

COVID19 – TRANSMISSION OF CORONA VIRUS AND IT'S MATHEMATICAL MODEL TO ANALYZE

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Abstract

It was accounted for that the vast majority of the contaminated cases in INDIA have visited some neighborhood refers to before positive affirming their sickness (i.e., seclusion medical clinic, air terminal, eatery, advertise, bistro, clinic, organization, Movie Hall, and so forth.).

Obviously, a few likely explanations behind spreading coronavirus in INDIA are summed up by numerous scientists in the field. Several researches were led to locate the plausible reasons of spreading the coronavirus in INDIA as opposed to different nations. Research Scientist have begun to extricate data about the contaminated cases and examined the biomedical data and their clinical narratives to separate the principle parameters that could cause coronavirus spreading. Scientists proposed that the spreading of coronavirus could be associated with sex, birth year, or the district they originate from.

Key words : Corona Virus, parameters, biomedical.

Introduction

The objective of this paper is to consider the impact of a few traits on the spreading of coronavirus CoVID-19 in INDIA dependent on genuine gathered information and reports published in various sources. The primary objective is to examine the impact of sex, birth year, the district they originate from, and the spot they visited on the quantity of expired and recouped cases in INDIA. The investigation would give a review about the present circumstance in INDIA, moreover, it might show the primary parameters that can be utilized to design a predicting models.

(a) In order to comprehend the profundity of disturbance, following signs may need to be checked:

- Time to execute social distancing after network transmission is affirmed –

Since this pandemic is spreading through network and nearby transmission, it is extremely vital to screen the time taken to execute social separating which can be achieved by utilizing time series analysis. The reason for Time Series Forecasting is commonly twofold-to comprehend or display the stochastic mechanism offering ascend to an observed series and to anticipate the future assessments of a sequence dependent on the chronological personal history of that series.

- Number of cases-absolute: Classification calculations can be utilized for checking the quantity of outright dynamic COVID19 cases.

Geographic dissemination of cases comparative with financial commitment Clustering algorithm can help in observing this indicator as it permits congregation a lot of objects so that items in a alike congregation (called a cluster) are increasingly similar (in some sense) to one another than to those in different congregations (clusters). For instance, Maharashtra State contributes impressive bit to the Indian media outlet and economy which has most extreme number of COVID-19 cases.

- Extent of movement decrease

Post COVID19 circumstance should be examined regarding the degree of movement decrease with the assistance of time series analysis algorithm and deep learning models. It will affect both vacationer and business trip because of at least one autonomous factors, for example, work steadiness, travel choices, direness of movement and travel cost.

(b) In order to understand the length of disruption, the following indicators may need to be monitored:

- Rate of change of cases- The following factors will allow the chain to break
 - (i) lack of community and local transmission

(ii) self-quarantine and self-isolation

Rate of change of COVID19 cases could be understood using an algorithm i.e. time series analysis.

- Evidence of virus seasonality–Predictions of COVID19 can be provided by Time Series Analysis in a linear or nonlinear pattern that repeats at regular or irregular intervals. It is also stated in various articles when temperature will increase, the impact and spread of this virus will decrease which is not proved by any scientist yet. Seasonality data can be obtained by using time series analysis algorithm and later on patterns can be identified, if observed.
- % of cases treated at home- In this case all data will be consisted of structured data classification and can be derived by classification algorithms.
- % utilization of hospital beds- Linear Regression Models can be used to find utilization forecasting to anticipate and make predictions based on existing data. This will help in reducing the curve to let the dynamic cases stay beneath the limit of emergency hospitals to treat the contaminated individuals.
- Availability of therapies- Binary Classification Algorithms can also be used for therapies treatment based on infection severity and spread and It will allow prediction of future cases with such types of medical diagnosis details

2. Tentative Model

As clarified before, this examination considers the impact of sex, age, district, and transportation on sensitivity to CoVID-19 in INDIA. The data received contains many information about 2771 contaminated cases (where the remainder of information is missing and not revealed) in INDIA specifically, sex, birth year, the first nation they originate from, the area that they live in, regardless of whether they conveying any sort of ailment previously, disease reason and request, affirmed date, expired or discharged date. The information contain several missed factors that barred from the investigation to give a reasonable summary about coronavirus pestilence in INDIA.

The transmission of CORONA virus can be understood by the following flow chart.



Fig 1. Flow diagram of Corona virus patient



Fig 2. : Infected people to Recovered people
(On average, how long does it take one infected person to recover?)

$$\text{Recoveries} = \underbrace{\text{Infected Population}}_{\text{People}} \times \underbrace{\frac{1 \text{ Recovery / person}}{\text{Duration of Infection}}}_{\text{Recoveries per person per day}}$$

Total Number of Contacts each day

Total Number of Contacts each day= Contacts each day for every infected person * Contaminated population

Infections per day = Total contacts per day * Infectivity

In the proposed model the population is divided into 3 categories for example susceptible person at time t_i , denoted by $S_u(t)$, enter the Infected class. The infectious class at time t_i , denoted by $I_n(t_i)$, represent the person who are contaminated with the virus and are experiencing the symptoms of Corona, then the recuperated class at time t_i is represented by $R_c(t)$.

The mathematical model has been formulated on the basis of the following assumption :

- i. Population is fixed (no entries / births or departure / deaths)
- ii. Latent period is zero
- iii. Infectious period = disease duration
- iv. After recovery, individuals are immune

People can be on of the three states

- i. Susceptible to the infection
- ii. Infected and Infectious
- iii. Recovered/immune/removed

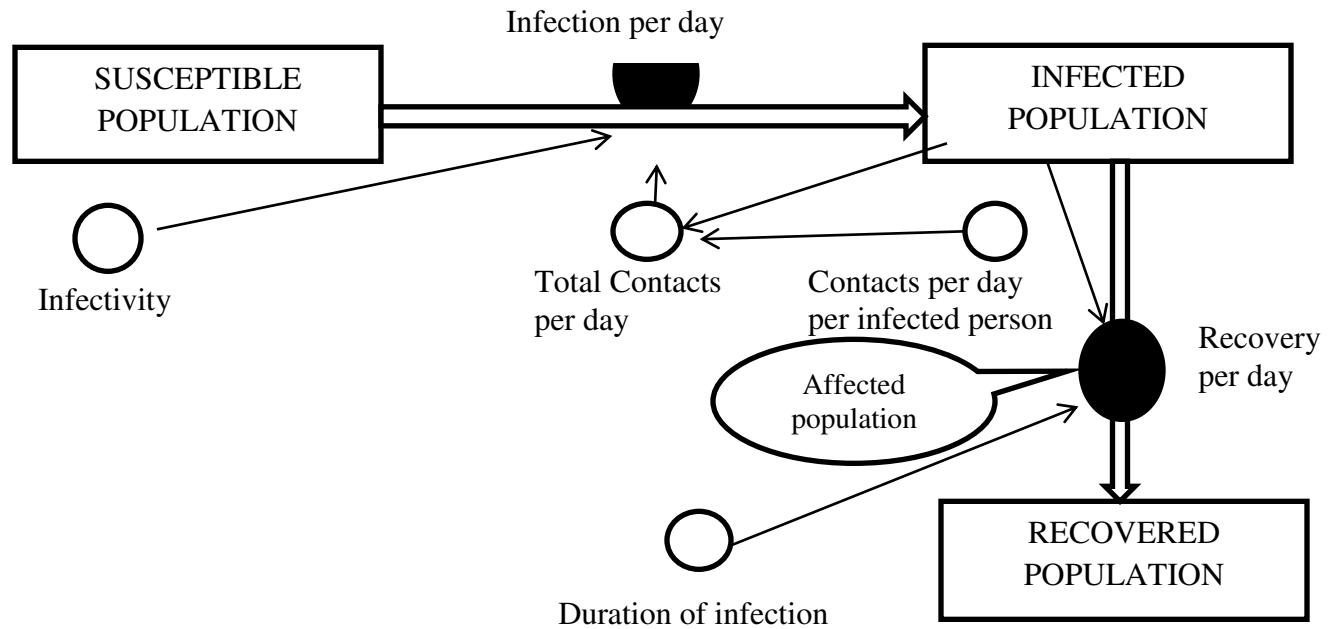


Fig 3: Steps of Corona Virus

Let us assume that

- T_p = Total population in India
- S_u = Number of Susceptible people
- I_n = Number of Infected people
- R_c = Number of Recovered people
- R_t = Rate of transmission
- R_i = Rate of Infection
- R_r = Rate of recovery

(i) Susceptible people

$$S_u(t_i + \delta t_i) = S_u(t_i) - R_t * S_u * I_n * \delta t_i \quad \text{-----(1)}$$

(ii) Infected People

$$I_n(t_i + \delta t_i) = I_n(t_i) + R_t * S_u * I_n * \delta t_i \quad \text{-----(2)}$$

(iii) Recovered people

$$R_c(t_i + \delta t_i) = R_c(t_i) + \gamma * I_n * \delta t_i \quad \text{-----(3)}$$

3. Sample data collected from Govt. Agency [28] as on date(29/06/20).

The data have been taken from government agency, Ministry of Home Affairs(<https://www.mohfw.gov.in/>) and its graphical representation is shown below.

3.1 Graphical representation of data

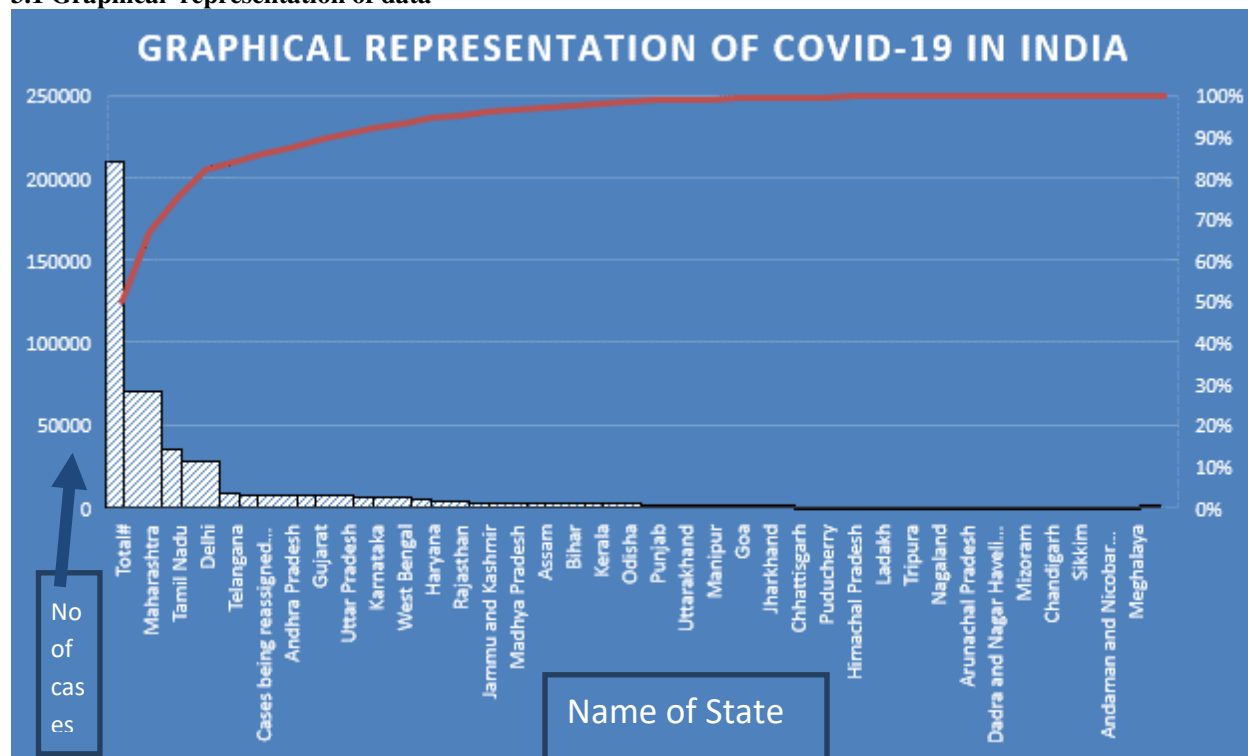


Figure -4 Graphical representation of Covid-19 cases in India

4. Conclusion

We are observing Corona Virus from since last 6 months and one thing is common in every patient who have become infected is sequence of events. Either they have come in contact withany person or he/she has touched the infected object any where i.e. Office, Shopping Mall, City Bus, Metro, Flight etc...

We all peoples in the world have been suffering fromone the most deadliest diseases which is known in the name of COVID-19 and all health agencies, researchers are working 24x7 to control its spreading. Researcher are also working day and night to find the medicine of this deadly virus which is not yet discovered. As long as antidote or medicine etc. are not found, there is only one solution to defeat the corona virus which is the instructions given by Govt agencies, Hospitals, Doctors etc..

In addition, the procedures of testing individuals against coronavirus ought to be quicker. Keeping INDIA clean from coronavirus would influence on every close by nation.

5. Future Scope :

There are many scopes of research not in the field of medical science but also in every areas. My future work will be on implementing of Machine Algorithm related to future prediction using actual dataset.

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The paper of authors declare that there is no conflict of interest in any capacity.

AUTHOR'S CONTRIBUTION

The authors have contributed their original work in this paper.

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COLLECTION OF DATA

Dataset taken from Ministry of Home Affairs ([https://www.mohfw.gov.in/\[28\]](https://www.mohfw.gov.in/[28]))