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Transformative Effects of COVID-19 on Global Economy and Internet of Medical Things (IoMT): Current Vision, Role and Applications

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ABSTRACT: The sudden outbreak of novel Corona Virus COVID-19 creates an alarming situation throughout the world and declared as global pandemic by World Health Organization (WHO). It alerts the governments and management bodies of all countries to take precautionary steps to reduce the positive rate of COVID-19 by implementing smart or full lockdowns. It drastically impacts over the global economy by affecting in all sectors from transport to industry and education to healthcare. WHO confirms 162, 177, 376 COVID-19 positive cases while the number of deaths has reached 3, 364, 178. This research paper shows the transformative effects of COVID-19 on global economy and evolutionary development via Internet of Medical Things (IoMT). We highlighted the COVID-19 background with their clinical features, symptoms, transmission behavior and recent advancements. We discussed various economy sectors with relevant statistics and their impact. Furthermore, we elaborated different emerging technologies for combating COVID-19 under umbrella of IoMT with their current vision, key role, available applications and contributions. We have also discussed various pandemics which outbreak in past.

Keywords: COVID-19, Global Economy, Internet of Medical Things (IoMT), Robots, IoT Buttons, Telemedicine, Artificial Intelligence, Medical Imaging, 5G

I. INTRODUCTION

Coronavirus disease 2019 is known as Covid-19. Coronavirus is considered as the family of viruses that include the diseases such as the severe acute respiratory syndrome (SARS) [1]. These diseases include symptoms such as headache, fever, fatigue, cough, and difficulty while breathing. The scientists have determined that SARS-COV is a member of the coronavirus family, which typically spreads from bats and rodents [2]. The first case of this disease was reported in December 2019, in Wuhan, China. Since that, this disease spreads very rapidly throughout the rest of the world in more than 212 countries [3]. Most of the countries have taken strict measures such as lockdown or stay at home orders to control this virus from spreading. According to the World Health Organization, there are 162,177,376 coronavirus cases while the number of deaths has reached 3,364,178 [4].
This paper discusses the transformative effects of Covid-19 on world economy with statistics and current vision, support and challenges of Internet of Medical Things (IoMT) to handle the Covid-19 outbreak. First, the Covid-19 transmission behavior along with it characteristics, symptoms, detection methods, medicine and precautions are elaborated. Past outbreaks are highlighted with destructive statistics. After that, deeply studied the effects on corona virus on world economy that how drastically it changed the world economy. Furthermore, various technologies of IoMT such as smart thermometers, IoT buttons, robots, Telemedicine, Autonomous vehicles, connected hospitals, crowd screening and surveillance, wearable IoT, blockchain, mobile applications, medical imaging and 5G are discussed with current vision that how can be adopted to minimize the effects of this outbreak and helps in the recovering.

II. COVID-19 BACKGROUND

SARS and Covid-19 are similar to each other as they are both types of coronavirus. SARS started in China in 2003 and spreads to different countries. This disease ended in 2004 but it seems that Covid-19 spreads faster than SARS. Coronaviruses are mainly RNA viruses ranges from 600-A to 1400-A in diameter [5]. The birthplace of Covid-19 virus is Wuhan, China. The cause of this virus might be linked to the seafood market, but this is not the exact source from where the disease spreads in China. The investigations are going on to determine how this virus started. The SARS-COV first case was also reported in China and after that it spreads to 37 more countries [6]. Due to SARS-COV, 8000 people were infected and 774 people lost their lives. In comparison, the coronavirus disease has spreads to more than 212 countries worldwide. On 31 December 2019, the World Health Organization reported 27 cases in China; this was linked to the Wuhan seafood market, which includes animals like bats and rodents. The disease spreads rapidly form Wuhan to other cities of China and then it started to

spread worldwide. It takes around 5 – 14 days for the symptoms to be visible for this virus.

A. Covid-19 Characteristics

It has been observed that majority of the patients show symptoms such as fever, breathlessness, and sore throat. Whereas other symptoms such as diarrhea, nausea, coughing up blood are very rare. According to the CDC, the people that are most likely to contract this disease are the people who are above 60 and people having existing diseases such as asthma, diabetes, hypertension etc.

B. Transmission Behavior

It is disclosed that this virus is generally transferred from one person to another. This virus is transmitted to people through coughing and sneezing from the spread of respiratory droplets in the air and these droplets have the tendency to cover a distance only up to 6 feet. The respiratory infections are mainly transmitted by various sizes of droplets. Therefore, the person is at risk when he gets close to the one who is infected with this virus. There is an information that this virus lasts up to three days on the surface of plastic and steel, 4 hours approximately on copper surface and up to 24 hours on the surface of cardboard.

C. Different Phases of COVID-19

According to the World Health Organization, the pandemic of Covid-19 is categorized into four different stages. This categorization helps the other countries to implement the rules such as closing the educations system and enforcing lock down for some time Duration.

Phase 1: Imported Cases Only. In this stage, the disease does not spread in the whole country. Only those people are infected who are living in the effected region.

Phase 2: Irregular Cases/Local Transmission. The second stage takes place when there are some infrequent cases in the country. This stage mainly occurs when the people who are infected contact with their family members or friends. Therefore, to stop this disease from spreading it is mandatory for infected people to stay in quarantine.

Phase 3: Clusters of Cases. When this disease starts to circulate and effect those who are not in contact with the people who are already having this disease then this is the third stage of an outbreak, which is termed as the cluster of cases. In this stage, the lockdown becomes necessary to stop this disease from spreading.

Phase 4: Community Transmission. In the fourth stage of this pandemic, there are very large outbreaks of locally transmitted cases in a country. It is almost impossible to control the outbreak at this stage, and developing a cure is the only option available. This causes a significant increase in the number of reported cases and deaths.

D. Diagnostic Testing for Covid-19

As from the past few months, this disease is almost spreads all over the world so to diagnose the infected peoples a beneficial procedure is required. For this purpose, the centers for control disease and prevention (CDC) has provided some guidelines for the testing criteria of the COVID-19 disease. The guidelines include the patients who are hospitalized and shows the symptoms mentioned above, the patients who are above the age of 65 and having existing medical disorders. Centers for control disease and prevention ensures that there are two tests available for the COVID-19.One is the Viral test which indicates about the current infection and Second is the Antibody test which tells if the patient had any infection before.

Contract Tracking. It is very challenging to identify the exact number of patients infected with the coronavirus disease. Contract tracing is a process, which determines the individuals infected with a history of contact with that infected person and they record the details of the individuals who are infected. Therefore, those individuals should be tested immediately.

Clinical Test for Covid-19. The test of COVID-19 includes some techniques to detect the existence of this virus. At present there are only two tests available for COVID-19 outbreak. One is the Nucleic acid amplification test and World Health Organization (WHO) recommended this test. The nucleic acid amplification test is also known as molecular test and this test uses the swab technique. The main drawback of this test is that it only detects the current infection. Second is the serological test and it's not similar to the nucleic acid amplification test. The serological test detects the existence of the virus by itself and the antibodies in the bloodstream of a person is identified by this test. Antibodies are proteins which are formed by the white blood cells. The major drawback of this test is that it does not detect the infection during its early days. When the body starts to build the antibodies against the infection.

E. Recent Advancements

Due to the vast and sudden outbreak of the Covid-19, many scientists, laboratories and organizations all over the world were busy doing research in order to find the reason behind this virus so that proper treatments and vaccines could come into existence [7]. Due to this sudden outbreak, many papers were published explaining different aspects behind the Covid-19. In order to find a proper treatment for this virus a scientist Dawei Wang observed about 138 infected people in Wuhan, china due to this Covid-19 as well observed the different symptoms of each patient so that he could handle each case carefully. He also discussed the laboratory test reports of the patients in order to describe which organs were mainly affected due to this disease [8]. Another Scientist Nanshan chen also observed about 99 patients suffering from the same disease and found that the major reason behind this virus is the seafood market in Wuhan. Different experiments were done in order to find the clinical characteristics of the virus as well discussed the results of each experiment which reported that among the affected patients which were observed 17% developed ARDS and 11% of them died of MODS [9]. Fang Jiang analyzed about six published papers in which the clinical characteristic of the disease was discussed. He mainly summarized the viewpoints of all the six paper and discussed different reasons and treatments of the Covid-19. He also mentioned that various authors have taken the characteristics of the virus available on different platforms such as Google scholar. Both these works fall short as the subset that they have reviewed is very small when compared to the broader subject [6]. Fang jiang also mentioned that these surveys shed some light on the current situation of the Covid-19 [10].

Although a lot of research has been carried out but there is no single paper which has clearly figured out the current condition of the Covid-19, moreover the impact of technology has not been discussed in any of the paper so there is need of a proper research which covers all these aspects and provides all the views

related to Covid-19[11] which would help people get a deeper knowledge of the current situation of the virus.

III. PANDEMICS FROM PAST

A large number of outbreaks and epidemics took place in the past century but coronaviruses such as SARS-COV and MERSCOV were mainly responsible for a majority of these outbreaks. Moreover, different types of flu viruses such as H1N1, H2N2 and H3N3 were the main cause of the pandemics in the past 105 years [12]. The virus H1N1 itself was responsible for two pandemics one the Spanish Flu from (1918-19) and the second Swine Flu from (2009-2010) whereas H2N2 and H3N3 were the main reason behind the Asian Flu and the Hong Kong Flu [13].
This section is a short summary on the viruses of the past century.

A. Spanish Flu Pandemic (1918-1919)
The main reason behind the Spanish Flu pandemic was the H1N1 virus which is said to be raised in birds[14] . The main victims of this disease were the young generation because the Spanish flu directly attacked hosts by causing cytokine storms in the patient's immune system. The reason why the young generation was mainly affected by this disease was that they had a stronger immune system as compared to the adults [15]. The Spanish flu was the reason behind the death of about 50 million people.

B. Asian Flu Pandemic (1957-1958)
The Asian flu pandemic took place in Singapore in February 1957 [16]. It was declared to be the second crucial pandemic of the 20th century after the Spanish Flu. It had caused about 1.1 million deaths all over the world. The main reason behind the Asian Flu was the H2N2 virus which like H1N1 is believed to be of avian origin [17]. After about eleven years of the outbreak of this virus its danger to human beings was reduced to such a level that it did not pose any threat to their health

C. Hong Kong Flu Pandemic (1968-1969)
The Hong Kong Flu pandemic was the third crucial pandemic of the 20th century [18]. The main reason behind this was the H3N3 virus which had been evolved from the H2N2 virus which was the reason behind the Asian Flu [19]. The impact of the Hong Kong virus described all over the world has been described as sporadic, which is believed to have been due to the anterior immunity developed against N2 [20]. Unlike the Spanish Flu the H3N3 virus was more dangerous for people above the age of 65.

D. Swine Flu Pandemic (2009-2010)
The H1N1 virus was also the main reason behind the Swine Flu Pandemic [21]. Similar to the Spanish Flu which was also based on different strain of the same virus the swine flu was dangerous for people below 65 [22]. It has been estimated that there have been more than 43.3 million cases of which 195,086 were hospitalized and 8868 deaths in the US [23].

E. Marburg Virus (1967-2000)
The Marburg virus was discovered in 1967 and this virus was the main reason behind hemorrhagic fever [24]. It belonged to the same family as the Ebola Virus. The symptoms of the Marburg virus include fever, sore throat, headache and many more. Two large outbreaks occurred simultaneously in Marburg and Germany due to which this virus came into existence [25]. Moreover, there was no proper treatment found for this disease at that time and according to many articles and researches, this virus has not been properly cured yet. The death rate of this virus had reached about 90% of which many cases were due to the bleeding into the gastrointestinal track.

F. Ebola Virus (2014-2016)
The Ebola virus that occurred in West Africa was the largest outbreak since the discovery of the virus in 1976 [26]. The scientist at that time were not able to figure out the main reason behind this virus but said that the main source of this disease are the bats which can transmit virus to other animals like primates spreading it to the human population. The scientist also tried to figure out the symptoms behind this disease and came out with the results that it symptoms can be sudden and involve fever, muscle pain, sore throat, headache as well the internal and external bleeding [27]. The average case rate of this disease was approximately 50% according to WHO (World Health Organization) but there was no proper treatment found for this disease.

G. Lassa Fever Virus (1969)
Lassa fever virus was discovered in 1969 and like Marburg virus this disease was also the reason behind hemorrhagic fever as well the multi organ failure [28]. Asymptomatic infection was a common factor of this disease. The death rate of Lassa fever was between (15 %to 50%) due to the vascular collapse. The Lassa fever was also known as the Lassa hemorrhagic fever (LHF). There was no major symptoms of this virus but fever, vomiting, muscular pain, headache were said to be the symptoms of this virus [29]. Moreover, there was no vaccine found for this disease.

H. Rabies Virus
The Rabies virus was mainly originated from the bite of an infected animal. According to different researches the symptoms of this disease can be prickling, or itching feeling around the bite area [30]. Moreover, the symptoms of this disease includes fever, headache, muscle ache and tiredness. There was no proper treatment found for this disease. There were two different forms of rabies including furious rabies or paralytic rabies [31]. In furious rabies the infected people experience hydrophobia a fear of water that is caused by the inability to swallow whereas on the other hand paralytic rabies cause muscle weakness and paralysis.

I. MERS-COV (2012-Present)
Middle East Respiratory Syndrome-Related coronavirus (MERS-COV) is a type of coronavirus, which mainly effects humans, bats and camels [32]. It was also said to be a member of the beta group of the coronavirus. Moreover, it was classified into two clades A and B [33]. All the earlier cases were due to clade A. The first case of this virus was reported in Saudi Arabia in 2012 and over 2000 cases were reported in 2017and the number of deaths were about 600. 80% of the cases were from Saudi Arabia. The most common symptoms of this disease were fever, cough, shortness of breath and vomiting [34]. According to many researches, this virus is also one of the main reason behind COVID-19. Furthermore, according to WHO there was no proper treatment or vaccine to control this disease [35].

IV. IMPACT ON GLOBAL ECONOMY

212 Countries and Territories around the world have reported COVID-19. Because of no proper treatment strategy, distance is considered as the possible best

way to avoid COVID-19 from spreading. Self-isolation at home has been suggested for those who are suffering from COVID-19 and also for those who suspect they have been [36]. Many of the world governments have mandated the self-quarantine for the entire population especially for those who are living in the affected area and many of the governments turned toward the lockdowns. Because of these lockdowns, the economy of the world is facing huge crises. All small business is forced to shut down by the governments which increase the poverty, especially in underdeveloped countries [37]. Furthermore, all the trades have been stopped between countries, which cause a large collapse on the economy of those countries that are fully or partially dependent on the trade. JPMorgan (Co. economists) place the lost output at $5.5 trillion or nearly 8% of GDP through the end of next year. The cost to developed economies unaccompanied will be similar to those witnessed in the recessions of 2008-2009 and 1974-1975[38]. Mckinsey & company claims that the Europeans' economies and the US could take two to three years to recover from the impact of COVID-19 and in an optimistic scenario 4.7 percent of the global GDP drops.Covid-19 cause impact on many industries few of them discussed below[39].

A. Automotive Industry

To follow the social distance, people use to stay at home and avoid the usage of transport. So roads are empty because of no public and personal transports. Only a few vehicles which are associated with some especial companies are currently using. So this causes a great impact on the automotive industry [40].

Relevant Statics: In Pakistan, the automobile sector which is already trajectory since the beginning of the current financial year, has now received the additional shock due COVID-19 and is now on the brink of collapse. The major plant that suffers from lockdown includes Yamaha, Pak Suzuki Motor Company, Indus Motors, Honda Atlas Car, Hinopak Motors Atlas Honda, Millat Tractors and Dysin Automobiles. From July 2019 to February 2021 of the financial year, automobiles sales dropped 44% which is 90,834 units compared to 162,240 units in the same period of the previous financial year [38].

It took seven years of India to increase its annual production from three million to four million. And by market of 2021 India will be the world's fourth-largest passenger-vehicle. Due to this crisis manufacturers faced with sudden fall in demands. In March 2020 India saw a decline of 52% and 89% in the sales of passenger vehicles and commercial vehicles [41]. In January 2020, the industry saw an 18% drop in sales. Despite containment efforts, in February 2020 this percentage increased to 79.1%, which is the biggest drop down experience in the chinses automobile industry [42].

The west European saw the downfall of 80% in the registration of new cars. In March 2020, the regional selling's sales fallen to just 2.8m unit a year. It was even more drop than the previously extraordinary 52.9% fall in sales [43].

In Germany, the sales contracted by 61.1% to 12K units in April 2020. This is more softened fall than other major economies.

In Spain, the car registration fell to just over 4,000 units for the month, an extraordinary drop of 96.5%.

In the UK, the car registration fell 97.3%, around 4,000 units for the month.

In Italy, car sales fell by 97.6% YOY and it's about 47,000 units a year [44], [45].

B. Aviation Industry

COVID-19 causes a significant impact on the industry of aviation. At the beginning of 2020, many countries across the world shut down airports and borders to stop the spreading of coronavirus in their country.

Relevant Statics: In March 2020, 10% of the flights canceled as compared to 2019. As the pandemic progressed, in the last of the March 40-60% flights were recorded as canceled. In April 2020, about 80% of the flights were restricted around the world. IATA (international air transport association) estimated that the airline industry could drop between $63 to 113 billion due to less number of passengers, this estimation was for 5th March but in 17 March this estimation was 'outdated' and IATA stated that the airline would require $200 billion for survival from this crisis.

In January 2020, the global air demand was just 2.4% and that is the lowest demand percent in the last decade.

The major disturbance recorded between 24 and 30th march 2020, when the reported amount of operational flights dropped to 280,000.

As the air transport is stopped, the demands for the purchase of new aircraft has also dropped. From 2018 to 2020 the purchase decreased from 1858 to 235.

The WTTC (world travel and tourism council) stated that 50 million jobs of World travel and tourism are affected due to COVID-19. Asia is worst affected for tourism by this epidemic. This industry will take 10 months for recovery. The tourism industry currently accounts for 10% of global GDP [46].

Italy bare 22% drop rate in flights on March 9, 2020. After 9th march this ratio increased to 74% from the normal rate.

On 17 February, 2020 China faced 71% of the drop down in flights as compared to the rate in 2019 [47].

C. Oil Industry

Due to the shutdown of national and international passenger vehicles and air crafts across the world has resulted faced a dramatic decline in the oil industries as well as the decline in the consumption of aviation fuel. In just a few months COVID-19 pandemic destroyed industry and economy of those countries which replays oil industries especially Saudi Arabia, Russia, and the US. Now in 2020, industries have to halt the production and might need to destroy their product. Onshore oil storage worldwide is now roughly 85% full. In the US there is nowhere place to save the oil. IMF (International Monetary Fund) says that the global economy willshrink by 3% this year [48].

Relevant Statics: In Pakistan oil cause a salutary effect on the economy and welfare condition. In May 2020 Government had announced a reduction of Rs.15 per liter. There would be difficulties for local oil industries. Some of the oil refineries have already been locked [48]. But overall the impact of low price on Pakistan's economy would be positive because there have been imports around 18-20 million tons per year. Due to COVID-19 import may come by 30 percent and yearly impact at reduced oil prices at $30/bbl. on average may cause a lessening in oil import bill of $7-8 billion which hasn't happened in history [49].

In 2020, China demand for crude oil has fallen around by 3 million barrels a day. That is parallels to the 20% of the total consumption.

On 20th April 2020, in the US the price of oil went lower than zero for the first time in history [50],[51].

D. Construction Industry

Construction firms are likely to face the interruption and delays in currents projects because of the corona pandemic. The results of delays are causing rescheduling on a large scale of existing projects, and are causing a loss for the industry. There are some reasons which cause problems for the construction industry e.g. across Africa the contractors are looking toward China for construction material. But the Chinese government stopped most of the activities due to COVID-19 and this causing a great loss in the construction industries of many countries. The second reason is labors, which are jobless because of quarantine and lockdown.

Relevant Statics: In February 2020, the fixed asset investment in China fallen by 30.34%, while the real estate **UK** development dropped by 16.3%.

In April 2020, 45% of the US states orders to limit the construction work activities.

In February 2020, 5.82% of industries experience effect in Japan. From 2nd to 8th March 35.31% of the industries face the crises. From 27th to 5th April 38.38% of industries experience the effect due to COVID-19.

In March 2020, Italy faced a 43.88% impact on the construction industry.

From April to June, the impact from the coronavirus on India is -13.9% of the growth rate.

E. Healthcare and Medical Industry

COVID-19 caused a shocking impact on the healthcare system across the world. Most of the industrial sectors are facing economic effects due to inactivity due to the lockdown. COVID-19 cases are increasing day by day, but hospitals across the world are currently facing a shortage of hospital equipment i.e. PPE (protective equipment), ICUs (intensive care unit), and especially the shortage of ventilator. Medical industries are not only disturbing to underdeveloped it's also a huge challenge for the developed countries.

Relevant Statics: In February 2020, the sales of medical and hygienic products sales in US are on peak. The sales value of medical supplies touches 85.3% as compared to the last year.

F. Food Industry

In comparison with other sectors of industry, food has not been faced the downfall due to the impact of COVID-19. Because food chain supply hasn't closed by any government. But this industry is not fully profited because bars, cafes, restaurants, and other luxury food services have forced to shut down. Furthermore, grocery, stores, and supermarkets are unable to meet the demands of the customer as rising during this pandemic. In UK restaurants experience a down fall by 14%.

G. Tourism Industry

The tourism industry is most affected by this pandemic. All over the world this industry is closed. 10% of the world GDP is generated through the revenue of the tourism sector. In 2020, the global revenue of the tourism industry is 447.4 billion U.S. dollars; this is 34.7% fewer from last year. Tourism is main industries of some countries including Spain, Portugal, Mexico, Iceland, France, Italy, and turkey, Australia, UK, Canada and Poland. In Italy tourism contributed 13% of GDP. Reduction of 28.5-million-dollar tourist arrival has been noted during COVID-19 pandemic. Impact of corona also disturbs the tourism related business like restaurants, bars and hotels. More than 45 thousand restaurants and bars are at risk of shutting down certainly because of this pandemic in Italy.

H. Telecom Industry

The telecommunication industry is one who is spared by the COVID-19 pandemic. Many telecommunication companies provide different and comfortable services which increases the selling of their product. ISPs (internet service providers) witnessed a massive increase in traffic during the COVID-19 pandemic. The main reason behind the massive traffic is the educational institution that uses this platform for teaching and employees are allowed to do work from home. Online audience is significantly spending more time in online markets. On 26 April, 2020 user spends 15.8% more time on the website as compared to January 2020. In Australia 21% people said they use more internet than usual.

I. Agriculture Sector

Food chain is a complex web including consumer, producer, trader, transportation, and marketing. COVID-19 causes a decrease in the growth rate of food from the agricultural sector. Due low availability of chemicals and raw materials because of industrial shut down and foreign trade restriction and lockdown forces farmers to stay at home [39]. This is causing price irregularity. Underdeveloped countries are facing the problem of increasing the price rate. Countries like Pakistan, India, Germany, Brazil, Spain, and France, etc. are facing the problem of exports because these are major exporting countries but due to COVID-19 now they are selling and restoring the food in their own countries. In Italy 57% of the companies from agriculture sector facing the significant decrease in sales. 23% of the companies are unable to find providers of external services, mostly transport.

J. Education Sector

Governments around the world have temporarily shut the educational institution. UNESCO (United Nations Educational, Scientific, and Cultural Organization) is supporting countries that mitigate the education on remote learning. This pandemic is affecting the university student the most. They are experiencing the major teaching interruptions in the final year part of their study. As on 15th May, 2020, about 1.725 billion learners are facing difficulties. According to the report of UNICEF 158 countries are currently implementing nationwide closure and 33 are implementing local closure and this impacting the 98.5 % of the students. Educational institution closure not only effecting the students, teachers, and parents it's also impacting economic and social consequences.

Relevant Statics: 26, February, 2020. In China institutions are around the countries closed due to COVID-19.

23 February 2020. In Iran the ministry of health announced the closure of universities and all other higher educational institutions in some provinces and cities.

4th March 2020. As Italy reached to hundred (100) deaths, Italian governments closed all educational institutions. After this closure Italy became the 22nd country in three continents which had announced school closure.

20th March 2020. 124 countries closed the educational institutions and this over 70% of the world learner was impacted by the closure.
29th March, 2020 about 90% of the world's student population is out of school.

K. Banking sector
Managing the direct economic impact of the COVID-19, banks need to have a plan in place to guard employees and customers from its spread. Around the world many of the banks had started the remote working of employees. WHO (world health organization) has guided people to use contactless payment. Corona virus live on banknotes for day so Bank of Korea has started a quarantine the bills originating from local banks and keeping them isolated or up to two weeks. This act is done by many worlds' governments. Banking sector is currently facing challenges across its many levels: social isolation requirements specify that limited clients can be served in physical branch, placing extra burden across networks such as mobile banking, internet, and social media. At the same time, huge numbers of individuals are frenzied to try and reach their financial services. Companies with inquiries, concerns or to appeal for protective steps because their finances have been affected by the coronavirus pandemic- many have lost jobs, their income has gone, many are frightened of defaulting on loans or missing loans.

E-commerce performance due to COVID-19 for bank and insurance in France [50].

L. Textile industry
The textile and clothing industries are passing through the toughest time due to COVID-19. The demands and domestic sales have come down rapidly. Factories are shut down because of lockdown. The business community is afraid on account of cash crunch, supply chain, and man-power related issues. According to ITMF (international textile manufacturer's federation) on an average 8%. Orders has dropped worldwide and the expended turnover this calendar year will be down by almost 10% over 2019. It seems that the textile industry may take six to eight months to see business see back to its regular position. Bangladesh economy is also integrated with the global economy. The degree of trade openness economy is currently 38.24%. Canada, the US, and the European countries are the major destination of export for Bangladesh. So, economic effects on those countries will also have significant consequences for Bangladesh. COVID-19 takes away USD 3.02 billion from. Bangladesh's economy.

V. IOMT AND COVID-19

Novel coronavirus has changed the world not just in the public health-care systems but also affect the economic, educational, and public Systems.Covid-19is continuously attacking worldwide, the environment is falling down under the weight of collapsing economic system and stacked up fatalities. Regretfully many individuals are still fear of contamination. The condition which seems today is unlikely to improve. A wide range of technological methods to resolve the effect of Covid-19 worldwide are emerging. Digital automation IoT, IoMT, Telecommunication Network such as 5G were among those at the forefront. Digital automation has an important part enhancing the medical care due to the Covid-19. In this section, we examine the efficiency of the above-mentioned technologies in reducing the devastating effects of the COVID-19 worldwide.

The Internet of medical things (IoMT), also known as health-care IoT, is a combination of medical devices and software applications that provide comprehensive health-care services related to healthcare IT systems. In early states, IoT and IoMT have seen an increase in the number of its useful applications. This increase is because the growing number of mobile devices are configured with readers from Near Field Communication (NFC) that allow these devices to communicate with IT systems. The applications of IoMT are: 1) Observing patients from a distant area. 2) following the medicine request 3) utilizing wearables to transmit medical information to the concerned human services experts. As a result of their capacity to gather, observed, break down, and transmit health information efficiently the human services sections are understood the transformative capability of IoMT innovations.
During the continuous COVID-19 pandemic, a few technologists, clinical associations, and government agencies try to utilize the IoMT resources to reduce the load on the health-care systems. In the following segments. We discuss different IoT and IoMT technologies that have a wide range of contributions to tracking and ultimately managing the effect of COVID-19 pandemic.

A. Smart Thermometer
Eight years ago, a US health technology company named Kinsa had distributed internet connect smart thermometers to household peoples for high fever. A smart thermometer is a medical thermometer that able to transmit readings, that can be gathered, stored, and observed. These smart thermometers are initially designed to monitor flu; they are however highly useful in detecting possible COVID-19 concentration throughout the United States. Due to COVID-19 eruption, Kinsa health technology company has distributed a wide range of technological thermostat to the household in many regions of the United States. That smart instrument is connected to a cell phone device, that enables them to automatically send their study to an app on user phone. Users can see the history of the temperature reading. Once this data has been received Kinsa adapts this data and develops a daily graph that shows which of US regions were increase in high fever, thus enabling the US official services to identify new zones. Over a couple of years, Kinsa communicating maps have shown itself to be highly accurate in predicting the quick breaking out flu around the United States.

B. Robots
While government and medical institutions around the world are struggling to control the COVID-19 outbreak, robots are being introduced to support patient recovery, thus reducing the burden of healthcare workers. Robot controlled non-contact UV surface decontamination techniques are also used to reduce the virus transfer via infected surfaces. Related to the manual disinfection effect, which includes the deployment of disinfecting workers and immediately put them at risk of getting the disease. Integrated decontamination robots can cause quick and efficient disinfection. Under the few sample of robots that how robots are helpful in healthcare institutes worldwide to manage the effect of COVID-19 and reduce the stress of People work in healthcare institutes.
As the COVID-19 worldwide continues to spread, Asimov Robotics a Kerala based company has built up three-wheel robots that are used to support patients

staying in isolation and ease the pressure on the medical staff. The three-wheeled robot is capable of doing different functions such as carrying food and service to the patient as well as giving medication and clinical equipment, and of freely exploring the hospitals.

An organization of US states provide many decontamination of trained medical researchers had created automated robot to help reduce the number of (HAIs). Xenex states that it is Light Strike Disease-Zapping UV robots that have can rapidly kill all diseased germs like a different type of viruses and bacteria.

Danish Robotic company, UVD Robots introduced many decontamination robots that be served in worldwide healthcare institute. UVD Robots distributed its robot among various regions of China, several in Asia and the US. These robots release strong UV ray's decontaminant external surface by breaking away DNA virus strains, The Danish company believes that their robot can run on a single charge for around 2.5 hours and decontaminate about nine or ten rooms.

China Mobile's 5G Robots in Shanghai. Chinese Telecom Company known as china mobile has played its role in minimizing the spread of COVID-19 by making sure the availability of six 5G enabled intelligent robots at Shanghai Public Health Clinical Centre. Telecom operator has not only provided 5G-enabled robots it also increases their bid to fight against COVID-19 by providing 5G health monitors and thermal imaging cameras. The robots provided by company can do multiple jobs such as sanitization of the health center premises and making availability of medicines to the patient hundred percent secure [52].

5G robots at hospital in Guangdong as nursing assistants. In this pandemic hospitals are busier so supply of more medicines, cleaning of areas and monitoring of is necessary but issue is being in contact with patients frequently raises the risk of infection, for cleaners and messengers as well. 5G connection is allowing robots to navigate the dynamic environment of hospitals. The issue is resolved by using the robots which are delivering medical supplies in hospitals, bringing food to the people who are quarantined in different hotels, taking temperatures of patients and disinfect spaces at hospital in Guangdong. These multitasking robots are in use at hospitals in Wuhan, Shanghai, and in Guangdong province, reducing work stress on medical staff and reducing risk of getting infected [53].

Cloud Minds' 5G Robots in Wuhan. Recently a field hospital was opened in Wuhan, china having many 5G-Enabled smart robots as staff. A company from Beijing named as Cloud minds has provided these smart robots which can perform multiple useful activities like cleaning and disinfecting of the premises, making sure the delivery of medicine to the patients, and measuring patient's temperature efficiently and precisely. At smart field hospital many other 5G-enabled smart devices are also employed to reduce work load from staff like patients wore a smart bracelet which is synced with Cloud Minds AI platform through these bracelets hospital staff can track important information of their patients like body temperature, heart rate and blood and oxygen levels without being physically present in front of them all time [54].

Patrol Robots in Multiple Cities of China. Another achievement of IT community is that 5G police patrol robots have been designed by a local robotics company from Guangzhou, a China, on top of the Advantech-developed edge computer MIC-770. These smart robots can measure the body temperature of more than 8 people at once by using the high resolution cameras and five infrared thermometers are integrated on them and they are developed using aspects of AI, IoT, 5G, and cloud computing technologies. These robots are also equipped with ability of environmental sensing which gives them strength to determine whether someone is wearing a mask or not. At the moment when robots detect anyone who has high body temperature or not following precautionary measures it will create an alert message and sent it to local [226]. Deployment of these robots has completed at many public places in many cities of republic of china Shanghai, Guangzhou, and Guiyang [55].

C. IoT Buttons

Several healthcare organizations in Vancouver have mounted battery powered IoT controller to Keep huge maintenance levels of addition, restrict the amount of healthcare. These buttons called Wanda Quick touch were developed for rapid or quick deployment in any unit, regardless of their size, to issue prompt warning to the administration, alert them of any contamination or maintain issues that can create a risk to public issues. Their independence on external networks have an ability stick to any surface.

Smart IoT buttons at Vancouver. A company known as Visionstate has designed their first IoT product "Wanda QuickTouch" which is a smart button and these buttons are under use of hospitals in Vancouver. These buttons send alert massages to management advising of issues like maintenance or cleaning issues which can lead up to risks to public safety. Facility managers can track alerts and give instructions to staff to response and can also track performance of staff by monitoring the cleaning activities in crowded areas using Wanda QuickTouch. The button monitor alerts issued by staff or the general public and can be adhered to any surface and requires no infrastructure to operate. The IoT buttons are battery operated and automatically connect to the LTE-M network and can be used in patient rooms, nursing stations, restrooms, or common areas. The buttons can be used in conjunction with Visionstate's new Wanda mobile app, which provides facility managers with the ability to track cleaning and maintenance activities throughout a facility [56].

D. Autonomous Vehicles

Autonomous vehicles (AVs) use to reduce the burden on current medical methods yet at same time reducing the risk of transmission of viruses. China takes the responsibility towards pandemic using autonomous vehicles(AVs). It is stated that as of now it is the only country in the world to develop AVs for COVID-19 effect mitigation. White Rhino Auto Company based in Beijing in association with the (ITPO) of UNIDO has deployed two AVs in China healthcare centers. That's AVs show extremely helpful for many tasks such as services of healthcare and food. These vehicles decreased burden of work of overwhelmed healthcare center personnel but also help to minimize the threat of contamination of virus.

Automated vehicles at Chinese Hospitals. Automated delivery vehicles which can drove up to more than 600 meters at a speed of 15kmph to deliver medical supplies safely are in use at ninth hospital in Wuhan China. These vehicles can work up to 6 to 8 hours continuously. 5G's high bandwidth and low latency allows real-time transmission of road images which than helps automated vehicles to avoid obstacles in their

way. Automated self-driving vehicles can bring food and medical supplies to hospital staff successfully by taking advantages of 5G's high bandwidth and low latency. These vehicles are also in use to shift patients from one block to another block of dedicated hospitals[53].

E. Telemedicine

Telemedicine is technique of using IoMT automation to enable remote monitoring of patients. This approach helps physicians to diagnose, identify, and treat patients without having to communicate with them physically. Many IoMT software and telemedicine platforms experienced a rapid rise following spread of highly infectious COVID-19. Many website work for medical recovery, recently reported a significant increase in requests for networked prescriptions since COVID-19 spread. The US (CMS) have to revoke many healthcare rules to allow physicians to provide remote medical care trainers to their patients via telehealth platforms.

The advantages of implementing telehealth strategies were given below: 1) it lowered the pressure on the healthcare worker, 2) it lowered the uncertainty of infection spreading from the contaminated people to hospital workers. There are some aspects in which telemedicine was used to control the COVID-19 effect are listed below:

Many telemedicine techniques, involving video calls and live Facebook webinars have been introduced in united states to offer remote medical professionalism to many peoples. In India government had established telemedicine equipment to allow rapid COVID-19 patients to communicate remotely with medical professionals.

Many telehealth care technologies were used in Israel's healthcare center to track 12 Israeli travelers who were quarantined on board the fishing boat in japan for many weeks. Rather than serving these travelers from a faraway area, the Sheba healthcare center used telemedicine techniques to confirm limited human interaction when at the healthcare center facilitate handling them. Many telemedicine devices such as telemedicine cart, tele discussion app and handheld medicine had shown the importance in the battle against COVID-19 in recent months. Nonetheless, only when current telemedicine systems were helpful in combination of many other IoT technologies such as 5G networks will the high speed of telemedicine. The convergence of these innovation with present telehealth system will create a more complex healthcare environment to allow remote monitoring and remote clinical treatment for the COVID-19 patients. A large number of use cases described above indicate the importance of IoT and IoMT's ability to solve the unparalleled challenges faced by COVID-19.

F. 5G

Around the globe, mobile networks are supported by wireless communication technology and 5G is its latest generation. On performance basis in aspects like speed, latency, range, availability and reliability 5G is much better than 4G. 5G technology has the potential to bring revolution to the health sector by using it together with associated technologies like IoT and AI. China changed their response mechanism to Covid-19 pandemic by facilitating frontline staff with better assistance, improved ways to track virus, patients monitoring, collection and analysis of data, the commercialization of 5G technology in China. The topic under our discussion in this session is that how other countries can improve their statistics of resisting the Covid-19 through the adoption of 5G technology by Citing China as an example.

5G Robots Deployed by AIS in Thailand in Thailand. 5G technology has been leveraged in different ways to fight against the COVID-19 outbreak by the largest phone operator of Thailand known as Advanced Info Services (AIS). For augmenting telemedicine facilities in hospitals installation of 5G network and deployment of 5G robots at more than 20 hospitals has been completed by AIS. Instead of performing only communication tasks between staff and patients these robots can also be used for thermal scans [57].

Remote consultation systems at Wuhan Union Hospital. Remote consultation system has been deployed at Wuhan Hospital china using 5G's better band width and low latency for Real-time transmission of large amounts of data ensure stable HD video system synced with specialized cloud-based remote office system supporting interactions of multiple parties with Multiple office collaboration capabilities. To fight against COVID-19 it is necessary to have medical experts from different backgrounds in the back office to give support in decision-making and diagnosis. Patients can be treated more effectively by frontline medical personals if they can interactively discuss the diagnosis of complex cases with other experts from different backgrounds. To minimize the impacts of COVID-19 on daily lives of people many solutions are proposed by the IT community since the day it starts spreading. Among all technologies IoT, drone technology, and machine learning are playing major roles in minimizing pandemic impacts and trying to normalize situation. To use the full transformative abilities of all the technologies it is necessary to have a cellular network which can provide high bandwidth, low latency, and more flexibility to current technologies by this an efficient system can be prepared for monitoring the crowds, detecting infected individuals, and providing treatment to them, all without the need for any physical human contact. In coming time, a system built to control epidemic has the potential to be one of the building blocks for the development of a more dynamic smart city management model.

5G+ TELEMEDICINE. Monitoring the patients using remote technology like drones and robots is called telemedicine. To realize the features of telemedicine, 5G network technology is necessary although these functionalities can be augmented by using drones. For seamless consultation teleconferencing video conferencing at high quality in real time is necessary and 4G cannot support it because bandwidth of 4G is limited and have low data transfer speed [58]. 4G LTE networks usually interfere with the connectivity of different IOMT devices on cloud platforms, and in turn rendering them inefficient. On the other hand, 5G has features like ultralow latency and tendency to transmit data at high-speed that gives ability to mobile networks to address all the issues regarding latency and bandwidth. Virtual reality and artificial reality (VR/AR) applications can also be enabled by 5G technology, which can provide in responsive experience in telemedicine, and by equipping caregivers immediate expertise can be provided according to treatment techniques and all possible complications[59].

In November from last year China unveiled the commercial use of 5G technology, using 5G technology features that can be brought into the field of telemedicine already has been drawn. 5G+ telemedicine platforms have been launched to facilitate the COVID-

19 patients at various medical centers and hospitals in China examples are:
Covid-19 5G and teleconsultation platform has been launched at west china with the help of china telecom.
Kunming medical university affiliated hospital as launched an online platform which works on the basis of 5G to make it possible treatment of Covid-19 at zero cost [60]..
A 5G remote consultation platform has been launched as an emergency facility at Huoshenshan Hospital in Wuhan. With the help of this consultation platform diagnosis and treatment of the COVID-19 patients become more efficient because now professionals from the healthcare departments in Beijing are able to work with the medical staff of hospital.

G. AI Empowered Medical Imaging

Medical imaging techniques such as Picture Archiving and Communication Systems (PACS) are becoming an indispensable part of diagnosis and treatment since recent years. Enhanced management and data analytics can be produced by PACS with small human efforts if we use artificial intelligence together with the technologies and cellular networks of next-generation and big data analytics. At a Leishenshan Hospital in Wuhan, load on medical staff is reduced by providing diagnosis of COVID-19 in real time through AI medical imaging platforms [61].

H. ML & DL Empowered Thermal Imaging

In the beginning, Thermal technology was designed for defense purpose such as anti- aircraft and is now used with different methodologies in to different scientific fields specially in healthcare, it has proven to be most propitious. Thermal imaging systems enabled with machine learning and deep learning have many applications in healthcare departments and its development is facilitated by the establishment of 5G networks. The temperature of moving bodies in real time can be monitored with high accuracy and precision by use of machine learning and deep learning in thermal imaging monitoring system. With the help of 5G networks the transmission of accumulated data to central monitoring system at ultralow latency is possible. Number of thermal imaging systems enabled with 5G have already been deployed in many cities of china to minimize the spread of Covid-19 [61].

VI. CONCLUSION

In this paper, we analyze the impact of COVID-19 in context of global economy and internet of medical things. We discussed the COVID-19 background by covering its clinical characteristics, symptoms, transmission behavior and fundamental medical advancements. Then we briefly reviewed the different pandemics which happened in past. After that, the exponential effect of COVID-19 on global economy is elaborated. We discussed all key sectors including automotive industry, aviation industry, oil industry, education, health, telecom, agriculture etc with their relevant statistics. Further, highlighted the various emerging technologies like, artificial intelligence, robots, 5G, telemedicine medical imaging under the umbrella of internet of medical things for combating with COVID-19. We discussed their current role and vision towards COVID-19 with the help of recent applications, contributions and deployed use cases.

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