

SUMMAR TRAINING REPORT



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**MBA HOSPITAL AND HEALTH MANAGEMENT
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PART-A

RESEARCH PROJECT



TITLE

**Public Health Interventions to manage COVID-19
pandemic in India : A Review**

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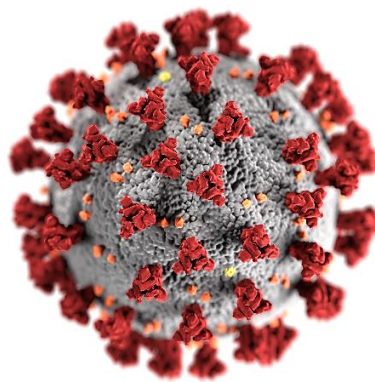
Last but not least my parents are also an important inspiration for me. So, with due regards, I express my gratitude to them.

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Introduction

The 2019 novel coronavirus also called as COVID-19 was initially spotted at a seafood market in Wuhan City, Hubei Province, China in mid-December 2019, and has now spread to 214 countries worldwide. This virus was originated in bat. This is the third coronavirus since year 2002 which have jumped the species. First was SARS-CoV (Severe Acute Respiratory Syndrome coronavirus) which was arisen in Guangdong, China, in 2002. SARS-CoV was transmitted from civet cats to humans. Second was MERS-CoV (Middle Eastern Respiratory Syndrome coronavirus) which emerged in the Middle East in 2012. MERS-CoV was transmitted from dromedary camels to humans in Saudi Arabia in 2012. And third was SARS-CoV-2 (Severe Acute Respiratory Syndrome coronavirus 2) which emerged in Wuhan, China, in 2019.



(Image credit- CDC/ Alissa Eckert, MS; Dan Higgins, MAMS)

China alerted WHO (World Health Organisation) of several flu-like cases in Wuhan on December 31, 2019. WHO advised against travel restrictions on January 5, 2020. On January 7, 2020, virus identified as coronavirus 2019-nCoV. On January 31, 2020, WHO declared this outbreak as public health emergency of international concern. On 3 Feb 2020, WHO released SPRP (strategic preparedness and response plan) which outlines the public health measures to respond to COVID-19.

This study gives the bird eye view of the public health measures which were undertaken in India to combat COVID-19 pandemic until 30 June 2020. More than 155 vaccines against the COVID-19 are being developed by researchers around the World, and 23 vaccines are in human trials. As of now there is no vaccine available to eliminate COVID-19 and that is why the public health interventions are of utmost importance to limit the spread of SARS-CoV-2.

Our study demonstrates the review of the current covid-19 situation, different public health interventions used to obviate the spread of COVID-19, usefulness of these public health interventions and key learnings which are very important for future readiness and responsiveness.

Literature Review

Sr. No.	Title	Source	Authors	Date	Objective	Findings
1.	The effect of extended closure of red-light areas on COVID-19 transmission in India	https://arxiv.org/abs/2006.10488	Abhishek Pandey, Sudhakar V. Nuti, Pratha Sah, Chad R. Wells, Alison P. Galvani, Jeffrey P. Townsend	12-06-2020	To understand the potential impact of extended closure of RLAs on COVID-19 in India	1. The initial nationwide lockdown is projected to substantially delay the peak of the epidemic for each city considered and India. 2. We found that an extended closure of RLAs after the initial lockdown period would avert 32% to 60.2% of cumulative cases and 43% to 67.6% of cumulative deaths across India. 3. The cumulative number of hospitalizations and deaths in RLAs would be substantially reduced with extended closure of the Red light areas. 4. India has approximately 1.9 million hospital beds, 95 thousand ICU beds, and 48 thousand ventilators. 5. At the projected November 19 peak of cases, India would need 10 times more hospital capacity than current capacity, while under extended closure of RLAs, required hospital capacity would be 5.8 times higher.
2.	Effectiveness of preventive measures against COVID-19: A systematic review of In Silico modeling studies in Indian context	http://www.ijph.in/article.asp?issn=0019-557X;year=2020;volume=64;issue=6;start=156;end=167;aulast=Lahiri	Arista Lahiri, Sweetly Suman Jha, Saikat Bhattacharya, Soumalya Ray, Arup Chakraborty	02-06-2020	To understand the effectiveness of NPIs reported in the contemporary literatures describing prediction models for prevention of the ongoing pandemic of SARS-CoV-2 specifically in Indian population.	1. It was observed that social distancing along with increasing testing seemed to be effective in delaying the peak of the epidemic and reducing the peak prevalence. 2. According to prediction models which are reviewed in this study, complete lockdowns have shown to have the potential to retard the progress of the epidemic by April 2020 and reduce the COVID-19 cases, bringing down hospitalizations, intensive care unit requirements, and mortality by almost 90%.

3.	Association of Public Health Interventions With the Epidemiology of the COVID-19 Outbreak in Wuhan, China	https://jamanetwork.com/journals/jama/fullarticle/2764658	An Pan, Li Liu, Chaolong Wang	10-04-2020	To evaluate the association of public health interventions with the epidemiological features of the COVID-19 outbreak in Wuhan by 5 periods according to key events and interventions.	1. In this study, the effective reproduction number R_t was calculated as an indicator to measure the transmission of SARS-CoV-2 both before and after the interventions. 2. Estimates of the effective reproduction number R_t varied in the first period, gradually increased in the second period with a peak of 3.82 on January 24, and declined thereafter. The R_t fell below 1.0 on February 6, 2020, and further decreased to below 0.3 on March 1, 2020. 3. It was observed that a series of multifaceted public health interventions was temporally associated with improved control of the COVID-19 outbreak in Wuhan, China.
4.	The Efficacy of Lockdown Against COVID-19: A Cross-Country Panel Analysis	https://link.springer.com/article/10.1007/s40258-020-00596-3	Vincenzo Alfeno, Salvatore Ercolano	03-06-2020	To study the Efficacy of Lockdown Against COVID-19.	1. Lockdown is effective in reducing the number of new cases in the countries that implement it, compared with those countries that do not. 2. Lockdown continues to reduce the number of new cases as much as 20 days after the initiation of the policy. 3. Lockdown starts to reduce the number of COVID-19 infections around 10 days after implementation.
5.	Effects of non-pharmaceutical interventions on COVID-19 cases, deaths, and demand for hospital services in the UK: a	https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(20)30133-X/fulltext	Nicholas G Davies, Adam J Kucharski, Rosalind M Eggo, Amy Gimma, Prof W John Edmunds	02-06-2020	To study the effects of non-pharmaceutical interventions on COVID-19 cases, deaths, and demand for hospital services in the UK.	1. Four base interventions (school closures, physical distancing, shielding of people aged 70 years or older, and self-isolation of symptomatic cases) were each likely to decrease reproduction number. 2. Intensive interventions with lockdown periods would need to be in place for a large proportion of the coming year to prevent health-care demand exceeding availability. 3. Study projects a median unmitigated burden of 23 million clinical cases and 350 000 deaths due to COVID-19 in the UK.

	modelling study					
6.	Quarantine alone or in combination with other public health measures to control COVID-19: a rapid review	https://pubmed.ncbi.nlm.nih.gov/32267544/	Barbara Nussbaumer-Streit, Verena Mayr, Andreea Iulia Dobrescu, Andrea Chapman, Emma Persad, Irma Klerings, Gernot Wagner, Uwe Siebert, Claudia Christof, Casey Zachariah, Gerald Gartlehner	08-04-2020	To assess the effects of quarantine (alone or in combination with other measures) of individuals who had contact with confirmed cases of COVID-19, who travelled from countries with a declared outbreak, or who live in regions with high transmission of the disease.	1. Quarantine of people exposed to confirmed or suspected cases averted 44% to 81% incident cases and 31% to 63% of deaths compared to no measures based on different scenarios. 2. The models combined quarantine with other prevention and control measures, including school closures, travel restrictions and social distancing, the models demonstrated a larger effect on the reduction of new cases, transmissions and deaths. 3. Early implementation of quarantine and combining quarantine with other public health measures is important to ensure effectiveness. 4. Testing in representative samples in different settings could help assess the true prevalence of infection.
7.	Prudent public health intervention strategies to control the coronavirus disease 2019 transmission in India: A mathematical	https://pubmed.ncbi.nlm.nih.gov/32362645/	Sandip Mandal, Tarun Bhatnagar, Nimalan Arinaminpathy, Anup Agarwal, Amartya Chowdhury, Manoj Murhekar,	28-04-2020	To find out if it was possible to prevent, or delay, the local outbreaks of COVID-19 through restrictions on travel from abroad and if	1. Port-of-entry-based entry screening of travellers with suggestive clinical features and from COVID-19-affected countries, would achieve modest delays in the introduction of the virus into the community. 2. Once the virus establishes transmission within the community, quarantine of symptomatics may have a meaningful impact on disease burden. 3. As a public health measure, health system and community preparedness would be critical to control any impending spread of COVID-19 in the country.

	model-based approach		Raman R Gangakhedkar, Swarup Sarkar		the virus has already established in-country transmission.	
8.	Healthcare impact of COVID-19 epidemic in India: A stochastic mathematical model	https://www.sciencedirect.com/science/article/pii/S0377123720300605	Kaustuv Chatterjee, Kaushik Chatterjee, Arun Kumar, Subramanian Shankar	22-03-2020	To study the impact of COVID-19 epidemic on healthcare in India.	1. Uninterrupted epidemic in India would have resulted in more than 364 million cases and 1.56 million deaths with peak by mid-July. 2. As per the model, at current growth rate of 1.15, India is likely to reach approximately 3 million cases by 25 May, implying 125,455 ($\pm 18,034$) hospitalizations, 26,130 (± 3298) ICU admissions, and 13,447 (± 1819) deaths. 3. At the current growth rate of epidemic, India's healthcare resources will be overwhelmed by the end of May.
9.	Evaluating COVID-19 Lockdown Policies For India: A Preliminary Modelling Assessment for Individual States	https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3575207	Aditya Mate, Jackson A Killian, Bryan Wilder, Marie Charpignon, Marie Charpignon, Ananya Awasthi, Milind Tambe, Maimuna S. Majumder	29-05-2020	To study the disease dynamics in India at the state level for Maharashtra and Uttar Pradesh to estimate the effect of further lockdown policies in each region.	1. Even policies that enforce physical distancing while otherwise returning to normal activity could lead to widespread outbreaks in both states. 2. Lockdown and physical distancing may lead to much lower rates of infection while simultaneously permitting some return to normalcy. 3. "Middle ground" policies could provide an effective means to curb the otherwise exponential rates of infection and death.
10.	Isolation, quarantine, social distancing and community containment: pivotal role	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7107565/	A Wilder-Smith, and D O Freedman	13-03-2020	To study the role of isolation and quarantine, social distancing and community containment in	1. Isolation is largely ineffective for infectious diseases where asymptomatic or pre-symptomatic infections contribute to transmission. 2. Financial compensation for work days lost should be considered voluntary is preferred over mandatory quarantine, but law enforcement may need to be considered if quarantine violations occur frequently. 3. Law enforcement is needed in most settings for community containment. Therefore such restrictive interventions should be limited to the actual level of risk to the community.

	for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak				novel coronavirus outbreak.	
11.	Projections for novel coronavirus (COVID-19) and evaluation of epidemic response strategies for India	https://www.sciencedirect.com/science/article/pii/S0377123720300770	Seema Patrikar, Deepti Poojary, D.R.Basannar, D.S.Faujdar, Renuka Kunte	27-05-2020	To evaluate the epidemic response strategies and predict the course of the epidemic of COVID-19 for India.	1. The epidemic curve will peak in the third week of June in India with 17,525,869 and 2,153,200 infected people with reproduction number of 1.8 and Rho of 0.7 and 0.6, respectively. 2. With R0 (Reproduction number) = 1.8 and Rho (effect of social distancing) = 0.6, the Intensive Care Unit (ICU) bed requirement is 107,660, whereas if transmissibility is high, the ICU bed requirement would increase to 1,994,682.
12.	Can we contain the COVID-19 outbreak with the same measures as for SARS?	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7102636/	Annelies Wilder-Smith, Calvin J Chiew and Vernon J Lee	05-03-2020	To examine whether COVID-19 outbreak can be contained with the same measures as for SARS.	1. The study states that traditional public health measures (active case detection, isolation of cases, contact tracing and quarantine of all contacts, social distancing, and community quarantine) used during SARS were successful. Whether these measures can also be used to contain COVID-19 does not depend on the similarities but the differences between SARS and COVID-19. 2. Clear differences are COVID-19 has a higher transmissibility than SARS, and many more patients with COVID-19 rather than SARS have mild symptoms that contribute to spread because these patients are often missed and not isolated. 3. Because of the extent of community spread individual case containment might not be possible in the long run, and there might be the need to move from containment to mitigation, balancing the costs and benefits of public health measures. 4. Even if our public health measures are not able to fully contain the spread of COVID-19, they will still be effective in delaying the onset of widespread community transmission.

13.	A Comprehensive Public Health Evaluation of Lockdown as a Non-pharmaceutical Intervention on COVID-19 Spread in India: National Trends Masking State Level Variations	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7310653/	Deepankar Basu, Maxwell Salvatore, Debashree Ray, Mike Kleinsasser, Soumik Purkayastha, Rupam Bhattacharyya and Bhramar Mukherjee	14-06-2020	To evaluate Lockdown as a Non-pharmaceutical Intervention on COVID-19 Spread in India.	1. Estimated doubling time across India was at 3.56 days on March 24, and the past 7-day average for the same on May 31 is 14.37 days. 2. The average daily number of tests have increased from 1,717 (March 19–25) to 131,772 (May 25–31) with an estimated testing shortfall of 4.58 million tests nationally by May 31. 3. Various states exhibit substantial departures from these national patterns. Identifying these variations can help in both understanding the dynamics of the pandemic and formulating effective public health interventions.
14.	Impact of nonpharmacological interventions on COVID-19 transmission dynamics in India	http://www.ijph.in/article.asp?issn=0019-557X;year=2020;volume=64;issue=6;page=142;epage=146;aulast=Patel	Purvi Patel, Aditya Athotra, TP Vaisakh, Tanzin Dikid, Sudhir Kumar Jain, NCDC COVID Incident Management Team	02-06-2020	To study the impact of nonpharmaceutical interventions on transmission dynamics of COVID-19 epidemic in India.	1. Time distribution showed a propagated epidemic with sub-exponential growth. 2. Average growth rate, 21% in the beginning, reduced to 6% after an extended lockdown (May 3, 2020). 3. Average early doubling time (4.3 days) (standard deviation [SD] = 1.86) increased to 5.4 days (SD = 1.03) and 10.9 days (SD = 2.19). 4. India's early response, especially stringent lockdown, has slowed COVID-19 epidemic. Thus far, the fallouts of the pandemic have been less severe than countries with more robust health systems.

15.	Impact assessment of non-pharmaceutical interventions against coronavirus disease 2019 and influenza in Hong Kong: an observational study	https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(20)30090-6/fulltext	Prof Benjamin J Cowling, Sheikh Taslim Ali, Tiffany W Y Ng, Tim K Tsang, Julian C M Li, Min Whui Fong, et al.	17-04-2020	To study the impact of non-pharmaceutical interventions against coronavirus disease 2019 and influenza in Hong Kong	1. Public health interventions (including border entry restrictions, quarantine and isolation of cases and contacts, and population behaviour changes, such as social distancing and personal protective measures) that Hong Kong has implemented since late January, 2020, is associated with reduced spread of COVID-19. 2. Control measures and changes in population behaviour coincided with a substantial reduction in influenza transmission in early February, 2020. 3. Suggests that the same measures would also have affected COVID-19 transmission in the community.
16.	Impact of intervention on the spread of COVID-19 in India: A model based study	https://arxiv.org/pdf/2004.04950.pdf	Abhishek Senapati , Sourav Rana, Tamalendu Das , Joydev Chattopadhyay	10-04-2020	To study the impact of intervention on the spread of COVID-19 in India.	1. Study reveals that higher intervention effort is required to control the disease outbreak within a shorter period of time when strength of the intervention throughout the period of implementation is kept fixed. 2. when the whole implementation time are divided into three time windows and in each of the window, different intervention strength is taken, it was found that the strength of the intervention should not be relaxed over the time rather the intervention should be strengthened to eradicate the disease effectively.
17.	Nonpharmaceutical Measures for Pandemic Influenza in Nonhealthcare Settings- Social Distancing Measures	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7181908/	Min W Fong, Huizhi Gao, Jessica Y Wong, Jingyi Xiao, Eunice Y C Shiu, Sukhyun Ryu, Benjamin J Cowling	17-05-2020	To see the effectiveness of nonpharmaceutical measures in nonhealthcare setting.	1. Social distancing measures are effective interventions to reduce transmission and mitigate the impact of an influenza pandemic. 2. School closures paired with teleworking policies to provide opportunities for parents to take care of school-age children at home. 3. Social distancing measures such as school closures and mall closures could be implemented simultaneously to prevent an increase in social contact rates outside schools. 4. Timely implementation and high compliance in the community would be useful factors for the success of these interventions.

Study Methodology

Study question and objectives were:

Study Question -

What are the public health interventions used to combat COVID-19 pandemic?

The Objectives of the study were -

1. To review the COVID-19 situation in India.
2. To study the public health interventions used to combat COVID-19 pandemic in India.
3. To summaries the key learnings of the study to manage pandemic like COVID-19.

Type of Study Method and Study Design –

The research method used for the study was qualitative method and the type of research design was observational study design.

Method of data collection and analysis :

- Data was collected from various secondary data sources like articles, journals, WHO, Government of India websites, newspapers, etc.
- Search term included were novel coronavirus 2019, severe acute respiratory syndrome coronavirus 2, 2019-nCoV-2, SARS-CoV-2, COVID-19 in combination with public health interventions, non-pharmacological interventions.
- Our literature search from PubMed, Lancet, Science direct of Elsevier, Jama network, Indian Journal of Medical Research, Indian Journal of Public Health, Medrxiv, Springer, Social Science Research network have retrieved 34 relevant articles. Additional relevant articles were identified from the review of citations referenced.
- The titles and abstracts are independently reviewed for inclusion and most relevant 17 articles were included in the study.
- Analysis was done on the official information published on the government website dedicated to the COVID-19 and all the secondary data collected through articles, WHO website, journals newspapers, etc to define the usefulness of public health interventions to combat COVID-19 and to identify key learnings for future readiness and responsiveness for pandemic or like situations.

Results

Current COVID-19 situation in India-

- As per the data, In the end of first phase of lockdown there were 11485 confirmed cases of SARS_CoV-2 which are increased to 190648 cases at the end of fifth phase of lockdown. As of 5 July 2020, 6,85,110 confirmed cases are reported in the country.

- The case doubling time was observed as 4.66 days in the 1st phase of lockdown which is increased to 20 days as of 5 July 2020.
- 510 out of every 1 million people in India have been tested positive for the SARS-CoV-2 virus and percentage of active cases was found to be 36.18% in the country.
- Recovery and mortality rate was observed to be 60.96% and 2.85% respectively.

Public health interventions-

- The lockdown was implemented in India when the number of positive COVID-19 cases confirmed in India was around 500. The initial nationwide lockdown delayed the peak of the COVID-19 cases.
- India has implemented all the public health measures used to curb SARS like contact tracing, isolation of cases, social distancing and quarantine of all contacts, et cetera
- As of 20 July 2020, 3,687 people are in institutional quarantine, 32,304 people are in home quarantine, and total people released are 4,53,775.
- India is equipped with approximately 95000 ICU beds, 19 lakh hospital beds, and 48000 ventilators to combat COVID-19.
- At present there are 1100 labs in the country out of which 314 private labs and 786 government sector labs.
- There are 591 testing labs for real time RT-PCR, 417 TrueNat based testing labs and 92 CBNAAT based testing labs.
- To combat COVID-19, India also have 10000 bedded largest COVID Care Center in the World established in Delhi and largest plasma therapy trial project Platina in the World for treatment of coronavirus patients in Maharashtra.
- India has 2 vaccines which are in human clinical trials- one developed by Zydus Cadila Healthcare Ltd. and another by Bharat Biotech International Limited in collaboration with the Indian Council of Medical Research.

Key learnings-

- India's initial proactive response, especially the brassbound lockdown, has slowed the COVID-19 epidemic in India.
- The social distancing interventions seem to have been working in absence of treatment for COVID-19 for India; however, the tenability of these interventions is uncertain.
- The number of cases across the five phases of lockdown have been continuously increasing despite being taking all the necessary measures required. But in this bloomy scenario one thing which is giving the ray of hope is the recovery rate which now stands at 60.96% and the mortality is only 2.85%, as of 5 July 2020 and the reason for this is India's enhanced capabilities of rapid testing, interconnected lab networks and safety measures like mandatory hand hygiene, thermal scanning, and compulsory mask at public places, etc.
- Various interventions at healthcare level like real time RT-PCR, usage of TrueNat, CBNAAT and rapid antigen detection test to enhance the COVID-

19 testing in the country has significantly strengthen the diagnosis of this disease due to which people are taking effective precautionary measures in time to safeguards themselves and others.

- The testing laboratory network continues to expand across the country to enhance the COVID-19 testing in the country.
- Plasma therapy has proven to be a encouraging boulevard for patients not to respond to other types of treatments.

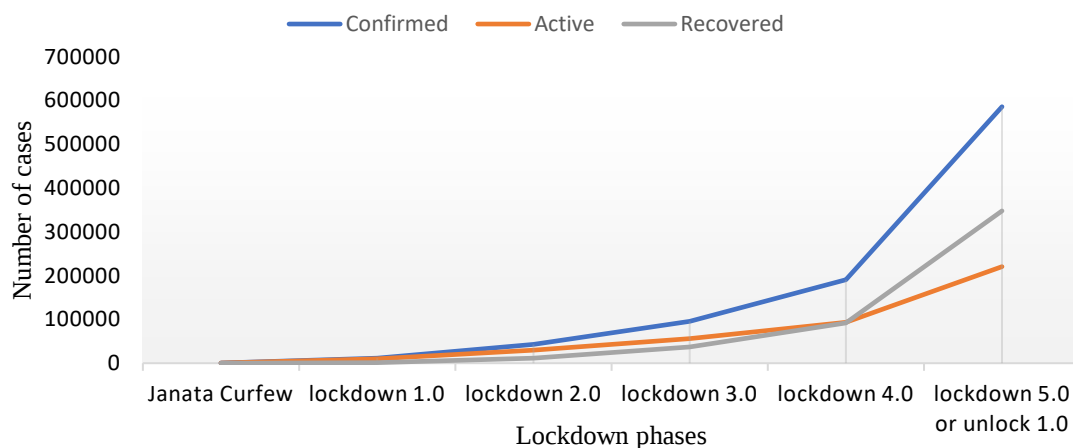
Review of the current COVID-19 situation in India

Today the world has come to a standstill with COVID-19 spreading across the globe in approximately 214 countries of the world. India also caught into the clutches of COVID-19 with its first case reported on 30 January 2020 in Thrissur district of Kerala, who was a student studying at Wuhan University. After the fifty days of virus first reported in India, on 22 March 2020, a nation-wide 14 hour voluntary lockdown called 'Janata Curfew' was observed in India on the appeal of Prime Minister Narendra Modi. India reported 403 confirmed cases, 398 active cases, 1 recovered case, 1 deceased case and tested a total of 18,127 individuals until the Janata Curfew.

Post-Janata curfew, 5 phases of lockdown were implemented till 30 June 2020.

The timeline of 5 phases of lockdown-

Trend of COVID-19 Cases Across different phases of Lockdown



▪ **Lockdown 1.0 (25 March 2020 – 14 April 2020) –**

Phase one of national lockdown was of 21 days. India reported confirmed 11485 cases, active 9721 cases, recovered 1365 cases, deceased 396 cases and tested a total of 244893 individuals until the 14 April 2020. Cases doubling time were observed as 4.66 days.

▪ **Lockdown 2.0 (15 April 2020 – 3 May 2020) –**

Prime Minister Modi lengthened the nationwide lockdown up to 3 May 2020 on 14 April 2020. On 16 April, lockdown areas were classified as "red zone", showing the presence of infection hotspots, "orange zone" having some infection, and "green zone" with zero infections. India reported 42779

confirmed, 29549 active, 11763 recovered, 1463 deceased cases and tested a total of 1107233 individuals until the end of phase 2 of lockdown. Cases doubling time were observed as 10.3 days.

▪ **Lockdown 3.0 (4 May 2020 - 17 May 2020) –**

On 1 May 2020, lockdown period was further extended by The Ministry of Home Affairs and the Government of India to two weeks beyond 4 May 2020. India reported confirmed 95699 cases, active 55875 cases, recovered 36795 cases, deceased 3025 cases and a total of 2302792 individuals were tested until the end of lockdown 3.0. Cases doubling time were observed as 12.3 days.

▪ **Lockdown 4.0 (18 May 2020 - 31 May 2020) –**

On 17 May 2020, the National Disaster Management Authority (NDMA) and the Ministry of Home Affairs (MHA) extended the lockdown for a period for two weeks beyond 18 May 2020.

India reported 190648 confirmed cases, 93368 active cases, 91862 recovered cases, 5405 deceased cases and tested a total of 3837207 individuals until the 31 May 2020. Cases doubling time were observed as 14.7 days.

▪ **Lockdown 5.0 or Unlock 1.0 (1 June 2020 – 30 June 2020) –**

The guidelines were issued by The Ministry of Home Affairs for the month of June. Activities were permitted in phased manner in zones other than containment zones. Lockdown restrictions for containment zones kept unchanged. There were no restrictions on inter-state travel but large gatherings were still banned. However, in all the areas the night curfew was in effect from 9 p.m. to 5 a.m.

India reported confirmed 585792 cases, active 220478 cases, recovered 347839 cases, deceased 17409 cases and tested a total of 8826585 individuals until the 31 May 2020. Cases doubling time were observed as 18.5 days.

Situation of India at glance (updated on 5th July 2020)

- Confirmed Cases - 6,85,110
- Active Cases - 2,47,424
- Recovered Cases - 4,18,112
- Deceased Cases - 19,505
- Total Individual tested - 97,89,066

Definitions-

- Confirmed cases :- These are the total number of patients have been tested positive for Corona virus.
Confirmed cases= Active case +Recovered +Deceased.
- Active cases :- It show the total number of patients which is currently in the hospital fighting with corona virus.
- Recovered cases :- It shows the total number of patients who have been completely recovered and returned home in a healthy condition.
- Deceased cases :- These are the number of fatalities caused due to the coronavirus 2019.

Confirmed Per Million -

India has 509.83 CPM, that is, 510 out of every 1 million people in India have tested positive for the virus.

Doubling rate – 20 days.

Active Cases -

36.18%, that is, for every 100 confirmed cases, 36 are currently infected.

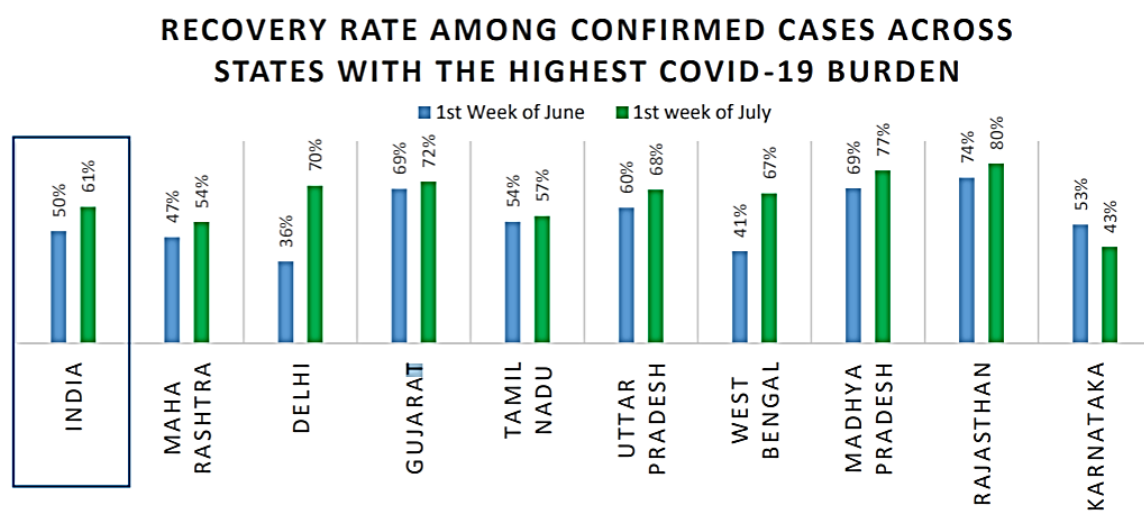
Transmission classification- Clusters of cases

Mortality Rate -

2.85%, that is, for every 100 confirmed cases, 3 have unfortunately passed away from the virus.

Recovery Rate -

60.96%, that is, for every 100 confirmed cases, 61 have recovered from the virus.



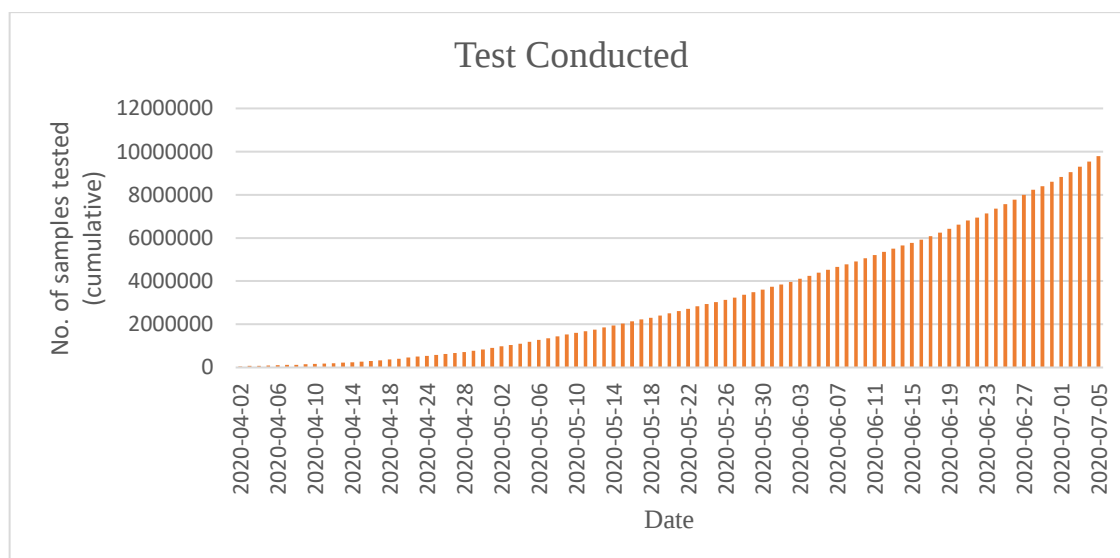
Source: MoHFW Government of India COVID-19 as on: 05 July 2020, 08:00 IST (GMT+5:30)

(Graph source – India situation report-23 by WHO)

Tests Per Million -

Approximately 7,344, that is, for every 1 million people in India, 7,344 people were tested.

(Data source- <https://www.covid19india.org/>)



(Source- data from github.com)

Region wise situation of different states of India-

Central Region	Confirmed Cases	Active Cases	Recovered Cases	Deceased Cases
Madhya Pradesh	14930	2911	11411	608
Chhattisgarh	3207	615	2578	14

Eastern Region	Confirmed Cases	Active Cases	Recovered Cases	Deceased Cases
West Bengal	22126	6658	14711	757
Bihar	11860	3005	8765	90
Odisha	9070	2800	6224	46
Jharkhand	2807	743	2045	19

Western Region	Confirmed Cases	Active Cases	Recovered Cases	Deceased Cases
Maharashtra	206619	86040	111740	8822
Gujarat	36123	8279	25900	1944
Goa	1761	818	936	7
Dadra and Nagar Haveli and Daman and Diu	373	211	159	0

Southern Region	Confirmed Cases	Active Cases	Recovered Cases	Deceased Cases
Tamil Nadu	111151	46863	62778	1510
Telangana	23902	10904	12703	295
Karnataka	23474	13249	9849	372
Andhra Pradesh	18697	10043	8422	232
Kerala	5430	2228	3174	26
Puducherry	946	484	448	14

Northern Region	Confirmed Cases	Active Cases	Recovered Cases	Deceased Cases
Delhi	99444	25038	71339	3067
Uttar Pradesh	27707	8161	18761	785
Rajasthan	20164	3780	15928	456
Haryana	17005	3796	12944	265
Jammu and Kashmir	8429	3042	5255	132
Punjab	6283	1711	4408	164
Uttarakhand	3124	530	2524	42
Himachal Pradesh	1063	316	724	10
Ladakh	1005	178	826	1
Chandigarh	466	65	395	6

North-eastern Region	Confirmed Cases	Active Cases	Recovered Cases	Deceased Cases
Assam	11737	4286	7434	14
Tripura	1580	373	1206	1
Manipur	1366	677	689	0
Nagaland	590	359	231	0
Arunachal Pradesh	269	190	78	1
Mizoram	186	53	133	0
Sikkim	125	51	61	0
Meghalaya	72	28	43	1

Top five states with highest number of confirmed COVID-19 Cases -

1. Maharashtra – 2,06,619 cases
2. Tamil Nadu – 1,11,151 cases
3. Delhi – 99,444 cases
4. Gujarat – 36,123 cases
5. Uttar Pradesh – 27,707 cases

Top five states with highest number of active COVID-19 Cases –

1. Maharashtra - 86,040 cases
2. Tamil Nadu- 46,863 cases
3. Delhi - 25,038 cases
4. Karnataka - 13,249 cases
5. Telangana - 10,904 cases

Top five states with highest number of recovered COVID-19 Cases –

1. Maharashtra - 1,11,740 cases
2. Delhi - 71,339 cases
3. Tamil Nadu - 62,778 cases
4. Gujarat - 25,900 cases
5. Uttar Pradesh - 18,761 cases

Top five states with highest number of deceased COVID-19 Cases –

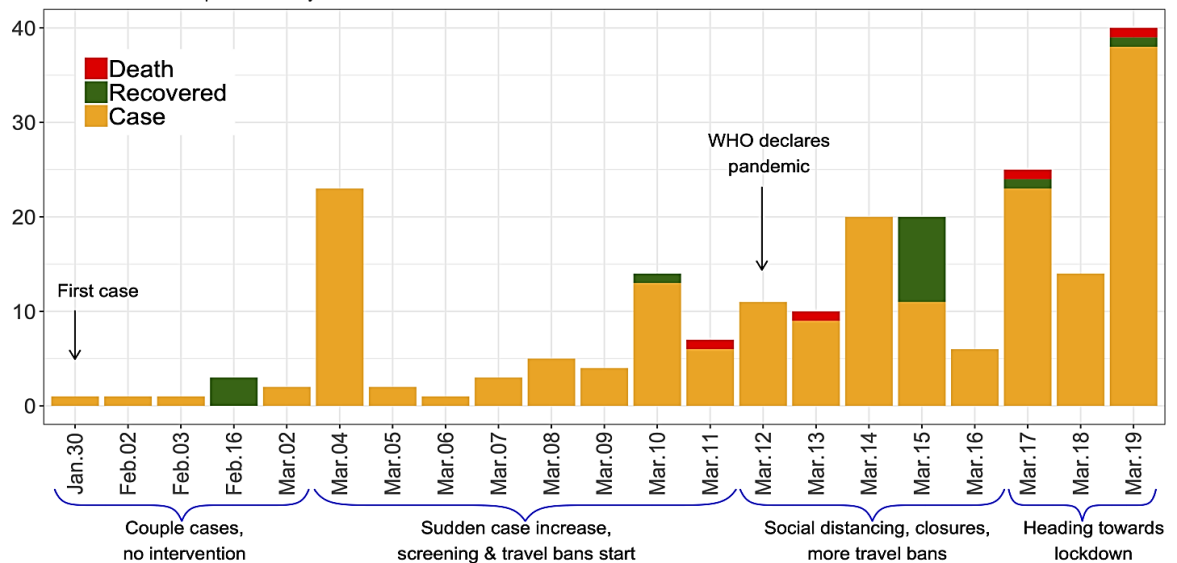
1. Maharashtra - 8,822 cases
2. Delhi - 3,067 cases
3. Gujarat - 1,944 cases
4. Tamil Nadu - 1,510 cases
5. Uttar Pradesh – 785 cases

Top five states with highest number of samples tested for COVID-19 –

1. Tamil Nadu - 1.3M
2. Maharashtra - 1.1M
3. Andhra Pradesh - 1M
4. Rajasthan- 909.1K
5. Uttar Pradesh - 835K

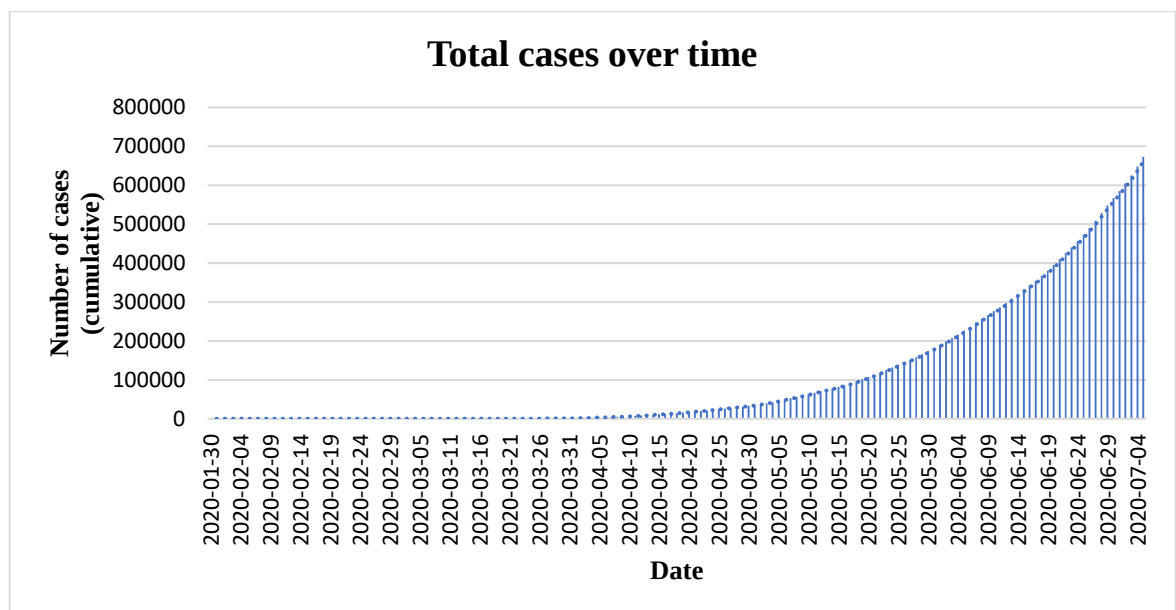
COVID-19 Confirmed New Cases/Recovered/Deaths by Day in India

Data source: Johns Hopkins University CSSE



(Graph source- medium.com)

Total cases over time



(Source- data from github.com)

Public health interventions in India to combat COVID-19 in India

As we all know that COVID-19 is rapidly spreading and if appropriate steps are not taken timely and in effective manner situation could have been more worse, for which, various public health interventions have been adopted by India to combat COVID-19 which are as follows-

Time-line of interventions in India till 23 March 2020

Table 1. Timeline of COVID-19 interventions in India

Date	Interventions
3 March 2020	India travel ban has been issued on four countries - China, South Korea, Italy, and Iran
6 March 2020	Union Health Ministry has issued advisory to avoid mass gatherings
7 March 2020	- Agra Mayor has urged the Union government to close down historical monuments including Taj Mahal - Kuwait suspends flights to India
9 March 2020	Qatar puts India on travel ban list
10 March 2020	Manipur has closed its border with Myanmar
11 March 2020	India suspends all visas and e-visas granted to nationals of France, Germany, and Spain on or before 11 March
12 March 2020	WHO declared the COVID-19 outbreak as 'pandemic' - India suspends all visas with the exception of those for diplomatic, UN, or international bodies, official and employment purposes until 15 April - India reports 1st death
13 March 2020	- India reports 2nd death - Several academic institutions (e.g., JNU, IIT, IIM) cancel classes/convocations, some closed hostels
16 March 2020	- Centre proposes social distancing measures until 31 March - India bans passengers from EU countries, UK, and Turkey until the end of March - Central government recommends the closure of educational institutions until 31 March
17 March 2020	- Taj Mahal will be shut down until 31 March; ASI closes 3,000 monuments and 200 museums - Mandatory quarantine of passengers coming from UAE, Qatar, Oman, and Kuwait India is heading towards a countrywide lockdown mode
19 March 2020	- India halts all incoming commercial international flights for 1 week - Some state governments ban public transportation - Prime Minister urges people of India to observe self-imposed curfew on March 22
20 March 2020	- Maharashtra announce lockdown in Mumbai, Nagpur and Pune - JNU orders students to vacate hostels
21 March 2020	- Private labs can conduct COVID-19 tests, says Maharashtra government - Rajasthan Government declares lockdown until March 31
22 March 2020	12 states including Telangana and Delhi announce lockdown until March 31 - International commercial passenger flights are not allowed to land in India from today for one week - Railways suspends all train services until March 31
23 March 2020	Centre has ordered all states in India to impose lockdown - Legal action will be initiated against people violating lockdown measures

Source: <https://www.pharmaceutical-technology.com/news/india-covid-19-coronavirus-updates-status-by-state/>

(Source- https://medium.com/@covind_19/predictions-and-role-of-interventions-for-covid-19-outbreak-in-india-52903e2544e6)

INTERVENTIONS AT COMMUNITY LEVEL

▪ Preventive measures

People over the age of 65, those with comorbidity, and pregnant women are advised to stay at home except for essential and health purposes.

Generic preventive measures to be followed at all time-

The generic preventive measures include general public health measures to reduce the risk of COVID-19 infection. At all times, these measures need to be observed by everyone.

- At least one meter of physical distancing.
- Mandatory use of face masks.
- Frequent hand washing for at least 40-60 seconds even if the hands are not dirty visibly and hand sanitising with alcohol based hand sanitizers for at least 20 seconds.
- Follow the respiratory etiquettes strictly which involves covering one's mouth and nose while coughing or sneezing with a handkerchief or tissue.
- Self-care and monitoring of health and reporting illness as early as possible.
- Spitting shall be strictly prohibited.

Specific preventive measures for offices-

- Entrance should have sanitizer dispenser and provision of thermal screening.
- Only allow asymptomatic staff or visitors.
- Prominently display audio-visual media or Posters on preventive measures about COVID-19.
- Operating staff wearing face masks and gloves should be there in Valet parking. Disinfection of keys, door handles, steering, etc. of vehicles should be done.
- Social distancing norms should be followed at all the times in the area of shops, stalls, cafeteria etc., if present outside or within the office premises.
- To manage the queue and ensure social distancing in the premises, specific markings may be made with sufficient distance.
- For officers, staff and visitors, separate entry and exit shall be organised.
- Frequent sanitization and proper cleaning of frequently touched surfaces at the workplace must be ensured.
- Proper disposal of face masks or gloves shall be ensured.

Management of cases and contacts-

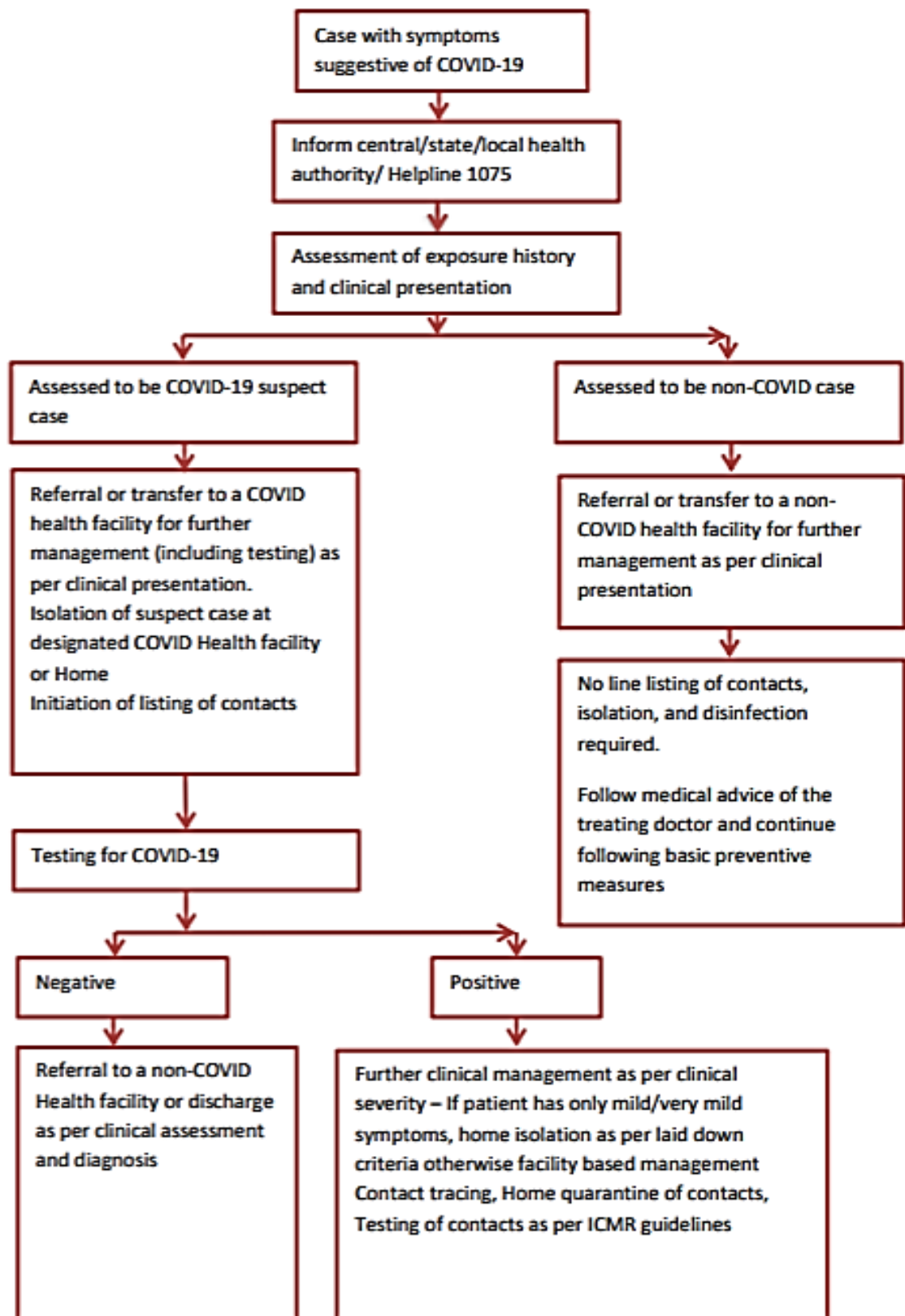
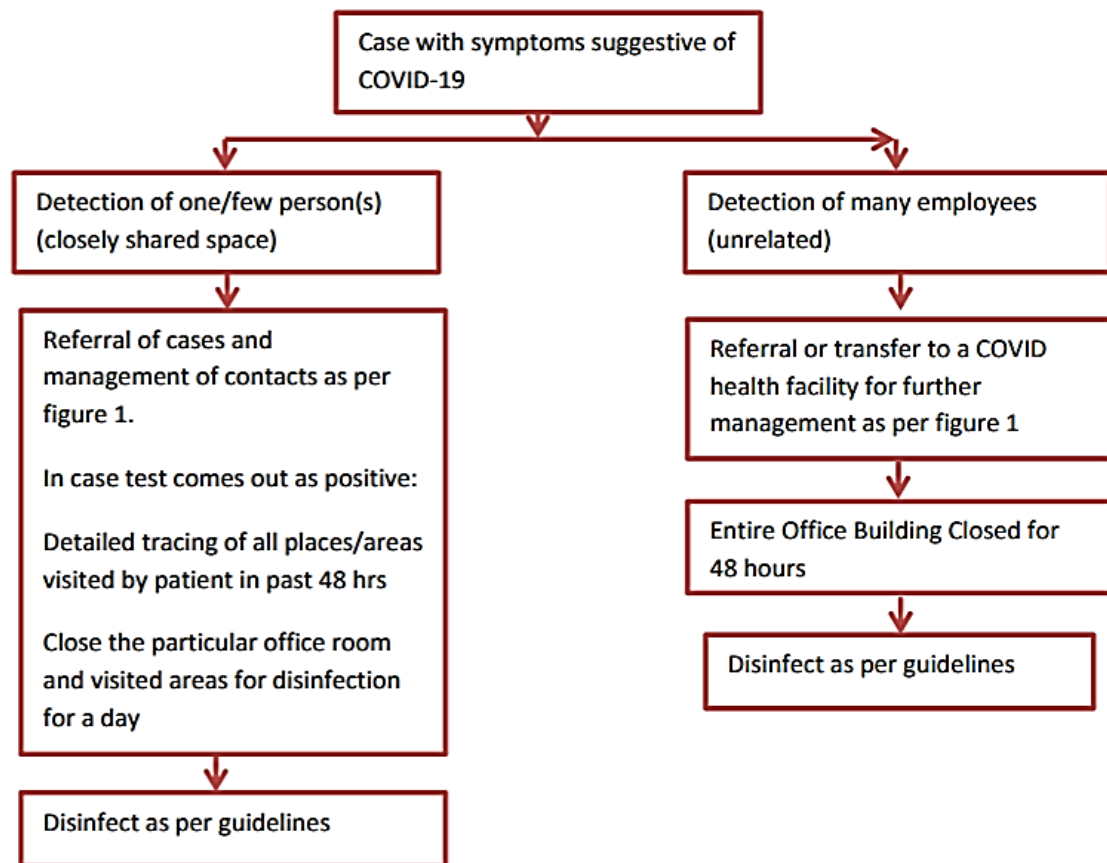


Figure 1

(Chart source-

<https://www.mohfw.gov.in/pdf/GuidelinesonpreventivemeasurestocontainspreadofCOVID19inworkplacesettings.pdf>)

Disinfection of workplace-



(Chart source-

<https://www.mohfw.gov.in/pdf/GuidelinesonpreventivemeasuresstocontainspreadofCOVID19inworkplacesettings.pdf>)

▪ Quarantine

Quarantine is the process of separating and restricting the movement of people who are exposed to or are exposed to an infectious disease. A restraint keeps such people away from others so that they do not inadvertently infect anyone in their surroundings. As of 20 July 2020, 3,687 people are in institutional quarantine, 32,304 people are in home quarantine, and total people released are 4,53,775.

Guidelines for home quarantine-

Duration for home quarantine- The period of home quarantine is 14 days from the date of contact with the confirmed case or if the suspicious case (index person is an acquaintance) turns out to be negative on laboratory test.

All close contacts of a symptomatic person will be home quarantined for 14 days and followed up for extra 14 days till the report of such case turns out negative on lab testing.

Home quarantined people should:

- Stay in a well-ventilated single room with attached or separate toilet. It is best to maintain a distance of at least 1 meter if a family member wants to be in the same room.

- There is a need to stay away from the elderly, pregnant women, children and co-sick people in the home.
- Restrict movement of quarantined person within the house.
- Do not attend social or religious meetings under any circumstances

▪ **Isolation**

Unlike quarantine, Isolation is when a person confirmed with infectious disease and has to be separated from healthy individuals around them. This is to prevent the spread of infection in the general population. Isolation is only for the people who are confirmed cases of COVID-19 even if the isolation achieves the same results as home quarantine.

Guidelines for home isolation-

- Cases should have necessary facility at their residence for isolation and for quarantining the family contacts.
- Patients who have immune compromised disease are not eligible for home isolation.
- Elderly patients more than 60 years of age and patients with co-morbid conditions such as Diabetes, Hypertension, Heart disease etc should be allowed home isolation after evaluation by the treating medical practitioner.
- Availability of caregiver should be 24 x7. Prerequisite for home isolation is a communication link between the caregiver and hospital.
- Mandatory installation of Arogya Setu App on smart phones which should always remain active.
- Patient should monitor his health and inform regularly his health status to the District Surveillance Officer, who is responsible for further follow up by surveillance teams.

When to end home isolation - Under domestic isolation the patient is discharged 10 days after the onset of symptoms and has no fever for 3 days. Subsequently, the patient was advised for home isolation and monitor his health for 7 days. Testing is not required after the home isolation period is over.

▪ **Lockdown**

The lockdown was implemented in India when the confirmed positive COVID-19 cases in India was reached approximately to 500. In India lockdown was implemented early as compared to other countries.

Method-

- Restrictions on people leaving their homes.
- All services and stores except pharmacies, banks, hospitals, grocery stores and other important services were closed.
- Shut down of commercial and private companies (work from home only allowed).
- Closure of all training educational, and research institutions.
- All places of worship were closed.
- Suspension of all unnecessary private and public transport.
- Restrictions on all political, sports, social, recreational, cultural, and religious activities.

- Not more than twenty persons permitted for congregation in case of funeral.

Lockdown in India was conducted in 5 phases till 30 June 2020. On 16 April 2020, the lockdown areas classified into red zone, orange zone, green zone. The Union Ministry on 1 May 2020, 733 districts of India were reclassified as Red Zones, Orange Zones and Green Zones.

- Red Zone-

- Red zone areas or the hotspots were classified taking into account the doubling rate of confirmed cases, total number of active cases, and the extent of testing and surveillance feedback from districts.
- There were 130 districts in the Red zone.

- Green Zone-

- Districts with no confirmed case or zero confirmed cases till date in last 21 days were included in the Green zone.
- 319 districts were in the Green zone.

- Orange Zone-

- Districts which were neither in the green zones red were included in orange zone.
- 284 districts were identified under the Orange zone.

- **Containment Zones**

The national level lockdown implemented in five phases while the classification of orange, red, and green districts operated at the state and inter-district levels. Containment zones were demarcated within a town, village, or municipal or panchayat area. District, town or panchayat authorities will decide which areas in the red zones and orange zones will be marked as containment zones, how large they will be, and the kind of restrictions would apply.

Containment areas were defined based on-

- Cases and contacts mapping.
- Geographical dispersal of cases and contacts
- Area having perimeter which is well demarcated
- Ability to enforce perimeter control

Activities performed in the Containment zone includes:

- Physical house to house surveillance of active cases by Special Teams formed for the purpose.
- As per sampling guidelines testing of cases.
- Contact tracing.
- Local community volunteers identified to help in contact tracing, surveillance, and risk communication.
- Strict social distancing.
- Clinical management of all confirmed cases.

- **Social Distancing Measures**

Social distancing is the measures taken to increase physical distance between people to prevent the spread of the virus. The Government issued an

advisory asking all the states to take measures for social distancing as a preventive strategy for COVID-19 on 16 March, 2020.

The following interventions were proposed:

- All educational establishments gyms, cultural and social centres, museums, theatres and swimming pool. Students should be advised to stay at home. Online education to be promoted.
- Private sector organizations encouraged to allow employees for work from home. Meetings shall be done through video conferences.
- Handwashing protocol and proper cleanliness of frequently touched surfaces should be ensured in the restaurants. Ensure physical distancing of 1metre between tables. Encourage open air seating where practical with adequate distancing.
- Already planned weddings should have limited gathering and all non-essential social and cultural gatherings should be postponed.
- Local authorities should have a conversation with organizers of sporting events and competitions which involve large gatherings should be advised to postpone events.
- Avoid non-essential travel. Trains , buses, and aeroplanes should maximize social distancing in public transport and ensure regular and proper disinfection of surfaces.
- Hospitals should follow protocols related to COVID-19 management and restrict visiting friends and families of patients.
- Physical distancing and hygiene must be maintained. Hugging and shaking hands to be avoided.

▪ **Contact Tracing**

Contact tracing is the process of identifying, evaluating and managing individuals exposed to a disease to prevent further infection. When applied systematically, contact tracing will break the transmission chain of an infectious disease and is therefore a necessary public health tool to control the spread of infectious disease.

The contacts of the laboratory confirmed case as well as suspect case of COVID-19 is listed and tracked and is kept under surveillance at home for about 28 days by the designated worker.

Risk profiling of contacts-

High-risk contacts-

- Contacted body fluids of the patient (body fluids being coughed on, touching used paper tissues with a bare hand).
- Direct physical contact with patient's body which also include the physical examination without wearing personal protective equipment.
- Staying in the same household as the patient.
- Anyone came in contact within 1 meter of the confirmed case without precautions.

Low-risk contacts-

- Shared the same area without having a high-risk exposure to COVID-19 case.

- Travelled in same train or bus or aeroplane without having a high-risk exposure.

Aarogya Setu mobile Application- Indian government launched the Aarogya setu app to assist in contact tracing. The app was launched on 2 April 2020. It also help people to know the risk of them getting infected with COVID-19 and alert authorities if exposed to an infected person.

INTERVENTIONS AT HEALTH FACILITY LEVEL

▪ Labs

The testing lab network in India is growing rapidly. With 314 private labs and 786 labs in the government, there are 1100 labs in the country. These include:

- Testing labs with real-time RT PCR: 591 (Private: 223 + Govt: 368)
- Testing labs with TrueNat: 417 (Private: 32 + Govt: 385)
- Testing labs with CBNAAT: 92 (Private: 59 + Govt: 33)

Existing strategies for COVID-19 testing:

- Real-time RT-PCR

For detecting COVID-19 cases, it is the gold standard test. Average 4-5 hours taken from receipt of sample to getting the result. Accuracy of detection and ability to run up to 90 samples in a single run are the advantages of this platform. This test requires specialized laboratory requirements like molecular virology facilities.

- TrueNat and CBNAAT (Cartridge Based Nucleic Acid Amplification Test)

These platforms have a turnaround time of 30 -60 minutes and only 1-4 samples can be tested at a time, which limits the numbers tests to 24-48 samples /day only. These platforms have availability even at district and primary health center level because these platforms are widely used for diagnosis of Tuberculosis.

- Rapid point-of-care Antigen Detection Test (for diagnosis along with RT-PCR)

Stand-alone rapid point of care antigen detection assay was evaluated by ICMR and AIIMS, Delhi independently, which does not need a specialized machine and can be evaluated with a naked eye. The test is a promising tool for quick diagnosis of COVID-19 in field. The assay is known as Standard Q COVID-19 Ag kit and developed by SD Biosensor which have a manufacturing unit at Manesar, Gurugram.

All symptomatic individuals testing negative through the rapid antigen test should be confirmed with a real-time PCR test and a positive test should be considered a true positive.

- IgG Antibody test for SARS-CoV-2 (Not for diagnosis but only for surveillance)

Generally IgG antibodies starts appearing after two weeks of onset of infection, once the individual gets recovered after infection and last for several months. That's why the IgG test is not of help for detecting acute infection. But, detection of IgG antibodies for COVID-19 may be useful in the following:

- Serosurveys (testing of blood serum of individuals to determine seroprevalence) to understand the proportion of population exposed to infection with COVID-19 which also includes asymptomatic individuals. Appropriate public health measures can be planned and implemented for prevention and control of the virus depending upon the level of seroprevalence of infection.
- Survey in high risk populations (frontline workers ,health care workers, individuals in containment zones, immunocompromised individuals, etc) to see who has been infected in the past and has now recovered.

Use IgG based ELISA and CLIA assays was strictly advised only for conduct of serosurveys.

▪ **Sardar Patel COVID Care Centre**

Sardar Patel COVID Care Centre and Hospital (SPCCCH) is the **world's largest SARS-CoV-2 care facility** at Radha Swami Satsang Beas in Delhi with 10,000 beds. South Delhi District Administration created this facility on an emergent basis in record time of 10 days with full support of the ministry of home affairs.

It functions as an isolation centre for mild as well as asymptomatic Covid-19 positive patients. Oxygen facility is provided to at least 10% of the beds. The SPCCCH has been linked operationally to Madan Mohan Malviya Hospital and Deen Dayal Upadhyay Hospital. The referral tertiary care hospitals are Rajiv Gandhi Super Speciality Hospital and Lok Nayak Jai Prakash Narayan Hospital.

▪ **Hospitals, Hospital beds & Ventilators reserved for covid-19-**

From a study done by CDDEP (Center for disease dynamics, Economics and Policy) it was found that with capacity of over one lakh isolation beds and 11,500 ICU beds, total of 586 hospitals in the country have been marked as dedicated COVID-19 hospitals as per the union health ministry of India.

There are 17,850 to 25,556 ventilators in India. Considering the best-case scenario where we assume that if all ICU beds have the facility of ventilators, we have a maximum of only around 57 thousand ventilators to provide to a increasing number of SARS-CoV-2 patients which is clearly not sufficient as per the future demand in the country.

In the study it was observed that many states lies below the national level guideline of 0.55 beds per 1000 population, these include Madhya Pradesh, Jharkhand, Bihar, Gujarat, Uttar Pradesh, Andhra Pradesh, Chhattisgarh, Odisha, Assam, Haryana, Maharashtra, and Manipur. Data shows that Bihar has an acute shortage of beds. However there are some states which are doing better on this metric are Sikkim (2.34 government beds per 1000) and West Bengal (2.25 government beds per 1000). The Southern states of Tamil Nadu has 1.1 beds per 1000 population, Kerala has 1.05 beds per 1000 and the capital Delhi has 1.05 beds per 1000 population. According to an estimate ventilator support will be required in 5-10% of total patients affected from COVID-19 in India.

INTERVENTIONS AT RESEARCH LEVEL

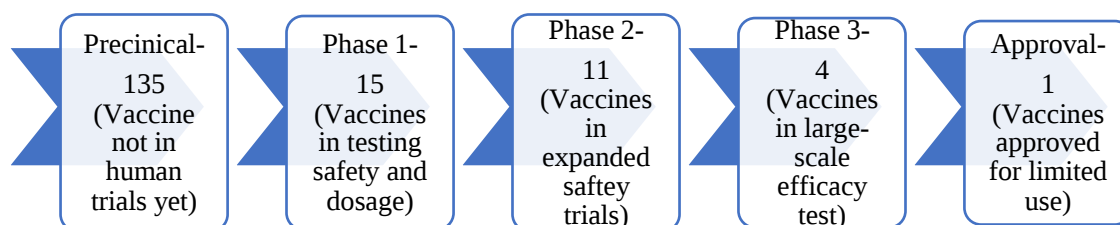
▪ Vaccine Trials

Till 5 July 2020, the DCGI (Drugs Controller General of India) has approved two vaccines - one developed by Zydus Cadila Healthcare Ltd and another one by Bharat Biotech International Limited in collaboration with the Indian Council of Medical Research to undergo first and second phase of human clinical trials.

These two candidates vaccine in India have successfully undergone toxicity studies in mice, rats, and rabbits and these data was submitted to the Drugs Controller General of India, after that both got clearance to undergo an early phase human clinical trials. On approximately 1000 human volunteers each, they are doing the clinical study at different sites.

More than 155 vaccines against the COVID-19 are being developed by researchers around the World, and 23 vaccines are in human trials.

Number of COVID19 Vaccines worldwide under different phases of trials are as follows-



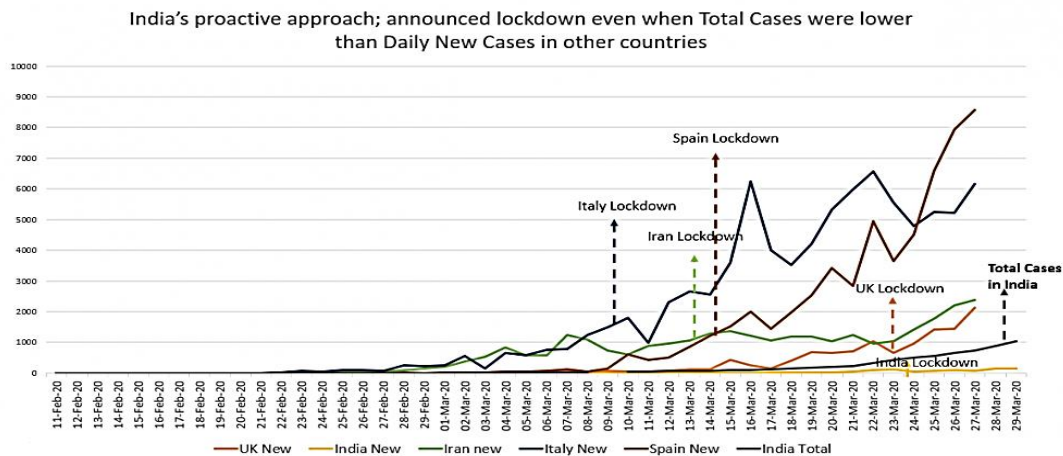
▪ Plasma Therapy Trials

To curb the COVID-19 while countries around the world experimenting with multiple treatments, plasma therapy has proven promising avenue for patients not responding to treatments. On 13 June 2020, the use of plasma therapy by hospitals as an investigational therapy has been sanctioned unofficially by the Ministry of Health and Family Welfare but only under some important conditions.

As of 6 July, there were 11 trials registered in India to test the efficacy of convalescent plasma therapy, with other hospitals carrying it out on an investigational, case-to-case basis.

Project Platina was launched by the Maharashtra government. It is the **world's largest plasma therapy trial** for treatment of SARS-CoV-2 patients having severe symptoms. Project Platina initially will supply plasma to 500 serious SARS-CoV-2 patients in Maharashtra, and gradually will be scaled up to supply to at least 5,000 serious COVID-19 patients by August.

Key learnings of the study :



(Source- <https://www.investindia.gov.in/team-india-blogs/timeline-actions-indian-government>)

- India adopted a lockdown quite early as compared to other countries and it has yielded favourable results. India's initial proactive response, especially the brassbound lockdown, has slowed the COVID-19 epidemic in India.
- Containment efforts, increased testing, modulated movement restrictions, intensive case-based surveillance while protecting the vulnerable population, and continuous observation and evaluation of transmission dynamics is proving effective in absence of effective treatment.
- The social distancing interventions seem to have been working in absence of treatment for COVID-19 for India; however, the tenability of these interventions is uncertain.
- The number of cases across the five phases of lockdown have been continuously increasing despite being taking all the necessary measures required. But in this bloomy scenario one thing which is giving the ray of hope is the recovery rate which now stands at 60.96% as of 5 July 2020 and the mortality is only 2.85% and the reason for this is India's enhanced capabilities of rapid testing, interconnected lab networks and safety measures like mandatory hand hygiene, thermal scanning, and compulsory mask at public places, etc.
- As of 20 July 2020, 3,687 people are in institutional quarantine, 32,304 people are in home quarantine, and total people released are 4,53,775.
- India has reported 6,85,110 confirmed cases and 19,505 deceased cases of novel coronavirus 2019, as of 5 July 2020.
- Recovery rate and mortality rate is observed to be 60.96% and 2.85% respectively.
- Madhya Pradesh, West Bengal, Maharashtra, Tamil Nadu, Delhi and Assam are the most affected states from Central, Eastern, Western, Southern, and North-eastern regions of India respectively.

- Maharashtra, Delhi and Tamil Nadu are the most affected states in the country with 2,06,619, 1,11,151, and 99,444 confirmed cases respectively.
- Segregation of the containment areas into three zone- ed, green and orange and sealing them off depending upon the severity of cases has also helped to some extent to curb the spread of COVID-19 in the country.
- Effective contact tracing methods like mandatory installation of Aarogya Setu app in each and every smart phone to alert people of any COVID-19 threat nearby and proper social distancing measures is also proving helpful in keeping the citizens of the country safe from covid-19.
- Seeing the increasing threat of COVID-19 in few states like Delhi and Maharashtra, the Indian government actively strategizing the plan to contain COVID-19, therefore establishing 10000 bedded largest COVID care center in the World at Radha Swami Satsang Beas in Delhi which is named as Sardar Patel COVID Care Center.
- Various interventions at healthcare level like real time RT-PCR, usage of TrueNat, CBNAAT and rapid antigen detection test to enhance the COVID-19 testing in the country has significantly strengthen the diagnosis of this disease due to which people are taking effective precautionary measures in time to safeguards themselves and others.
- The testing laboratory network continues to expand across the country to enhance the COVID-19 testing in the country. As of 5 July 2020, for every 1 million people in India, 7,344 people were tested for novel coronavirus disease.
- At present there are 1100 labs in the country out of which 314 private labs and 786 government sector labs, 95000 ICU beds, 19 lakh hospital beds, 95 thousand ICU beds, and 48000 ventilators to combat COVID-19.
- Plasma therapy has proven to be an encouraging boulevard for patients not to respond to other types of treatments.
- The Maharashtra government also launched the largest in the World ‘Project Platina’ for plasma therapy trial for treatment of coronavirus patients with severe symptoms which will cater to 5000 serious patients by August.

Social distancing and lockdown in the light of literature-

- According to prediction models which are reviewed in the study done by Arista Lahir, sweetly Suman Jha et al, complete lockdowns have shown to have the potential to retard the progress of the epidemic by April 2020 and reduce the COVID-19 cases, bringing down hospitalizations, intensive care unit requirements, and mortality by almost 90%. They also observed that with increasing testing, social distancing seemed to be effective in postponing the peak of the COVID-19 epidemic.
- To stop health-care demand exceeding availability, intense interventions with lockdown need to be in place for a coming year, suggested by the study done by Nicholas G Davies et al. They also found that social distancing is likely to decrease reproduction number. They also observed that interventions like physical distancing, school closures, self-isolation of cases and protection of people with 70 years of age or older, were each likely to

decrease reproduction number (refers to number of new infections caused in a susceptible population by an infected individual).

- But according to the recent study done by Seema Patrikar et al, it is predicted that in the third week of June the epidemic curve will peak in India having 17,525,869 and 2,153,200 infected population with reproduction number of 1.8 and Rho (effect of social distancing) of 0.7 and 0.6, respectively.
- Aditya mate et al found in their study that physical distancing and lockdown may lead to lower rates of infection while parallelly permitting return to normalcy to some extent.
- According to the study done by Abhishek Pandey et al, an extended closure of red light areas after the initial lockdown period would avert 43% to 67.6% of cumulative deaths and 32% to 60.2% of cumulative across India. They also found that cumulative number of hospitalizations and deaths in RLAs would be substantially reduced with extended closure of the Red light areas.

Discussion and Conclusion-

Current situation of COVID-19:

The threat of COVID-19 started from Wuhan in China has now spread to almost each and every country across the globe gripping India also in its clutches when the first case of SARS-CoV-2 found in Kerala on 22 March and now on 5th July 2020 the total number of confirmed SARS-CoV-2 cases in the country stands at about 6,85,110 cases and 19,505 fatalities in the country. India is not in the community transmission phase yet. At present there are cluster of cases in India. But as threat of COVID-19 is increasing, one thing that is giving the ray hope is the recovery rate which now stands at 60.96% and the mortality is only 2.85% as of 5 July 2020. Madhya Pradesh, West Bengal, Maharashtra, Tamil Nadu, Delhi and Assam are the most affected states from Central, Eastern, Western, Southern, and North-eastern regions of India respectively despite every possible interventions deployed by the Indian government to curb the spread of SARS-CoV-2.

Public health interventions-

To control the increasing menace of this deadly virus in the country various safety measures and interventions have been deployed both at the public level and personal level with the help of government and non-government organisations like initiation of complete lockdown at the national level, formation of containment zones and mandatory wearing of mouth mask at public places. However, as per the findings, the strategy of the government and public healthy interventions were not quite effective in controlling the threat of COVID-19 in India as today 510 out of every 1 million people in India have been tested positive for novel coronavirus. During the five phases of lockdown in the last 4 months the number of SARS-CoV-2 positive cases in India have been increasing at an exponential rate. However, Containment efforts, increased testing, modulated movement restrictions, intensive case-based surveillance

while protecting the vulnerable population, and continuous observation and evaluation of transmission dynamics is proving effective in absence of effective treatment.

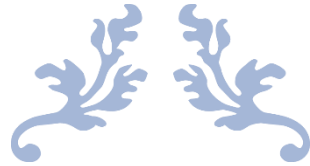
Key learnings of the study-

India's early response, especially brassbound lockdown, the social distancing interventions seem to have been working in absence of treatment for COVID-19 for India; however, the tenability of these interventions is uncertain. Various interventions at healthcare level like real time RT-PCR, usage of TrueNAt, CBNAAT and rapid antigen detection test to enhance the SARS-CoV-2 testing in the country has significantly strengthen the diagnosis of this disease due to which people are taking effective precautionary measures in time to safeguards themselves and others. The testing laboratory network continues to expand across the country to enhance the COVID-19 testing in the country. Also, Plasma therapy has proven to be an encouraging boulevard for patients not to respond to other types of treatments.

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PART-B

ONLINE COURSE



TITLE

**MARKET RESEARCH AND
CONSUMER BEHAVIOR**

OFFERED BY



IE Business School, Madrid, Spain | Coursera



Contents

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- 2. Course description**
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NAME OF THE COURSE

Market Research and Consumer Behaviour

Credential URL-

<https://coursera.org/share/466ceebefca869895defd77e6fc229a9>

Website- www.coursera.org

Duration-

From 03/05/2020 To 30/05/2020 (28 days)

COURSE DESCRIPTION

- This course is offered by IE Business School, Madrid, Spain.
- Course instructor- Prof. Shameek Sinha.
- This course helps to develop the understanding of the importance of knowing the customers and how to go about conducting thorough market research.
- This course consist of two blocks: Marketing Research and Consumer Behaviour. In this course, firstly, Professor show the tools and methods to be able to effectively conduct and interpret market research. Secondly, he teach the foundations of consumer behaviour and the consumer decision-making process and how to use this knowledge in the formulation of effective marketing strategies and tactic.

OBJECTIVES OF THE COURSE

- To learn about the tools and methods to be able to effectively conduct and interpret market research.
- To learn how to design a research plan and analyse the data gathered.
- To learn to accurately interpret, communicate survey reports and to translate the results into practical recommendations.
- To gain the tools and techniques to translate a decision problem into a research question.
- To understand the consumer decision-making process.
- To analyse the customer perceptions about the purchase and their purchase experience.
- To understand the state of the product before approaching the market strategy.
- To learn to formulate effective marketing strategies.

WEEK 1

CONSUMER BEHAVIOURAL FUNDAMENTALS

OBJECTIVES

- To understand the importance of consumer behaviour in the marketing process framework.
- To study the different factors which affects the consumer behaviour.
- To learn the prospect theory to understand how the consumer rationality affects their decisions.
- To study the continuum of buying decision behaviour.

CONTENTS

1. The Building Blocks

- Why is Consumer Behaviour Important in the Marketing Process Framework?

2. Attitudes and Thought Process

- The Consumer Behaviour Process
- The Consumers' Attitudes Perspective
- The Continuum of Consumers' Thought Process

3. Behavioural Approaches: Prospect Theory

- Prospect Theory: How Your Customers' Rationality Affects Their Decisions
- Understanding Your Customers' Limits
- The Continuum of Buying-Decision Behaviour

4. Reading Material

- Article: Motivation, Cognition, Learning- Basic Factors Consumer Behaviour, by James A. Bayton

METHODOLOGY

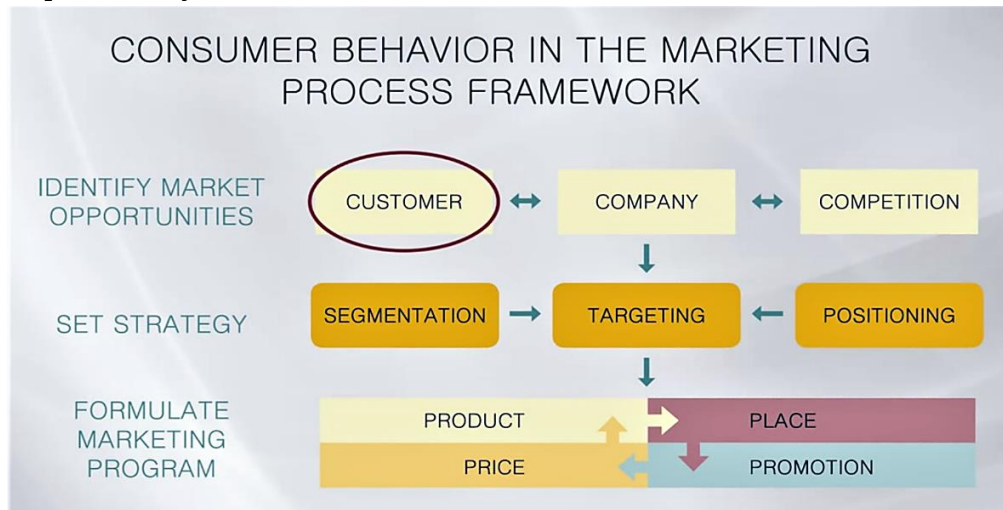
- In this module Prof. Shameek Sinha talked about consumer behaviour fundamentals.
- Video lectures were provided and the topics covered were-
 - Why is consumer behaviour important in marketing process framework.
 - The consumer behaviour process and attitudes.
 - Prospect theory.
 - Consumer limits.
 - Continuum of buying decision behaviour.
- Professor teach the consumer's thought process to get to know what makes them tick, and, more specifically, what makes them make their purchase decisions, which is the first step in developing a marketing strategy that is effective.
- Additional reading materials were also provided at the end of the session.
- Assignments were given at the end of the session, mainly consisting of quiz which were graded and 60% or more score was required to clear the quiz.

KEY LEARNINGS

❖ Consumer Behaviour :

The psychological and behavioural processes involved when individuals or groups search, select, purchase, use, evaluate or dispose of products, services, ideas or experiences to satisfy their expected needs and desires.

- We study consumer behaviour because knowing how people behave and what psychology underlies their actions allows marketers to create communication strategies to influence their choices to maximise profitability.



❖ Factors which affects consumer behaviour :

- Marketing stimuli- Products and services, price, distribution, communications.
- Economic situation- whether the economy is in downturn or in a boom.
- Technological
- Political
- Cultural
- Consumer psychology- motivation, perception, learning, memory, etc
- Consumer characteristics- cultural, social, personal, etc

❖ Psychological processes a consumer go through while making decision :

• Motivation

- **Freud's Theory**- Laddering and projective techniques
- **Maslow Theory**- Hierarchy of needs
- **Herzberg's Theory**- Satisfiers and Dissatisfiers

• Learning

A consumer learn about a particular product over time and then discriminate between different products.

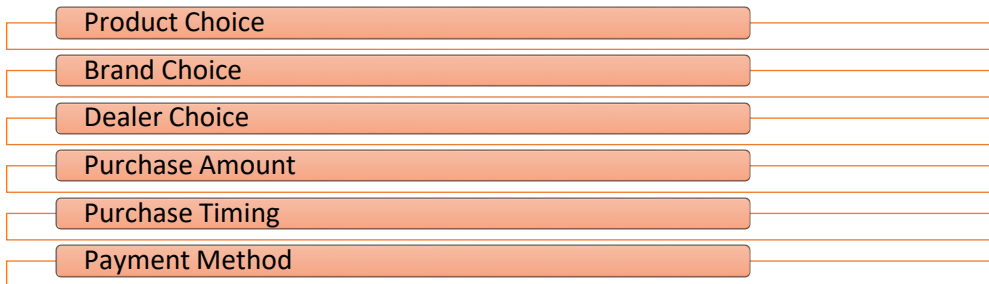
• Memory

Every consumer have a certain ingrained memory in their mind which might play a role while making decision.

❖ Buying Decision Process of a consumer :



❖ Purchase decisions a consumer encounters :



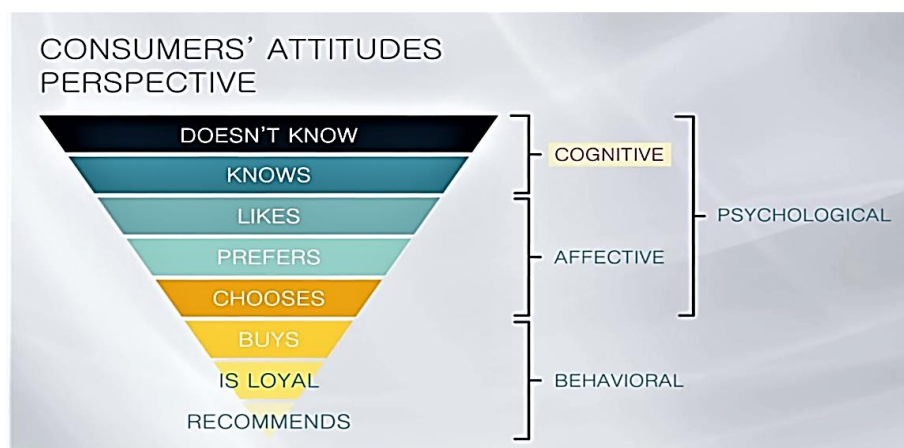
❖ Perspectives of consumer behaviour :

- **Behaviourist perspective-** This involves how consumers respond to different stimulus.
- **Information processing perspective-** In this consumers go through problem solving mechanism and uses their cognition in order to understand the perspective.
- **Emotional perspective-** This involves how consumer is emotionally active when purchasing a product.
- **Cultural perspective-** This involves cultural considerations which a consumer have in mind.
- **Multi-perspective approach-** Combination of two or more perspectives.

❖ Consumers' Attitude Perspective :

Consumer behaviour basically comprises of two main parts-

- Psychological
- Behavioural



❖ Continuum of Consumer Thought Process :

Different approaches a consumer takes in order to decide on the product which he or she finally decides to purchase.

- **Rational Approach**

- Consumer assess their different options of purchases relative to their net worth.
- Utility is maximised with respect to budget constraint.

- **Motivational Approach**

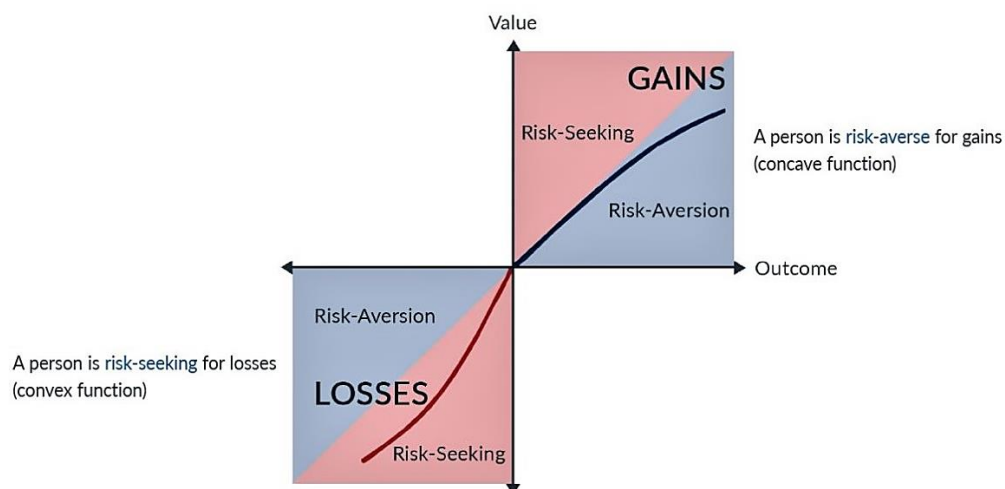
- Consumer are not rational at all here and their purchase behaviour is solely drive by emotions.
- Three main types of appeals which marketers mainly target- emotional, sex, fear

- **Bounded Rationality Approach**

- Consumer decision making is driven more by prospect theory and the behavioural sciences.
- Consumers are not necessarily completely irrational or completely rational. They usually take a reference pricing as a baseline.

❖ Prospect Theory

- Prospect theory have three main pillars- Value function, risk function, reference point.
- Bounded rationality approach



- **Concepts under bounded rationality approach-**

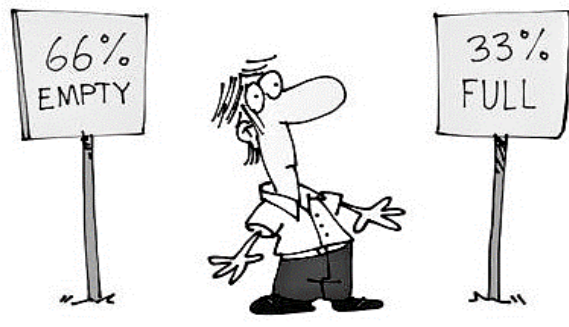
- **Reference pricing-**

- The value of the price of the product is judged with respect to a reference point.
- Reference point can be a price which a consumer or his or her relatives, friends have paid for previous purchase of a product.

- **Framing-**

- cognitive bias where people decide on options based on whether the options are presented with positive or negative connotations e.g. as a loss or as a gain.

- Consumer usually evaluates losses more than gains, that is, if consumer have to pay little bit of extra price, that hurts him or her more than if he or she is to pay a slightly less of a price.



- **Risk Profile-**

- Consumers usually have a diminished sensitivity to gain versus losses.
- When consumers are in the loss frame of mind, they are willing to take risk. (Loss Frame : Risk Seeking)
- When consumers are in gain frame of mind, they are usually risk neutral, that is, consumers are not willing to take any kind of risk. (Gain Frame : Risk Neutral)

- **Risk Aversion**

- Increase in price probably would hurt a consumer more than the decrease in price.

- **Mental Accounting**

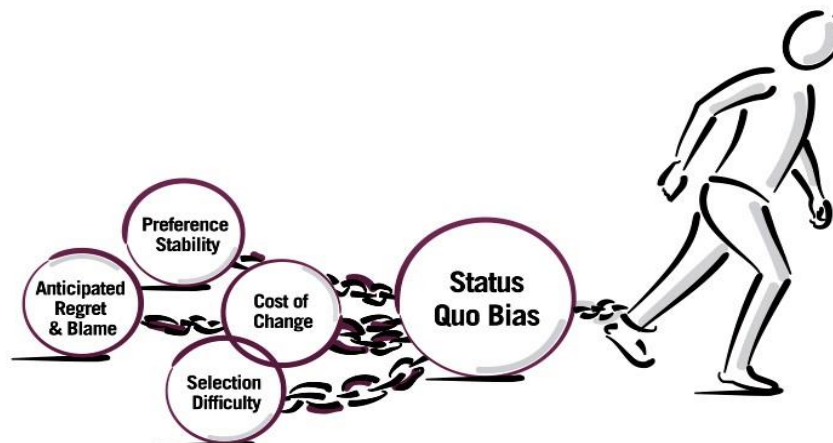
- Money is mentally coded as a gain or a loss.

- **Disposition Effect**

- Consumer somehow hold on to their losses and gains. Especially they hold on to their losses for longer and sale their gains faster.

- **Status Quo Bias**

- Consumer usually have a tendency to favour stability in their purchase decisions instead of change. This is called status quo bias.

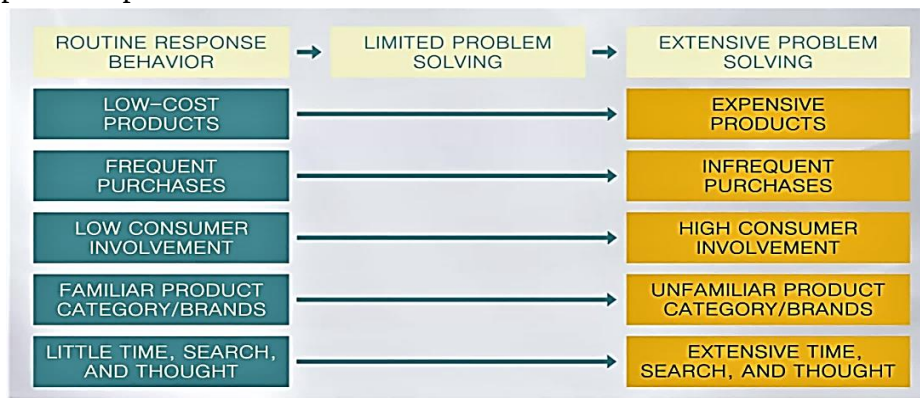


❖ Continuum of Buying Decision Behaviour

Three types of responses of consumers when they purchase a product-

- **Routine Response Behaviour**

- Situation where the products are low-cost (Ex. consumer packaged goods) where a consumer does not need to go deeper into a lot of information search or a lot of analysis before making the purchase.
- Because it is routine, the purchases are much more frequent and it will cause lower consumer involvement.
- These are the categories where the products or brands are more familiar.
- There is minimal time, thought or research goes on behind the inter-purchase process.



- **Extensive Problem Solving**

- Situations where the products are expensive (Ex. products which are durable goods) where a consumer needs a lot of research.
- Purchases are infrequent because of expensive category purchases.
- It requires a higher consumer involvement.
- Product normally is unfamiliar or brand is unfamiliar.
- Consumer needs more time, thought and research before purchasing the product.

- **Limited Problem Solving**

- Somewhere between routine problem solving and extensive problem solving, that is, category which does not require a consumer to go into a lot of research or a lot of involvement but some research needs to be still involved.
- Category like clothing purchases.

APPLICATIONS

Studying consumer behaviour helps to find answers to following questions and which ultimately contribute to devising marketing strategy -

1. What is the psychology behind consumer's feelings and reasonings as it relates to purchase?
2. What persuades consumers: culture, family, friends, the media?
3. What prompts consumers to purchase goods and services?

WEEK 2

THE CONSUMER DECISION PROCESS

OBJECTIVES

- To identify need recognition as part of consumer decision making process.
- To examine “information search”, “evaluation of alternatives”, “purchase decision” and “post-purchase behaviour” stage of the consumer decision making process.
- To understand how a potential buyer researches a product.
- To learn about the constraints the consumer encounters while making decisions.

CONTENTS

1. The Decision Sequence

- Stages of the Consumer Decision-Making Process
- Need Recognition and Information Search
- Evaluation of Alternatives & Purchase
- Post-Purchase Evaluation

2. Constraints on Decision Process

- What Constraints do Consumers Encounter?
- Information Processing and Overload

3. Perception and Attitudes

- How Perceptions & Attitudes Affect Consumers' Decisions

4. Reading Material

- Consumer Attitudes and Perceptions on Sustainability (The Guardian Sustainable Business)

METHODOLOGY

- In this module Prof. Shameek Sinha talked about consumer decision process.
- Video lectures were provided and the topics covered were-
 - Stages of consumer decision making process.
 - Constraints on decision making.
 - How perception and attitude affect consumers' decisions.
- Professor Sinha helps to explore how a potential buyer researches a product, how they make their purchase decisions and their post-purchase evaluation. Also, the difference between consumer markets and business markets is explained.
- Additional reading materials were also provided at the end of the session.
- Assignments were given at the end of the session, mainly consisting of quiz which were graded and 60% or more score was required to clear the quiz.

KEY LEARNINGS

❖ Stages of consumer decision making process

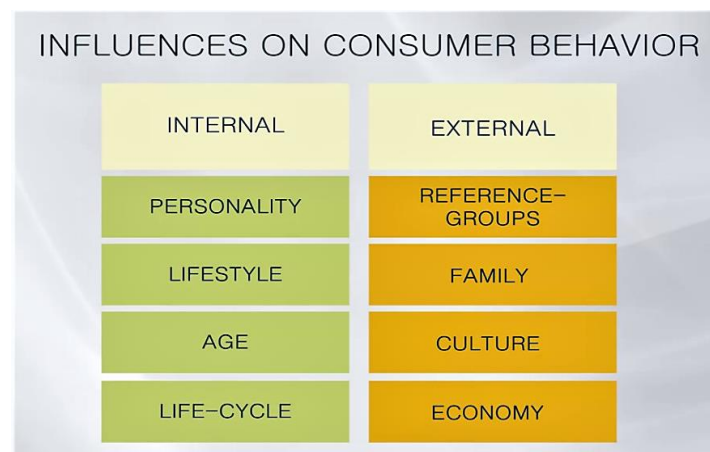


- Also known as Buyer Decision Processes. It refers to the decision-making stages that a consumer undergoes before, during, and after they purchase a product or service.
- These five stages differ under different product categories.
- Information search is one of the critical ones. It is important because before making purchase decision, consumer needs to spend a lot of time going through the different information which is available or made available by the companies who sell the product.
- So, firms do a lot of market research in order to understand their competition, their overall market situation, what kind of pricing they are going to follow, distribution strategy, etc

Stages :

1. Need Recognition

- It occurs when a consumer identifies a need and thinks of a product that might meet his or her needs.
- Need or problem recognition is oftentimes recognized as the first and most crucial step in the process because if a consumer does not perceive a problem or need, he generally will not move forward with considering a product purchase.
- A need can be triggered by internal or external stimuli.



2. Information Search

- Information Search is a stage in the Consumer Decision Process during which a consumer searches for internal or external information.
- During the information search, the options available to the consumer are identified or further clarified.
- An internal search refers to a consumer's memory or recollection of a product, oftentimes triggered or guided by personal experience.
- An external search is conducted when a person who has no prior knowledge about a product seeks information from personal sources (e.g. word of mouth from friends/family) and/or public sources (e.g. online forums, consumer reports) or marketer dominated sources (e.g. sales persons, advertising).



3. Evaluating Alternatives

- During the evaluation of alternatives stage, the consumer evaluates all the products available on a scale of particular attributes which have the ability to deliver the benefit that they are seeking.
- Consumers can be significantly influenced by their attitude as well as the degree of involvement that they may have with the product, brand, or overall category.



4. Purchase

- During the purchase decision stage, the consumer may form an intention to buy the most preferred brand or product because he has evaluated all the alternatives and identified the value that it will bring him or her.
- During this stage, the consumer must decide the following-
 - from whom he should buy,
 - when to buy and
 - whether to buy.

5. Post-purchase behaviour

- Post-purchase behaviour is when the customer assesses whether he is satisfied or dissatisfied with a purchase.
- How the customer feels about a purchase will significantly influence whether he will purchase the product again or consider other products within the brand repertoire.
- Cognitive dissonance is when the customer experiences feelings of post-purchase psychological tension or anxiety.
- Some companies like to engage their consumers with post-purchase communications in an effort to influence their feelings about their purchase and future purchases.



❖ Product Categories

- **Expensive Products-**
 - Durable goods category
 - Ex. Laptop
 - Infrequent purchases
 - Requires high consumer involvement
 - Complicated decision.
- **Low-cost Products-**
 - Consumer packaged goods
 - Ex. Milk
 - Frequent purchases
 - Required low consumer involvement
 - Simple decisions.
- **Intermediate price category-**
 - Ex. Clothing
 - Requires a bit more involvement than low-cost products.

❖ Constraints on the consumer decision making process

- **Overload of information processing-**
 - Consumers usually have a limited capacity to attain, receive, perceive, process and interpret marketing stimuli
 - Ex. while buying a particular product, if there are multiple options to choose from, he or she might get confused.

- **Attention- unexpectedness, personal relevance**
 - If consumer encounters anything that is totally unexpected about the product or if the customer finds something about the product that is of personal relevance to him or her, it grabs their attention, which ultimately affects their decision making process.
- **Perception**
 - Branded versus unbranded products.
 - Preference pattern changes.
 - Preference order differential.
- **Attitude**
 - Consumers usually try to maintain attitude (Status Quo Bias).
- **Marketers try to influence consumers to maintain attitude to retain consumers -**
 - **Foot in the door technique**
 - If a marketer has been able to acquire a particular consumer, they have gained some entry in consumer's mind and now they want to emphasize this entrance by putting in message which are very consistent.
 - Dissonance reduction- Marketers try to avoid inconsistency in message which might lead to consumer confusion.
- **Marketers try to influence consumers to maintain attitude to acquire new consumers-**
 - **Elaboration likelihood model**
 - High involvement products
Focus is on argument strength – message focuses on the arguments, that is, message which explains the features of the product, benefits, etc
 - Low-involvement products
Focus is on peripheral cues – something really catchy which can get the consumer's attention.

APPLICATIONS

1. Studying consumer decision making process helps to take informed marketing decisions.
2. Answer to the following question contribute to making marketing campaigns-
What constraints prevent consumers from purchasing a certain good or service?

WEEK 3

MARKETING RESEARCH FUNDAMENTALS

OBJECTIVES

- To learn about the market research and its role in an organisation.
- To explore the role of market research in marketing management.
- To study the research designs involved in market research.
- To understand the experimental research fundamentals.
- To study different types of experimental designs.

CONTENTS

1. Marketing Research and Its Role in an Organization

- The Importance of Marketing Research & Its Role In Marketing Management
- The Steps to Conducting Marketing Research

2. Research Designs

- Types of Market Research
- Exploratory, Descriptive and Causal Research – Part I
- Exploratory, Descriptive and Causal Research – Part II

3. Experimental Research Fundamentals and Effects

- Types of Experimentation
- Validity & Reliability

4. Experiment Design

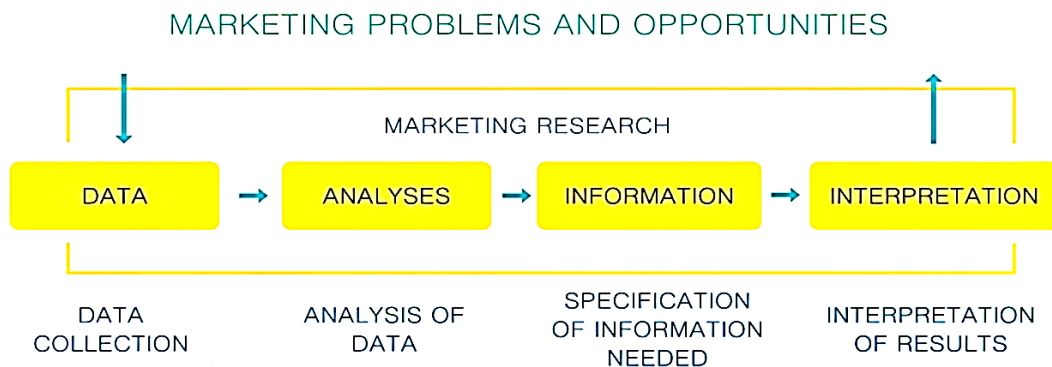
- Types of Experimental Designs

METHODOLOGY

- In this module Prof. Shameek Sinha talked about marketing research fundamentals.
- Video lectures were provided and the topics covered were-
 - Importance of marketing research and its role in marketing management.
 - The steps of conducting marketing research.
 - Research designs.
 - Experimental research fundamentals.
 - Types of experimental designs.
- Professor Sinha shares the importance of market research and how to acquire data. Later, different types of experimental research and designs are explained.
- Assignments were given at the end of the session, mainly consisting of quiz which were graded and 60% or higher score was required to clear the quiz.

KEY LEARNINGS

❖ Market Research Process :



❖ Relationship between Marketing Research and Marketing Management :

Market research plays a very crucial role in combining all the elements of the marketing management and coming up with the most important conclusions which are relevant to the company like marketing mix which includes product, price, place and promotion, so that a company can target right consumers at right time.



❖ Components of marketing research

- Economic environment
- Internal corporate structure
- Competition
- Pricing
- Product
- Distribution
- Promotion
- Buying behaviour

❖ Organizational structure of marketing research

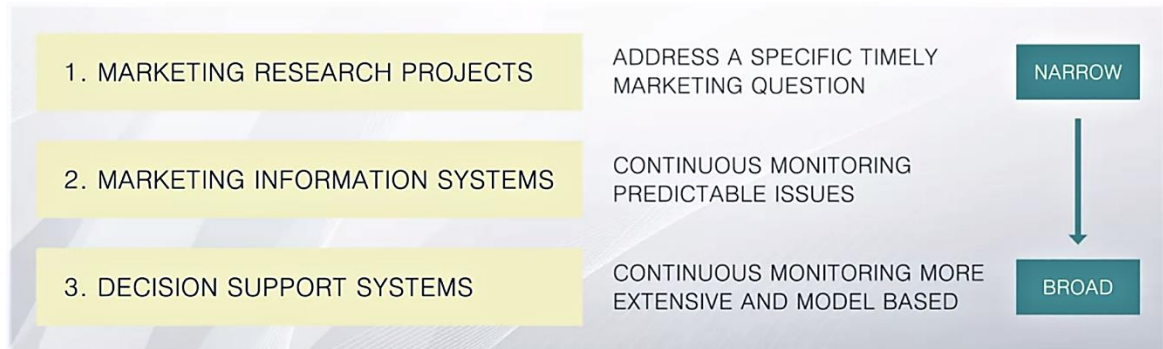
• Decentralization-

- One marketing department per division.
- Better focus on individual markets, the practices and problems.

• Centralization

- One marketing department at headquarters.
- Economies of scale.
- Better control over entire marketing research process.

❖ Types of Information Delivery



❖ Steps to conduct market research

- 1) Formulate problem
- 2) Determine research design
 - Exploratory
 - Descriptive
 - Causal
- 3) Design data collection method and forms of data collection
 - Design – observation, survey, etc
 - Form of data collection – open ended, closed ended.
- 4) Design sample and collection of data
 - Who - representative
 - How - reliability
 - How many - validity
- 5) Analyse and interpret data
 - Basic analysis – descriptive analysis or correlation analysis
 - Advance analysis – certain models are used like statistical model or econometric model.
- 6) Reporting
 - Summarise research results
 - Recommendations
 - Make conclusions

❖ Types of Market Research

1) Exploratory Research

- Discovery of ideas or insights.
- Results in soft information.

- Can not draw ultimate conclusion based on research.

- **Purpose-**

- Eliminate impractical ideas.
- Refine problem.
- Establish priorities for future research.
- Clarify concepts.
- Increase familiarity with problem.
- Generate hypothesis.

- **Types of Exploratory Research**

- Literature research
- Experience survey
- Participant observation
- Focused group discussion
- Personal in-depth interview

2) **Descriptive Research**

- Deals with frequencies and relationship between variables.
- Typically guided by hypothesis.
- **Types of Descriptive Research**
- Survey
- Developmental research- longitudinal approach, cross-sectional approach
- Case study
- Causal
- Correlational

- **Steps of Descriptive Research**

1. Statement of problem
2. Identification of information
3. Selection or development of data gathering instruments
4. Identification of target population and sample
5. Design of information collection procedure
6. Collection of information
7. Analysis of information
8. Generalisation or prediction

3) **Causal Research**

- Concerned with cause and effect relationship.
- Mostly conducted with experiment.

❖ **Product Categories**

- **Expensive Products**

- Durable goods category
- Ex. Laptop
- Required in-depth information.
- Involved detailed market research.
- **Exploratory research-** consumer reports, brochures, expert opinions, focus group reports, consumer

- reviews.
- **Descriptive research**- survey reports
- **Causal research**- professional reports, academic publications in journals, etc.

- **Low-cost Products**

- Consumer packaged goods
- Ex. Milk
- Though the decision process still involves descriptive, exploratory, causal research; the amount of information need here is much less.

- **Intermediate price category**

- Ex. Clothing
- A little bit in-depth information is required.
- Sources of information- exploratory research and descriptive research.

- ❖ **Experiment**

- It is the manipulation and control of one or more variables and based on the effects of those variables observed outcomes.
- The experiment provides evidence of causal research.

- **Variables**

1. **Dependent variables**

- Also known as ‘outcome variables’.
- Measure the effect of the manipulation.

2. **Independent variables**

- Also known as ‘treatment variables’.
- These are the variables of interest which are manipulated.

3. **Control variables**

- Measured by the researchers.
- Not intended to measure the effects but they are intended to keep the other conditions constant.
- Control variables are not allowed to vary freely or systematically with the independent variables.

4. **Extraneous variables**

- These variables can not be controlled by the researchers.
- Sometimes because of extraneous variables, the effect of the treatment variables is biased.

- **Measuring the effects of treatment**- 2 main ways

1. **Within subject variation**

- In this, the same subject is measured in the form of outcome variable and then actual manipulation is experimented and then measured once more after the manipulation is implemented.
- So, basically we are capturing the difference of the after outcome with the before outcome and the difference is the effect of the manipulation.

2. Between subject variation

- In this, we actually measure two different subjects.
- Here the concern is, are there two groups being affected by the same manipulation differently.
- Between subject variation is usually measured as the after outcome of the two or more subjects and the difference is very critical to understand whether two different subjects react differently to a particular manipulation.

▪ Validity of Experiment

- Do you measure what you intend to measure?
- 3 types-
- 1. Internal validity- Extent to which the research design accurately identifies causal relationship.
- 2. External validity- Extent to which a causal relationship found in a study can be expected to be true in the entire population.
- 3. Construct validity- Extent to which the variables under investigation are completely or accurately identified prior to hypothesizing any functional relationships.

▪ Reliability of Experiment

- Will you find the same results if you repeat the research?
- Statistical design and measurement techniques can improve the reliability.

▪ Types of Experimental Designs

1. Pre-experimental Design

- No control over test subjects.
- No control over who will be measured and when.
- No randomization or matching.

2. True Experimental Design

- Control over subjects.
- Control over who is measured for outcome and when.
- Randomization and matching is possible.
- Effects of extraneous factors can be measured.

3. Quasi Experimental Design

- No control over subjects.
- Control over who is measured for outcome and when.

APPLICATIONS

Market research is useful in following areas-

1. Pricing research- To make pricing strategy decisions and to find on market positioning opportunities.
2. Product research- For new product design and market validation and to assess existing product strength.
3. Branding research- To decide on brand strategy and to measure the depth of a brand power in target market.
4. Distribution research.
5. Marketing environment research.
6. Et cetera

WEEK 4

MARKETING RESEARCH DATA COLLECTION & ANALYSIS

OBJECTIVES

- To study the different types of marketing data.
- To learn about designing a questionnaire.
- To study different types of attitude measurement scales.
- To understand the data collection in survey research.
- To explore the data analysis fundamentals.
- To learn about target population and its importance in market research.

CONTENTS

1. Types of Marketing Data

- Primary Data in Market Research
- Secondary Data & Scales of Measurement

2. Data Collection in Survey Research

- How to Design a Questionnaire
- How to Measure and Scale our Consumers' Attitudes
- Reading: Article - Self-Reports: How the Questions Shape the Answers by Norbert Schwarz

3. Sampling

- Target Population and Sampling

4. Data Analysis Fundamentals

- Categorical Data, Metric Data & Hypothesis Testing

METHODOLOGY

- In this module Prof. Shameek Sinha talked about marketing research data collection and analysis.
- Video lectures were provided and the topics covered were-
 - Types of marketing data.
 - Data collection in survey research.
 - Target population and sampling.
 - Data analysis fundamentals.
- Professor Sinha teach various types of data acquired during the market research process and how to evaluate and assess it in more detail. Also, the importance of, and how to create an effective survey is explained. Later, Professor Sinha helps to understand the marketing research.
- Assignments were given at the end of the session, mainly consisting of quiz which were graded and 60% or higher score was required to clear the quiz.

KEY LEARNINGS

❖ Types of Marketing Data

- **Primary data**- Data collected for specific study
 - **Types-**
 1. Demographics or socio-economics
 2. Psychographics or lifestyles
 3. Personal values
 4. Awareness or knowledge
 5. Attitude or motivations or benefits
 6. Behaviour
 - **Secondary data**- Data collected for separated study.
 - Using the data of a study which was done earlier.
 - **Scale of measurement-**

NOMINAL	NO ORDERING, LABELS	E.G., WHICH OF THE FOLLOWING BRANDS DO YOU LIKE (CHECK ALL THAT APPLY) ? [] HEINZ, [] HUNTS, [] PRIVATE LABEL
ORDINAL	ORDERED, BUT THE DISTANCES BETWEEN CATEGORIES ARE IRRELEVANT	E.G., RANK ORDER THE FOLLOWING BRANDS IN ORDER OF YOUR PREFERENCE (1 = MOST PREFERRED, 3= LEAST PREFERRED): HEINZ, HUNTS, PRIVATE LABEL
INTERVAL	DISTANCE BETWEEN CATEGORIES IS MEANINGFUL	E.G., RATE THE FOLLOWING BRANDS (1-10, WITH 10 BEING THE BEST POSSIBLE) IN ORDER OF YOUR PREFERENCE: HEINZ, HUNTS, PRIVATE LABEL
RATIO	NATURAL ORIGIN ('ZERO') AND DISTANCE BETWEEN CATEGORIES ARE MEANINGFUL	E.G., YEARLY SALES (\$, UNITS) OF HEINZ KETCHUP

↓ MORE INFORMATION

❖ Questionnaire Design

- 1) **Specify what information will be sought**
 - Unless we know what kind of data we need to collect, we can't design a good survey.
- 2) **Determine type of questionnaire and method of administration**
 - Open ended, closed ended, dichotomous, multichotomous, etc
 - Online or offline
- 3) **Determine the content of individual question.**
- 4) **Determine the form of response to each question**
 - Open ended scale, ratio scale, interval scale, etc.
- 5) **Determine wording of each question**
 - Use simple words and questions.
 - Avoid ambiguous words and questions.
 - Avoid leading questions.
 - Avoid double barrelled questions.
 - Develop clear instructions.
- 6) **Determine question sequence**
 - Use simple, interesting opening questions.
 - Use a funnel approach- asking broad questions first, then narrowing down to more specific questions.

- Carefully design branching questions.
- Place difficult or sensitive questions towards the end or hide in couple of questions.
- 7) **Determine physical characteristics of questionnaire**
 - Offline mode- what kind of paper you want to put questionnaire on?
 - Online mode- what kind of background colour or fonts you want to put in the questionnaire?
- 8) **Pre-test questionnaire and revise if necessary.**

❖ Types of Attitude Measurement Scale

• Single Item Measures

1) Itemised category scale

- Respondents select from a limited number of categories which do not have any ordering.

2) Rank-order scale

- Ordinal data and limited number of items which are rank-ordered.

3) Constant sum scale

- Score needs to add up to a number.
- Limited number of items.
- Relative but can be used to measure interval or ratio scale.

4) Paired comparison

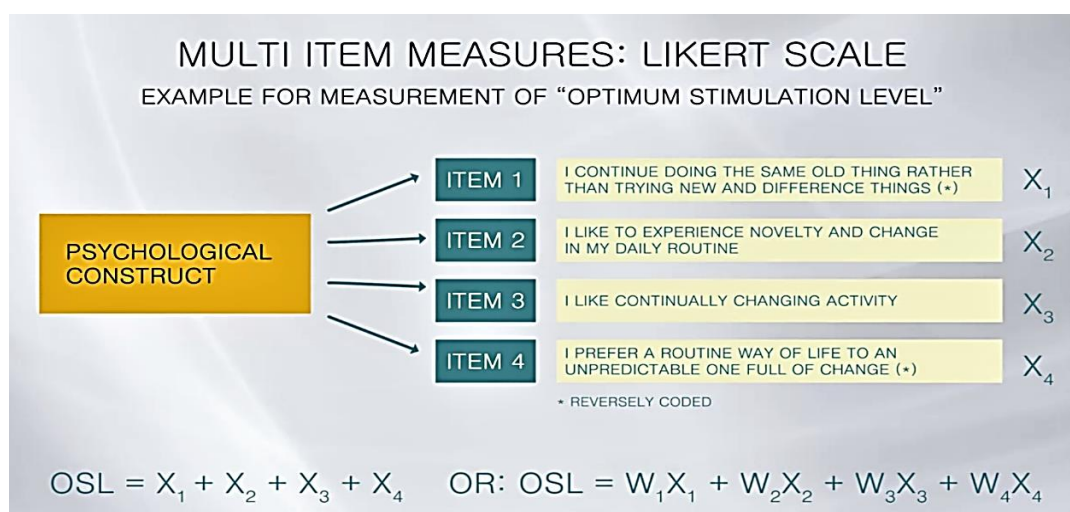
- Often used to compare brands, two at a time.
- Limited number of brands since otherwise the number of comparisons increase rapidly.

5) Graphical scale

- Measured using a graphical slider **mechanism**.

• Multi-item Measures

1) Likert scale



(where, $W_1X_1 + W_2X_2 + W_3X_3 + W_4X_4$ is weighted sum because may be each of these items have different weights to the respondents)

❖ Data Types

- **Categorical data**

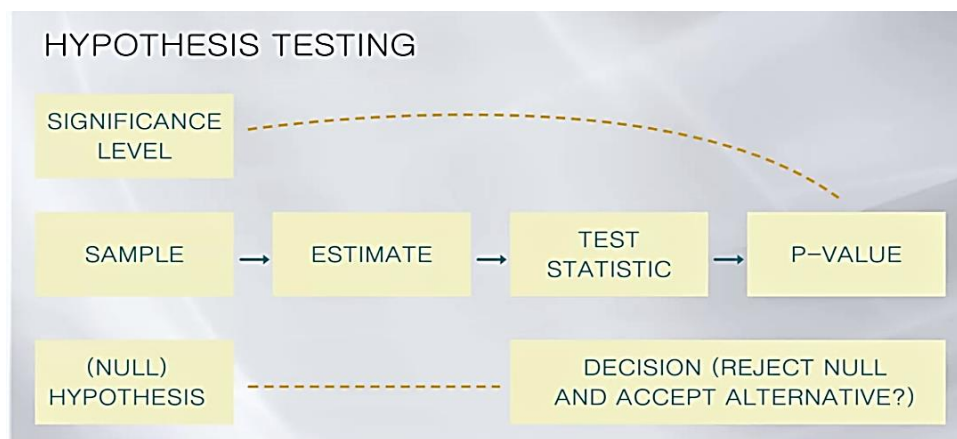
- **Nominal**- have values that can be distinguished from each other.
- **Ordinal**- have values that can be put into some sort of meaningful ordering.

- **Metric or Interval data**

- **Discrete**- countable variables.
- **Continuous**- measured to any degree of accuracy.

❖ Hypothesis Testing

- Objective of hypothesis testing is to specify a null hypothesis in terms of certain statistical quantity of interest.
- Ex. To test whether a specific advertisement has any significant effect on sales or not.



- **Steps-**

1. In order to test the hypothesis, first determine the degree of level of significance, called degree of significance and is measured by 'alpha'.
2. Draw a sample.
3. Estimate the quantity of interest
 - Ex. The effect of specific advertisement on sales
4. Calculate test statistics
 - that is, the observed value of statistic which you want to test.
 - This can take different distributions like T-distribution, F-distribution, chi square distribution, etc
5. Evaluate the P-value of the hypothesis test.
 - P-value basically measures the probability that an observed effect is there in the sample, given that null hypothesis is true.
6. Arrive at the decision.
 - Reject the null hypothesis and accept the alternative hypothesis, if P- value greater than zero.

- **Types of Error in Hypothesis Testing**

1. Type 1 Error-

It is the probability that you reject the null hypothesis, given that the null hypothesis is actually true.

2. Type 2 Error-

It is the probability that you do not reject the null hypothesis even though the null hypothesis is false.

APPLICATIONS

- Hypothesis testing helps to examine causes and effects before making a crucial management decisions.
- Concept testing
- Hypothesis testing is a good tool for confirming a business claim.
- Data driven informed marketing decision making.

THANK YOU
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