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Vaccination Management in Covid – 19 for Indian Subcontinent(An Empirical Study)

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Abstract*:Covid – 19 has changed our life in almost all possible ways. It forced us to think differently for all known problems that we faced or experienced earlier. All structured problems have suddenly turned unstructured. Scientists, researchers, business personal, government agencies all around the globe have to organize themselves in a distinct and disjoint approach of work culture. The work-from-home culture has become predominant. To save common citizens from such ambience, deep rooted research has been carried to find a vaccine for corona virus. And finally the day has come when people have been given vaccine shots that assure them to minimize the disaster if they eventually get infected. This paper discusses the management of Covid vaccine that has been introduced for Indian masses and how policies can be built up to maximize the vaccine count. Also, an empirical model has been suggested with a supporting decision table to maximize the use of Covid – 19 vaccines.*
Keywords*– Covid-19, work-from-home, vaccine, corona virus.*

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Introduction: Our society is going through its toughest times. Covid – 19 has jeopardized most of the livelihood and placing challenges in all levels. Various IT tools likeblock chain technology, artificial intelligence, IoT, cloud and security technologies are combined to speed up the entire supply chain of vaccination management from production of drugs to its end users through doctors and other health workers in a trusted way.This is not aneasy job. It requires cross cultural organization tie up with strong technological setup that will speed access to life-saving vaccines and helps the nation return to its daily routine activities.

It has been observed that in the Indian subcontinent many people are resistant to vaccination because of various myths associated with it. This escalates the tasks of controlling the corona virus for the government. It has been found that many vaccination centers are overcrowded and many are waiting for their turn to get vaccinated. Thus, a proper vaccination management scheme has to be set up for making optimal usage of vaccination drive. The paper discusses various approaches for making this Himalayan task easier for all stakeholders and also how vaccination can be related to day to day activities of Indian people.

Covid – 19 and Indian Population:India is a densely populated country; thanks to its people. Since corona virus transmits through human contact, its effect is more in dense areas. However, after examining methodically that Covid-19 infection and death rates of 913 urban counties in the USA, a recent investigation by researchers at the Johns Hopkins Bloomberg School of Public Health claims that the infection rate is not linked with population density, whereas death rate is inversely related to population densityexcept for metropolitan areas where higher infection and higher mortality rates

have been noted.This inverse mortality relation with density has been attributed by the authors on the availability of better healthcare systems.
In India, a major part of total infections and mortality have been attributed to metropolitan cities such as Mumbai, Delhi, Bangalore, Ahmadabad, Hyderabad, Chennai, and Kolkata. The infection and death rates appeared to be much lower at remote parts of the country. Moreover, media reported the Covid-19 cases in metropolitan cities in greater detail which might give a false impression that only these cities are dominantly contributing Covid-19 infection and related death; though the situation may be same in other places.

Survey of Vaccination Data:The literature survey covers the data related to the vaccination in different states and UT's of India with respect to the present study. It has borrowed heavily from excellent and detailed survey mainly focused on India (Source: https://ourworldindata.org/covid-vaccinations, https://dashboard.cowin.gov.in/).The study has been carried on three parameters – total vaccination doses, sites conducting vaccination and total registrations (till 09/07/2021) (refer Table – 1).

Table – 1

Vaccination doses			Sites conducting vaccination			Vaccination registration		
Total	Dose 1	Dose 2	Total	Government	Private	Total	Age 18-44	Age 45+
370931729	299628282	71303447	42041	40136	1905	379241006	187388220	191852846

The vaccination trends in India from January2021 to June2021 are shown in Fig – 1 and Table – 2 which shows that vaccination process started with a slow pace and gradually picked up. Also, this graph suddenly comes down in the 1st week of July, 2021.

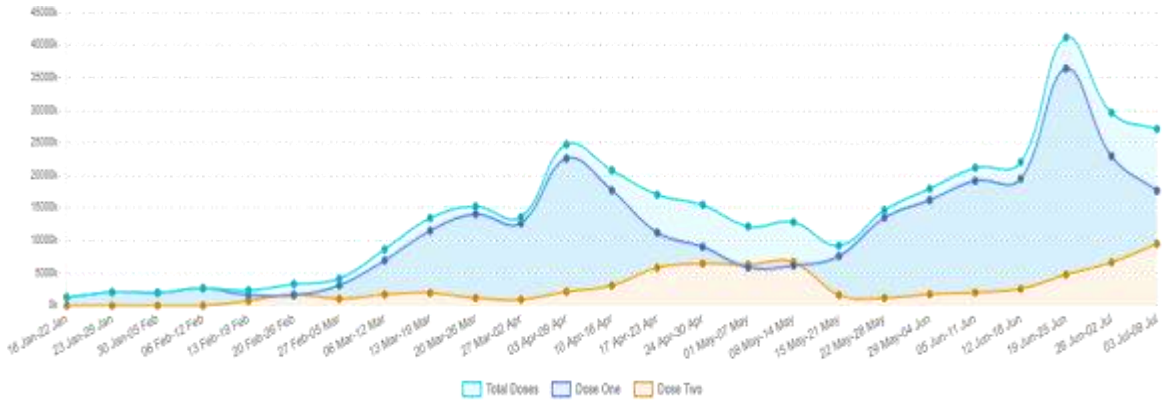

Fig – 1

Table – 2

Time Period	Dose 1	Dose 2	Total Doses
16/01/21 – 22/01/21	1243013	0	1243013
23/01/21 – 29/01/21	2053181	0	2053181
30/01/21 – 05/02/21	1959386	0	1959386
06/02/21 – 12/02/21	2656057	0	2656057
13/02/21 – 19/02/21	1635606	718186	2353792
20/02/21 – 26/02/21	1612831	1701102	3313933
27/02/21 – 05/03/21	3102888	1038758	4141646
06/03/21 – 12/03/21	6939297	1704080	8643377
13/03/21 – 19/03/21	11499687	1944114	13443801
20/03/21 – 26/03/21	14065700	1169412	15235112
27/03/21 – 02/04/21	12686954	925007	13611961
03/04/21 – 09/04/21	22610262	2136613	24746875
10/04/21 – 16/04/21	17718027	3075336	20793363
17/04/21 – 23/04/21	11217226	5818200	17035426
24/04/21 – 30/04/21	9026096	6455419	15481515
01/05/21 – 07/05/21	5878417	6284103	12162520
08/05/21 – 14/05/21	6145801	6686790	12832591

15/05/21 – 21/05/21	7596547	1614260	9210807
22/05/21 – 28/05/21	13505852	1175374	14681226
29/05/21 – 04/06/21	16217166	1749880	17967046
05/06/21 – 11/06/21	19177847	2000327	21178174
12/06/21 – 18/06/21	19489495	2562678	22052173
19/06/21 – 25/06/21	36441378	4761596	41202974
26/06/21 – 02/07/21	22983015	6648873	29631888
03/07/21 – 09/07/21	17664968	9481889	27146857

The age and category wise vaccination for the same period is shown in Fig – 2 and Fig – 3 thatcorresponds to Table – 3.It has been observed that more males have been vaccinated as compared to females which are obvious. Also, age group 45+ has received more vaccines as it has started earlier.

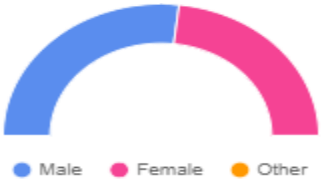

Fig – 2

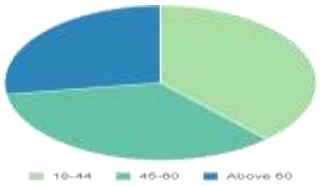

Fig – 3

Table – 3

Category	Sub Category	Total Count
Sex	Male	18,92,26,413
	Female	16,32,22,208
Age	18 – 44	13,41,39,067
	45 – 60	12,17,99,858
	Above 60	9,65,70,276

Two vaccines that have been used so far more predominantly are Covishield and Covaxin. Fig – 4 shows their usage for the last six months from January 2021 to June 2021. Covishield count is 30,89,33,160 and Covaxin count is 4,34,55,553.

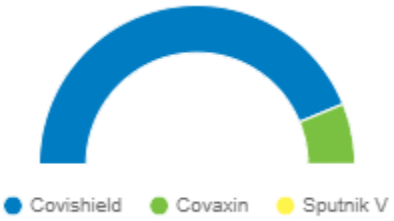

Fig – 4

The adverse effect following immunization (AEFI) for a period of 1 month from 06/06/21 to 05/07/21 is shown in Fig – 5.The AEFI is very negligible which 0.008%. Thus vaccination is safe for Indian population.

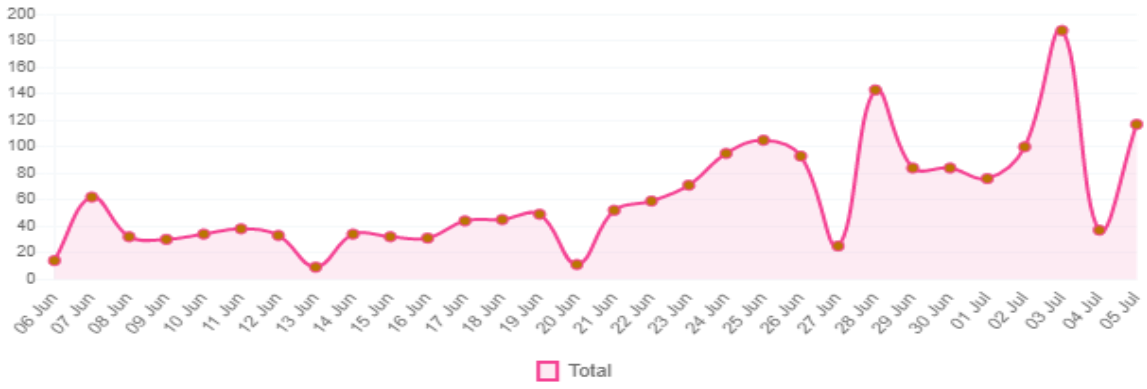

Fig – 5

The number of vaccine sessions conducted for a period of 1 month from 06/06/21 to 05/07/21 is shown in Fig – 6.

Fig – 6

The state wise vaccination coverage is shown in Fig – 7. It shows Maharashtra, UP, Gujarat, Rajasthan are few states where vaccination is done at a higher rate. This is because of more cases coming up in those states.

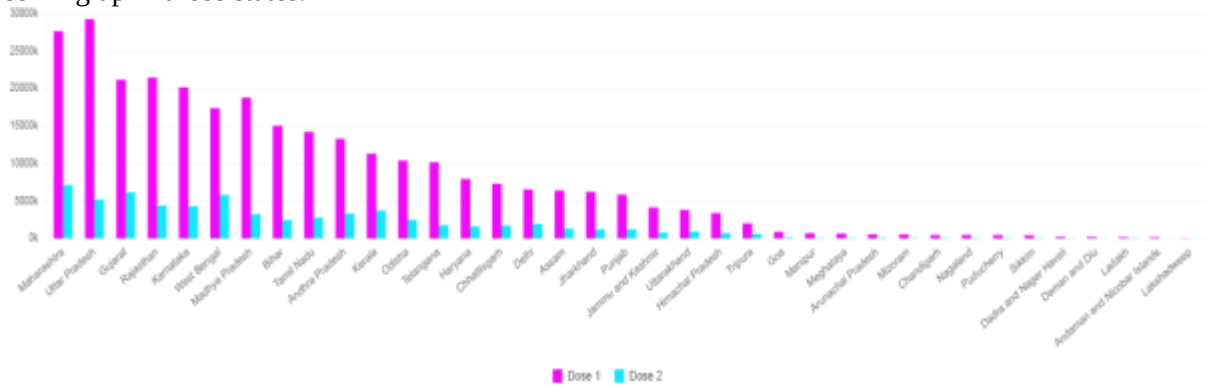

Fig – 7

The registration trend in India since beginning is shown in Fig – 8. This is very interesting finding. After the vaccination drive started, people were not so reluctant to accept the vaccination. This is because of various myths associated with the vaccines in the initial phases of its implementation.

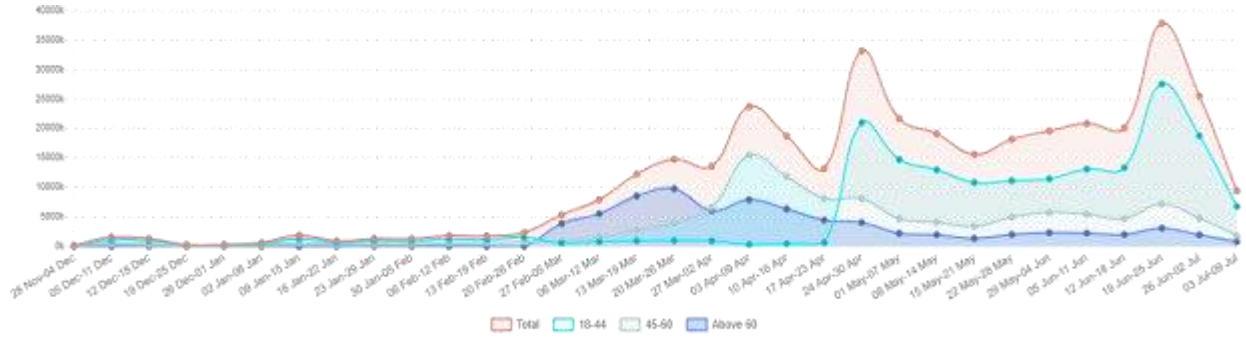

Fig – 8

ApproachesAdopted for Vaccination Management:The Indian government has formed a committee called National Expert Group on Vaccination Administration to provide guidance of all kind related to corona virus vaccination in India. The recommendations of the committee are as follows.

i. Corona virus vaccine will be first offered to doctors, nurses, hospital and public administrative staff and citizens who are above the age of 50 years with simultaneous multiple diseases carrying with them.
ii. Committee also recommended people with severe cardiac disease, end – stage kidney disease, cancers, and liver cirrhosis should be included in the priority.
iii. Self-registration can be done by using Aadhar card and phone number.
iv. After vaccinating nearly 300 million populations in the initial phase, the rest of the masses will receive vaccines based on epidemiology and availability.

The government thenasked the states to initiate and mobilize its training personnel for vaccine administration. It all started on 5th December, 2020 through virtual platform by launching of 'Integrated Govt. Online Training' (iGOT) portal on the Ministry of Human Resources and Development (HRD)'s Digital Infrastructure for Knowledge Sharing (DIKSHA). The main idea was to enhance volumeof foreground workers on corona virus vaccine management. DIKSHAprovides instructions and guidelines that can be accessed by doctors, nurses and other medical staff.This recognized human forcefrom all the different locations has been lessoned in dealing with the Covid – 19 Intelligence Network system. Corona vaccine is then instigated after training is completed for all medical and administrative staff at all levels.
As Indian government has planned to have corona virus vaccination programs in cities, towns and villages concurrently, female medical staff, who can reach in the innards and rustic parts of the country, were included in the first group of people trained in vaccination expertise.Also, included in the vaccination campaign are allied healthcare workforces including pharmacists and public health workers. The idea was that pharmacists may be able to do a better job as a second line of "vaccination warriors" as they have a professional knowledge of maintaining the cold chain and keeping the vaccine intact. For this, the existing laws and regulations need to be amended to permit pharmacists to administer vaccines.

Role of IT in Vaccination Management:IT played a significant role in this pandemic time in every domain and definitely in vaccination management. The first step in Indian is the introduction of Arogya Setu app as a compulsory application to be downloaded in every smart phone. Also, government introduced Co – Win System that very preciously monitor and follow up on the immunized individuals.The Co-WIN system is used not only to track enlisted beneficiaries but it will also to ensure that only pre-registered beneficiaries will be vaccinated in accordance with the prioritization. Enlisted beneficiaries can select vaccination sites nearest to their home. Auto generated SMS/email intimations are sent to the beneficiaries, vaccinators, supervisors and other stake holders about the date, time, and place of the session. To observe the staggered approach, beneficiaries are advised by vaccination centers to come to the session as per the staggered time slot to prevent overcrowding at the session site.

Empirical Model of Vaccine Management: The empirical model has been designed to give an idea on how the management of Covid – 19 vaccinations can be done so that utilization of resources can be optimized and more people get benefitted.

The variables that are considered are: d_i (number of doses), r_i (number of recipients), C_k (number of available centers) and R_i (number of registrations for any center C_k).
In any center C_j, where $j \in k$ there can be following three possibilities.
(a) When $d_i < r_i$, then long queue will appear outside C_j.
(b) When $d_i > r_i$, then no queue outside C_j but require proper inventory management for storage in cool medium,
(c) When $d_i = r_i$, a easiest way to optimize vaccine resources. This can be achieved only if $R_i = r_i$.

All the above possibilities are examined with respect to the equation:

$d_i = R_i + \Delta r_i$ ……..(i), where Δ is a negligible variation in number of recipients.

Suggested Approaches:

Case –I: When $d_i < r_i$, the following conditions must be true.

(a) Each R_i will go for vaccination.
(b) Each R_i will not get affected by any other disease in the time gap between registration and vaccination.
(c) C_j will maintain a deadline for registration of all r_i .
(d) If any R_m, where m Ɛ I is not present on the day for dose d_m without any valid reason then R_m should be debarked from primary citizenship rights (This is a policy decision).

Case – II: When $d_i > r_i$, the following actions must be adopted.

(a) After the registration deadline is over, C_j should track for those C_i s where $d_i < r_i$ or $d_i < R_i$. (Implementation of **Intelligent Supply Chain**)
(b) If satisfactory results does not come from above action (a), C_j must assure proper storage for doses d_p, where p < i. (Implementation of proper **Storage Cooling System**)

Covid – 19 Vaccination Decision Table:

Conditions ↓	**Rules**				
	R1	**R2**	**R3**	**R4**	**R5**
$d_i < r_i$	**Y**	**Y**	**N**	**N**	**Y**
Each R_i will go for vaccination	**Y**	**N**	**Y**	**N**	**N**
R_i is affected by any disease in the time gap	**N**	**Y**	**N**	**N**	**N**
C_j will maintain a deadline for registration	**Y**	**Y**	**Y**	**N**	**Y**
Action ↓					
Complete usage of vaccine	**Y**	**N**	**N**	**N**	**N**

Conclusion and Future Scope: The study on vaccination management in India reveals various facts like number of dose 1 and dose 2 administered, number of registered people, number of males and females going for vaccination, and so on. The present study suggests a simple empirical linear model for implementation of proper vaccination management in Indian perspective. Also, a decision table is proposed to quickly figure out the consumption of vaccine in any center based on certain conditions and it has been observed that complete usage of vaccination is done only in the case when people are going for vaccination and number of doses is less than the number of recipients. When surplus dose is available in any center, proper storage cooling system should be provided for storing the vaccine for future use. The condition of number of doses equals to the number of recipients is possible only when proper management will be done by the vaccination center by ensuring the availability of all people who have registered for vaccination.

The future scope of this study lies on criteria that have not been considered like deadlock mechanism that may happen in the process of vaccination.

References:

[1]. ShimaHamidi, SadeghSabouri, Reid Ewing, "Does Density Aggravate the Covid – 19 Pandemic?", Journal of American Planning Association, Vol – 86, Issue – 4, June 2020, pp. 495-509.
[2]. ArunavaBhadra, Arindam Mukherjee, KabitaSarkar, "Impact of population density on Covid-19 infected and mortality rate in India", Modeling Earth Systems and Environment 7, 623 – 629, (2021).
[3]. Velayudhan Mohan Kumar, S. R. PandiPerumal, IlyaTrakht, S. P. Thyagarajan, "Strategy for Covid – 19 Vaccination in India: The country with the second highest population and number of cases", njp Vaccines 6, Article number : 60 (2021).
[4]. Gupta, R. et al. Guidelines of the Indian Society for Sleep Research (ISSR) for practice of sleep medicine during COVID-19. *Sleep. Vigil.* 4, 1–12 (2020).
[5]. GuliaK. K. &Kumar V. M.,"Importance of sleep for health and wellbeing amidst COVID-19 pandemic", *Sleep. Vigil.May* 4, 1–2 (2020).
[6]. Ministry of Health and Family Welfare (2020) COVID-19 Vaccine Operational Guidelines. Ministry of Health and Family Welfare, Government of India. 28 December 2020. https://main.mohfw.gov.in/sites/default/files/COVID19VaccineOG111Chapter16.pdf.
[7]. Vaccine information, ICMR New Delhi—COVID-19 vaccine. https://vaccine.icmr.org.in/covid-19-vaccine (2021).
[8]. https://ourworldindata.org/covid-vaccinations
[9]. https://dashboard.cowin.gov.in/
[10]. Rowland C, Johnson CY, Wan W., "Even finding a COVID-19 vaccine won't be enough to end the pandemic", *Washington Post*. May 11, 2020, May 13, 2020.
[11]. Sarah Schaffer DeRoo, N. J. Pudalov, Linda Y. Fu, "Planning for a Covid –19 Vaccination Program", JAMA 2020, 323(24), pp. 2458 – 2459.
[12]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7423510/