Journal of Infectious Diseases & Therapy
ISSN: 2332-0877

Khandelwal et al., J Infect Dis Ther 2020, 8:2

Research Article Open Access

An Outbreak of Coronavirus (COVID-19) Epidemic in India: Challenges and Preventions

AnjuKhandelwal[1*], Ashish Agrawal[2] and Avanish Kumar[3]

[1]*Department of Mathematics, SRMS College of Engineering and Technology, Bareilly, India*

[2]*Department of Computer Science, SRMS College of Engineering and Technology, Bareilly, India*

[3]*Commission for Scientific and Technical Terminology, Ministry of Human Resource Development, New Delhi, India*

[*]**Corresponding author:** Anju Khandelwal, Department of Mathematics, SRMS College of Engineering and Technology, Bareilly, India, E-mail: dranju07khandelwal@gmail.com

Received date: April 13, 2020; **Accepted date:** April 25, 2020; **Published date:** May 02, 2020

Abstract

With the end of the year 2019, the world had affected with an unknown terrible disease which was, at an initial stage, inculcating the symptoms of pneumonia and spasm but later on people start realizing that it was much more than expected and called it as the "Novel Coronavirus (COVID-19)". The worst part was that no medicine and vaccine was available to tackle the situation. Within two months, it spread to almost all continent and affected many countries and obviously had entered in India at the end of January. Soon, the disease had crossed the stage one and entered into stage two. The rate of growth of COVID-19 in India has been increased exponentially up to an extent and affected the country in so many ways whether it is socially, economically, and culturally. This paper contains the study of the effect of COVID-19 on Indian citizens, their minds of state, Indian Government's actions to tackle the terrible situation generated by this disease, as WHO categorized it pandemic.

Keywords: Corona; COVID-19; India epidemic quarantine; Symptoms

Introduction

COVID 19 (coronavirus) disease was first detected in China in November 2019. On December 31, 2019, the China Office of the World Health Organization (WHO) made its first report public. The basis of this report was on the back of several pneumology cases in the city of Wuhan in eastern China with a population of more than 11 million as a pre-unknown virus. What started as an epidemic confined mainly to China, this unknown virus has now become a truly global epidemic. In the last four months, it spread rapidly across the continents and eventually became an epidemic. Currently, it has become a complete crisis in about 3/4 of the world. On 11 February 2020, the World Health Organization (WHO) announced a new name for the pandemic disease caused by this unknown virus 2019-nCoV: Coronavirus disease (COVID-19). The disease has been shown to be sufficiently distinct from *SARS-CoV,* which has been considered a new human-infective beta coronavirus [1-3]. These viruses have a single intact open reading frame gene 8, as a further indicator of bat-origin CoVs [4].

How did the Corona Virus start?

The disease has its origins in the Wuhan seafood market [5], where a variety of wild animals, such as rabbits, birds, bats and snakes, are traded illegally. The coronavirus is known to transfer from animals to humans, so it is thought that people were first infected with the disease for the same reason and then contracted to contact with animals. However, a preliminary analysis of the virus that caused the coronavirus reported that it was similar to the virus seen in snakes. A team of virologists at the Wuhan Institute for Virology released a detailed paper stating that the genetic makeup of this new coronavirus, like the coronavirus found in bats, is 96 percent, while it as yet unpublished study argues the genetic sequence of coronavirus pangolins is 99 percent similar to human viruses.

What exactly are Corona Viruses?

A corona virus is a group of viruses known to infect both humans and animals. This causes respiratory disease in humans, ranging from the common cold to more serious infections. The most well-known case of a coronavirus epidemic was Severe Acute Respiratory Syndrome (SARS), which, when first detected in southern China in 2002, affected 26 countries and resulted in more than 8,000 cases and 774 deaths. Also, *SARS-CoV* has been reported to survive for 36 h on stainless steel [6-8]. The number of people infected with the coronavirus now exceeds those hit with succulents.

The Figure 1 represent severe acute respiratory syndrome (SARS) reported cases where the total number of cases was 5327 between February 1, 2003 and July 10, 2003, this data includes 223 cases of SARS that were excluded and from which the report dates could not be identified.

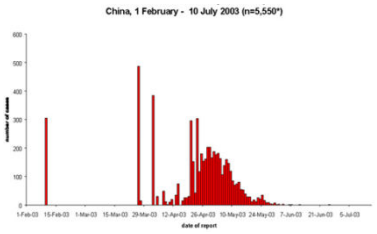

Figure 1: Probable cases of SARS by date of report [9].

The Figure 2 represents the total number of 11387 deaths till 20th March 2020. 11,417 people have died so far from the coronavirus COVID-19 outbreak as of March 21, 2020, 06:15 GMT. There are currently 276,469 confirmed cases in 185 countries and territories.

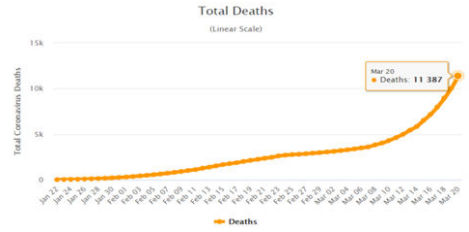

Figure 2: Total deaths worldwide till 20th March 2020 [9].

The Figure 3 reported total daily deaths day-wise where the number of deaths is 1356 till 20th March 2020. Here we have seen that this data is continuously increasing. Also, Figure 4 represents the total number of deaths is 11419 till March 21, 2020, 07:57 GMT whereas 7911 are in critical stage.

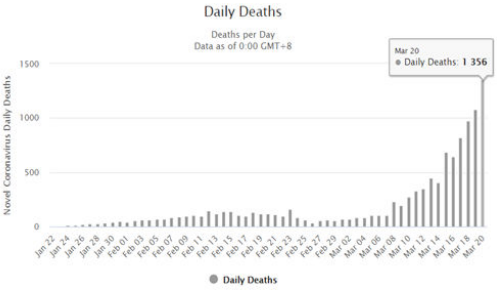

Figure 3: Total daily deaths worldwide till 20th March 2020 [9].

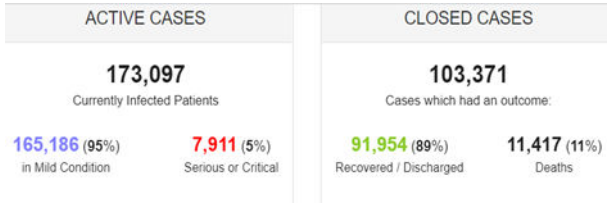

Figure 4: Active and closed cases record till 20th March 2020 [9].

The first case in India was reported on 30 January in a student who had returned from Wuhan University to Trissur, Kerala. The second case was confirmed on 2nd February again in Kerala; the individual traveled regularly between India and China. On 3rd February, the third positive case was reported in Kasaragod, Kerala. The patient had traveled from Wuhan. The specific methods of transmission of the virus are not yet clear as it is a particular virus. The virus was presumed to have originally originated from an animal source, but now appears to have spread from person to person. It is not yet clear how easily the virus spreads from person to person. It is believed to primarily transmit in conditions when an infected person coughs or sneezes, similar to influenza and other respiratory pathogens. There is evidence that human-to-human transmission [6,10] has occurred among close contacts since the middle of December 2019. Considerable efforts to reduce transmission will be required to control outbreaks if similar dynamics apply elsewhere [2]. The figure given below represents the cumulative data of total confirmed cases.

The Figure 5 represents cumulative data from 30th January 2020 to 21st March 2020 where we have the total number of confirmed cases are 288. Here 261 patients are hospitalized till and 23 patients i.e. 8% cases are recovered from COVID-19. Overall 1% of the total i.e. 4 deaths are confirmed.

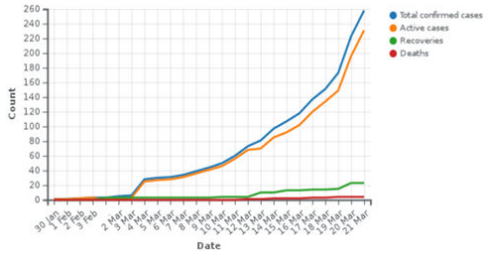

Figure 5: Number of COVID-19 Indian patient [History of epidemic diseases in India].

An Epidemic is a term often used to describe any medical problem that has gone out of control. An epidemic is defined as "an outbreak of a disease that occurs over a wide geographical area and affects an exceptionally high proportion of the population. In contrast, the term epidemic is concerned, a disease that affects the much larger part of the country or the world. The dynamics of pandemic and pandemic diseases generally occur in four stages. Not all epidemic diseases necessarily pass through each stage. The first stage is the emergence or introduction of a community. The second stage is an outbreak that occurs with local transmission and involves sporadic infection by the pathogen. In the third stage, the outbreak turns into an epidemic and the pathogen is able to transmit infection from human to human and cause a sustained outbreak in the community. Fourth-stage transmission is reduced when there is a decrease in human-to-human transmission of the pathogen due to acquired population immunity or effective intervention to control the disease. Here the epidemic phases and response interventions shown below (Figure 6) [7].

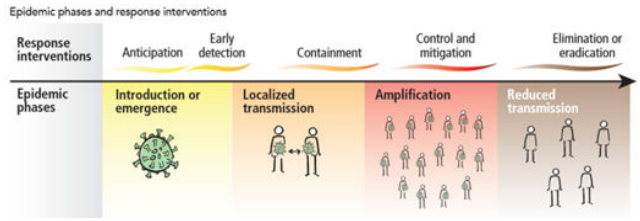

Figure 6: Epidemic phases and response interventions.

Name of Disease	Reasons	Most affected Indian state	Number of deaths during 1991-1999
Plague	Transmission of Plague Bacillus through insect bite	Gujarat	>1000
Cholera	Contaminated Water and food	Bengal	>35,000
Meningococcal Disease	Bacterial disease	Meghalaya	>20,000
Dengue	Female aedes Mosquitoes	Andhra Pradesh	>40,000
AIDS	HIV called retrovirus	Mizoram	>4,000

Table 1: Major diseases that were fought in India in the last century.

There have been many epidemic diseases in the past in India. The following are some of the major epidemic diseases India fought with in the last decade of the previous century. The data shown in Table 1 is from 1991 to 1999. The data provides information about the reasons, most affected Indian state and approximate deaths from these disease.

COVID-19 in India

Initial State of COVID-19 in India

The very first case of the novel Coronavirus (COVID-19) was found on 30th January 2020 at Kerala, one of the most literate states of India. The infected person was returned from Wuhan, China. Later on, India found the second patient of the novel Coronavirus (COVID-19) on 2nd February 2020 again in Kerala, this patient was also returned from China as well. On 3rd February 2020, the third patient was found again in Kerala, also returned from China. All these patients were recovered as on date. On 2nd March 2020, three more cases of the epidemic disease were identified positive at Delhi, Hyderabad, and Jaipur respectively. On 3rd March 2020, the wife of Jaipur patient was also tested positive for the epidemic disease.

Growth of COVID-19 in India

The positive cases of the COVID-19 had increased almost exponentially in India. Figure 7 shows the day by day growth of the COVID-19 positive cases in India from 30th January 2020 to mid of March. Figure 8 shows the variation in the Google searches made by the Indian citizens for the Coronavirus search term, and Figure 9 shows the Indian state-wise growth of the Indian COVID-19 patients. But interestingly the most affected Indian state is now Maharashtra where the maximum positive cases were found till March and the second most affected state was Kerala.

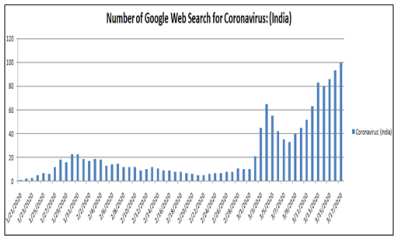

Figure 7: Total daily deaths.

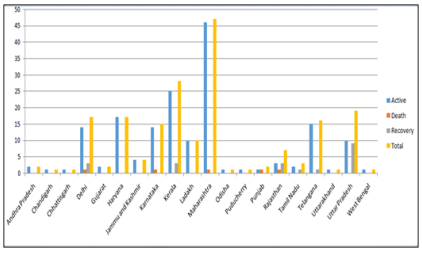

Figure 8: Google search trends analysis for coronavirus in India.

Figure 9 shows the rate of the worldwide Google Web Search results for the search term "Coronavirus" in all search categories of Google over 90 days of December to March.As more countries were being infected until March, the search about Coronavirus was also increased.

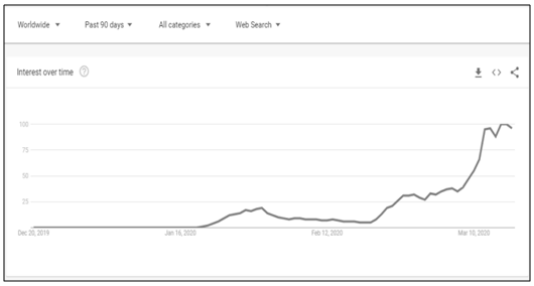

Figure 9: Coronavirus worldwide Google search results.

Figure 10 shows the growth in the number of news searches for Coronavirus in India in the period of December to March. The Indian citizens became more cautious in the first week of February, when Coronavirus started affecting Indian citizens. The rapid growth of positive Coronavirus cases was identified in March and therefore the Google searching about Coronavirus was increased.

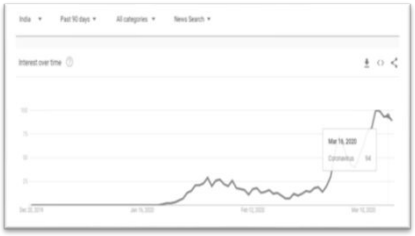

Figure 10: Coronavirus Google India search results.

Figure 11 shows the growth of Google web search results for the terms Coronavirus Topic (Blue Color) and Corona Search term (Red Color) in all categories from India over 90 days.

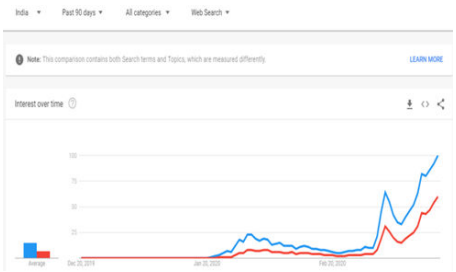

Figure 11: Coronavirus Google India web search results.

Figure 12 shows the states or sub-region-wise interest for Coronavirus.As per the Figure 12, Jammu and Kashmir were the Indian states from where the highest number of searches was made about Coronavirus and the Corona. 74% of searches were made for the topic Coronavirus whereas 26% of searches were made for the term Corona.

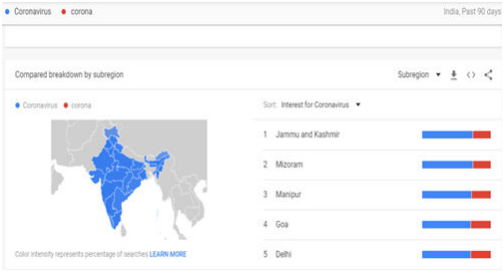

Figure 12: Coronavirus Google India state-wise search results.

Figure 13 shows the related queries which were made by Indian citizens to search about Coronavirus. The most used query other than "Corona Virus" was India Corona Virus.

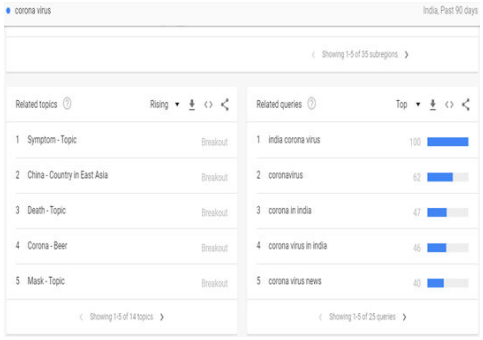

Figure 13: Coronavirus Google India Search Queries.

Figure 14 shows the names of the top five Indian cities from where most of the Google searches for Coronavirus were made. Most of these Indian cities were undergo to a lockdown on 20 March 2020. Along with these cities, Lucknow and Nagpur were also undergoing the lockdown.

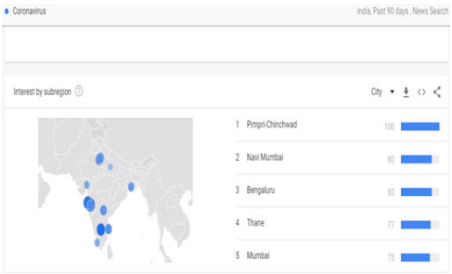

Figure 14: Coronavirus Google India city wise interest.

Indian Government Actions for Prevention against Coronavirus

India was closely monitoring this important situation from the beginning and it started preparing well before this epidemic/pandemic entered India. As soon as the first positive case in India came up on 30 January 2020, the Government of India started taking strict restrictive action. The process of issuing new visas was first suspended and the already issued visas were also suspended. The Indian government than rescued 324 Indian nationals from China's Wuhan city, through its first air flight evacuation, on 1st February 2020. In this sequence, more than 500 people were rescued from other part of the world. The Government of India activated a hierarchical response system and proceeded to prevent expansion with a cohesive healthcare system for detection, isolation and deployment of medical resources for the treatment of Corona positive cases, as well as doubtful cases. This initiative has not only delayed the spread of effective viruses through the human chain, but has also prevented fatal growth. Due to this, even though the nation has reached the threshold of the third phase, it has not yet entered the critical third phase. On 11 March 2020, the Cabinet Secretariat of India announced that the provisions of Section 2 of the Infectious Diseases Act 1897 would be implemented by all states and Union Territories. Under the Disaster Management Act, 2005, the

central government declared the epidemic a "notified disaster" on 14 March 2020.

To prevent the spread and lethal growth of this virus, the government has taken initial action with caution on these important points so that the entry of this virus into the third phase can be prevented.

a. The process of issuing new visas was first suspended and the already issued visas were put on hold.

b. The Indian government made health check-up mandatory for all international passengers' at all international Indian airports.

c. The Indian government immediately started closing primary schools so that children under the age group could be protected from the effects of coronaviruses.

d. Major pilgrimage sites, temples and all religious sites, monuments, shopping malls, and parks were closed for some time to reduce social interaction.

e. Measures under the gradual response regime to reduce the effects of coronavirus disease include the process of proper hybridization involving the process of cancellation of metro rail, travel restrictions, trains, buses and flights.

f. In order to prevent the entry of coronaviruses in the third phase, all private and government organizations and educational institutions were advised to employ their employees from domestic facilities i.e. encourage the work from home.

g. The rules adopted by the Government of India to implement social distance include encouraging work from home, reducing office staff, canceling weddings, banning religious and cultural events, banning public meetings, closing restaurants etc. were amongst some important. This prevented the spread of coronavirus by breaking the chain of contamination.

h. Among other measures adopted to prevent entry into the third phase are declaring health emergency, enforcing the law. Spreading contamination by carriers has become a criminal offense and FIR is being deliberately registered against persons involved in its spread.

i. Apart from this, from time to time social consultations, self-quarantine, not-holding of large meetings, cancellation of conferences, and issuing consultations regarding social events, the Government of India urged Indian citizens to support the "Janata curfew" Where everyone was requested to stay indoors from 7 am to 9 pm on 22 March 2020 to break the chain of contamination.

To prevent the spread of COVID-19 infection and to provide a reliable diagnosis to all individuals who meet the inclusion criteria of COVID-19 test, Indian Council of Medical Research, Department of Health Research, Ministry of Health and Family Welfare, Government of India currently The following test strategy (Revised Strategy of COVID-19 testing in India (Version 3, dated 20/03/2020) is determined.

All those who are in touch of international traveling people in the last 14 days:

They should remain in quarantine of the house for 14 days.

They should be tested only if they have symptoms like fever, cough, and difficulty in breathing.

All family members living with a confirmed case must remain in quarantine of the home

b. All symptomatic contacts of laboratory-confirmed cases.

c. All symptomatic health care workers.

d. All hospitalized patients with Severe Acute Respiratory Illness (fever and cough and/or shortness of breath).

e. Asymptomatic direct and high-risk contacts of a confirmed case should be tested once between day 5 and day 14 of coming in his/her contact.

Response of WHO (World Health Organization) on India's COVID-19 Preventive Actions

The Prime Minister's Office, Group of Ministers, Ministry of Health and Family Welfare (MoHFW) and Cabinet Secretary are closely monitoring the situation of COVID-19. With the declaration of COVID-19 as a notified disaster, the State Disaster Response Fund constituted under Section 48 (1) (a) of the Disaster Management Act, 2005, is now available to the State Governments for response measures. The Union Ministries along with the States / UTs have provided rapid monitoring teams for community monitoring, quarantine facilities, strengthening isolation wards and adequate personal protective equipment (PPE), trained manpower and management of COVID-19. Immediate steps have been taken to ensure its smooth implementation. Addressing the nation, Prime Minister Shri Narendra Modi has urged solutions and moderation and adoption of social distances. He has also asked the citizens of the nation to observe 'Janata curfew' (voluntary self-segregation) on Sunday 22 March 2020 from 7:00 am to 9:00 pm. In a new advisory, the government has banned all international flights from entering India for a week from 22 March 2020, among other preventive measures. These are temporary measures and will remain in force till 31 March 2020.

WHO Country Office for India (WCO) is working closely with MoHFW on preparedness and response measures for COVID-19, including training and clusters on disease surveillance, laboratory and research protocols, risk communication, infection prevention and control (IPC) Contains prevention, passenger monitoring and tracking plans.

Dr. Henk Bekedam, WHO representative from India, states that "We welcome the Prime Minister's call for public curfew and his citizens' appeal to adopt social distances. Effective implementation of the strategy controls the spread of the virus for a long time will be helpful to do. Along with hand hygiene, coughing and sneezing in handkerchiefs can prevent transmission. Along with a social distance Sector measures can be effective in transmission. Even when we stand with solidarity to overcome this challenge to maintain social distance, is equally important".

Impact of COVID-19 on Indian Economy

COVID-19 is spreading worldwide. The outbreak of coronavirus virus first occurred in Wuhan, China on December 31, 2019. In the last four months, it spread rapidly across the continents and eventually became an epidemic. Currently, it has become a complete crisis in about 3/4 countries of the world. Coronaviruses (CoV) are a large family of viruses that cause various respiratory illnesses. It ranges from the common cold to serious diseases such as Middle East respiratory syndrome (MERS-CoV) and severe acute respiratory syndrome

(SARS-CoV). The first two coronaviruses demonstrated to cause respiratory infections in humans, the coronaviruses 229E and OC43, were identified in the 1960s [1].WHO is working closely with global experts, governments and other health organizations to provide advice to various countries regarding precautionary and preventive measures, we cannot ignore the fact that the outbreak of COVID-19 in China is expected to have a significant impact on the economy globally including economic downturns, trade, supply chain disruptions, commodities and logistics. In trade, China is the world's largest exporter and second largest importer. It accounts for 13% of world exports and 11% of world imports. The lockdown will affect an average of 500 million people in the country who consume goods. To a large extent, it will also affect Indian industry. In imports, India's dependence on China is huge. Of the top 20 popular products that India imports from the world, China holds a significant stake in most of them.

About one-third of the machinery and about two-fifths of organic chemicals that India buys from the world come from China. India accounts for 45% of China's total electronic imports. China accounts for over 25% of India's imports for automotive parts and fertilizers. About 90% of mobile phones and about 65 to 70% of active pharmaceutical ingredients arrive in India from China. Therefore, it can be said that due to the current outbreak of coronavirus in China, import dependence on China will have a significant impact on Indian industry. The Figure 15 shows the impact of COVID-19 on economic growth and Figure 16 shows the impact of COVID-19 global growth.

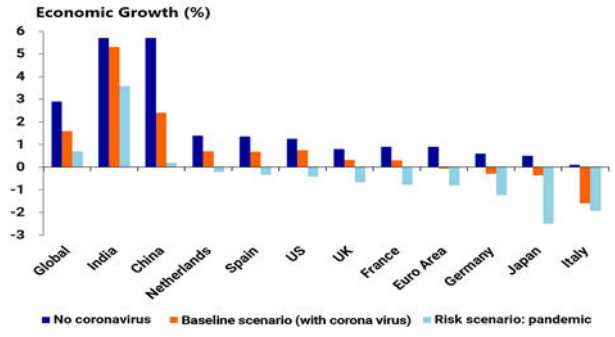

Figure 15: Global Economic Impact of COVID-19 [11].

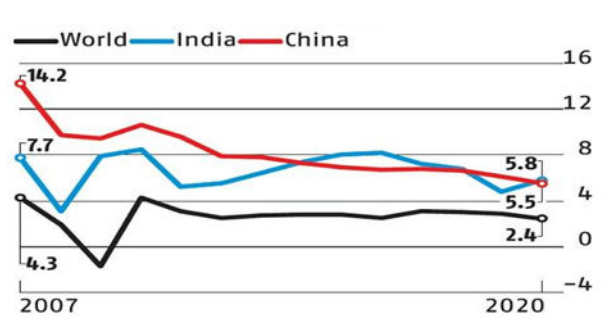

Figure 16: Global Development Affected by COVID-19: India in a State of Potential Improvement [12].

Conclusion

An outbreak of COVID-19 poses a clinical threat to the general population and healthcare workers worldwide. The Government of India made the right decisions and actions at the right time to control the spread of COVID-19 . The Internet and social media already have played a huge role in spreading awareness about the pandemic. However, one cannot determine the extent and adverse effects of any disease with the right preventive measures, but try to minimize the harm caused by it, with particular loss of life. India has not only adopted appropriate measures to get out of this situation, but has also supported the working class in this difficult situation by providing them basic facilities like medicine, food grains, medical support and money, for those who needed so that everyone can survive. Most Indian citizens have extended their support to the Government of India by starting self-quarantine/self-isolation to stay safe and keep the safe others. This paper shows the initial impact of COVID-19 up to two stages in India. It is also hoped that these preventive measure, pandemic can be controlled during the next stages, Through this research paper some useful information about the introduction of COVID-19 in India, its effects and preventive actions is presented.

Author Conflict

The authors have no conflict in publication of this manuscript.

References

1. Bleibtreu A, Bertine M, Bertin C, Houhou-Fidouh N, VisseauxB (2019) Focus on Middle East respiratory syndrome coronavirus (MERS-CoV). Médecineet Maladies Infectieuses.
2. Li Q, Guan X, Wu P, Wang X, Zhou L, et al. (2020) Early transmission dynamicsin Wuhan, China, of novel coronavirus-infected pneumonia. N Engl J Med.
3. Lu R, Zhao X, Li J, NiuP, Yang B, et al. (2020) Genomic characterization and epidemiology of 2019novel coronavirus: Implications for virus origins and receptor binding. Lancet 6736: 30251-30258.
4. Ren LL, Wang YM, Wu ZQ, Xiang ZC, Guo L, et al. (2020) Identification of a novel coronavirus causingseverepneumoniainhuman: A descriptive study.
5. Liu W, Morse JS, Lalonde T, Xu S (2020) Learning from the past: possible urgent pre-vention and treatment options for severe acute respiratory infections caused by 2019-nCoV.
6. Munster VJ, Koopmans M, van Doremalen N, van Riel D, de Wit E (2020) A novel coronavirus emerging in China-key questions for impact assessment. N Engl J Med.
7. Casanova LM, Jeon S, RutalaWA, Weber DJ, Sobsey MD (2010) Effects of air temperature and relative humidity on coronavirus survival on surfaces. Appl Environ Microbiol 76:2712-2717.
8. World Health Organization (2003) First data on stability and resistance of SARS coronavirus compiled by members of WHO laboratory network. World Health Organization, Geneva, Switzerland.
9. Novel coronavirus Disease (covid-19) (2020) Situation Update Report-22.
10. Coronavirus disease 2019 (COVID-19) (2020).
11. India Fights Corona COVID-19 (2020).
12. Erken H, Hayat R, Ji k (2020) Coronavirus: The economic impact of covid-19 on india.
13. Pan-american unity-vs-cv-19 (2020) Live cast from Mexico, Colombia, Ecuador, El-Salvador, Brazil, Canada &USA.