

Covid-19 – How to Fight and Live with it: A Critical Analysis and Review

R.V. Mahendra Gowda

Principal, Mahendra Engineering College (Autonomous)
Mallasamudram, Namakkal District, Tamilnadu – 637 503, India

REVIEW ARTICLE

ABSTRACT: Covid-19 is a coronavirus disease set off from China in 2019 and it has spread as a pandemic throughout the world, causing more than a million deaths and leaving several millions of people to struggle with acute respiratory and throat infections. It has wide-ranging effects on human health and functioning of vital parts in the body. In acute cases it affects the normal functions of the kidneys, lungs, heart, eyes and brain. This paper discusses the causes, spread and symptoms of Covid-19, and critically analyses its status in India and world-wide, and suggests preventive measures, the ways and means to fight coronavirus and eventually learn to live with this contagious virus in the event of not discovering the right vaccine. The paper also throws light on the challenges in the post-Covid era, such as human life, livelihood, health, education, economy, etc.

KEYWORDS: COVID-19, Symptoms, Testing, World-status, Prevention, Live with the virus, Livelihood, Health, Education and Economy in post-Covid situation.

<https://doi.org/10.29294/IJASE.7.2.2020.1706-1722>

© 2020 Mahendrapublications.com, All rights reserved

1. INTRODUCTION

Covid-19 is a short form for "*Corona virus disease 2019*". It is the official name given by the World Health Organization to the disease caused by the newly identified coronavirus in 2019. This disease caused by the novel coronavirus was first identified in Wuhan, China, in December 2019. The coronavirus is a new virus, which belongs to the family of viruses that caused Severe Acute Respiratory Syndrome (SARS) and some types of common cold including throat irritation, skin rashes, etc.

The coronavirus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. So it is transmitted through direct contact with respiratory droplets of an infected person. The virus may remain in air for some time and when other person passes by and breathes the air, it will enter into his respiratory system. It may also enter the throat through the mouth and from hands by touching external surfaces contaminated with the virus. The coronavirus may survive on such surfaces for several hours, but simple disinfectants can kill it. This virus may also enter through the eyes in the event of touch by hands and irritation. The prolonged watching of computer screens, laptops, video-conferencing devices, mobile phones would cause strain to the eyes and the person starts touching the eyes and trying to rub. Often it may develop into conjunctivitis and reddening that may heat up the eyes

and other body parts leading to rise in the body temperature.

2. Symptoms of Coronavirus disease

The symptoms of coronavirus include a wide variety of following incidents [1]. The most common symptoms include: (a) Fever, (b) Dry cough, and (c) Tiredness. The less common symptoms are: (i) Aches and pains, (ii) Chills, (iii) Headache, (iv) Diarrhoea, (v) Sore throat, (vi) Conjunctivitis, (vii) Loss of smell or taste, (viii) Rashes on skin, or discolouration of fingers or toes. In more severe cases, infection can cause Pneumonia or Influenza, breathing difficulties, chest pain or pressure, and loss of speech or movement. In extreme cases the disease can be fatal, as it leads to heart attack, causing death. These symptoms are similar to the flu (influenza) or the common cold and it is only detectable after several days of infection as depicted in Figure 1 below [2].

It can be understood from the diagram of Covid-19 cycle that there will be an asymptomatic stage for the first 4-5 days, after which there will be an onset of symptoms. Hence testing is required to confirm whether someone has coronavirus or not. After 7 days, we can see from the graph that there is a window period (blue line) when one might have coronavirus and may have already developed symptoms, but may or may not test positive for IgM antibody.

*Corresponding Author: rvmgowda6@gmail.com

Received: 25.09.2020

Accepted: 15.10.2020

Published on: 01.11.2020

Mahendra Gowda

After about 14 days, the IgM antibody (green line) starts declining as the body immune system produces another antibody later, known as IgG (indicated by the red line) and this provides long-term immunity, and the patient gets fully recovered from coronavirus [2].

It is evident from the graph that one can see that there is a window period where a person can be infected, and even show symptoms, but during which the antibody test will not come as positive. However, during this time, a PCR test should detect the presence of the virus. With all this in mind, the experts would never recommend the Antibody test as a way of replacing RT-PCR for early-mid stage diagnosis of Covid-19 because of the risk of false negative. So if the Antibody test is being used to diagnose the current infection, it must be used with RT-PCR, and with other clinical information such as scans of the lungs. It is best used to provide evidence of historic infection. If one wants rapid diagnosis of the current infection, he/she

has to ultimately look for evidence of the coronavirus itself and not the body's immune response as every person's immune response differs [2].

In respect of the human immunity system in people of different ages, a study conducted at the Chinese Centre for Disease Control and Prevention as on 11th February 2020 shows that the elderly are more vulnerable to the attack of coronavirus and the fatality rate increases as the age goes up, which is depicted in Figure 2 [3]. A recent mortality rate in different age groups as broadcasted by the India Today live news on 31.05.2020 [4] reveals that death rate increases steeply with increase in the age profile of the affected people as depicted in Figure 3. It is also evident from the demise of many senior persons due to Covid-19. It is observed that people with 'O' positive blood have higher immunity whereas those with 'A' and 'AB' blood groups are more susceptible to the attack of coronavirus.

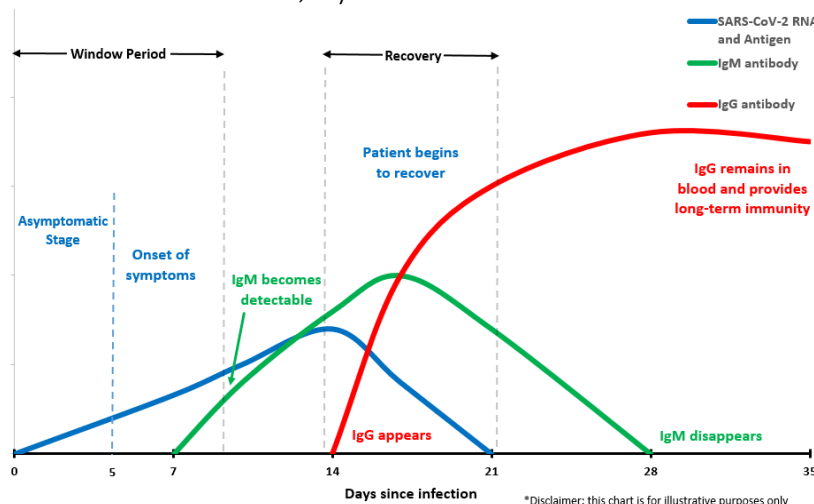


Fig. 1 Diagram showing the cycle of symptoms and stages of Covid-19 [2]

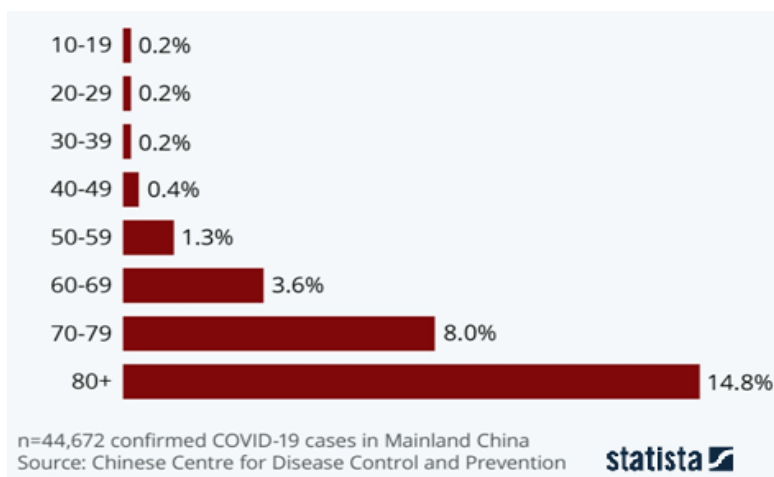


Fig. 2 Covid-19 fatality rate in people of different age groups [3]

Mahendra Gowda

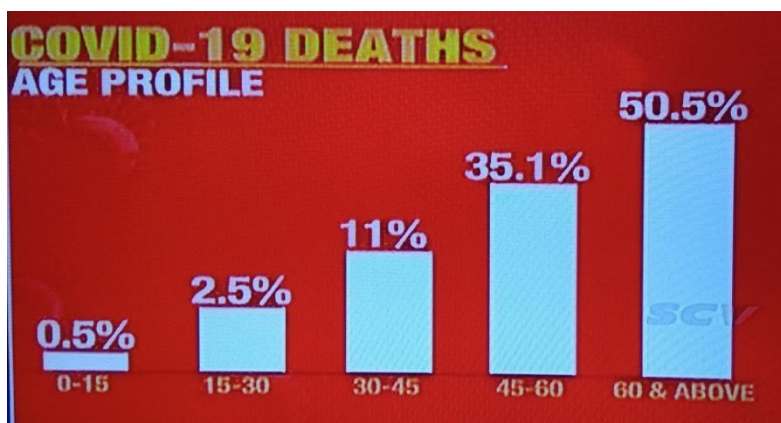


Fig.3 Coronavirus death rate versus age profile in India [4]

3. Different Kinds of Tests for Coronavirus

As there is no direct or unique test for detection of coronavirus, Doctors and medical practitioners worldwide tried several tests. The common ones are Polymerase Chain Reaction (PCR) Test, Antibody Test and Antigen Test amongst few others described below.

3.1 PCR Test

The PCR Test helps us to detect the presence of RNA genetic material from the coronavirus, which will indicate if someone is infected with coronavirus or not. In PCR Test, swabs are taken from the patient's nose or throat and sent to laboratories for testing, which takes time. Independent experts opine that as many as 30% of results could be false negatives, so many patients have to be tested more than once to get an accurate result [5].

3.2 Antibody Test

An Antibody Test, known as Serologic Test, gives indication about the proportion of the population being infected. It won't tell who is infected because the antibodies are generated after a week or two, after which time the virus should have been cleared from the system. The Antibody Test tells us whether someone has had coronavirus at some point of time in the past. It indicates who has been infected and who should be immune to the virus. Thus the Antibody Test does not detect the presence of the coronavirus, but it shows whether the immune system has created antibodies to fight it. Unlike PCR Tests, which commonly use swabs to detect Covid-19, Antibody Tests need blood samples for detection. This is because there will be a very small amount of the coronavirus circulating in the blood as

compared to the respiratory tract with a significant and measurable presence of antibodies [6].

3.3 Isothermal Amplification Assays

The Isothermal Nucleic Acid Amplification Assays are just like PCR Test, which amplify a piece of the virus's genome. They are faster than PCR Test, because they don't involve repeated cycles of heating and cooling the sample. Isothermal Amplification Assay Tests typically detect the amplified virus sequences using fluorescent tags that are read out with specialized machines.

3.4 Lateral Flow Assay

There are reports that the Canadian firm Sona Nanotech has attempted to push a completely different kind of rapid screening test for Covid-19 to the market. It is known as a quick-response Lateral Flow Assay. It is expected that this test produces results in 5-15 minutes at a cost less than \$50. It can be administrable even by untrained individuals. The Lateral Flow Assays have a wide array of applications and can test a variety of samples like urine, blood, saliva, sweat, serum, and other fluids. It is claimed that unlike a PCR Test, which requires more time, the Sona's Lateral Flow Assay Test will directly detect the coronavirus [6].

3.5 Antigen Test

An Antigen forms a part of the pathogen that brings out an immune response. The Antigen Test looks for proteins from the surface of the virus. In the case of coronavirus, usually the proteins from the surface spikes and nasal swabs are collected as samples. In an Antigen Test a nasal swab from a patient is exposed to paper strips that contain artificial antibodies that may bind to coronavirus antigens. Any antigens that are

Mahendra Gowda

present will bind to the strips and give a visual readout. The process takes less than 30 minutes, which can deliver results on the spot. It does not require any expensive equipment or extensive training. The only problem is that in the case of respiratory viruses, often there is not enough of the antigen material present in the nasal swab to be detectable. This would especially be true with people who are asymptomatic and who have very little nasal discharge. There is no amplification of viral proteins in an Antigen Test as against the PCR Test, which amplifies very small amounts of genetic material so that there is enough to detect [7].

Initially India lagged behind other countries in testing but subsequently the testing rate has increased on daily basis. Earlier rapid testing kits were used and since many have shown faulty results, testing by using those kits was discontinued. The Indian Council of Medical Research (ICMR) stated that the rapid testing kit is not for diagnosis but for random checking and

surveillance, especially in hotspots. Since the rapid testing kits were discarded, the RT-PCR Test is the most commonly used one. Earlier ICMR opined that the number of tests done in the country was below its potential testing capacity. Later on with the onset of rapid spread of the coronavirus, the process of conducting more tests, even few lakhs of tests per day, is implemented with aggressive surveillance in coronavirus hotspots in the country. Random tests are being done at other zones also to contain the spread of coronavirus. Now-a-days more rapid Antigen Tests are being conducted to get quick results. There is a comparison between the PCR Test and Antigen Test in respect of positivity rate. The positivity rate is high for PCR Test in Maharashtra and Delhi, which witnessed very high number of cases whereas the positivity rate for PCR Test is relatively lower as compared to Antigen Test in five states, which witnessed relatively lower number of cases as shown in Table 1 [8].

Table 1 Positivity Rate in PCR Test, Antigen Test and Covid cases [8]

States	Positivity Rate		Remarks
	PCR Test	ANTIGEN Test	
Maharashtra	24%	10%	The Two Best States for PCR Testing methods
Delhi	14%	5%	
Andrapradesh	16%	24%	The Five Worst States for PCR Testing methods
Assam	6%	10%	
Chhattisgarh	8%	9%	
Odisha	1%	15%	
Punjab	7%	12%	
Tests versus Positivity Rates			Number of Covid Cases
All India Covid Tests show an Average Positivity Rate of 7% for Antigen Test and 9% for PCR Test			90,000-1,00,000
With Antigen Test at 7%, properly conducted PCR Tests positivity Rate for India is likely to be 14% to 17.5%			2,00,000-2,20,000 (projected daily cases)

4. World-wide Status of Covid-19

Coronavirus disease appears to be more contagious than others. It first surfaced in Wuhan in China in late 2019 and has spread rapidly to other countries. There was a faster rate of occurrence of cases in USA, Spain, Italy, Brazil, France and Russia. In Germany, the first case of coronavirus was confirmed with a man from the Sternberg area of Bavaria falling ill. The authorities believed that the risk of the virus spreading in the country remains low and the patient involved was isolated at home but subsequently there was a significant increase in the number of cases. In India, initially there was a misconception about this disease that its spread would be very low owing to sub-tropical temperature conditions as evidenced by low numbers in March and April but it increased at very high rate in June, July and August, and peaked in September.

No one knows how contagious the coronavirus actually is, but a recent WHO estimate published in Der Spiegel assumes that there will be 1.4 to 2.5 newly infected people per every sick individual. The following graphic (Figure 4) provides an overview of the average number of new infections for different diseases based on the data reported by Der Spiegel [3]. The assumption made in respect of coronavirus infection was based upon the data in earlier 2020, the initial period of spread, but definitely the figures would be different after the massive spread of the disease in recent days. As per recent news the average number of people infected by coronavirus may vary from 2 to 5. Covid-19 is treated as a deadly disease inspite of the number of infections per individual is relatively lower as compared to other diseases.

Mahendra Gowda

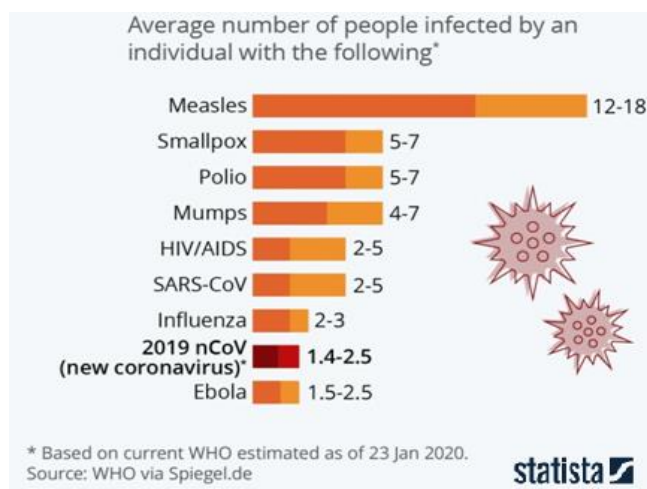


Fig. 4 An overview of average number of infections for different diseases [3]

Coronavirus appeared to be as deadlier as the flu at every age. The seasonal flu, like coronavirus, gets deadlier as patients get older. But the two diseases are operating at completely different levels of mortality despite sharing a pattern, and data so far suggest that Covid-19 is many times deadlier than the seasonal flu at every age group based upon the world data as depicted in Figure 5. It is reported that as per Chinese data, just one-tenth of one percent of coronavirus patients younger than 20 years died due to the disease. But that is still 25 times higher than the seasonal flu's 0.004% mortality rate among patients of 17 years or younger. Similarly, coronavirus appears to be 15 times deadlier than the flu among adults under 50 years, and 7.5 times deadlier among seniors [9]. Figure 5 shows that the initial fatality rate due to coronavirus disease

is around 1.40%, which has significantly increased to around 15% over a period of time, varying from country to country as shown in subsequent figures.

Further, the study conducted at the University of Michigan, as broadcasted by India Today TV channel on 10th May 2020 [4], reveals that the coronavirus world average fatality rate is around 6.86%, which varies from 3.35% in India through 5.9% in USA to 14.9% in France. The county-wise fatality rate is shown in Figure 6. Figures 7 & 8 show the tracker results of coronavirus cases and deaths in major countries. As on 10th May 2020 there were a total of 41,26,154 cases and 2,83,120 deaths world-wide. These numbers increased considerably within 10 days and as on 20th May 2020 there were 5.0 million cases with the total number of deaths nearing 3.25 lakhs throughout the world.

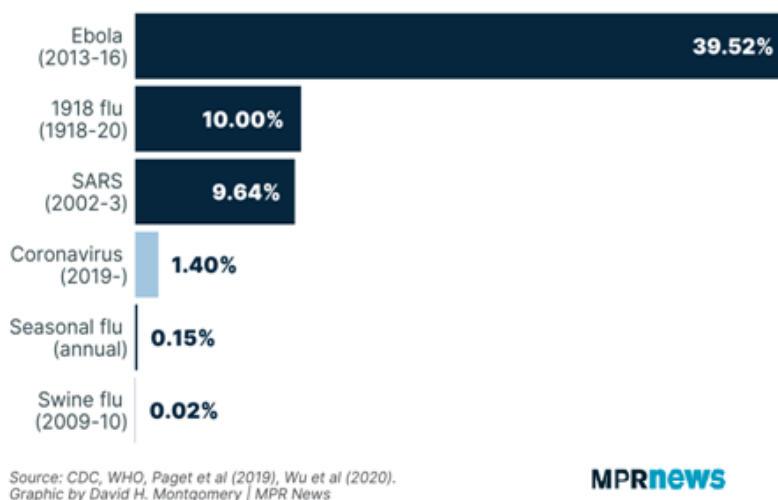


Fig. 5 Average fatality rate of different diseases [9]

Mahendra Gowda



Fig.6 Coronavirus fatality rate world-wide as on 31.05.2020 [4]



Fig. 7 Coronavirus world-wide cases tracker [4]



Fig. 8 Coronavirus world-wide deaths tracker [4]

Table 2 shows the world-wide data of major Covid-19 cases in 15 countries along with the total number of deaths, total number of people recovered, number of active cases, number of tests conducted per million vis-à-vis the population of each country as on 31.05.2020. It is clear from Table 2 that the total number of cases in the World as on 31st May 2020 is around 6.18 million with the total number of deaths around 3.71 lakhs. With the increasing number of coronavirus cases the world average fatality rate has decreased to around 6.0%, which varies from 2.83% in India through 5.8% in USA and Brazil to 15.3% in France.

Similarly, the data was compiled after 3-months of time on 31st August 2020 [10]. We can see almost a four-time increase in total number of cases world-wide and the number of deaths being more than double. The total number of cases in the World, USA, Brazil and India were 25,457,379; 6,183,259; 3,862,311; &

3,649,639 respectively. Similarly, the total number of deaths in the World, USA, Brazil and India were 8,51,691; 1,87,373; 1,20,896; 64,951 respectively. USA and Brazil are the worst affected nations standing in first and second positions respectively. India, which was earlier in 9th position, came to top 3rd position with the spiralling number of cases and significantly increasing number of deaths. The coronavirus world average fatality rate has considerably decreased to 3.3%, which varies from 1.8% in India through 3.1% in USA and Brazil to 6.4 % in Spain.

The data was updated after 2-months of time on 25th October 2020 [10]. Table 3 shows the total number of cases in the World, USA, India, Brazil and others. It can be seen that with an almost doubling number of cases, India came to second position crossing Brazil. The number cases recovered also increased significantly, leading to decrease in the fatality rate to around 1.5%.

Mahendra Gowda

Hence the News channels, Governments and some politicians claim that the mortality rates have fallen continuously with increasing number of total cases and recovery data. But the total number of deaths has considerably increased to 1,18,500. We cannot just play with the decreasing trend of percentage of deaths; instead we have to consider the actual numbers, which are ever-increasing. The increasing numbers of deaths are alarming as every human life is precious and the

death of around 1.2 lakh people is a great loss to the humanity and to the families of their loved ones. As the number of Covid-19 cases keeps on increasing in the World from time to time, the cumulative number of cases by the number of days since 10,000 cases in various countries is depicted in Figure 9 [10]. It is seen that after around 200 days the number of cases are highest in USA, followed by India, Brazil, and others in decreasing order.

Table 2 World-wide Covid-19 Statistics of 15 Countries as on 31.05.2020 [10]

Country, Other	Total Cases	Total Deaths	Total Recovered	Active Cases	Tot Cases / 1 Million	Deaths/ 1 Million	Total Tests	Tests/ 1 Million	Population
World	6,176,486	371,286	2,745,011	3,060,189	792	47.6	--	--	--
USA	1,816,897	105,557	535,238	1,176,102	5,492	319	17,270,841	52,203	330,838,184
Brazil	499,966	28,849	205,371	265,746	2,354	136	930,013	4,378	212,430,396
Russia	405,843	4,693	171,883	229,267	2,781	32	10,600,000	72,638	145,929,337
Spain	286,308	27,125	196,958	62,225	6,124	580	3,556,567	76,071	46,753,295
UK	272,826	38,376	N/A	N/A	4,021	566	4,171,408	61,474	67,855,909
Italy	232,664	33,340	155,633	43,691	3,848	551	3,824,621	63,249	60,469,020
France	188,625	28,771	68,268	91,586	2,890	441	1,384,633	21,217	65,261,548
Germany	183,294	8,600	165,200	9,494	2,188	103	3,952,971	47,193	83,761,616
India	182,889	5,186	87,049	90,654	133	4	3,737,027	2,710	1,378,826,256
Turkey	163,103	4,515	126,984	31,604	1,936	54	2,003,594	23,779	84,259,813
Peru	155,671	4,371	66,447	84,853	4,727	133	1,012,708	30,752	32,930,962
Iran	148,950	7,734	116,827	24,389	1,775	92	896,571	10,686	83,897,889
Chile	94,858	997	40,431	53,430	4,966	52	563,320	29,490	19,102,061
Canada	90,190	7,073	48,103	35,014	2,391	188	1,634,277	43,334	37,713,606
Mexico	87,512	9,779	61,871	15,862	679	76	270,992	2,104	128,814,639

Table 3 World-wide Covid-19 Statistics of 15 Countries as on 25.10.2020 [10]

Country, Other	Total Cases	Total Deaths	Total Recovered	Active Cases	Tot Cases/ 1 Million	Deaths/ 1 Million	Total Tests	Tests/ 1 Million	Population
World	43,028,260	1,156,014	31,724,004	10,148,242	5,520	148.3	--	--	--
USA	8,829,951	230,085	5,741,991	2,857,875	26,627	694	132,211,112	398,687	331,616,304
India	7,866,740	118,593	7,078,123	670,024	5,683	86	102,523,469	74,063	1,384,271,181
Brazil	5,381,224	156,926	4,817,898	406,400	25,260	737	21,900,000	102,799	213,036,330
Russia	1,513,877	26,050	1,138,522	349,305	10,372	178	57,300,000	392,588	145,954,385
Spain	1,110,372	34,752	N/A	N/A	23,746	743	15,503,165	331,544	46,760,544
France	1,086,497	34,645	109,486	942,366	16,634	530	14,637,427	224,090	65,319,392
Argentina	1,081,336	28,613	881,113	171,610	23,857	631	2,804,114	61,865	45,326,314
Colombia	1,007,711	30,000	907,379	70,332	19,738	588	4,718,734	92,428	51,053,257
Mexico	886,800	88,743	646,739	151,318	6,855	686	2,288,589	17,692	129,358,368
Peru	886,214	34,095	803,846	48,273	26,761	1,030	4,367,969	131,901	33,115,484
UK	854,010	44,745	N/A	N/A	12,559	658	31,157,988	458,213	67,998,844
South Africa	714,246	18,944	644,641	50,661	11,995	318	4,677,942	78,564	59,542,957
Iran	568,896	32,616	455,054	81,226	6,746	387	4,719,597	55,966	84,329,667
Italy	504,509	37,210	264,117	203,182	8,348	616	14,492,122	239,803	60,433,453
Chile	500,542	13,892	476,576	10,074	26,114	725	4,081,078	212,912	19,167,892

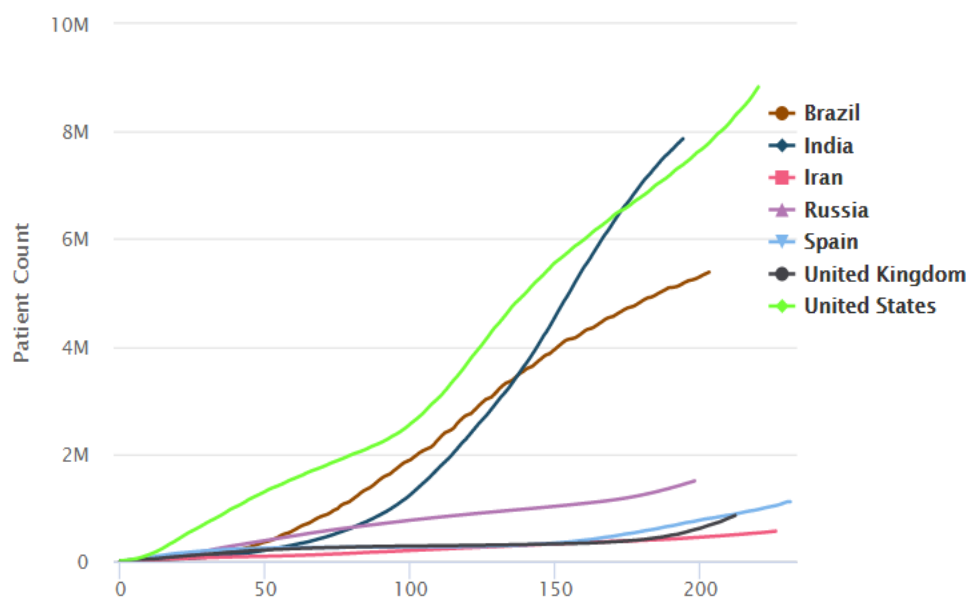


Fig. 9 Cumulative number of cases since 10000 cases in various countries [10]

Figure 10 shows the distribution of cases in top 10 countries in terms of total number of cases and the average percentage of the same. It is clear that USA alone accounts for nearly one-fifth of the world-wide cases. India recorded around 18% of total cases and Brazil accounted for around 12% of total cases, with the result that USA, India and Brazil put together account for more than 50% of the total cases in the World.

Similar to the number of cases, the number of Covid-19 deaths keeps on increasing from time to time; the cumulative number of deaths by number of days since 100 deaths occurred in various countries is shown graphically in Figure 11 [10]. Unfortunately, USA recorded around 20% of total world-wide deaths, Brazil encountered around 14% of total deaths and India accounts for around 10% of the total deaths in the World.

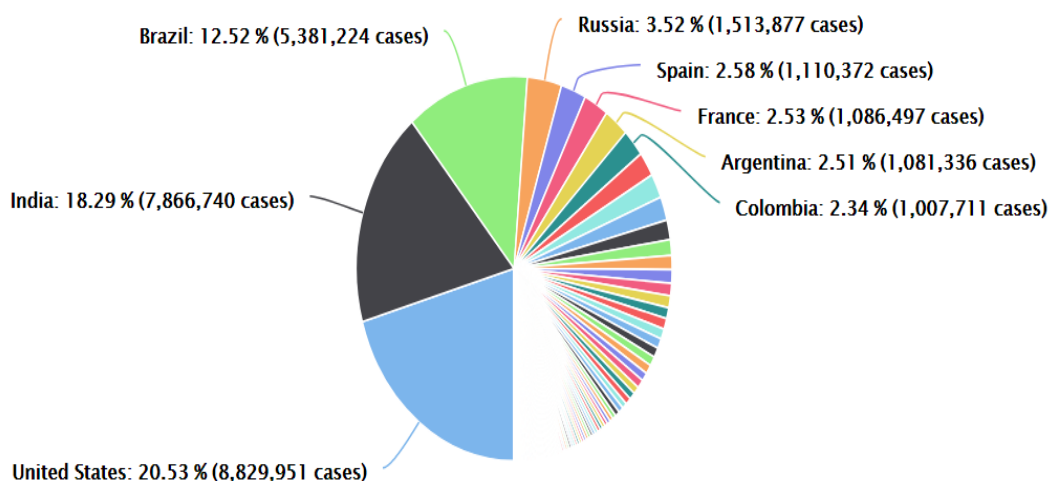


Fig. 10 Distribution of number of cases in various countries [10]

Mahendra Gowda

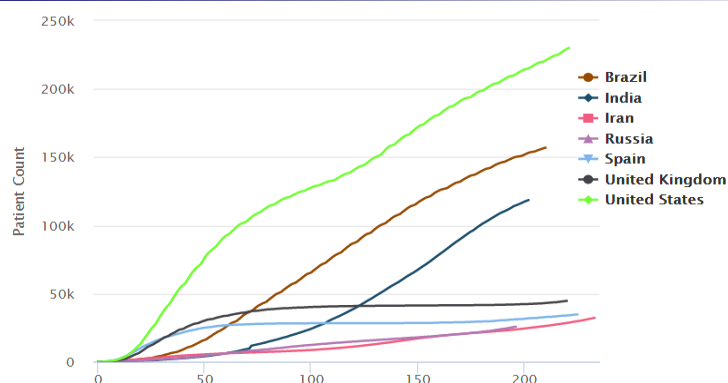


Fig. 11 Cumulative number of deaths by number of days since 100 deaths [10]

A comparison of the coronavirus disease situation in South Asia is analyzed till 15th September 2020 and depicted in Figures 12-18 [4]. Figures 12-18 clearly explain the total number of coronavirus confirmed cases, cases per million, total active cases, total number of covid deaths, deaths per million, total number of recovered cases, and total number of covid tests conducted in five countries, namely India, Pakistan, Bangladesh, Sri Lanka and Nepal. It is observed that Sri Lanka is positioned in a much better position in all aspects as compared to the remaining four countries. The relatively very low COVID cases with the least number of deaths and a very high recovery rate greater than 90% in Sri Lanka are reported to be attributed to their better management of the well-connected healthcare infrastructure system and high spending on the basic healthcare needs. It was also due to the early testing, strict isolation and the effective monitoring of

covid cases. India, on the other hand, shows highest numbers in all aspects. In spite of the high recovery rate of around 78.5%, our country has unfortunately recorded around 82,000 deaths that include more than 300 Doctors and more than 350 Police personnel, who were COVID warriors, which is a great loss to the humanity and their families and relatives. It is very much convenient for some people to claim that the mortality rates have fallen continuously. The mortality rate calculated as a percentage of number of cases has fallen due to ever-increasing number of total cases. However, one should keep in mind that each human being is very important and every life is precious. So some people cannot just play with the percentage and try to downplay several thousands of deaths, because every human being with right understanding shall feel for the loss of other human life and show sympathy.



Fig. 12 Total Covid cases in South Asian countries [4]



Fig. 14 Total Covid active cases in South Asian countries [4]



Fig. 13 Total Covid cases per million in South Asian countries [4]



Fig. 15 Total Covid deaths in South Asian countries [4]

Mahendra Gowda



Fig. 16 Total Covid deaths per million in South Asian countries [4]

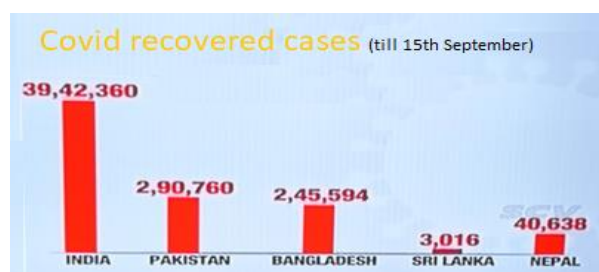


Fig. 17 Total Covid recovered cases in South Asian countries [4]



Fig. 18 Total Covid Tests conducted in South Asian countries [4]

5. Status of Coronavirus cases in India

The trend of coronavirus cases in some of the countries, where it has spread rapidly is shown in Figure 19 below [4]. It can be observed that the number of cases has peaked out in many countries but there is an increasing trace of coronavirus cases in India despite lockdown for first 40 days as on 05.05.2020.

Figure 20 [4] shows the plot of coronavirus cases in India in first 40 days as on 05.05.2020. It indicates that there were 47,000 cases in 40 days. The curve depicts a steady increase in the number of cases on day-wise basis. The doubling period varied from a week to 14-days from state to state.

Figure 21 depicts the trajectory of day-wise and week-wise coronavirus cases in several states as on 25.05.2020 [4]. There were nearly 1,51,700 cases

reported all over the country. There is an increase of more than 1,00,000 cases in just three weeks, because as on 05.05.2020 there were a total of 47,000 cases in all states. As on 25.05.2020, the state-wise position has changed with Maharashtra still topping the list followed by Tamilnadu, Delhi, Gujarat, and others. As on 31st May 2020, India has recorded more than 1,82,000 cases with 5,186 deaths. The recovery rate has continuously increased from 33% to 48%.



Fig. 19 Increasing coronavirus cases in India [4]

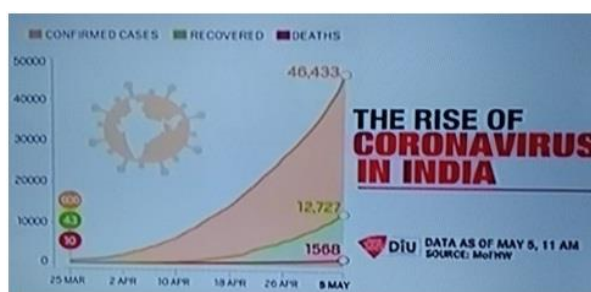


Fig. 20 Graph of coronavirus cases in India in first 40 days after lock-down [4]



Fig. 21 Trajectory of coronavirus cases as on 25.05.2020 [4]

Figure 22 depicts the number of days for the increase of each million cases in India. It took 169 long days to cross the first 1 million cases, from then onwards the number of cases shot up and it took only 21 days to cross the second 1 million cases to become a total of 2 million cases. Similarly afterwards it took only 16 days to cross the third one million cases to make the total to be 3 million cases. Subsequently, the total number of

Mahendra Gowda

cases increased to 4 million in just 13 days, and later on in just 11 days the total number cases have crossed 5 million [8]. This clearly shows that despite of the continued lockdown for last four months and severe lockdown and restrictions in hotspots, the cases have only gone up steeply. Figure 23 show that the 7-day moving average daily number of cases in India during September has surpassed those of USA and Brazil [8]. The daily average cases in India during September stood at around 89,000 reaching a peak of 93,199 on 17th September 2020. The doubling time for the number of cases was 41 days and for the number of deaths was 53 days. These figures clearly prove that the severe lockdown imposed in India was a crude method, which did not have any effect on the spread of the disease, excepting maintaining some social distancing. Except the crude method of lock-down India could not find any other solution as the countries like Germany, Italy and Russia resorted to develop antibodies to contain the spread of the virus. However, the number of cases started decreasing in October with the 7-day daily average stood at around 60,000 cases. As on 25.10.2020 the total number of corona cases, number of recoveries and number of deaths in India are 78,66,740, 70,78,123 and 1,18,593 respectively. The average fatality rate is 1.5% and the recovery rate is around 90%. As usual Maharashtra stands top with maximum number of cases at 16,38,000, followed by Andrapradesh with 8,04,000, Karnataka with 7,98,000, Tamilnadu with 7,06,000 and Uttar Pradesh at 4,68,000 in decreasing order. Fortunately, the number of cases is decreasing with around 50,000 cases per day and the challenge is to maintain the continuous downward trend in the days to come. The doubling time has considerably increased and it is around 97 days for the number of cases and 125 days for the number of deaths.

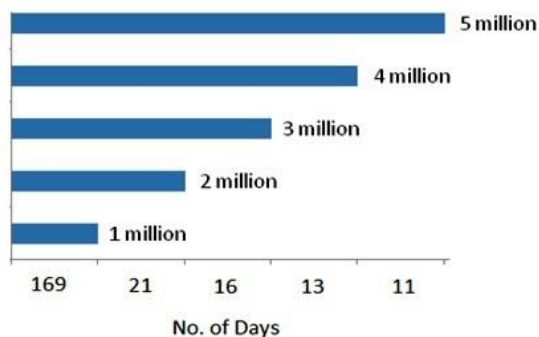


Fig. 22 A plot of number of days for rise of each million of cases in India [8]

6. Prevention is better than cure

As coronavirus disease has spread like a pandemic, its prevention is always better than the cure. In the first place, there are four main recommendations for how to

try to avoid getting coronavirus, namely (i) social distancing, (ii) good hand washing, (iii) wearing mask, (iv) good personal hygiene that includes frequent face washing including eyes and nose cleaning. Hence the following measures can be taken to prevent the coronavirus infection and to slow down its transmission:

- Take bath daily and maintain your body and dress hygiene.
- Take food of your choice at regular intervals in sufficiently warm condition.
- Drink sufficient water and pass urine and then hydrate. Let the cycle repeat every 3-4 hours.
- Wash hands regularly with soap and water for at least 20 seconds or clean them with alcohol-based hand rub.
- Use sanitizers while working at home or office to frequently handle papers, other items.
- Maintain at least two metres distance between you and the people coughing or sneezing.
- Wear neat and clean masks, and cover safely the nose and mouth.
- Cover your mouth and nose when coughing or sneezing. Throw the tissue in dustbin or wash the hand kerchief with soap before next use.
- Avoid rubbing your eyes and touching face, nose.
- Frequently wash your face, eyes and nose with clean water.
- Stay home if you feel unwell.
- Refrain from smoking and other activities that may weaken the lungs.
- Practice regular physical distancing by avoiding unnecessary travel and by staying away from large groups of people.
- Do regular physical exercise, breathing exercise or yoga or meditation.
- When you reach home from outside work, clean your hands with soap, wash your face, nose, eyes and legs neatly. It is better to change the dress if you had stayed outside for more than 4-5 hours.

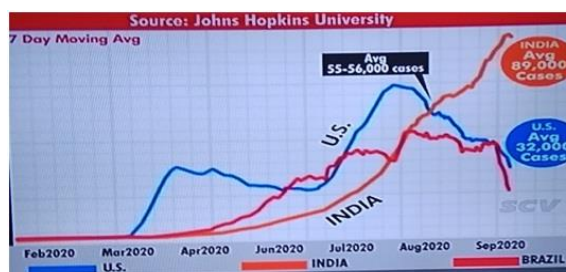


Fig. 23 A 7-day moving average for number of cases in India vs USA and Brazil [8]

Social distancing is very important step to prevent the spread of Covid-19. There has been a great canvassing of this aspect throughout the world when the disease turned out to be epidemic. Many have advocated that there should be at least 1-2 meter distance between the person who has symptoms and others in public places, outside.

Mahendra Gowda

It is safer that the person with symptoms is separated and put in an exclusive room outside so that others will be safe from the infection. A model showing how a one-day of social distancing makes a huge difference in slowing the spread of coronavirus is depicted in Figure 24 below [11].

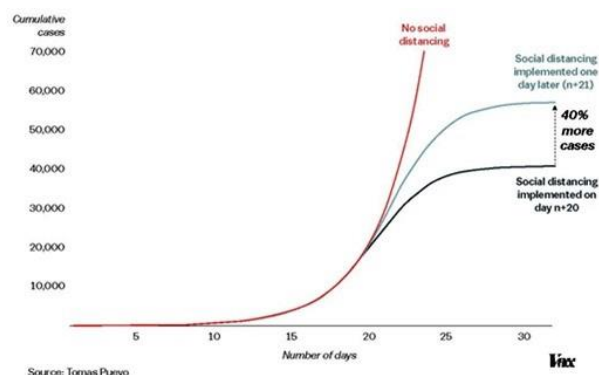


Fig. 24 Graphic model of the effect of social distancing on the spread of coronavirus [11]

7. How to fight Covid-19 at Home

Everyone says how not to catch coronavirus, but very few people provided some advice on what to do if someone gets Covid-19. Nevertheless precaution is better at the early stage itself. So one can just prepare as though he/she is going to get a fever, flu or pneumonia or respiratory infection such as bronchitis. The following are few things one should actually do ahead of time, namely to purchase and preserve paracetamol, kleenex, sanitized tissues, cough medicine, thermometer or temperature sensor, etc.

One can get an idea that he/she has coronavirus infection if they experience itching in the throat, dry throat, dry cough, high temperature, shortness of breath, eye irritation, nose pinching, etc. If there are any or more of these symptoms or fever, one should check the temperature and if it has crossed 100 °F he/she should use paracetamol atleast three times a day and frequently check the temperature to keep it under 100 °F. It is advisable to take a blood test and check the Haemoglobin content, count of RBC, WBC and Platelets. If the count of WBC and Platelets is below the normal value or found to be falling, then one should take steps to maintain the normal ratings in blood. It is preferable to have papaya leaf juice or pomegranate juice 3-4 times a day, which will greatly help to improve the platelet count to provide good immunity in the body to fight the infections. Upon the onset of symptoms, it is important to drink more water and pass urine once in every 3-4 hours and again drink water to repeat the cycle. Drink warm water once in every 3-4 hours, after boiling and added with jeera, salt or neem extract as per one's wish and practice. This will try to kill any germs or virus in the throat or intestine.

If there are any respiratory issues or shortness of breath, prepare a boiled water solution with lemon, ginger

and turmeric and inhale the fumes to clear the respiratory or breathing difficulties. If there is an irritation in throat or tongue, gargling with salt water will help and even consuming little honey also can work out well. If there is a headache or pain, then apply vicks vaporub on the forehead or chest. One can also just take hot water bath and sit in the bathroom breathing in the steam. Steam would kill any virus present in the nasal back. After taking bath, dry the hair in the head and later on apply little coconut oil to the hair, which will cool down the heat and try to lower the temperature. Consume sufficient quantity of juice like apple, lemon, musambi, orange, pine apple, pomegranate thrice a day.

The patient can take the regular food but well boiled and cooked nicely with natural ingredients such as pepper, turmeric, jeera, garlic, etc., which are natural disinfectants and provide good immunity. One shall also have a favourite well cooked soup in warm condition. If anyone has a previous history of asthma he/she can have a prescription inhaler, make sure to get it refilled for regular use. Humidifier is also a good thing to use in the room if someone likes it before going to bed overnight. Brush the teeth, clean the mouth and nose, pass urine and drink enough water before sleeping in the night.

The person with coronavirus infection should isolate and live in a separate room at home and should not leave the house and must rest for long time. He/she must use separate toilet, soap, utensils for drinking water, taking food, etc. They have to sanitize their bed linen and frequently wash clothes and clean the bathroom with recommended sanitizers. Even if one feels better next day, he/she may still have infections and continue to observe the above medication at home for 14-15 days. After a week's time when some relief is observed, the patient can go for little walk near the house to breath fresh air but by wearing the mask and gloves. He/she may also practice yoga or meditation to concentrate and enhance self-confidence and get rid-off any fear.

One need not go to the hospital if the above treatment at home works out to be well and the health condition improves. Perhaps telephonic conversation with the family doctor would be of great use during such time period. Self-confidence, courage and keeping away from the fear of disease are vital to get cured early. It is observed that more than 75% of adults and children who appear to have sufficient immunity have managed at home with basic rest, hydration, and at home treatment as described above. However, the cases may be serious in aged people and those who have cardiac, sugar or asthma experiences.

If the at-home treatment does not work out well and if there is trouble in breathing or fever is not under control but shoots up above 100 °F, and one is worried or in distress or feels that the symptoms are getting worse, then he/she has to immediately report to the hospital to undergo coronavirus test and to get treatment.

Mahendra Gowda

It is observed that the places wherein houses are built sparsely with a lot of distance in between in the hilly, forest and plateau regions reported fewer cases. So many people in such areas used to follow a good social distancing, better hygiene, and take food with natural ingredients as mentioned above. They drink water boiled with jeera that provides very good immunity and hence comparatively less number of Covid-19 cases was reported including less number of deaths. The great economist and Nobel laureate Dr. Amartya Sen in his Covid-19 interaction on India Today TV channel [4] on 5th May 2020 advocated a good healthcare model to fight Covid. He also suggested that similar models to be established in the fields of education and employment to cater to the needs of poor and down-trodden.

8. Life, Health, Education, Employment and Economy in post-Covid-19 era

Covid-19 made the life miserable to many people in several countries. It caused a great havoc to the health of several millions of people throughout the world. Many countries have shut down their business and normal operations for last 3-5 months. The statistics of number of cases, deaths, etc., are already described in the earlier sections of this paper. Though many scientists are busy in inventing a vaccine or medicine for coronavirus, as on date there is no definite solution to combat the virus, and thus people are still struggling to fight the virus and adopting themselves to live with the virus in the days to come.

In an exclusive on living with the virus, broadcasted by India Today TV channel [4] on 20th May 2020, Dr. Ian Lipkin, the world renowned virologist at the University of Columbia in USA, has shared his experience on how to live with the coronavirus in the post-Covid era. Dr. Lipkin himself was affected by the virus and tested positive on 20th March 2020. He explained that he struggled himself, lived with the virus, managed and bounced back to normalcy. Dr. Ian told that he did not consult any Doctor, nor consumed any drug like Hydroxychloroquine, which he felt may not be safe as it may pose side-effects if used. He opined that though there is a lot of research in progress to develop a vaccine, it will definitely take a year so that the vaccine may be ready in USA around April 2021. Till then he says that people have to struggle and learn to live with the virus. He suggested that people should slowly try to come out of their home and involve in their routine works, going to office, schools, salons, shops, restaurants, so that they will come out of the fear and syndrome of coronavirus and divert their attention to interact with people, but by maintaining the social distancing, observing standard hygiene and wash practices, wearing masks, gloves, spectacles, as the virus commonly enters the body through the mouth, nose, eyes and hands.

In a series of discussions on India Today TV, NDTV, Republic TV and other news channels, our country's

renowned Doctors such as Dr. Randeep Guleria, Director, AIIMS and Dr. Hemant Thacker, a famous Consultant Physician in Mumbai, and few others often clarified many doubts concerning Covid-19, offered valuable advice and suggested precautionary measures to be taken to fight coronavirus. They opined that the coronavirus stalks the body of the patients who have just recovered from Covid-19 disease. Even in the post-Covid situation, the virus which was cultured in the patient's body might physically attack the vital organs such as Lungs, Heart, Brain, Kidneys, etc. Lungs might experience shortness of breath, long-term breathing problems; Heart may show symptoms of narrow arteries, cardiac shock, blocks in capillaries; Brain might experience brain fog or forgetfulness, encephalitis, nerve cell damage, memory disturbance; Kidneys may experience the risk of dehydration, inflammation, etc. There may be other problems such as improper vision, skin irritation, hearing loss, blood clots, sleeping disorders, etc. Hence the experts advise the covid patients to have regular check-up of lungs function, heartbeat, blood pressure, and use blood thinners, zinc vitamin tablets as per advice. They shall perform regular exercise, yoga, breathing exercise, etc. It is advisable that the patients recovered from covid and others who have mild symptoms shall stay at home for few months and follow the precautionary measures as suggested above until their organs and body become normal.

As far as education in the post-Covid situation is concerned, Schools, Colleges and Universities were closed and students are at home for several months. During this lockdown, almost all Schools, Colleges and Universities started virtual classes and online education using Google meet, Google classroom, Zoom, Microsoft teams, Cisco webex or video-conferencing by skype, etc. They are conducting online tests and examinations using similar technological tools and students got enough opportunities to learn and practice at home by being safe and healthy. So there is a smooth transition from physical classrooms to digital or virtual classrooms. Even many corporates and industries have encouraged the students to learn through webinars, online quiz and online internships, without visiting the companies. Many companies have started conducting online tests and interviews to recruit the students. AICTE has offered several online ATAL FDPs, UHV workshops for the benefit of faculty members. Many engineering colleges have organised online meets, seminars, FDPs and webinars to the students, teachers and parents. In a nut shell the author opines that the post-Covid era has witnessed innovation in online education through enhanced use of e-learning, virtual classes and online assessment tools. Hence one can see that there is a great opportunity to expand the e-learning or online education in a bigger way throughout the world in the post-Covid era.

As regards employment, Covid-19 caused a devastating effect on human beings, due to closing down the industries, factories, manufacturing, services, businesses, retail shops, etc., across the world. The entire business is

Mahendra Gowda

frozen in lockdown and billions of people lost their livelihoods. In India several people working in unorganized and private sectors, including construction, manufacturing and especially migrant workers lost their jobs. Even many teaching and non-teaching staff in schools and colleges lost their jobs and experienced huge pay-cuts. Several Doctors and healthcare workers in private hospitals suffered without salary for few months. It is estimated that nearly 50 million people may have lost their jobs in India during the Covid-19 lockdown period (Figure 25).

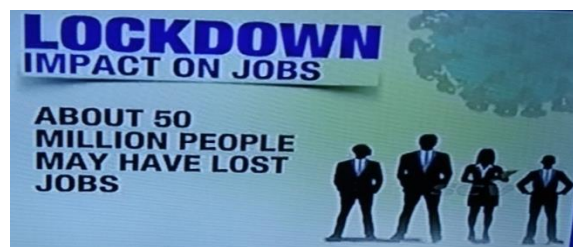


Fig. 25 Impact of Covid-19 lockdown on jobs [4]

Employees in many sectors including IT, production, services, education, others experienced lay-offs to greater extent, others faced pay cuts. However, some IT majors permitted majority of their workforce to work from home. The lockdown severely impacted jobs world-wide, especially in India the overall unemployment rate has jumped from 7.2% to 24% in just two months during the Covid-19 lockdown period (Figure 26).



Fig. 26 Unemployment rate rises during Covid-19 lockdown [4]

Covid-19 caused a great misery and sufferings, especially, to the migrant workers in our nation. When the 21-days lockdown was announced on 24th March 2020 night, many were caught in the shock without any preparations and stock of grocery, grains and livelihood for the next 3-weeks. After a week's struggling without work and food, millions of migrant workers started moving towards their home states. It is important to mention that few Honourable High Courts were seized of this issue and ordered the concerned state governments to provide food, shelter for migrant workers and pay for their transport, and accordingly some states made adequate arrangements. It was a matter of fact that several lakhs of migrant workers

struggled for their livelihood without any work and were on roads, walking for long distances on foot, carrying their children and some pregnant women. On their way, they suffered and faced severe hardship without any transport. Some of them met with accidents, crushed by the train and trucks, and thus lost their lives, causing a great loss to their families and next of kin. It is estimated that nearly 970 people died in this migrant workers tragedy including some drivers and others. It was a sad story in the history of this great nation that a great workforce, which used to carry out very hard work for building the nation right from the scratch, was left to lurch for many days as the administrators and others concerned turned a blind eye towards this tragic incident, and all witnessed the despair and sufferings of poor people for nearly two months, as telecasted by many news channels and electronic media. Fortunately, the Honourable Supreme Court took a *suo moto* cognizance of the problems faced by migrant workers in different states of the country and ordered the central and state governments to provide food and shelter to the migrant workers, and provide adequate transport arrangements for them as many were still stranded on roads, railway stations and state borders. This came as a sigh of relief for many who were still struggling.

Needless to say that Covid has impacted the life style of every human being. It was only the government employees and other rich people who observed less hardship as they had regular earnings and enough cash. But Covid caused a great distress to several millions of poor and middle class people in the country as the lockdown resulted in loss of jobs, cut in salaries and reduced earnings for more than six months. In this context, it is worth appreciating that the central and state governments provided free ration and grocery to many of these poor and middle class people through PDS and thus helped them to manage their livelihood. But many retired people who do not have enough earnings and many average income groups have suffered a lot without adequate cash. Many people could not return to their jobs as there were long-term shut down of businesses, enterprises, malls, stores, hotels, schools, colleges, unorganised sectors, etc. Figure 27 shows increase in both rural unemployment rate and urban unemployment rate from July to August 2020. There is slight reduction in the unemployment rate in September (Figure 28), however, this sad state of affairs is bound to continue for atleast another six months.

As regards the influence of Covid-19 on economy, it has blown a death knell to the growth of many countries. The entire operations came to stand still in many countries and even major economies have faced severe impact. The rating agencies have slashed the growth rates of many countries and as a result the

Mahendra Gowda

world economy may grow at an average -1 to 1% in FY 2021. The Q1 2020 GDP figures of G7 countries are shown in Figure 29. [12]. It is surprising to see that only China has recorded a positive growth of 3.2%. It can be observed that our nation has unfortunately recorded the lowest GDP figure of -23.9% in Q1 of 2020-21 followed by other countries, which have shown relatively lower negative GDP figures.



Fig. 27 Rural and Urban Unemployment rates rise from July to August [4]

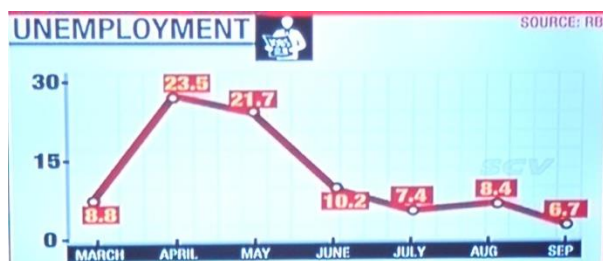


Fig. 28 Trace of unemployment rates in Covid-19 situation [4]

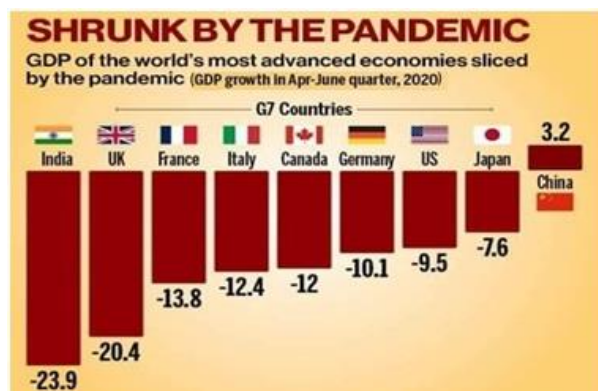


Fig. 29 The Q1 GDP figures of G7 countries [12]

Figure 30 shows the fall in GDP (from 3.1% to -23.9%) versus an increase in corona cases from 1400 to 36.2 lakhs during the same period (Q1 2020-21). It is convenient for some people to put the entire blame for the debacle of our economy on Covid-19. But the

true economists and wise-men used to remember the real happenings before and after Covid-19. It is evident from Figure 31 that our economy was in a continuous decline trajectory from Q4 2018 (8.2%) to Q4 2020 (3.1%). The sector-wise growth crash is shown in Figure 32. We can see that the major sectors such as construction, trade and manufacturing are the worst hit. There is only a ray of hope as Agriculture has shown a 3.4% growth, thanks to the Rain God and Farmers who are 'Annadhatha' for all the remaining people. Hope the blessings of the God to protect human beings and the good-will and hard-work of such good human beings will help our economy to come back on the growth trajectory (around 8% growth) in the years to come as predicted by IMF in Figure 33. There are signs of recovery of growth in few sectors such as automobiles, IT, consumer needs, etc. Hope it will improve in many other sectors in future.

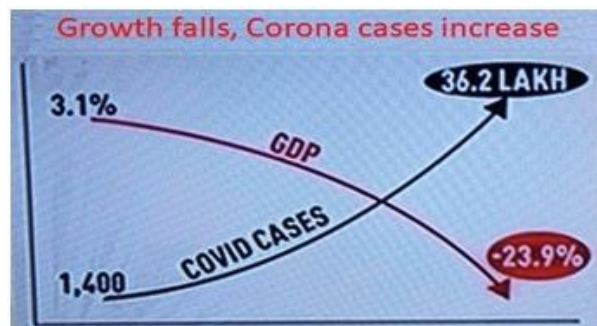


Fig. 30 The growth falls whereas corona cases increased in India [8]

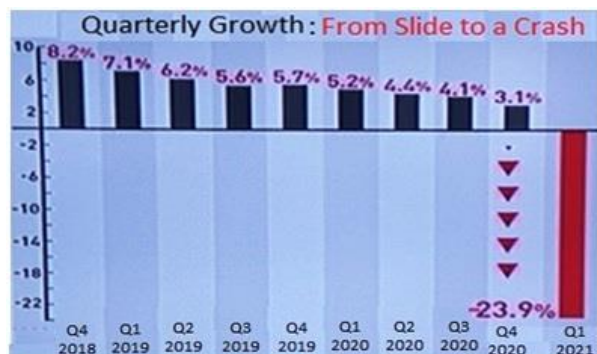


Fig. 31 Quarterly-wise fall in India's growth [8]

In order to reboot the economic activity, restore faith and confidence in people, to provide job and livelihood to those who lost during the last 4-6 months, countries across the world announced stimulus package depending upon the extent of damage to mankind and with a plan to revive all major activities. Figure 34 depicts the Covid stimulus package announced by major economies based upon the percentage of their GDP [4]. It found that India has

announced a package of Rs.20 Lakh crores amounting to around 10% of the GDP to cater to the needs of wide-ranging sectors. Hope this package will be sincerely distributed to the needy in various sectors to cushion the shock of growth crash, compensate the losses and enable restarting the growth engine. It is essential to highlight that utmost importance is to be given to Health, Education, Employment and Livelihood for the people to return to normalcy.

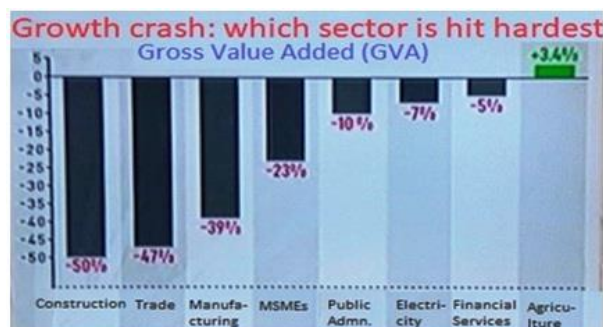


Fig. 32 Sector-wise growth crash in India [8]



Fig. 33 IMF growth forecast of major economies [4]

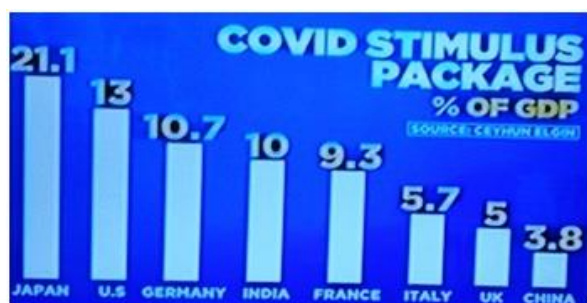


Fig. 34 Covid stimulus package as percentage of GDP [4]

It is worth mentioning that in the post-Covid era, one may worry as what happens if a coronavirus vaccine is never developed. There are some viruses for which we still do not have vaccines, says Dr. David Nabarro, a Professor of global health at Imperial College London,

who also serves as a special envoy to the World Health Organization on Covid-19. He opines that we cannot make an absolute assumption that a vaccine will appear at all, or if it does appear, whether it will pass all the tests of efficacy and safety [13]. It happened before, as many HIV/AIDS, Influenza, Dengue affected humans lost their lives and till today no suitable vaccine could be developed for these diseases and human beings have learnt how to avoid, tackle and live with such deadly diseases.

Though many scientists and medical professionals world-wide started discoveries and invention to come out with a suitable vaccine for coronavirus, the society is still bracing for a breakthrough in invention and waiting for a ray of light that an amicable solution would arise in near future. If it does not materialise, the worst-case possibility is that no right vaccine is ever developed. In this eventuality, the hopes of public will be dashed and they may lose faith in science and research. If that is going to be the outcome in future, instead of wiping out Covid-19, societies may learn to fight and live with it. Cities and many business locations started opening slowly and some freedom and relaxations are provided for people to attend work, office, business, etc., maintaining the social distancing and other personal hygiene norms. I hope that normalcy will be returned in few months and people will learn to work in the new normal environment and live carefully with the coronavirus and such other diseases.



Fig. 35 Global Hunger Index for the year 2020 [8]

9. Conclusions and recommendations

Covid-19 has turned to be a pandemic infecting several million people causing more than a million fatalities all over the world with the numbers rising. Though people were highly scared of it at the beginning and as the time passed, they have learnt how to prevent it and bear its brunt if infected. Since there is no breakthrough in discovering vaccine, people need to continue the current hygiene practices and medication to fight and live with the coronavirus and sustain its hazards. In view of a debate on lives versus livelihood, the nations have now started opening up to restart the economic activities to provide livelihood and jobs to

Mahendra Gowda

people while continuing to protect their health and safety.

It is recommended that in this nascent period of rejuvenation, all nations must primarily focus on four important areas, namely health, education, employment and food for the poor and unemployed. It is believed that the stability and sustainability achieved in these four frontiers will pave way for the growth and improvement of the economy of any nation. Especially, countries like India must focus on providing viable measures to safeguard the health of human beings, perhaps a common public health policy not a mere insurance, but a comprehensive healthcare procedure has to be worked out with funds approx. 10% of the budget earmarked and such measures be implemented irrespective of the nature of people, i.e., whether they are rich, poor, male, female, urban, rural, employed or not, and from any religion, culture, etc.

There is a strong belief that if human is healthy; he/she can live with peace, which leads to prosperity and growth of individuals, society, nation and eventually the whole world. There is a saying that education is the key to nation building. Hence, the governments of the day must spend atleast 10% of the budget on education, research and innovations. Similarly, the policy makers must focus on creating employment to the poor and needy, and spend substantial funds in annual budget. The time has come for the government to work out a universal income for every individual in poverty or below poverty line through a benevolent measure of enacting a Minimum Income Guarantee Act, in order to provide regular jobs for such people to earn certain minimum yearly income or provide certain cash transfers on monthly basis so as to protect the lives of downtrodden, migrant workers and poor who still suffer from hunger and poverty as India stands at number 94 out of 107 countries in Global Hunger Index for the year 2020 (Figure 35). The report says that around 14% of India's population is undernourished. Hence the lives of such people and many others with disability must be protected by providing requisite quantity of free food grains as envisaged in Food Security Act as our nation has surplus food grains, which must be properly stored, preserved and distributed to the needy on time. In addition, a regular cash transfer has to be ensured for their livelihood and health needs. Therefore, it is advisable to use the available resources judiciously to safeguard health, education, life and livelihood of human beings and thus pave the way for advancement of their progress, peace and happiness.

REFERENCES

- [1] https://www.who.int/health-topics/coronavirus#tab=tab_1
- [2] <https://www.channel4.com/news/factcheck/factcheck-qa-the-new-coronavirus-blood-tests>
- [3] <https://www.statista.com/chart/20641/average-number-infected-by-an-individual-with-diseases/>
- [4] www.indiatoday.in; India Today TV news channel-live news
- [5] <https://www.channel4.com/news/factcheck/factcheck-qa-the-new-coronavirus-blood-tests>
- [6] <https://www.medicaldevice-network.com/features/types-of-Covid-19-test-antibody-pcr-antigen/>
- [7] https://en.wikipedia.org/wiki/COVID-19_testing
- [8] www.ndtv.com
- [9] <https://www.mprnews.org/story/2020/03/11/Covid19-how-it-compares-with-other-diseases-in-5-charts>
- [10] <https://www.worldometers.info/coronavirus/>
- [11] <https://www.vox.com/2020/3/15/21180342/coronavirus-Covid-19-us-social-distancing>
- [12] www.businesstoday.in
- [13] <https://edition.cnn.com/2020/05/03/health/coronavirus-vaccine-never-developed-intl/index.html>