

# COVID-19 India Data Analysis

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## Background

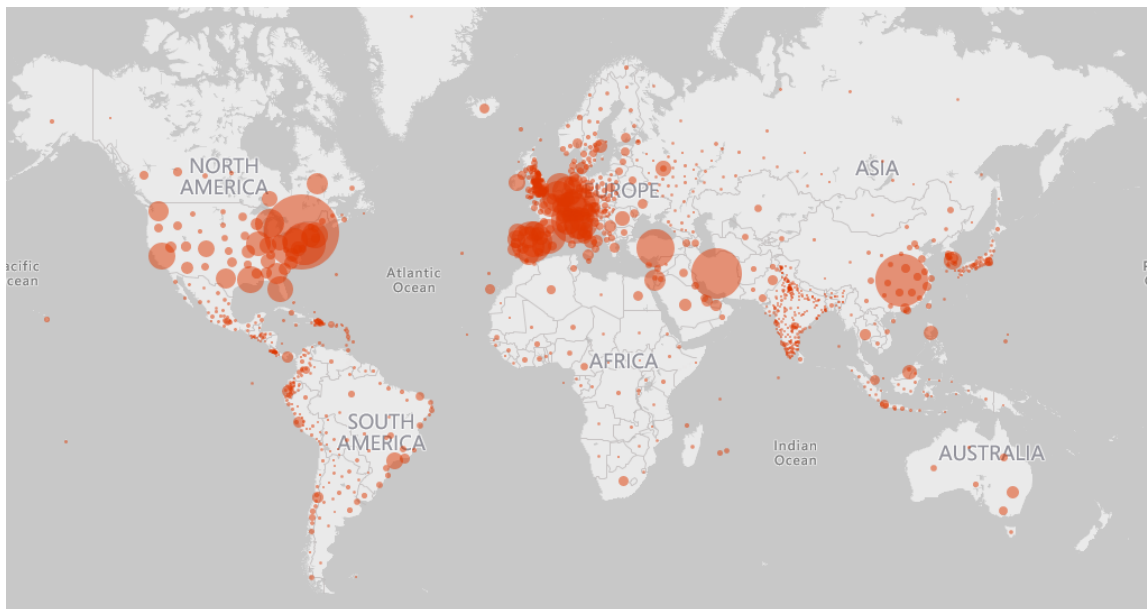


Figure 1: COVID-19 spread across the world

COVID-19 (SARS-Cov 2) currently a global concern. Since the first case that were reported in Wuhan, China in late December of 2019, it has spread to many countries all over the world. As of 7th April 2020, over 13 million cases have been reported in the world with more than 75000 dead [1]. Many countries have introduced lock downs and other restrictions to prevent the spread. With raising number of cases, deaths and economic impacts due to lock downs, it is fair to say that COVID-19 is the major problem facing mankind today.

India is a densely populated country. There have been concerns whether India has enough infrastructure in terms of hospitals and other resources to deal with a full blown outbreak of COVID-19. This makes it really important to control the spread and make sure that it doesn't go to the communal transmission stage.

## Problem statement

With new cases of COVID-19 being reported everyday in India, it is important to analyze the spread to gain insights on how this could be prevented. Indian government has made the COVID data publicly available (MoHFW) ([link](#), [link](#)) and

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there are other public crowd sources data sources ([link](#), [link](#)). These resources can be utilized to obtain demographics of current covid outbreak and to understand how we got here. These insights can be used to model future spread and to see how the measures that are currently being implemented like social distancing, movement restrictions are working and to see if more measures are necessary.

## Objective

Objectives include exploratory analysis of the available data to study the phenomenon, to draw patterns enabling us to model it. This is comprised of but not limited to the following -

- Study how the virus has spread in the initial phase (imported and local transmissions).
- Model the growth trend, understand the factors influencing it [2].
- Use mathematical models for forecast, understand the impact decisions could make.
- Extensive visualization of data to draw useful insights [3].

We focus on India for the purpose of this study.

## Research questions

This could act as a testing ground for various theoretical models since we have a developing situation. There are measures in medical field that are used to model the spread of disease. We could integrate geographical component to better understand the spread.

- How efficient are theoretical spread models in modeling the spread of a disease [4] [5].
- How various decisions and factors affect the spread of the disease. How can this be modelled [6].
- How efficient are the steps taken to prevent the spread of the disease. What role does geography and movement play in this [7].

## Possible methods to be adopted

- Ablation studies to see what are the important factors involving the spread [6,7].
- Age-structured SIR model with social contact matrices obtained from surveys and Bayesian imputation to study the progress of the COVID-19 [4].
- Epidemic outbreak prediction techniques using Bio-surveillance models [5].
- What role do various factors and managerial decisions play in the spread of a disease [7].

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## Expected results

- Models for COVID spread in India.
- Analysis of current models and their effectiveness.
- Visualizations to draw better insights.
- Effectiveness of current measures being taken, and what more can be done using mathematical models.

## Tentative Monthly Plan

- 1st & 2nd Weeks - Data collection, cleaning, and visualisation.
- 3rd Week - Finding out the major factors and decisions which affect the spread of the COVID-19.
- 4th & 5th Weeks - Applying various mathematical models on the spread of the COVID-19 based on the factors and decisions.
- 6th Week - Final report with various insights.

## Keywords

COVID-19, epidemiological models, SIR model, Bio-surveillance models, Vaccination Modelling, Risk factors ,COVID in India, COVID spread analysis.

## References

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