

# Corona virus Covid 19: The Journey around the Globe so Far

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## **Abstract**

*Originating in China towards the end of 2019 Covid 19 spread across the Globe like wild fire terrorising over 190 countries. It starts with common cold leading to respiratory problems and death. The virus grows exponentially. The evidence shows that death rate peaked towards the end of February in China and Iran and its growth is even more alarming in European countries and USA by the third week of March 2020. The rate of spread appears to have slowed in countries like India due to preventive care or reduced human flows from countries with incidence of the virus to other countries. Extensive social distancing appears to address slowing down of the virus and its ultimate elimination depends on therapeutic care.*

**Keywords:** Corona virus, COVID-19, China, European countries, USA, Other Asian countries.

## **1. Introduction**

On 31<sup>st</sup> December 2019, WHO was informed by its china country office that cases of pneumonia with unknown etiology were traced in Wuhan city of China. In quick time (7<sup>th</sup> January) the virus grew like a monster in China. It was identified as a new strain called novel corona virus, as named by WHO. The outbreak was traced to a virus that originated at a sea food market in Wuhan city. The spread of the corona virus to other countries was as fast as the reach of the news about the virus. In the first stage, countries nearer china such as South Korea, Thailand and Japan were affected. Since the virus later spread to many countries across the globe depending on the intensity of movement of people to and fro china due to mostly economic and tourist related factors other countries started experiencing the brunt of the virus.

The present paper is aimed at depicting the actual evidence on the spread of the virus over time considering the confirmed, recovered and death of the people afflicted by the corona virus.

## **2. What is Corona Virus?**

Corona is described by WHO as “a family of viruses that causes illness in patients ranging from common cold to respiratory problems. Severe illness includes shortness of breath, respiratory rate more than 30 bpm, hypoxemia, chest X-ray with multi-lobar infiltrates or pulmonary infiltration progressed more than 50 % within 24 - 48 hrs. Critical condition includes respiratory failure, septic shock and other organ failure which requires Intensive Care Unit (ICU) admission”. This implies that any patient affected by corona starts from common cold leading to respiratory related problems. Unless treated the patient dies of respiratory failure or failure of other organs due to respiratory problems.

## **3. Transmission**

It is now evident that covid-19 only spreads from human to human through either touch or droplets out of coughing and/or sneezing. It is not supposed to be an airborne disease. The

transmission of the virus is similar to Middle East Respiratory Syndrome (MERS) and ‘Severe Acute Respiratory Syndrome’ (SARS).

#### 4. Dataset

The dataset used in the present study is extracted from Data Repository for the 2019 Novel Coronavirus Visual Dashboard operated by the Johns Hopkins University Centre for Systems Science and Engineering (JHU CSSE). Also, the centre is supported by ESRI Living Atlas Team and the Johns Hopkins University Applied Physics Lab (JHU APL).

#### 5. The Growth factor estimation

The spread appears to follow exponential pattern. Exponential growth is calculated as number of cases on a given day ‘ $N_d$ ’; if average number of people infected/exposed on each day is ‘ $E$ ’ and probability of each exposure becoming an infection is ‘ $p$ ’ then number of new cases on a given day is given by

$$\Delta N_d = E.p.N_d$$

$$N_{d+1} = N_d + E.p.N_d$$

$$N_{d+1} = (1 + E.p) N_d \text{ is same as}$$

$$N_{d+1} = (1 + E.p)^d N_0$$

$$\text{Where } p = (1 - N_d / \text{pop. Size})$$

#### 6. Spread Across Countries

By 20<sup>th</sup> January, 2020, 282 confirmed cases have been reported from four countries including china, Thailand, Japan and Republic of Korea. Cases from Thailand, Japan and Korea were exported from Wuhan city, china. The later three countries were affected by China due to their geographical proximity.

By the end of January cases were reported from some more countries like United Arab Emirates, Finland, India and Philippines. Italy joined them by 31<sup>st</sup> January reporting two confirmed cases. From first of February 2020, the spread and growth of the virus was so significant as to include one country after the other in reporting the positive cases of the virus. By this time WHO developed a dash board on incidents and spread globally to record and lend operational support and logistics. It also developed “2019- ncov kit” similar to prepared treatment kits used for outbreaks of other high threat pathogens. By mid-February 14,840 cases were reported including 13,332 from Hubei province china. By this time Egypt also joined the list of virus affected countries. Several cases were reported from Feb 20<sup>th</sup> to end of the month from countries like Islamic republic of Iran, Lebanon, Israel, Kuwait, Afghanistan, Bahrain, Iraq, Oman, Austria, Switzerland, Brazil, Denmark, Greece, Norway, Netherlands, New Zealand, Mexico and Qatar. WHO has increased the assessment of risk of spread and risk of impact of COVID-19 to ‘very high’ at global level. By 1<sup>st</sup> March out of total confirmed cases 92% of the affected were in china although 58 countries were effected. Even in case of deaths only 3.5% were from outside China. Within five days (5<sup>th</sup> March) the proportion of confirmed cases outside China doubled to 15.5% and share of deaths also jumped to 8% from all the countries except China. By then 85 countries were affected. By 10<sup>th</sup> of March the people confirmed with virus increased to over 1 Lakh out of which 29% were from countries other than China. However 78% of dead belong to China alone. In another five days (15<sup>th</sup> March) while the confirmed cases remained

stagnant in China the confirmed cases in all other countries significantly shot up taking their combined share to 47%. 44 % of dead belonged to 142 countries excluding China. By 20<sup>th</sup> March the share of confirmed cases belonging to China declined to 25 % of the world while 67% of the dead were from rest of the world other than China. By this time the virus spread to over 190 countries of the world. By end of March only 12.5% of confirmed cases originated from China while sharing only 12.5 % of the deaths in the world. The spread and growth of covid 19 by confirmed, recovered and death stages are represented graphically along with their growth factor.

The spread and growth of the virus across the world are depicted in the Fig1. It may be observed that until the end of February 2020 the spread of the virus was mainly confined to China increasing at an increasing rate of cases confirmed and died. The cases recovered started increasing at an increasing rate from March 2020 onwards, which is a positive sign for humanity.

Countries are grouped into three categories based on growth factor. Countries recording high growth factor are grouped in the first category, and countries around average growth factor are in the second category while others are in the third category.

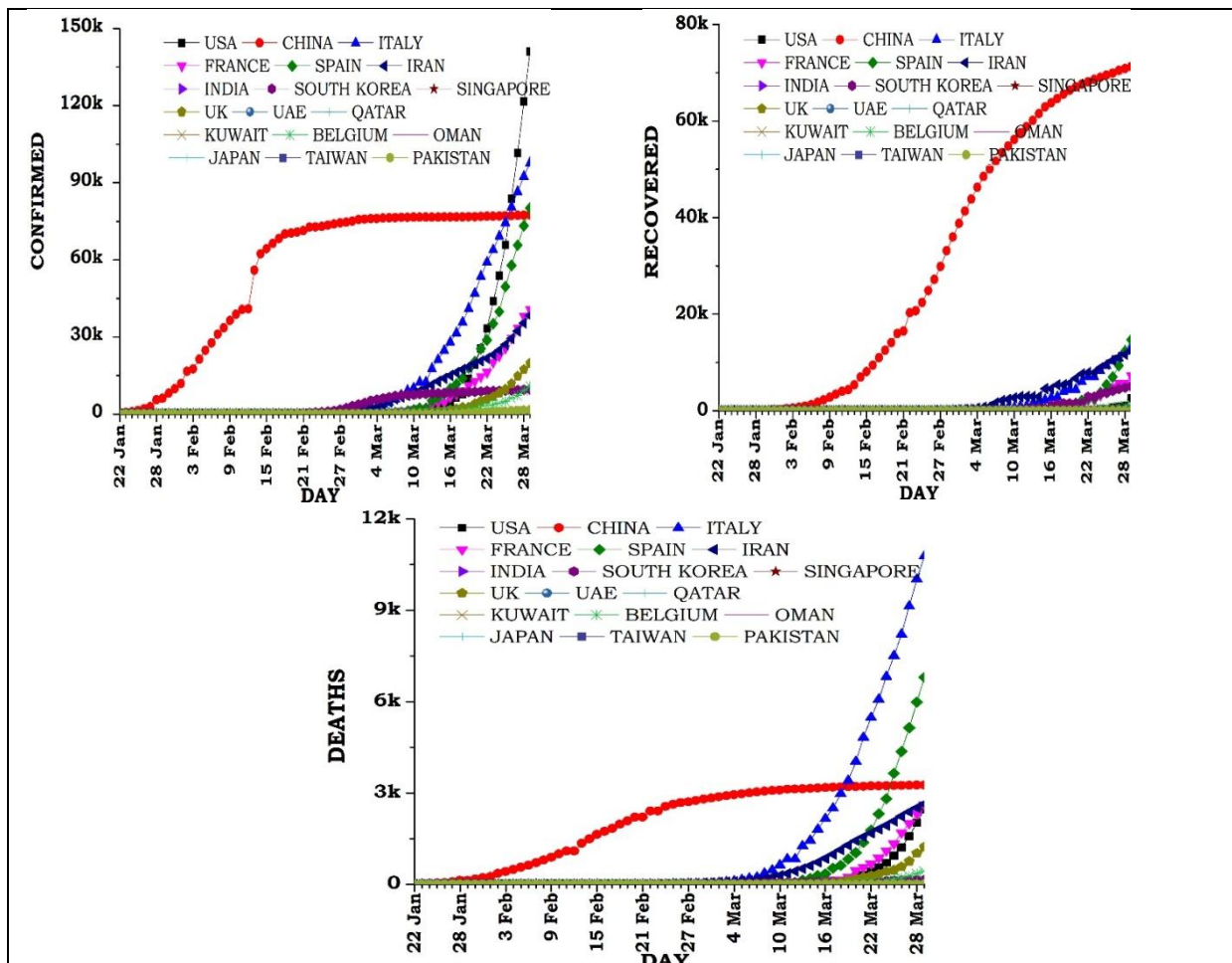
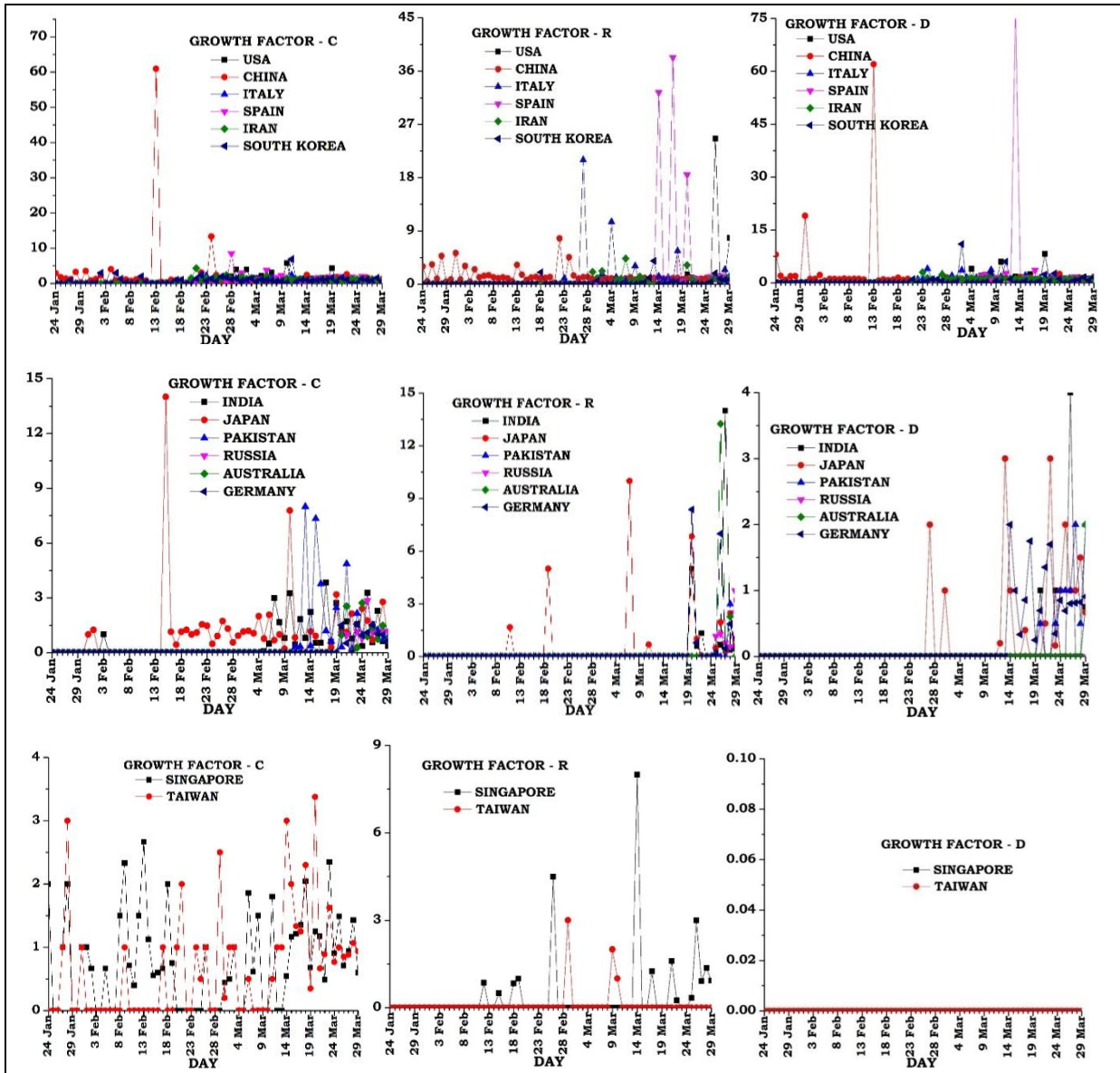


Figure 1. The Spread of the Virus across the World in different countries in terms of Confirmed, Recovered and Deaths

The growths of the virus category wise at different countries are presented in Fig2. It may be discerned that the growth factor peaked in confirmed cases in China in the middle of February followed by Spain and USA later. Spain, Italy and USA recorded better growth in recovery in this group. China and Italy registered peak and low death growth factor. In the second category Japan and Pakistan had peaked in confirmed cases while in recovery Australia and India did better. India, Japan and Germany registered peak death rates also.

Surprisingly, Singapore and Taiwan though had peaks in confirmed cases recovered fully recording low death rates, possibly taking clue from their previous experience gained in tackling SARS virus in 2003.



**Figure 2. Growth Factor of Virus by Category at different countries**

## 7. Response of World Health Organization

WHO responded positively and its operations supply and logistics division shipped surgical masks, N95 masks, gloves, gowns and goggles to 57 countries in the first week of March while advising countries to prepare emergency response systems and develop lifesaving medical interventions. WHO also constituted global response team including UNICEF and other international agencies. The core elements of health operations include clinical care and management, laboratory capacity strengthening, surveillance, case and contact tracing, infection prevention and control, risk communications and community engagement.

## 8. Prevention

As on now there appears to be no direct therapeutic cure but effective prevention could be the solution. To interrupt the transmission of virus from one person to other and to prevent exportation of cases from China to other countries and territories, a combination of public health measures such as rapid identification, diagnosis and management of cases, identification and follow up of contacts, infection prevention and control in healthcare settings, implementation of health measures for travellers, awareness increase in population and risk communication are suggested. China could succeed in reducing the incidence following these measures.

## 9. Conclusion

Covid 19 is spreading through human networks – through countries, towns, workplaces and families. A single person's behaviour can cause ripple effects that touch far away people. The pace of spread as reflected in the growth factor has fluctuated peaking and falling by the three indicators studied. Recovery almost equalling confirmed cases with low deaths happened in small countries. Countries with large populations continue to be in the midst of risk even if human flows across countries are temporarily prohibited. It is clear that mostly the elderly members of our community are at risk of dying. The spread can be slowed, if people practice social distancing by avoiding public spaces and limiting their movement. Extensive social distancing is reported to be working best of all. Early appropriate therapeutic invention and its application may ultimately eliminate the virus and save humanity from the calamity

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