Healthcare System of India and the Covid-19 Pandemic: A Study on the Challenges and Road Map Ahead

Debasish Naskar¹*, Bappaditya Biswas²

¹Department of Commerce, Raja Peary Mohan College, Uttarpara, West Bengal, India ²Department of Commerce, University of Calcutta, West Bengal, India

*Corresponding Author's Email: deba05061@gmail.com

ABSTRACT

The world is currently experiencing the Covid-19 pandemic in more than 200 countries and territories all over the globe. India is one of the worst-hit countries by this pandemic. The healthcare sector is one of the worst affected by this pandemic. The lack of protective equipment, including N95 face masks, sanitizers and poor sanitizing process, poor medical facilities, shortage of ICU beds and ventilators, and excessive healthcare costs have made the situation more dangerous and revealed the weakness in our healthcare system. Low investment in the public healthcare sector creates a challenge for India's COVID-19 containment strategy. A huge variation in the healthcare system can also be found across the different states in India. These variations create challenges for the country's disease containment strategy. Though a well-structured health care system and well-established infrastructure are needed to counter this pandemic, India is far behind compared to the other developed and developing countries. However, new opportunities have evolved for India to develop newer drugs and vaccines to stand against this pandemic.

Keywords: Global Emergency; Healthcare; Health Insurance; Pandemic; WHO

INTRODUCTION

Now the whole world is witnessing the devastating effect of the COVID-19 pandemic. The World Health Organization (WHO) has declared the Covid-19 outbreak as a global emergency on January 30, 2020. According to WHO, 43.73 crores of confirmed cases and 59.61 lakhs of deaths were reported to WHO as of March 2, 2022. The situation has led to an economic crisis and recession worldwide. India is the worst-hit country in this pandemic. As declared by the Ministry of Health and Family Welfare (MoHFW), Government of India, over 4.29 crore confirmed cases and 5.14 lakh deaths have been registered as of March 2nd, 2022. In response to this epidemic, the government has imposed travel restrictions, border shutdowns, and quarantine to mitigate the spread of the pandemic. But these actions had a negative impact on the economy and also caused a reduction in the workforce across the different sectors and resulted in many job losses.

Though all sectors have been affected by this pandemic, the healthcare industry is the most affected one. To survive this epidemic, we need a strong health infrastructure, but India's healthcare system and capacity are insufficient to deal with it. One of our country's major drawbacks is a lack of doctors. medical and pharmaceutical supplies and the inability to provide adequate testing facilities. The government's investment in the public health care system is very low in India. The majority of Indians finance their healthcare expenses by themselves. As per the National Health Profile 2019, about 65% of total healthcare spending is household out-of-pocket expenditure. Higher population density, poor socioeconomic status, low public healthcare investment, and a low literacy rate have all harmed India's healthcare system.

LITERATURE REVIEW

Talib and Rahman (2013) found that a considerable portion of healthcare establishments in India,

consisting of private hospitals and government hospitals, are quality-certified and government accredited.

Wani, Taneja, and Adlakha (2013) suggest that providing primary healthcare is the responsibility of the government and also an objective to create 'equal society," which is repeatedly emphasised in the Preamble and Directive Principles of the Constitution of India. In this context, significant progress can be found in India's healthcare system.

Ganesan and Veena (2018) suggest that the private healthcare sector and the government need to work hand in hand as a team to make progress and achieve the required development in the healthcare sector. This move can transform our country into a global hub of innovation, health services, and manufacturing healthcare equipment.

Kasthuri (2018) found five main challenges in the Indian healthcare sector: awareness or the lack of it; access to healthcare or the lack of it, absence or the human power crisis in healthcare, affordability or the cost of healthcare; and accountability or the lack of it.

According to Kapur (2019), the public health care system in rural India is underdeveloped in comparison to urban areas. Illness and disease spread are more vulnerable in rural areas due to contaminated water, a lack of sanitation and hygiene, a lack of health awareness, and so on.

Singh, Ravi, and Chakraborty (2020) found that the availability of hospital beds in government hospitals is extremely low in India. Among the total government hospital beds, only 5%-8% are ICU beds, and of the total ICU beds, assuming only 50% have ventilators.

Gopalan and Misra (2020) suggest that India should emphasize on National Health Programs to counter the possible outburst of communicable and non-communicable diseases.

lyengar *et al.* (2020) claim that Covid 19 pandemic is a learning opportunity for India to strengthen its health care infrastructure. It helps to understand the drawbacks and limitations in the health system and helps in optimizing the available resources.

Objectives of the study:

The objectives of the study are as follows:

- i. To overview the current scenario of the Indian healthcare sector.
- ii. To assess the needs and urgency of healthcare reboot in India.

METHODOLOGY

Based on secondary data, the current study is descriptive and analytical in nature. The data has been collected from various related research papers, reputed journals and magazines, annual reports of the Ministry of Health and Family Welfare, National Health Profile data, Global Health Security Index and various websites. The collected data has been analyzed with the help of tables, charts, and other diagrams to present the data in a more comprehensive manner.

Following methodology has been used for state wise estimation of Hospital beds, ICU beds and Ventilators –

- 1. National Health Profile, 2019 provides:
- a. State/UT wise number of government hospitals in India.
- b. State/UT wise number of government Hospital beds in India.

2. National Sample Survey (NSS) 75th Round Report, 2019 provides a percentage break-up of hospitalization cases by type of hospital across government/public hospital, charitable/trust/NGO-run hospital, and private sector hospital, for India and States/UTs (Ministry of Statistics and

Programme Implementation, 2019).

Based on the above data (1& 2), following assumptions has been made:

• Based on the percentage break up of hospitals (as provided in NSS) and number of government hospital (as provided in NHP), an estimation has been made for number of private hospitals in states/UTs.

• The same percentage break-up as to calculate the number of private hospitals, has been used here also to estimate the number of hospital beds in states/UTs.

3. Among the total government hospital beds, only 5%-8% are ICU beds (Singh, Ravi & Chakraborty, 2020). COVID-19: Is India's health infrastructure equipped to handle an epidemic.

4. Among the total ICU beds assuming only 50% have ventilators (Singh, Ravi & Chakraborty, 2020). COVID-19: Is India's health infrastructure equipped to handle an epidemic.

Based on the above data (3 & 4), following assumptions has been made:

- ICU bed strength is at 5% of total hospital bed strength.
- 50% of ICU beds are equipped with ventilators.

RESULTS AND DISCUSSION

Global Health Security Indicators

Table 1: Table showing Global Health Security indicators

Country	Overall	Prevention	Detection	Respond	Health	Norms	Risk
United States (Rank 1)	75.9	79.4	80.1	65.7	75.2	81.9	73.3
United Kingdom (Rank 7)	67.2	63.5	70.8	64.8	68.3	62.5	73
Italy (Rank 41)	51.9	47.2	49.7	43.2	40.2	65.3	65.9
Brazil (Rank 43)	51.2	49.7	53.6	56.3	50.3	41.7	55.9
China (Rank 52)	47.5	43.9	48.5	38.5	51.8	38.9	63.4
India (Rank 66)	42.8	29.7	43.5	30.3	46.1	47.2	60.2

Source: Global Health Security Index, 2021

Note:

- 1. 'Higher rank and lower score indicate higher vulnerability.
- 2. GHS index is an aggregate score of 6 indicators.
 - i. Prevention of the emergence or release of pathogens
 - ii. Early detection and reporting for epidemics of potential international concern
 - iii. Rapid response to and mitigation of the spread of an epidemic
 - iv. Sufficient and robust health system to treat the sick and protect health workers
 - v. Commitments to improving national capacity, financing plans to address gaps and adherence to global norms
 - vi. Overall risk environment and country vulnerability to biological threats'



Figure 1: Global Health Security indicators

The Global Health Security Index (Figure 1) measures pandemic preparedness of countries on a score of 1-100. The score is based on the ability to prevent, detect, mitigate and cure of diseases. India ranks at 66 out of 195 countries. The above data indicate that we may be more vulnerable than China (at 52), Brazil (at 43), Italy (at 41), United Kingdom (at 7) and the United States (at 1). The above result clearly indicates the lack of health security in India and also suggests an improvement in its health facility and health infrastructure.

Health Expenditure

The following graphs shows the health expenditure as share of GDP (Figure 2), Government expenditure on health as percentage of GDP in India (Figure 3) and the per capita health expenditure of different countries across the globe (Figure 4).



Source: OECD iLibrary, 2021

Figure 2: Health Expenditure as share of GDP

The above graph (Figure 2) shows that OECD countries spent on average 8.8% of GDP on healthcare in 2019 (prior to the COVID 19 pandemic). The health expenditure of the United States was the most at 16.8% of its GDP, followed by Germany (11.7%) and Switzerland (11.3%). The health care expenditure of France, Japan, Canada, Austria, United Kingdom etc. are more than 10% of their GDP. India spent only 3.6% of GDP on health care, which was one of the lowest among the developed and developing countries. Even it is lowest among the BRICS countries also, where the health

expenditure as percentage of GDP for Brazil (9.6%) is the most, followed by South Africa (8.6%), Russia (5.6%), and China (5.1%). To combat the epidemic of Covid 19 India needs to increase investment in the health care sector.

In 2020 a significant growth in the ratio of health spending to GDP can be experienced for a number of OECD countries. Specially those countries which were worst affected by the pandemic, reported remarkable growth in health expenditure as percentage of GDP (e.g. United Kingdom, France, Italy etc.).



Source: RBI, 2020

Figure 3: Government Expenditure on Health as Percentage of GDP in India

India is suffering from its under-funded healthcare investment by the central government. Centre's stagnated contribution makes state driven healthcare spending in India. The above graph (Figure 3) depicts that Central government's health expenditure as percentage of GDP has grown only 23% in last eighteen years, starting from 0.26% in 2002-03 to 0.32% in 2019-20, compare to overall spending growth of 27% starting from 0.96% in 2002-03 to 1.22% in 2019-20. State government's spending on health is maximum in the year 2018-19 at 1%, where the centre's contribution is only 0.29%, which accounts for almost 78% states driving health expenditure in the public healthcare system in India.



Source: OECD iLibrary, 2021

Figure 4: Per Capita Health Expenditure

Figure 4 shows that average per capita health expenditure of OECD countries was estimated at USD 4,087 in 2019. The expenditure reached at USD 10,948 in the United States for every US citizen. Switzerland (USD 7,138) spends the next highest in per capita health among the OECD countries, followed by Norway (USD 6,745), Germany (USD 6,518), Netherlands (USD 5,739) and Austria (USD 5,705). While the health expenditure of other countries, such as Japan, United Kingdom, New

Zealand etc. were almost the same as the OECD average. The per capita health expenditure of China was below 20% of the OECD average, while Indonesia and India spent only 8% and 6% of this figure. Even, India's per capita health expenditure is lowest among the BRICS countries also, where per capita expenditure of Russia is the most (USD 1,860), followed by Brazil (USD 1,514), South Africa (USD 1,104), and China (USD 811). The results signify that India needs more investment in its healthcare system.

The above Figure 4 also shows the classification of health expenditure on the basis of type of health care coverage. Across the OECD countries, on an average more than 75% of health expenditure is financed by government schemes or other compulsory insurance schemes. This share is very high in the United States (83%). In India the picture is quite different. Here, only 27% of health expenditure is financed by government insurance schemes and the rest of the portion is from voluntary/ out of pocket health expenditure. That very low government health expenditure in this pandemic moment will create an extra burden in the pocket of the common people.

Health Care Activities and Health Workforce

Health care activities and health workforce are an indicator of the resource available for delivering services to the patient. The following graphs shows the hospital beds per 1,000 population (Figure 5), practising doctors per 1,000 population (Figure 6) and practising nurses per 1,000 population (Figure 7) across the globe.



Source: OECD iLibrary, 2019

Figure 5: Hospital Beds (per 1,000 population)

Figure 5 shows the number of hospital beds per 1000 population across the globe. Across the OECD countries, there were on an average 4.7 hospital beds per 1,000 population in 2017. In Japan and Korea, the rates are extremely high with 13.1 and 12.3 beds per 1,000 people respectively. In India, there is a major problem in availability of hospital beds. There are only 0.5 beds available per 1,000 people. Which is the sign of low healthcare investment and confirming the health backwardness in India. The result proves that India needs more healthcare spending to curve down the inequality.

The number of hospital beds per capita has decreased in almost all OECD countries since 2000. In India, it has decreased from 0.7 beds per 1 000 people in 2000 to 0.5 people in 2017 (with a sharp fall of 40%). The figure signifies the necessity of an increase in the number of hospital beds all over India to strengthen our health infrastructure.



Source: OECD iLibrary, 2021

Figure 6: Practising Doctors per 1,000 population

Figure 6 shows the practicing doctors per 1,000 population all over the world. The average number of practicing doctors in OECD countries was 3.6 per 1,000 population in 2019. The number of practicing doctors in Greece was 6.2 per 1,000 population and stood first position, followed by Austria and Portugal with 5.3 doctors for the same. India has only 0.9 practicing doctors per 1,000 population, which is very few compared to the world scenario. Here also India is lowest among the SAARC countries. Due to shortage of doctors, to some extent Indian people deprived from the proper treatment and it's also creates a financial burden for the poor people. Shortage of doctors creates an overburden for the existing practicing doctors, to devote their time to serve a huge number of patients.

The number of doctors per 1,000 population have grown in almost all the OECD countries between the year 2000 and 2019. In India, it has increased by 80% in this time period, from 0.5 doctors per 1,000 population in 2000 to 0.9 doctors per 1,000 population in 2019. Though the number has increased a lot, a gap between the demand and supply of doctors still exists in India. The above data signify that we need a greater number of doctors to overcome these limitations and to provide better services.



Source: OECD iLibrary, 2021

Figure 7: Practising nurses per 1,000 population

From the above figure (Figure 7) it is observed that in 2019 there were on an average 8.8 nurses per 1,000 population in OECD countries, ranking from almost 18 per 1,000 population in Norway and Switzerland to 1.1 in South Africa. India have only 2.4 nurses per 1,000 population in 2019. India needs to maximize its number of nurses and need to implement advanced roles for them, as the doctor population ratio is very low there. To counter the problem of shortages of doctors, nurses can play an advanced role to ensure proper care of patients.

The number of nurses has increased in almost all OECD countries since 2000. It increased from 7.0 per 1 000 population in 2000 to 8.8per 1 000 population in 2019. In case of India, the figure is more than double, comparing from 0.7 nurses per 1,000 population in 2000 to 2.4 nurses per 1000 population in 2019. In spite of this steady growth, we still have a shortage in the total required number of nurses. Hence, India needs more improvement in that particular aspect.

Health Infrastructure in India

The following tables shows the state wise health infrastructure in India - number of hospitals per states/UTs (Table 2), number of hospital beds per states/UTs (Table 3) and number of ICU beds / Ventilators per states/UTs (Table 4).

States/UT's	Number of hospitals in public sector	Number of hospitals in private sector	Total (public + private)
Uttar Pradesh	4635	2468	17103
Karnataka	2842	7842	10684
Rajasthan	2850	2794	5644
Telangana	863	3247	4110
Kerala	1280	2062	3342
Maharashtra	711	2492	3203
Bihar	1147	1887	3034
Odisha	1806	695	2501
Tamil Nadu	1217	1222	2439
Punjab	682	1638	2320
West Bengal	1566	697	2263
Haryana	668	1480	2148
Assam	1226	503	1729
Gujarat	438	970	1408
Jharkhand	555	809	1364
Uttarakhand	460	829	1289
Himachal Pradesh	801	235	1036
Madhya Pradesh	465	506	971
Andhra Pradesh	258	670	928

Table 2: Number of hospitals per states/UTs

Chhattisgarh	214	182	396
Arunachal Pradesh	218	20	238
Meghalaya	157	28	185
Delhi	109	67	176
Tripura	156	8	164
Jammu & Kashmir	143	14	157
Mizoram	90	23	113
Goa	43	22	65
Nagaland	36	13	49
Sikkim	33	8	41
Manipur	30	8	38
Andaman Nicobar Island	30	6	36
Daman & Diu	5	21	26
Puducherry	14	6	20
Dadra & N Haveli	12	6	18
Lakshadweep	9	4	13
Chandigarh	9	4	13
India Total	25,778	43,487	69,265

Source: Researcher self-calculation (Based on Ministry of Health and Family Welfare, 2020)

Table 3: Number of hospital beds per states/UTs

States/UTs	Number of hospital beds in public sector	Number of hospital beds in private sector	Total (public + private)
Uttar Pradesh	76260	205142	281402
Karnataka	69721	192388	262109
Maharashtra	51446	180293	231739
Tamil Nadu	77532	77843	155375
West Bengal	78566	34969	113535
Telangana	20983	78936	99919
Kerala	38004	61223	99227
Rajasthan	47054	46122	93176
Andhra Pradesh	23138	60092	83230
Madhya Pradesh	31106	33833	64939
Gujarat	20172	44690	64862
Punjab	17933	43064	60997

Delhi	24383	15072	39455
Haryana	11240	24901	36141
Bihar	11664	19193	30857
Jharkhand	10784	15712	26496
Odisha	18519	7131	25650
Assam	17142	7036	24178
Uttarakhand	8512	15331	23843
Chandigarh	9412	8018	17430
Himachal Pradesh	12399	3641	16040
Jammu & Kashmir	7291	704	7995
Chandigarh	3756	1875	5631
Meghalaya	4457	787	5244
Puducherry	3569	1603	5172
Tripura	4429	238	4667
Goa	3012	1572	4584
Arunachal Pradesh	2404	220	2624
Nagaland	1880	681	2561
Mizoram	1997	499	2496
Sikkim	1560	392	1952
Manipur	1427	363	1790
Andaman Nicobar Island	1075	219	1294
Daman & Diu	240	1010	1250
Dadra & N Haveli	619	322	941
Lakshadweep	300	126	426
India Total	7,13,986	1,18,242	18,99,228

Source: Researchers self-calculation (Based on Ministry of Health and Family Welfare, 2020)

Table 4: Number of ICU beds / Ventilators per states/UTs

States/UTs	Number of ICU beds in public sector	Number of ICU beds in private sector	Total (public + private)	Number of Ventilators in public sector	Number of Ventilators in private sector	Total (public + private)
Uttar Pradesh	3813	10257	14070	1907	5129	7036
Karnataka	3486	9619	13105	1743	4810	6553
Maharashtra	2572	9015	11587	1286	4508	5794
Tamil Nadu	3877	3892	7769	1939	1946	3885

India Total	35702	59267	94969	17861	29643	47504
Lakshadweep	15	6	21	8	3	11
Dadra & N Haveli	31	16	47	16	8	24
Daman & Diu	12	51	63	6	26	32
Andaman Nicobar Island	54	11	65	27	6	33
Manipur	72	18	90	36	9	45
Sikkim	78	20	98	39	10	49
Mizoram	100	25	125	50	13	63
Nagaland	94	34	128	47	17	64
Arunachal Pradesh	120	11	131	60	6	66
Goa	151	79	230	76	40	116
Tripura	221	12	234	111	6	117
Puducherry	179	80	259	90	40	130
Meghalaya	223	40	263	112	20	132
Chandigarh	188	94	282	94	47	141
Jammu & Kashmir	365	35	400	183	18	201
Himachal Pradesh	620	182	802	310	91	401
Chandigarh	471	401	872	236	201	437
Uttarakhand	426	7667	1193	213	384	597
Assam	857	351	1209	429	176	605
Odisha	926	357	1283	463	179	642
Jharkhand	539	786	1325	270	393	663
Bihar	583	960	1543	292	480	772
Haryana	562	1245	1807	281	623	904
Delhi	1219	754	1973	610	377	987
Punjab	897	2153	3050	449	1077	1526
Gujarat	1009	2235	3244	505	1118	1623
Madhya Pradesh	1555	1692	3247	778	846	1624
Andhra Pradesh	1157	3005	4162	579	1503	2082
Raiasthan	2353	2306	4659	1177	1153	2330
Kerala	1900	3061	4961	950	1531	2481
Telangana	1049	3947	4996	525	1974	2499
West Bengal	3928	1749	5677	1964	875	2839

Source: Researchers self-calculation (Based on Ministry of Health and Family Welfare, 2020)

The above tables (Table 2, 3 & 4) show the insufficiency of health infrastructure in India. The above estimates suggest that an approximate India have 19,00,000 hospital beds, 95,000 ICU beds and 48,000 ventilators. The result shows an inadequacy in the healthcare infrastructure in India. Again, inequality exists in distribution of healthcare facilities among the different states. Top five states comprise almost 55% of total healthcare facilities of the country in terms of availability of hospital beds, ICU beds and ventilators – Uttar Pradesh (14.8%), Karnataka (13.8%), Maharashtra (12.2), Tamil Nadu (8.1%), West Bengal (5.9%). To counter this pandemic and to provide essential healthcare facilities to every Covid-19 patient we need rapid expansion in healthcare capacity and also, we should focus on removing the inequalities in distribution of healthcare facilities.

Findings

• The healthcare spending of India is very low compared to the other developed or developing countries. India's total healthcare expenditure is only about 3.6% of GDP, far lower comparing with the average healthcare expenditure of OECD countries at 8.8% of GDP in 2019.

• India's public healthcare expenditure accounts for only about 1%, which is one of the lowest around the world. Even it is lowest among the BRICS countries also.

• India's overstrained public health infrastructure forces millions of Indians to the costly private healthcare sector.

• Shortage in number of hospitals and availability of hospital beds are the major crises in the Indian health sector. There are only 0.5 beds available per 1,000 population, comparing to average 4.7 hospital beds per 1,000 population in OECD countries.

• The number of doctors per capita is very low in India at 0.8 practicing doctors per 1,000 population, against the WHO stipulated standard of doctor-population ratio 1:1000. The average per capita doctors in OECD countries are 3.5 doctors per 1,000 population.

• The number of nurses per capita in India is just 1.5 nurses per 1,000 population, comparing to average of OECD countries at 8.8 nurses.

Recommendations

• India needs to increase the budget allocation towards the healthcare sector and effective utilisation of existing budgets to strengthen the countries healthcare system.

• Government needs to invest more in the public healthcare system to make it efficient and reduce over dependence on the private healthcare system.

- India needs to smooth implementation of all the existing policies announced by the government.
- India needs to make an efficient public health infrastructure, with all modern facilities and essential elements of health.

• India needs to open new hospitals and increase the number of hospital beds so that the benefits of the health system can reach to every patient.

• The number of doctors and nurses per capita should be increased.

• India needs to implement the universal public health insurance schemes for all to reduce the healthcare cost borne by the poor.

CONCLUSION

In spite of the centuries-old heritage of medical science, a shortage of healthcare infrastructure at almost all levels exists all over India. There is a great discrepancy in the quality and coverage of medical services across the nation. Government expenditure on health in India is one of the lowest in the world. An overstretched public healthcare system forces millions of Indians to move towards the costly private health-care sector. Under-investment in the public healthcare system, poor health infrastructure, and variations in healthcare systems among the different states may create special challenges for the country's Covid-19 containment strategy. India needs to increase investment in the public healthcare sector and should focus on opening new hospitals, increasing the number of hospital beds, number of

doctors and nurses etc. The Covid-19 pandemic has made India learn about how to find healthcare drawbacks and to rediscover those which may trigger public health reforms. It has also taught us the necessity of rebooting the healthcare system in India.

ACKNOWLEDGMENT

The authors would like to express their heartfelt gratitude and respect to Prof. Ashish Kumar Sana, Department of Commerce, University of Calcutta, under whose guidance this research work took shape. They are extremely grateful to Dr. Sandeep Poddar, Deputy Vice Chancellor (Research & Innovation), Lincoln University College, for his precious guidance, unwavering support, constant help and motivation. It was a great privilege and honor to study and work under his guidance.

REFERENCES

- Ganesan, L., & Veena, S. R. (2018). 'Make in India' for healthcare sector in India: a SWOT analysis on current status and future prospects. *International Journal of Health Science and Research*, 8 (2), 258-265.
- Global Health Security Index. (2021). Advancing Collective Action and Accountability Amid Global Crisis. https://www.ghsindex.org/wp-content/uploads/2021/12/2021_GHSindexFullReport_Final.pdf.
- Gopalan, H. S., & Misra, A. (2020). COVID-19 pandemic and challenges for socio-economic issues, healthcare and National Health Programs in India. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *14*(5), 757-759.
- Iyengar, K., Mabrouk, A., Jain, V. K., Venkatesan, A., & Vaishya, R. (2020). Learning opportunities from COVID-19 and future effects on health care system. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 14(5), 943-946.
- Kapur, R (2019). The Public Health System in India. Acta Scientific Nutritional Health, 3(11), 130-133.
- Kasthuri, A. (2018). Challenges to healthcare in India-The five A's. *Indian Journal of Community Medicine:* Official Publication of Indian Association of Preventive & Social Medicine, 43(3), 141.
- Ministry of Health & Family Welfare. (4th October, 2021). *National Health Profile 2021. Government of India*. https://cbhidghs.nic.in/showfile.php?lid=1160
- Ministry of Health and Family Welfare. (16th October 2020). *Health and family welfare statistics in India 2019-20*. https://main.mohfw.gov.in/sites/default/files/HealthandFamilyWelfarestatisticsinIndia201920.pdf
- Ministry of Statistics and Programme Implementation. (November, 2019). Key Indicators of Social Consumption in India: Health. NSS 75th Round. http://164.100.161.63/download-reports?main_cat= NzIy&cat=All&sub_category=All
- OECD iLibrary. (7th November, 2019). Heath at a Glance 2019: OECD Indicators. https://doi.org/10.1787/ 4dd50c09-en
- OECD iLibrary. (9th November, 2021). Heath at a Glance 2021: OECD Indicators. https://doi.org/10.1787/ ae3016b9-en
- Reserve Bank of India (2020). State Finances: A Study of Budgets of 2019-20. https://rbidocs.rbi.org.in/ rdocs/Publications/PDFs/STATEFINANCE201920E15C4A9A916D4F4B8BF01608933FF0BB.PDF.
- Singh, P., Ravi, S., & Chakraborty, S. (2020). COVID-19: Is India's health infrastructure equipped to handle an epidemic. https://www.brookings.edu/blog/up-front/2020/03/24/is-indias-health-infrastructure-equipped-to-handle-an-epidemic/.
- Talib, F., & Rahman, Z. (2013). Current Health of Indian Healthcare and Hospitality Industries: A Demographic Study. *International Journal of Business Research and Development*, 2(1), 1-17.
- Wani, N. U. H., Taneja, K., & Adlakha, N. (2013). Health System in India: Opportunities and Challenges for Enhancements. *IOSR Journal of Business and Management (IOSR-JBM), 9*(2), 74-82.
- World Health Organization (2nd March, 2022). WHO Coronavirus (Covid-19) Dashboard. https://covid19.who.int/