

Research on COVID-19 in India

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INTRODUCTION

- ▶ India is the third worst hit nation in the world in terms of the number of cases of Corona Virus behind only Brazil and the United States.
- ▶ Meanwhile Maharashtra, Tamil Nadu and Delhi continue to remain the worst hit regions in India. Together these three states have more than 46% of the total cases reported across India
- ▶ The number of Corona virus cases in India has now crossed the 7 lakh with a record of over 20,000 new cases reported for five days consecutively as on 8th July,2020.
- ▶ The death toll in India stands at over 20,000.The latest 5,000 deaths took 11 days, previous one took 9 days, hence we can see a slowing rate of death overtime in the country.
- ▶ However India's death rates per 10,000 of its population are still much lower than the global experience

METHODOLOGY

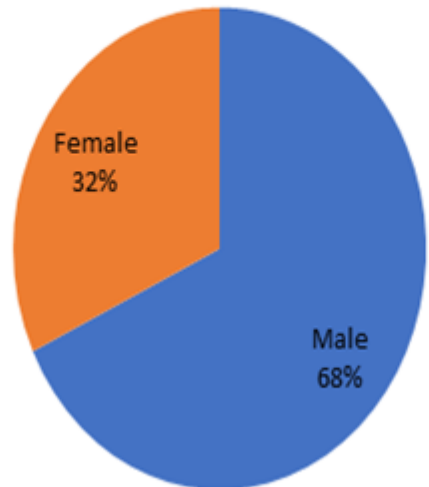
- ▶ The report is built from the publicly accessible COVID-19 datasets and it was taken from the various research websites, news reports and the compilations of datasets available in website of Ministry of Health and Family Welfare, India.
- ▶ The data contains the numbers of cumulative confirmed cases, recovered cases and death cases from January 30,2020 to July 8th,2020.

An overview of the situation of Covid-19 across India

- ▶ After originating in the Wuhan district of China, Covid-19 has found its way to all the countries of the world. India reported its first case on 30th January, 2020 in Thrissur district of Kerala, and is now the third most affected nation in the world.
- ▶ The pandemic has cut across all aspects of the society, impacting communities, individuals, markets and businesses in an unprecedented manner.
- ▶ It has been found out by the Union Health Ministry that 8 states which include-Maharashtra, NCT of Delhi, Tamil Nadu, Gujarat, Uttar Pradesh, West Bengal and Andhra Pradesh has contributed to more than 85% of the total active corona virus caseload and has also been responsible for more than 87% of the total number of deaths due to the virus.

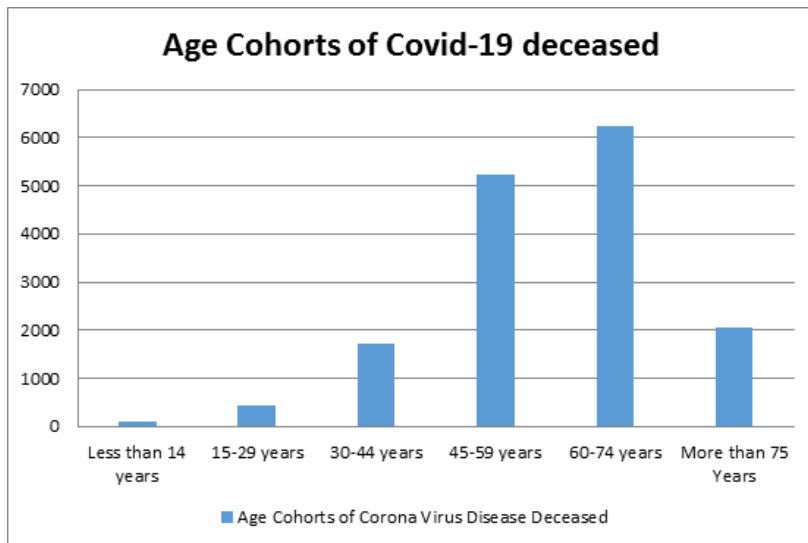
Distribution of the Covid-19 deaths between genders

GENDER SEGREGATION OF COVID-19 DEATHS
(Total Number of deaths: 17,834)



- The IDSP analysis reveals that males accounted for 68% of all Covid-19 deaths in India.
- The obvious reasons could be higher incidence and prevalence of comorbidity, greater health risk-taking behaviour, lesser attention to the hygienic practices and naturally weaker immune system as compared to the women.
- Some research also points out that women are up against a higher chance to die from corona virus than men due to a combination of socio-economic factors.

Age cohorts of cases in India

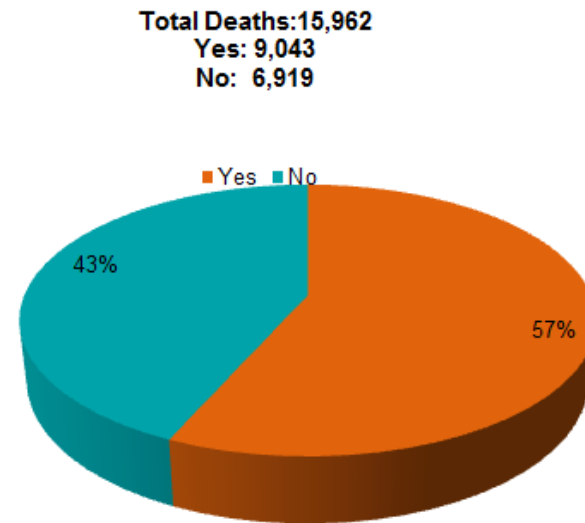


- ▶ The study also conducted an age-wise split of deaths and revealed the following analysis:
- ▶ Around 0.5% of the total deaths were in children who were less than 14 years of age
- ▶ Around 2.6% of the total deaths were in individuals who were between the ages of 15-29
- ▶ Around 11% of the total deaths in individuals between 30-44 years of age
- ▶ Around 33% of the total deaths in individuals between 45-59 years of age
- ▶ Around 39% of the total deaths in individuals between 60-74 years of age
- ▶ Around 13% of the total deaths in individuals who were over 75 years of age
- ▶ Hence the majority of the deaths due to COVID-19 is occurring between the ages of 45-75 years and above ages.

Comorbidities

- ▶ Pandemic has also shed light on the seriousness of the burden of NCDs or Non Communicable Diseases
- ▶ Hypertension, Diabetes, Heart Diseases, Cancer, Respiratory Diseases, Obesity are some of the common comorbidities
- ▶ Increased susceptibility of the Covid-19 affected patients has been a matter of concern
- ▶ IDSP analysis indicates that 43% of the deaths resulted from the disease alone and not any prior co-morbidities
- ▶ Hence safety of the elderly and those with comorbidities becomes even more important

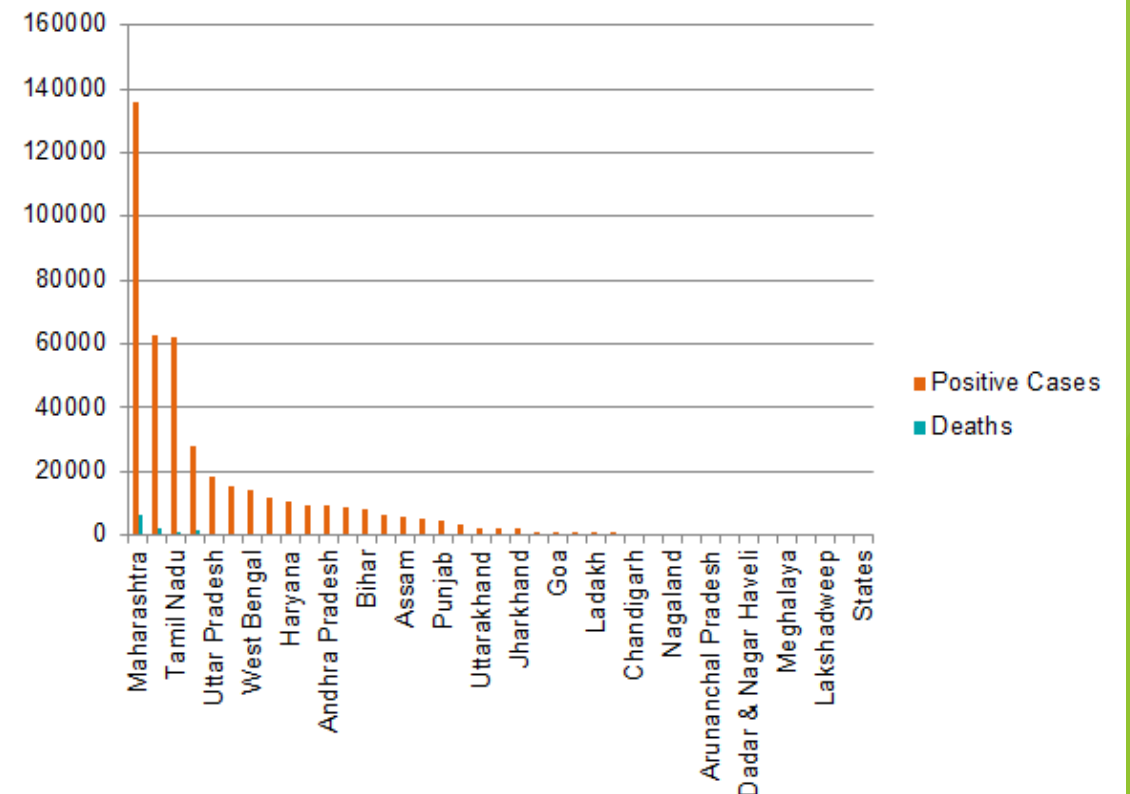
UNDERLYING CO-MORBIDITY IN COVID-19 DEATHS



Impact of Covid-19 across states

CHANDIGARH	82.3%
MEGHALAYA	80.8%
RAJASTHAN	79.6%
UTTARAKHAND	78.6%
CHHATTISGARH	78.3%
TRIPURA	78.3%
BIHAR	77.5%
MIZORAM	76.9%
MADHYA PRADESH	76.9%
JHARKHAND	76.6%
ODISHA	73.2%
GUJARAT	72.3%
HARYANA	70.3%
LADAKH	70.1%
UTTAR PRADESH	69.1%

Recovery rates (June end)



Cases and deaths as on July 04, 2020

Impact of Covid-19 across states

- ▶ Gujarat, Maharashtra and Tamil Nadu, along with the NCT of Delhi have been the most severely affected consistently: most industrialised states with significant portion of urban population and consequently high population densities
- ▶ Imminent shortfall of critical care facilities by July end / August
- ▶ The least affected areas are the North eastern states (except Assam, Tripura and Manipur) and the Union territories like Puducherry, Dadra and Nagar Haveli.
- ▶ States like UP, Haryana and West Bengal have similar trends where recovery rates have improved significantly by June end
- ▶ Surprisingly, Bihar has very low mortality rate : below 1%

Impact of Covid-19 across states

- ▶ Rajasthan: topped the virus management index; pioneer in keeping the doubling rate above the national average and the death rate below the national average
- ▶ Following priority areas have been thus identified:
 - ▶ Expansion of the testing capacity, keeping in view the increasing positivity rate (more than 3 lakh tests per day now)
 - ▶ Proactive steps for bringing the lives and livelihood of the poor back on track: introduction/strengthening of poverty alleviation programs such as guaranteed and provision of essential supplies such as food, medicines and other basic needs
 - ▶ To not ignore the other preventable communicable and non communicable diseases in the wake of Covid-19
 - ▶ Integration of non pharmaceutical measures in our daily lives
 - ▶ Effective data management, in terms of uniformity in data dissemination data for informed evidence based policy decision-making and generate reasonable inferences for research activities.

The R_0 value trends in India

State	R_0 value (June end)
Telangana	1.69
Maharashtra	1.19
Delhi	1.26
Tamil Nadu	1.26

- ▶ Means of understanding the ability of the infectious agent to spread. It is the average number of people to whom an infected person will spread the infection.
- ▶ R_0 is used for novel infections as it assumes that the entire population is susceptible to it
- ▶ Estimated to be between two and three initially; but by the first week of July, it came down to 1.14 after being around 1.22 in the initial days of June
- ▶ Huge variation among states
- ▶ Maharashtra: 1.49 during April, declining to 1.27 by May end
- ▶ Delhi: 1.4 during first week of June, rose to 1.15 by mid-April
- ▶ Tamil Nadu: above 2 in early May, and reached 1.56 by mid-May, 1.31 in early June and further declined to 1.26 by June end.
- ▶ By early June, the R value stood high at 1.9 for Haryana, while it was 1.68 for Assam. Though it has declined since then, it is still 1.56 for Haryana and 1.31 for Assam by late June. States like West Bengal, Jammu and Kashmir and Gujarat are showing sub-exponential trends. However, the value can only be substantiated when coupled with robust testing

Government's response to Covid-19

- ▶ Compulsory thermal screening of all passengers who were in-bound from China at all major airports of the country and later extended to other regions
- ▶ "Social Distancing" advisory with necessary protective measures
- ▶ COVID-19 Economic Task Force, Atma Nirbhar Bharat Abhiya
- ▶ Visas put on hold with compulsory self-quarantine for returnees (14 days)
- ▶ Launch of Aarogya Setu app
- ▶ Ramping up the testing: "Test,Trace,Treat" strategy
- ▶ Categorisation into Red, Orange and Green zones
- ▶ Complete and stringent lockdown, with subsequent 'unlocking'

Government's response to Covid-19

- ▶ Ministry of Health and Family Welfare Toll-Free number for prompt guidance
- ▶ Pradhan Mantri Garib Kalyan Anna Yojana, 'Prime Minister's Citizen Assistance and Relief in Emergency Situations Fund (PM CARES Fund)
- ▶ Insurance cover of Rs.50 Lakhs each to health workers
- ▶ Inclusion of private sector in testing and treatment
- ▶ Bharat Biotech is in the process of developing its first indigenous corona virus vaccine COVAXIN - human trials phase I launched

The pandemic through Health Systems perspective

- ▶ Inadequate public health spending recognised as the root cause of the poor health indicators
- ▶ The largely unplanned urbanisation not only degrades the environment but also creates inequity among the different socio-economic groups
- ▶ Disease profile of urban setting undergoing a change: rise of NCDs even in the urban poor
- ▶ Thrust for urban health much needed with strengthening the NUHM
- ▶ Gujarat has 50% shortfall of PHCs, while it is 54% for Maharashtra and 41% for Tamil Nadu

State	% of GDP spent on healthcare in 2019-20
Gujarat	5.8%
Tamil Nadu	5.1%
Maharashtra	4.2%
Delhi	13.8%
Kerala	5.1%
Assam	7.4%
Bihar	4.6%
Haryana	5.4%
Chhattisgarh	5.4%
Himachal Pradesh	6.4%
Karnataka	4.6%
Jharkhand	5.6%
Madhya Pradesh	4.9%
Rajasthan	6.2%
Telangana	4.0%
Uttar Pradesh	5.5%
West Bengal	5.1%
Odisha	5.1%

The pandemic through Health Systems perspective

State	Percentage shortfall in health workers in PHCs
Uttarakhand	100
Tripura	82
Chhattisgarh	70
Bihar	67
Kerala	82
Punjab	93
Karnataka	23
Telangana	26

- ▶ Lessons to be learnt from the decentralised approach adopted in Kerala as early as 1996
- ▶ Shortage in manpower also: PHCs, CHCs, ANMs and female health workers
- ▶ States like Bihar, Manipur, Meghalaya and Nagaland have zero urban CHCs

Conclusion

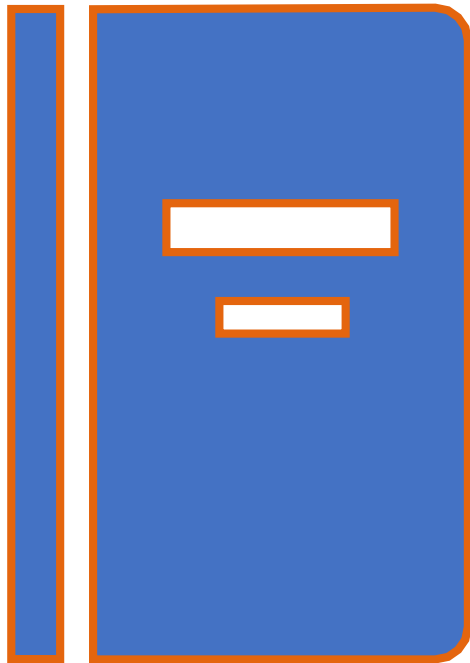
- ▶ The novel Coronavirus- covid 19 will continue to shape the world for the coming years
- ▶ Has tested the resilience of the health systems across the world
- ▶ More challenging for developing countries
- ▶ India: densely populated country, with significant rural population only increases the challenges for us.
- ▶ Has highlighted the importance of strengthening the public health system and leverage the technology at its best

- ▶ Newspapers: The Times of India, The Hindu, The Indian Express, The Economic Times, Deccan Herald
- ▶ Websites:
 - ▶ Ministry of Health and Family Welfare (<https://www.mohfw.gov.in/>)
 - ▶ Covid dashboard on Government of India (<https://www.mygov.in/covid-19/>)
 - ▶ <https://www.coronatracker.com/country/india/>
 - ▶ <https://app.datawrapper.de/map/qbomz/publish#export-image>
 - ▶ <https://coronavirus.jhu.edu/map.html>
 - ▶ <https://www.grainmart.in/news/coronavirus-covid-19-live-cases-tracker-john-hopkins/>
- ▶ The following government reports were referred for statistics:
 - ▶ Ministry of Women & Child Development, Rural Health Statistics report 2018-19
 - ▶ Census of India, 2011

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 - ▶ <https://www.deccanherald.com/national/coronavirus-india-update-state-wise-total-number-of-confirmed-cases-deaths-on-june-28-854607.html>
 - ▶ <https://www.hindustantimes.com/india-news/nearly-70-of-india-s-covid-19-cases-come-from-five-states-including-uttar-pradesh-state-tally/story-MQWu7bFFBuxP2upecZhKK.html>
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 - ▶ https://public.tableau.com/profile/anuj.arora#!/vizhome/Covid-19_15852241513720/MapMobile
 - ▶ <https://theprint.in/health/telangana-has-highest-covid-r-value-of-1-69-indias-overall-figure-now-1-11/451089/>

References



Online Course on Systematic Review & Meta-Analysis

Course description

Understanding what is a systematic review - the need and scope

Its similarities and differences to a traditional narrative review

More objective and scientific search strategy hence more replicable

Component of critical evaluation and focus on answering a research question

Optional component of 'meta-analysis': statistical tools for quantitative study of the aggregate data

Employed in various fields, most prominently in public health and public policy

Foster evidence based decision making

Course Objectives and learning methodology



Describe the steps in conducting a systematic review



Develop an answerable question using the “Participants Interventions Comparisons Outcomes” (PICO) framework



Describe the process used to collect and extract data from reports of clinical trials



Describe methods to critically assess the risk of bias of clinical trials



Describe and interpret the results of meta-analyses



Learning methodology for the entire course was a combination of video lectures, quizzes and readings

Introduction to systematic review

- ▶ Systematic Review uses explicit methods to Identify, Select, Appraise and Synthesise results from similar but separate studies; explicit inclusion and exclusion criteria
- ▶ It aims to answer specific questions, reduce uncertainties and identify outstanding questions
- ▶ Source for Evidence-based Practices
- ▶ Essential to gather, summarise and disseminate the up-to-date information for the concerned topic
- ▶ Most notable organisation is the Cochrane collaboration

Framing the question

- ▶ Specific "Narrow Scope": Each type of question requires a different type of research
- ▶ Components of a "well-structured: & "answerable" question: using any of the suitable frameworks, most frequently used is PICO (P: Population or Patient, I: Intervention/Exposure, C: Comparison group/s, O: Outcome)
- ▶ Supported by clear eligibility criteria
- ▶ Clearly specify the type and scope of the research question: Whether the focus is on incidence, prevalence, intervention or any other aspect of the disease; each will require different study designs
- ▶ A preliminary question is framed and refined eventually, like incorporating an additional element like time or setting (PICOT/PICOTS)

Finding the evidence - searching principles

- ▶ Inclusion and exclusion criteria well defined; documentation of the entire process to clarify any doubt later
- ▶ Multiple databases should be searched (PubMed, Embase, Cochrane, LILACS, CINAHL as deemed suitable)
- ▶ Break the research question into elements of PICO and refine the search strategy time and again
- ▶ Strategies include the use of 'controlled vocabulary', Boolean logic, synonyms, truncation and 'snowballing'
- ▶ Used alongwith manual searching and 'grey literature'
- ▶ All duplications must be removed if you retrieve studies from different sources
- ▶ Bibliographic management softwares like EndNote, RefWorks, Reference Manager and QUOSA

Assessing the risk of bias in clinical trials

- ▶ The included studies should have low risk of bias, otherwise it might cast doubt on the credibility of the systematic review
- ▶ Three types of bias may occur– selection bias, information bias and bias in the analysis
- ▶ Selection bias occurs when there is a failure to achieve true randomisation, now addressed through sophisticated computer programs and allocation concealment
- ▶ To minimise information bias, the most commonly employed technique is called masking or blinding
- ▶ Bias in the analysis arises because of missing data for reasons like losses to follow up, non-compliance and withdrawals, can be minimised using any of the two methods– the intention to treat analysis and sticking to pre-decided outcomes
- ▶ Summarising bias in the individual studies in a tabular format and performing sensitivity analysis

Minimising metabias

- ▶ Metabias refers to the resultant bias in the systematic review
- ▶ Reporting bias; influence of the direction of the results on the nature of reporting
- ▶ Publication bias: unpublished studies tend to possess different results
- ▶ Selective outcome reporting; less severe side effects of a drug, for example, might be selectively reported
- ▶ Ascertainment bias: whether the 'easy to find' studies show the same results as those which cannot be found so easily
- ▶ Inclusion bias: when the authors knowingly shape the inclusion and exclusion criteria because they are well aware about the topic of the systematic review

Qualitative synthesis and interpreting the results



Qualitative synthesis refers to ‘an assessment of the body of evidence that goes beyond factual descriptions or tables that, for example, simply detail how many studies were assessed, the reasons for excluding studies. The range of study sizes and treatments compared, or the quality of each study as measured by a risk of bias tool’



The aim of the qualitative synthesis is therefore to identify patterns in the evidence and help the readers to gain a deeper understanding of it. It seeks to describe the nature of evidence in the literature, interpret the possible effect of the differences among the individual studies, and evaluate the strengths and weaknesses of the evidence base



How many studies were assessed? Reasons for excluding studies? Range of study sizes and treatment compared?

Planning the meta-analysis

- ▶ The method followed for the meta-analysis would depend on the aim of the review: the different methods being pair-wise meta-analysis, network meta-analysis and meta-regression
- ▶ The rationale for combining results is that the individual studies are trying to address the same question and estimating a common effect. Forest plot is most commonly used for meta-analysis
- ▶ Utmost care must be taken for the interpretation of the results of the meta-analysis: statistical significance v/s clinical significance
- ▶ A meta-analysis should not be done if the related literature is of questionable quality, i.e. there is a concern regarding any bias in the individual studies, or if the studies are not comparable enough

Statistical tools for meta-analysis

FIXED EFFECTS MODEL	RANDOM EFFECTS MODEL
• All studies in analysis share a common (true) effect. • The meta-analytic result is our estimate of this common effect • All the observed variation reflects the sampling error. The study weights are assigned proportional to the inverse of within studies variance	• The true effects in the studies have been sampled from a distribution of true effects. • The summary effect is our estimate of the mean of all relevant true effects, and the null hypothesis is that the mean of these effects is 0(or 1 for ratio) • The confidence interval for the random effects estimate indicates uncertainty about the location of the centre of the random effects distribution • Our goal is to estimate the mean of the distribution, taking into account two sources of variance (within and between)



THANK YOU