

A brief history and trend of state wise Covid-19 vaccine status in India

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Abstract

After the devastating second wave of COVID-19, with the rapid increase in the number of new cases in many states of India marking the beginning of a third wave of COVID-19, our best bet is taking a jab to protect against COVID-19. Currently, licensed vaccines are found to be reasonably safe and effective.

The second wave of COVID-19 was devastating, but it's a silver lining to note that most of the individuals who had taken the jab recovered with mild infections, and the hospitalization rates among jabbed individuals were meager. India is regarded as the vaccine manufacturing hub of the world, contributing 60% to the global vaccine supply.

The country has the capacity to manufacture well over 3 billion coronavirus disease 2019 (COVID-19) vaccine doses annually. The ability of the country to produce low-cost COVID-19 vaccines will benefit low-income countries that cannot afford expensive vaccines. This analysis provides an insight into the myths, pros and cons, and efficacy of the available vaccines. This paper focuses on the trend and growth of Covid-19 vaccine doses in the Indian States and Union Territories. Secondary information was the focus of the study.

The census approach is commonly employed in academic settings. The current state of Covid-19 was examined using percentage approaches, coefficients of variation, linear trends, and compound growth rates. A variety of sources, such as the Internet and books as well as newspapers and pamphlets, are utilised to gather secondary data. The data reveals that Dose1 immunisation in India was on average higher than Dose2 vaccination in India. The trend coefficient for the state-by-state vaccination status in India between October 14, 2021, and December 2, 2022, was found to be statistically significant. According to the coefficient of variance, India's Dose1 vaccine is more reliable than Dose2 immunisation.

Key words : COVID -19; covishield; covaxin; vaccination; India.

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Vaccines are an important new weapon in the fight against COVID-19⁹. COVID-19 vaccination programme will aid in the fight against COVID-19⁵. India began administration of COVID-19 vaccines on 16 January 2021. As of 29 November 2021, India has administered over 1.23 billion doses overall, including first and second doses of the currently-approved vaccines⁶. Uttar Pradesh was the first state to vaccinate over 20 lakh people²⁷. Uttar Pradesh received 11,796,780 doses, it consumed 10,261,718 of them, and has 2,211,000 in the pipeline in April²³. As of September 2021, Uttar Pradesh is leading in the vaccination coverage with 9,88,83,207 doses administered in the state²¹.

Present vaccination situation in India:

Indian Council of Medical Research (ICMR) suggested recurrence of infection in 0.13% and 0.07% following both doses of Covishield and Covaxin¹⁷. The efficacy rate of vaccines varies, with 81% efficacy in Covaxin and 70% in Covishield, respectively¹⁰. The safety, immunogenicity, and efficacy data of Covishield administered on 23,745 participants over 18 years outside India showed 70.42% vaccine efficacy¹⁹. Fully vaccinated individuals had a lower incidence of SARS-CoV-2 infections than partially vaccinated and non-vaccinated individuals.

The cumulative vaccine efficiency was determined to be 88.6% in fully vaccinated individual and 44.1% in partially vaccinated individuals¹⁵. Some data from global trials of Covishield suggests that extending the duration between doses to 12 weeks increased its

efficacy much more⁴. Recurrent life-threatening conditions dropped significantly after 28 days of the second dose. Interim data from the studies in USA, Chile and Peru indicated that the vaccine had 79% effectiveness even when the second dosage was administered four weeks after the first dose²⁶.

The central government's unsynchronised allocation of the vaccine to various states also created a misconception among the population not ruled by the central party¹⁴. A study done in West Bengal revealed that 40% of their subjects wanted a cheap vaccine, and 58% preferred an Indian vaccine¹². Nevertheless, rumours also claimed vaccine production with genes from monkeys and pigs⁸. A déjà vu was experienced earlier, and rubella and measles vaccines were boycotted due to similar beliefs, and the world had to face the brunt¹¹.

Both vaccines, Covishield and Covaxin elicited a good immune response in health care workers across India after two doses of vaccination despite the fact that seropositivity rates and the median anti-spike antibody titer were significantly higher in Covishield²⁴. However, the cause of death was unknown, and reports further revealed that none reported infection after receiving a second dose of Covaxin¹⁸.

WHO has so far validated only six vaccines globally, the Johnson, the Pfizer vaccine, Sputnik V, Sinopharm-BIBP, Moderna, and two Astra Zeneca vaccines for emergency use.²⁵ Natural immunity by COVID-19 may not last long, and evidence suggests reinfection. Therefore, vaccination is necessary for

boosting immunity¹³.

However, optimism about the vaccines remains as more than 80% of hospital admissions, almost all the severe cases requiring intensive care unit admission, and COVID-19 related deaths have been observed only in the unvaccinated population of Seychelles¹. There is also no difference in the doses, schedule, or platform. However, the vaccine is given to such subjects after 90 days. These suggest the rumours about the contents of the vaccine as fabricated.

Objectives :

The aims of the present study are:

1. To review the present vaccination situation in India.
2. To determine the Covid-19 vaccine doses in different Indian states and union territories as of October 14, 2021 and as of December 2, 2022.
3. To find out the trend and growth of Covid-19 vaccine doses in different Indian states and union territories as of October 14, 2021 and as of December 2, 2022.

The research was focused on secondary knowledge. For research, the census method is used. Percentage techniques, coefficient of variations, linear trend, and compound growth rate were used to compare and analyse the status of Covid-19. Secondary data collected through the internet, books, newspapers, documents, brochures, etc.

Calina Daniela *et al.*,¹⁶ stated that immunization of the population by the vaccine

is recognized as a public health priority in this triggered Covid-19 pandemic. They also concluded that social distancing is very expensive in terms of social and economic consequences.

Shih *et al.*,²⁰ examined the progress of SARS-CoV-2 treatments and vaccines, focusing on current clinical studies and their challenges. They stated in their review that the vaccine candidates for SARS-CoV-2 are based on the viral spike protein, which plays a critical role in viral infection. They also advised that significant worldwide coordination and collaboration among studies, pharmaceutical firms, regulators, and governments is needed to prevent further damage due to the emerging SARS-CoV-2 virus.

Talukdar *et al.*,²² according to their research, a broad range of information technology tools can play an important role in raising awareness of the Covid-19 immunization campaign. According to their survey of 60 nations across the world, 65.06 per cent of people are willing to get vaccinated, and many individuals believe the Covid-19 pandemic is a real threat to the community and preventive measures should be taken including the vaccination drives.

Several social and economic issues have arisen as a result of the Covid-19 outbreak in the United States, according to D. Amutha *et al.*,⁴. Both socially and in terms of controlling the virus's propagation, there has been a huge influence on human life. As a precaution, they wash their hands frequently and wear face masks. Covid19 can be fought thanks to the Indian government's protections and directions.

During the COVID-19 epidemic in India, the poll was utilised as one of the markers of mental health among construction workers, according to D. Amutha³. During the lockdown, as many as a third of them were suffering from the mental health of construction workers. In other words, their impact on human mortality and morbidity is equally horrendous for countries and the rest of the world.

Amutha² revealed that the Corona virus pandemic has a significant effect on people's life. This disease affects everyone on the planet, whether they realise it or not. In both developed and developing countries, there is a sense of fear, worry, and stress. Other problems occur as a result of the disease's intense isolation and lockdown, including social anxiety, panic attacks brought on by a feeling of discomfort, economic downturns, and high levels of psychological stress.

State wise Covid-19 vaccine status in India:

Current vaccination scenario in India as of 14th August 2021, the ministry of health and family welfare reported that India has vaccinated 536188903 of its population amidst total of 1.3 billion, which is not even half of its

population. The second-largest populated country in the world is facing a jolt with vaccination acceptance. The target of vaccinating 90% of the population by the end of June was not achieved. The majority of the states have jabbed their population except for Uttar Pradesh, Maharashtra, Bihar, Jharkhand, Madhya Pradesh, Meghalaya, Nagaland, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Chhattisgarh, West Bengal, and Assam. These states have jabbed less than 50% of their population.

The preponderance of population among these states and their perplexed attitude are the drawback of their vaccination campaign. A number of states have been successful in their vaccination campaign and have jabbed the bulk of their population such as Goa, Sikkim, Kerala, Andaman & Nicobar, Tripura, Delhi Daman and Diu, Lakshadweep, and Ladakh. Vaccination in kids and below 18 years is still awaited, and clinical trials are in progress in these age groups. Parents are skeptical and bewildered.

As of October 14, 2021, Table-1 shows the Covid-19 vaccine doses in different Indian states and union territories.

Table-1. State-Wise Cumulative Coverage Report of of Covid-19 Vaccination in India on 14.10.2021

Sl. No	State/UTS	Dose1	Dose2	Total Vaccination Doses
1	Andaman and Nicobar Islands	292202	172247	464449
2	Andhra Pradesh	29888413	16445530	46333943
3	Arunachal Pradesh	764965	481564	1246529
4	Assam	19697342	6511177	26208519
5	Bihar	47228020	14168728	61396748
6	Chandigarh	917117	498492	1415609
7	Chhattisgarh	13764641	6164721	19929362

8	Dadra and Nagar Haveli and Daman and Diu	639888	240933	880821
9	Delhi	11586343	5190550	16776893
10	Goa	1209915	615835	1825750
11	Gujarat	40742081	17628651	58370732
12	Haryana	15992934	5796379	21789313
13	Himachal Pradesh	5636538	2475473	8112011
14	Jammu and Kashmir	7441156	3116463	10557619
15	Jharkhand	13049217	3756187	16805404
16	Karnataka	38271800	15677221	53949021
17	Kerala	24341295	10331760	34673055
18	Ladakh	202848	132008	334856
19	Lakshadweep	54576	39315	93891
20	Madhya Pradesh	46362905	13518826	59881731
21	Maharashtra	54812576	22108614	76921190
22	Manipur	1217411	434132	1651543
23	Meghalaya	1063908	431973	1495881
24	Mizoram	690706	402479	1093185
25	Nagaland	679956	326310	1006266
26	Odisha	21272105	7832873	29104978
27	Puducherry	682803	277135	959938
28	Punjab	13876483	4632092	18508575
29	Rajasthan	39544905	14512093	54056998
30	Sikkim	516318	351985	868303
31	Tamil Nadu	34118728	9580398	43699126
32	Telangana	17185597	6443755	23629352
33	Tripura	2489252	1271721	3760973
34	Uttar Pradesh	80885097	17998110	98883207
35	Uttarakhand	7294328	2923712	10218040
36	West Bengal	38407873	15635624	54043497
37	Miscellaneous	1902795	1558835	3461630
	Total	634725037	229683901	864408938
	Average	17154730.73	6207673.00	23362403.73
	SD	19782031.37	6584200.37	26071499.81
	Co-efficient of Variation (C.V)%	115.32	106.07	111.59

Source: https://en.wikipedia.org/wiki/COVID-19_vaccination_in_India :

State-wise cumulative vaccination rate is shown in table-1. Over 80885097 first doses and 17998110 second doses were administered in the state of Uttar Pradesh on October 14, 2021. Furthermore, over 864408938 total vaccine doses were administered in India during the same time period. In total, Bihar received 61396748 doses of the vaccine and in total, Madhya Pradesh received 59881731 doses of the vaccine.

It can be inferred from the data in the

table that Dose1 vaccination in India was on average higher than Dose2 vaccination in India. A total of 17154730.73 Dose1 vaccination in India and 6207673.00 Dose2 vaccination in India on 14.10.2021. Dose1 vaccination in India more constant compared to Dose2 vaccination in India, according to the coefficient of variation.

As of December 2, 2022, Table-2 shows the Covid-19 vaccine doses in different Indian states and union territories.

Table-2. State-wise Covid-19 vaccination status in India on 2.12.2022

Sl. No	State/UTs	Dose 1	Dose 2	Total Vaccination
1	Andaman and Nicobar Islands	347593	353171	700764
2	Andhra Pradesh	44701029	47571235	92272264
3	Arunachal Pradesh	959636	819439	1779075
4	Assam	24809380	22118753	46928133
5	Bihar	73445990	67847695	141293685
6	Chandigarh	1184844	985124	2169968
7	Chhattisgarh	21263214	20314475	41577689
8	Dadra and Nagar Haveli	462295	356763	819058
9	Daman and Diu	319938	280022	599960
10	Delhi	18289638	15704993	33994631
11	Goa	1439791	1295336	2735127
12	Gujarat	54383059	53999903	108382962
13	Haryana	23670613	19822671	43493284
14	Himachal Pradesh	6644628	6319827	12964455
15	Jammu and Kashmir	11370582	11764400	23134982
16	Jharkhand	23921087	17704290	41625377
17	Karnataka	55151191	55298658	110449849
18	Kerala	29145781	25256091	54401872
19	Ladakh	238239	203811	442050
20	Lakshadweep	61807	60495	122302
21	Madhya Pradesh	60743829	59199333	119943162
22	Maharashtra	91634509	76528753	168163262
23	Manipur	1648482	1336831	2985313
24	Meghalaya	1446246	1086733	2532979
25	Mizoram	894117	749117	1643234

26	Nagaland	923483	744156	1667639
27	Odisha	35249769	33000231	68250000
28	Puducherry	994223	865836	1860059
29	Punjab	24150666	20966934	45117600
30	Rajasthan	57009013	50861113	107870126
31	Sikkim	591873	554651	1146524
32	Tamil Nadu	61191759	57148292	118340051
33	Telangana	32435627	31526993	63962620
34	Tripura	2916264	2520981	5437245
35	Uttar Pradesh	176948613	168783823	345732436
36	Uttarakhand	9114362	8720810	17835172
37	West Bengal	73519363	66686583	140205946
38	Miscellaneous	2243099	1579113	3822212
	Total	1025465632	950937435	1976403067
	Average	52587981.13	48766022.31	101354003.44
	SD	163792142.51	151987875.06	315770497.87
	Co-efficient of Variation (C.V)%	311.46	311.67	311.55

Source: https://en.wikipedia.org/wiki/COVID-19_vaccination_in_India

The Indian state of Uttar Pradesh reported the highest number of administered doses of the vaccine against the coronavirus (COVID-19) as of December 2, 2022. India's cumulative vaccination coverage reaches 1976403067. Over 150 million first doses and over 110 million second doses were administered in the state of Uttar Pradesh. Furthermore, over 1.7 billion total vaccine doses were administered in India during the same time period.

It can be exposed from the data in the table that Dose1 vaccination in India was on average higher than Dose2 vaccination in India. A total of 52587981.13 Dose1 vaccination in India and 48766022.31 Dose2 vaccination in India on December 2, 2022. Dose1 vaccination in India more constant compared to Dose2 vaccination in India, according to the coefficient of variation.

Vaccination in India were administered since January 16, 2021, with the administration of vaccines to all health care workers in the first phase. In February, the vaccination program was expanded to cover front line workers. The second phase of the program began in March which included citizens above the age of 60 and subsequently, people above the age of 45 with comorbidities. India's vaccination program currently includes two vaccines, namely, Oxford University – AstraZeneca's Covidshield vaccine, manufactured by the Serum Institute of India and Bharat Biotech Covaxin. Russia's Sputnik V was expected to be added to the mix starting May 2021.

Table-3. presents state-wide Covid-19 vaccination status in India on 14.10.2021 and 2.12.2022 in different Indian States and Union Territories.

Table-3. Trend and growth of Covid-19 vaccination status in Indian states and union Territories

Particulars	Trend Coefficient		R ²	Compound Growth Rate in Percent
	a	b		
Vaccination on 14.10.2021	4.334	0.023*(3.209)	0.257	11.12
Vaccination on 2.12.2022	7.384	0.311*(6.138)	0.401	9.41

Figures in brackets represent 't' values

*Significant at 5 percent level.

The trend coefficient was found to be statistically significant for state-wise vaccination status in India on 14.10.2021 and 2.12.2022. It indicates, on an average, it had increased by 2.3 percent for vaccination on 14.10.2021 and 31.1 percent vaccination on 2.12.2022. The growth rates are found to be 11.12 percent, 9.41 percent by the vaccination status in India on 14.10.2021 and 2.12.2022.

The value of R² indicates that the variations in vaccination in India on 14.10.2021 (0.257) and vaccination in India on 2.12.2022 (0.401) explain variations independent variables to the extent of 26 percent and 40 percent respectively.

Indian population is still in a dilemma regarding covid 19 vaccination. Fewer than half of the Indian population are vaccinated six months down the lane, as of August 13th 2021. Uttar Pradesh, Maharashtra, Bihar, Jharkhand, Madhya Pradesh, Meghalaya, Nagaland, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Chhattisgarh, West Bengal, and Assam have vaccinated less than half of their population due to an apprehension related to vaccines.

This review concludes that all the current covid vaccines face paradox as they are safe and efficient but abolishes 100%

protection. Pfizer provides 95% and Moderna 94% with higher rates of side effects. However, Indian vaccines have lower efficacy rates with 81% in Covaxin and 70% efficacy in Covishield with more potency at 12 weeks intervals between doses. Thus, with these findings, we conjectured that in India, Covaxin is a potent vaccine to shield against the mutant variants of covid 19 and is the only way to develop herd immunity amongst the Indian population.

In conclusion, the Government of India needs to devise effective public health strategies regarding mass vaccination and avoid assembling people at health-care units for vaccination. Many states have adopted door to-door vaccination to avoid superspreading and to assist in the nation's mass vaccination efforts. Vaccine hesitancy should be tackled by awareness campaigns at the village level. Looking at the emerging SARS-CoV-2 variants, the government should focus on maintaining a high vaccination pace and coverage with a double-dose of COVID-19 vaccine and a shorter time between doses so that high efficacy rates can be achieved in the whole population of India.

The authors are thankful to the Ministry of Health and Family Welfare, Government of India site: <https://www.mohfw.gov.in/> for

providing the facilities and access to online resources for this data for the study and literature review.

Conflicts of Interest

Authors do not have any conflict of interest.

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