in July, company will do technology transfer pact with vaccine partner and hence production start is expected in October
9	Haffkine and Bharat Immunologicals potential Covid vaccine capacity not considered as it would take time to ramp up	
10	Not factored Novavax vaccines as they are still under trials	
11	Wastage of 5% embedded in our calculations (reported figures of 6.5% & 4.5% in March & April respectively)	Each Covishield vial has 10 doses in total, while a Covaxin vial contains 20 doses. Each dose of 0.5 ml is meant 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. The vaccine wastage in India can be largely be attributed to low turnout beneficiaries turning up to get vaccinated, besides some teething troubles. We assume 5% wastage in our calculation
12	Provision for disruption or shortage of raw materials	Assumption of 80% capacity utilisation inherently factors in shortage of raw materials
13	Government to allow free imports of vaccines and raw materials and fast-track approvals	With rising cases, Indian government has taken various initiatives to boost supply. We infer that government will maintain its thrust on easing supply, unless a significant proportion of population is vaccinated. We presume approvals will be fast-tracked
14	India exports of vaccines to be allowed in a phased manner, depending on the easing of domestic supply situation. Export rising to 31% of the production by end of this fiscal year from 13% in July'21	Apart from Serum's 20% of the production, 70% of the RDIF tied up capacity is assumed for exports. Aurobindo will export to UNICEF nations. Cadila will export 25% of its production. Once vaccination rates in India reach optimal levels, vaccine manufacturers will try to export more to overseas markets for better utilization of capacity
15	20% of US vaccine produced to be exported to India in the next few months. Extrapolating the same, we expect vaccine imports for FY22 to range between 155-170mn units	Considering that 30% of the global population is below 18, the rest 70% or 5.6bn needs to be vaccinated. US (250mn) and Euro zone (320mn) will cover major part of their adult population in next few months, while China (1bn) will completely rely on their indigenous manufactured vaccines to inoculate its adult population. Effectively, US vaccine manufacturers will have around 4bn of the world population to cater after US attains herd immunity. Given that India's adult population of 1bn will account for 1/4 of the potential 4bn market for US vaccines, India is likely to get 20-25% share of US vaccine exports
16	2nd Dose to be administered after an interval of 7 weeks from the 1st Dose	Government has stipulated a gap of 6-8 weeks between the two doses.
17	Post 70% inoculation of 1st Dose, 60% of the vaccine supply to be channelized for the second dosage	Given that a large part of the adult population gets the first dose, a major chunk of the supply will be utilised as a second dose to attain full vaccination

India's Path to Herd Immunity

Exhibit 4: Expanding production capacity to provide much-needed impetus for mass inoculation



Source: Media Reports, YES Sec – Research

Exhibit 5: Domestically produced vaccines alone to fully vaccinate 48% of India population by December this year...

Month	Cumulative Dose (mn)	1 st Dose (mn)	% of Population	Full Vaccination (mn)	% of population
Apr-21	145	122	12.6	23	2.4
May-21	213	130	13.5	83	8.6
Jun-21	295	164	17.0	132	13.6
Jul-21	389	255	26.4	134	13.9
Aug-21	502	309	32.0	193	20.0
Sep-21	619	340	35.2	279	28.9
Oct-21	746	427	44.2	319	33.0
Nov-21	880	519	53.7	362	37.5
Dec-21	1,017	554	57.4	463	48.0
Jan-22	1,155	619	64.1	536	55.5
Feb-22	1,293	727	75.3	565	58.5
Mar-22	1,431	783	81.0	648	67.1

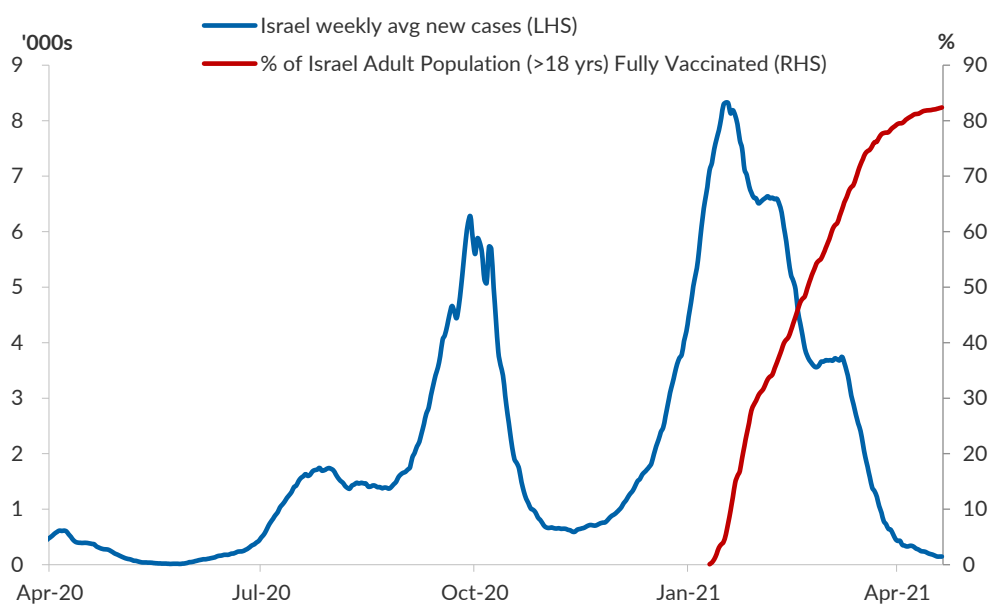
Source: YES Sec – Research

Assumptions:

1. Population number excludes 0-18 age group
2. 2nd Dose to be administered after an interval of 7 weeks from the 1st Dose
3. Post 70% inoculation of 1st Dose, 60% of the vaccine supply to be channelized for the second dosage

India's Path to Herd Immunity

Exhibit 6: ...enough to build immunity, supported by Israel's vaccination response to COVID...



Source: CEIC, YES Sec - Research

Exhibit 7: ...various nations to attain immunity soon

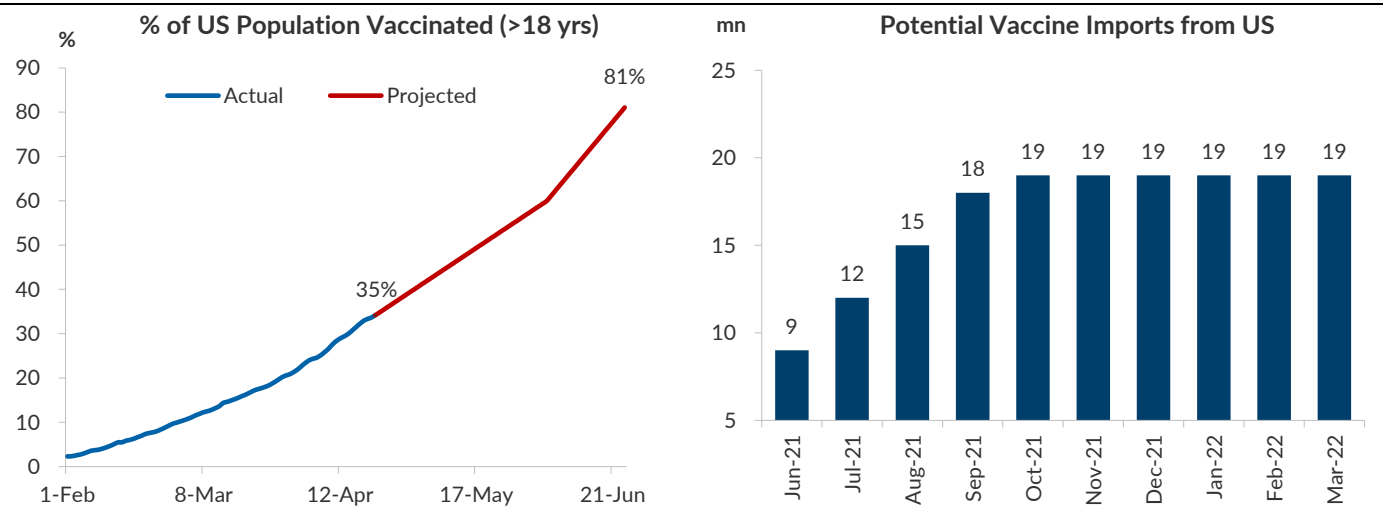
Countries and regions	% of adult Population (>18 years)		Daily rate of doses administered (mn)	Months required to vaccinate 75% of population
	1 st dose vaccination	fully vaccinated		
US	53.8	35.1	3.02	2
EU	23.7	8.9	2.43	6
UK	64.5	20.9	0.49	2
Brazil	18.0	7.1	0.86	7
Turkey	22.5	14.0	0.18	12
Mexico	12.5	4.9	0.33	11
Chile	54.8	39.3	0.15	2
Canada	24.6	2.8	0.27	4

Source: Bloomberg, Population data from United Nations, YES Sec - Research Projections

India's Path to Herd Immunity

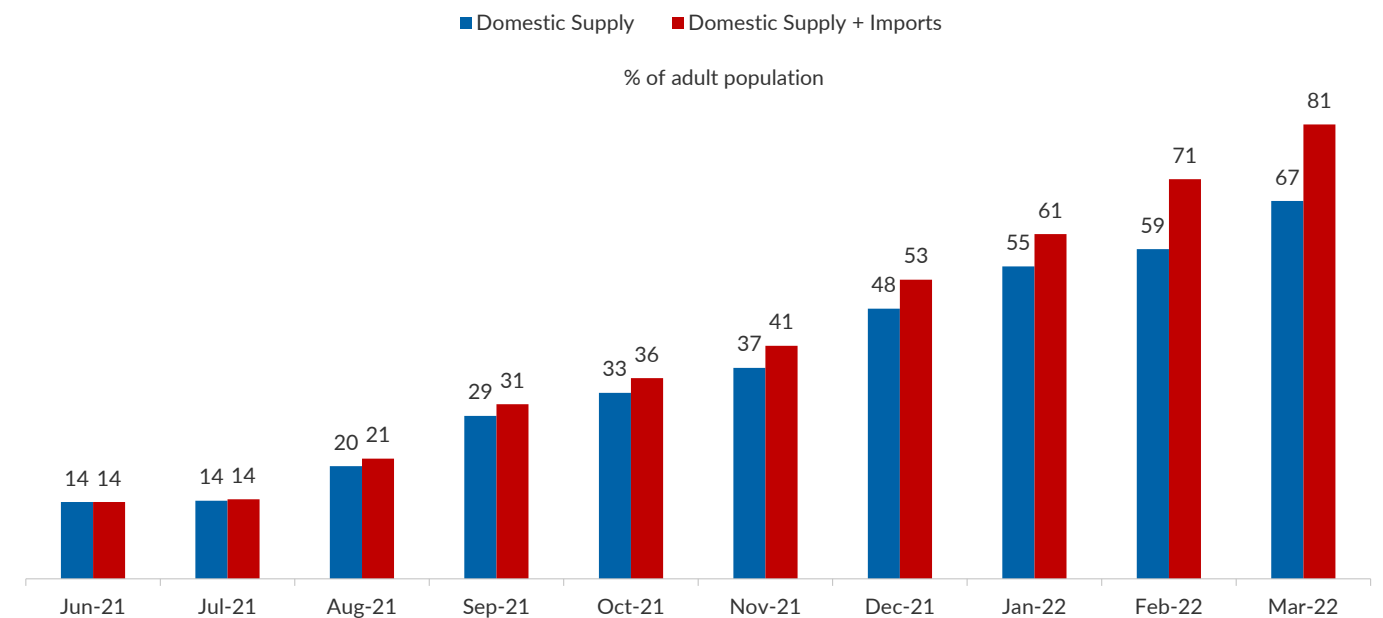
As US moves towards full vaccination, prospects of India imports of vaccines & raw materials improve

Exhibit 8: With US likely to immunize 81% of its population in next two months, a pathway opens for India imports...



Source: CEIC, YES Sec – Research
Assumption: 20-25% of US vaccine produced to be exported to India

Exhibit 9: ...vaccine imports from US will boost India's inoculation drive



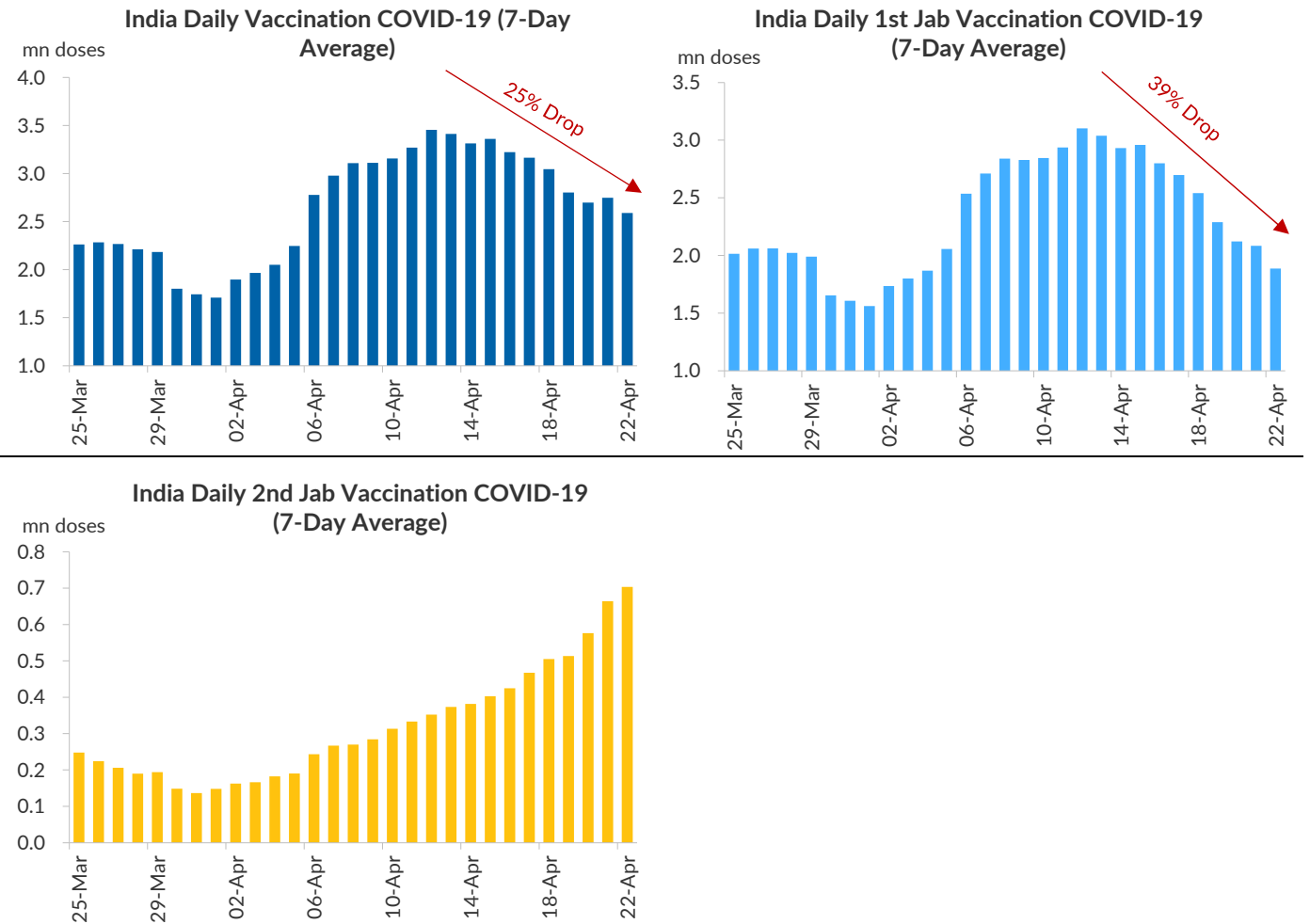
Source: YES Sec – Research

Assumption:

1. After 70% of the adult population is inoculated with the 1st Dose, 60% of the vaccine supply will be channelized for the second dosage.
2. By the end of Jan-22, 70% of the adult population will get the first dose with the help of Domestic supply + Imports. In case of only Domestic supply, 70% of the adult population inoculated with first dose by the end of Feb-22.

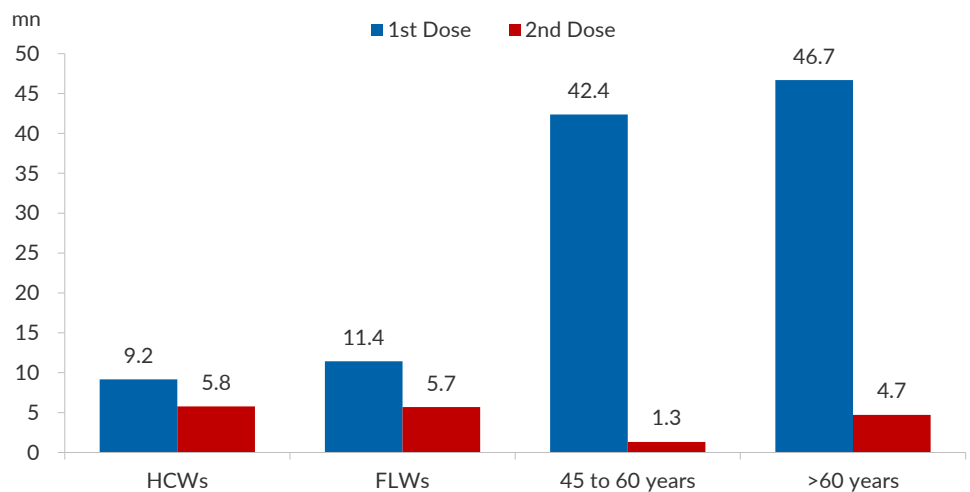
Annexure

Exhibit 10: Shortage of vaccines evident from the dip in India daily vaccination rate...



Source: CEIC, YES Sec – Research

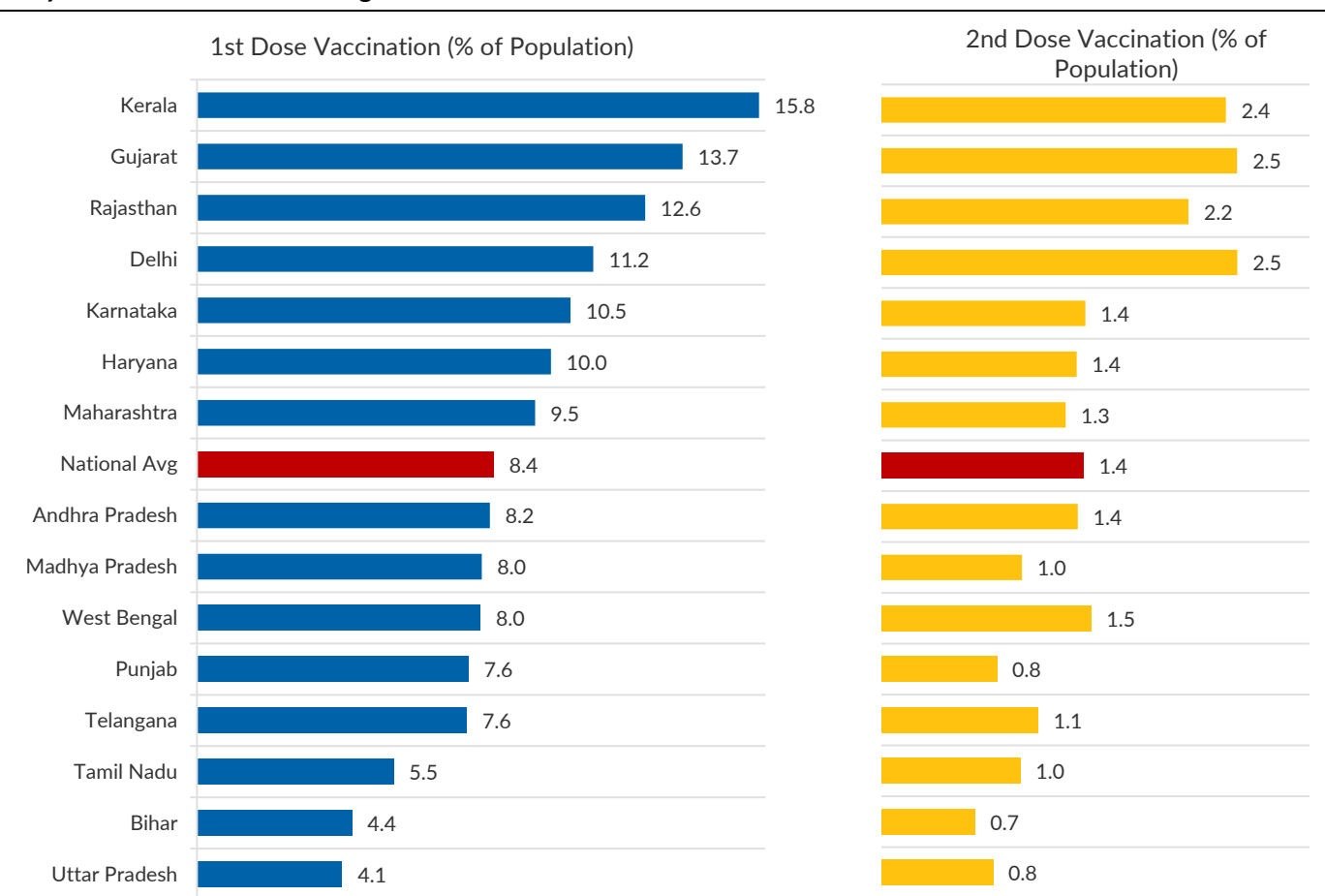
Exhibit 11: India Cumulative vaccination among groups



Source: YES Sec – Research HCW: Healthcare Workers, FLW: Frontline Workers

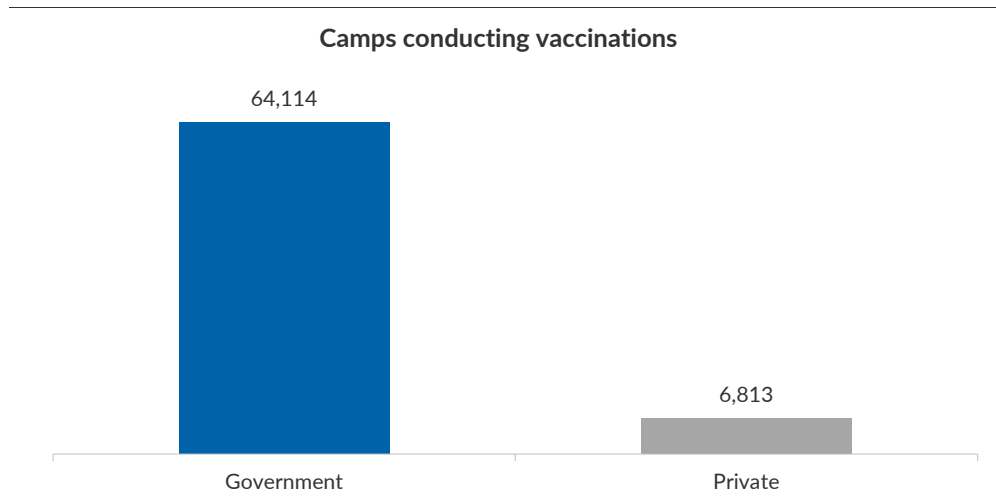
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Exhibit 12: Vaccination drive in Kerala & Gujarat among the best, while densely populated states like Bihar and UP way behind the national average



Source: CEIC, YES Sec – Research

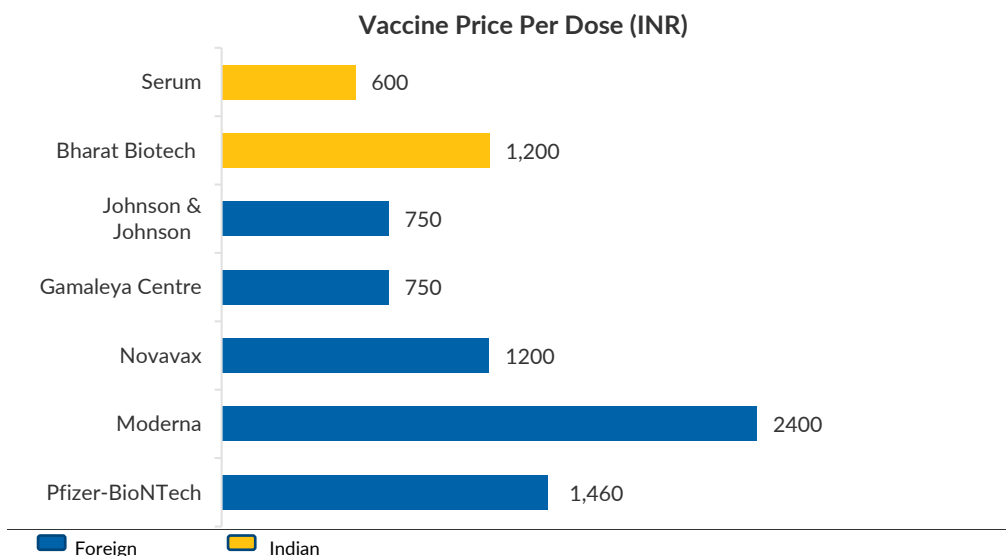
Exhibit 13: India Government spearheading the vaccination campaign



Source: YES Sec – Research

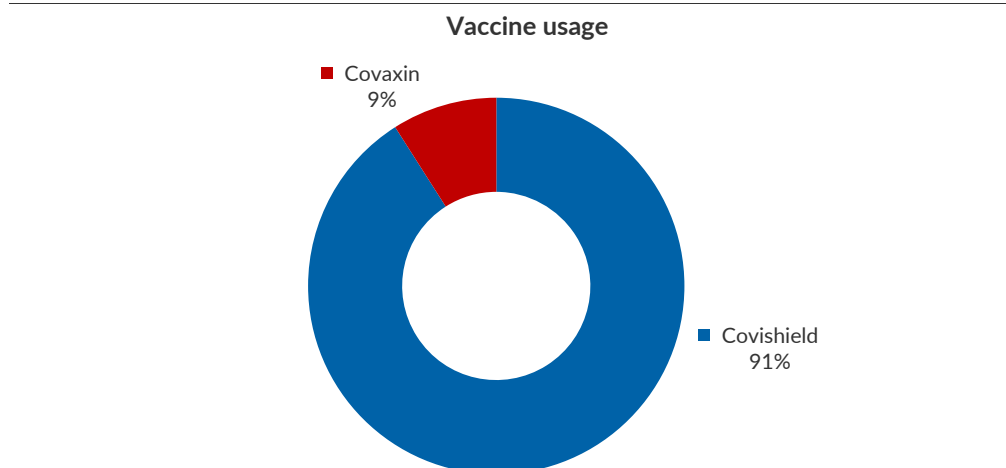
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Exhibit 14: India Government spearheading the vaccination campaign



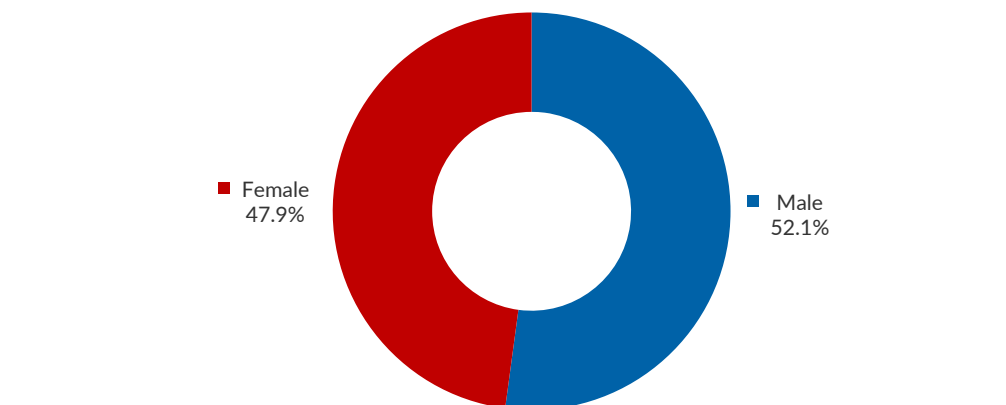
Source: Media Reports, PIB, India Today, YES Sec - Research.

Exhibit 15: Serum Institute (Covishield) the main purveyor of vaccines in India



Source: YES Sec - Research

Exhibit 16: India Vaccination Category by Gender



Source: YES Sec - Research

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YES Securities (India) Limited

Registered Office: Unit No. 602 A, 6th Floor, Tower 1 & 2, One International Center, Senapati Bapat Marg, Elphinstone Road, Mumbai - 400013, Maharashtra, India.

Email: research@ysil.in | Website: www.yesinvest.in

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