**Coronavirus (COVID-19)** **Outbreak: A Most Fatal****Pandemic in the Twenty First Century**

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**Abstract.** *The novel (new) coronavirus fatal disease (COVID-19) is an infectious disease caused by SARS-COV-2 (2019-nCoV). It has been identified as the causative agent of the viral pneumonia outbreak in Wuhan, China, at the end of 2019. It has a high human to human transmission capability and primarily targets the human respiratory system. Healthcare providers to common people are in high risks of the contamination of this fatal disease. It spreads person to person through respiratory droplets by coughs and sneezes. It is associated with severe and fatal respiratory disease in humans. At present it becomes great global public health concern. On 11 March 2020, the WHO declared the global COVID-19 outbreak as a pandemic. An attempt has been taken here to create consciousness among the common people to reduce the fatality of this killer disease.*

**Keywords:** SARS-CoV-2, COVID-19 outbreak, SARS-CoV, MERS-CoV, Wuhan, pandemic

1. **Introduction**

 An outbreak of COVID-19 in Wuhan, Hubei Province, China has spread quickly nationwide (Zhu et al., 2020). On 1 December 2019 first case of COVID-19 has been identified in a person who had not had any exposure to the Huanan Seafood Wholesale Market of Wuhan (WHO, 2020f). At the end of December 2019, about 41 cases of ‘pneumonia of unknown etiology’ were reported by the Wuhan Municipal Health Committee (Zhu et al., 2020; WHO, 2020c). The diseases spread outward from Hubei Province at the late December 2019 (Li et al.,2020). The first confirmed death was on 9 January 2020 in Wuhan. On 22 January 2020, novel CoV has been declared to be originated from wild bats and belonged to Group 2B of β-CoV (Gralinski & Menachery, 2020). The first death outside China occurred in the Philippines, and the first death outside Asia was in France (Holm & Moritsugu, 2020).

 On 11 February 2020, the World Health Organization (WHO) named the zoonotic coronavirus disease as COVID‑19 (“co” stands for “corona”, “vi” for “virus” and “d” for “disease”, while “19” was for the year), which belongs to the sarbecovirus subgenus of Coronaviridae family, subfamily Coronavirinae (Enserink, 2020; Zhao et al., 2020). On 7 January 2020, the causative pathogen was identified as a novel coronavirus, which is distinct from both Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV), and Middle East Respiratory Syndrome Coronavirus (MERS-CoV). This virus was named as 2019-nCoV by WHO on January 12 and the disease as COVID-19 on 11 February 2020 (WHO, 2020a). The Coronavirus Study Group (CSG) of the International Committee on Taxonomy of Viruses renames 2019-nCoV to SARS-CoV-2. It is a new illness that is caused a novel severe acute respiratory syndrome coronavirus, which infects both humans and animals. It is infectious dieses and spread from one person to others by respiratory droplets that produced during coughing or sneezing. It is closely related to the original SARS-CoV (ECDC, 2020). It is more contagious than both SARS-CoV and MERS-CoV (Wang et al., 2020a).

 The epidemic has spread very quickly taking only 30 days to expand from Hubei to the rest of Mainland China (WHO, 2020a). On 30 January, the WHO declared the outbreak a “*Public-Health Emergency of International Concern (PHEIC)*” as the outbreak could spread to countries with fragile health systems (Callaway, 2020). On 11 March 2020, the WHO declared the global outbreak as a pandemic to minimize the infection and mortality rate (WHO, 2020g). On 25 February it globally infected more than 465,000 people and 21,000+ died.

 It affects lungs, with severeacute respiratory illness that develop a fever, dry cough, fatigue, and shortness of breath. Public health responses for SARS-CoV-2 are isolation, quarantines, travel restriction, stop of workplace and educational institution closures, and ultimately lockdown (Rothan & Byrareddy, 2020).

1. **Literature Review**

 J. S. M. Peiris and his coauthors followed up 75 patients for 3 weeks to investigate the temporal progression of the clinical, radiological, and virological changes in a community outbreak of SARS-CoV (Peiris et al., 2003). Yang Yang and his coauthors have analyzed the spreads in humans and causes of MERS-CoV. They have believed that this virus originated from bats and transmitted to humans (Yang et al., 2014). Abdullah Assiri and his coauthors analyze epidemiological, demographic, clinical, and laboratory data from confirmed 47 cases of sporadic, household, community, and healthcare associated MERS-CoV infections reported from Saudi Arabia by identifying knowledge gaps (Assiri et al., 2013).

 Paul S. Masters has discussed the different models for the mechanism of genomic RNA packaging. He also discusses the recent exciting discovery that selective coronavirus genome packaging is critical for in vivoevasion of the host innate immune response (Masters, 2019). Hussin A. Rothan and Siddappa N. Byrareddy highlight the symptoms, epidemiology, transmission, pathogenesis, phylogenetic analysis and future directions to control the spread of COVID-19 (Rothan&Byrareddy, 2020).

 Jieliang Chen discusses the pathogenicity and transmissibility of 2019-nCoV. He also shows the relationship between viral pathogenicity and transmissibility of this virus. He has shown the basic reproduction number  for 2019-nCoV is 1.4–5.5, for SARS-CoV is 2–5, and MERS-CoV is less than 1 (Chen, 2020).

1. **Methodology of the Study**

 Methodology is the guidelines to approach and perform activities. Research methodology provides us the principles for organizing, planning, designing and conducting a good research. Therefore, we consider that it is the science and philosophy behind all researches (Legesse, 2014). This study is a review work. In this study we have used the secondary data. The data are collected and designed the article from books, previous published articles, websites, theses, conference papers, case studies and various research reports. In the study, we have tried to discuss the various sides of noble coronavirus which becomes most fatal pandemic in the 21st century. The virus spreads almost every country of the world. More affected countries are China, Italy, Spain, and Iran. Since December 2019 to 26 March 2020, more than 5000,000 people are infected from this disease and more than 21,000 died.

1. **Objective of the Study**

 The main objective of this study is to reduce ongoing global outbreak of the COVID-19 virus. The other specific objectives are as follows:

* to highlight the knowledge gaps for the transmission of these disease,
* to provide the morphology, structure, and history of coronavirus, and
* to analyze the symptoms, transmission prevention, and treatment techniques of the disease.
1. **Morphology and Structure**

 Coronaviruses (CoV) are a large family of viruses which may cause illness in humans or animals (camels, cattle, and bats). The name *coronavirus* is derived from the Latin *corona*, meaning “crown” or “halo” or “wreath”, which refers to the characteristic appearance reminiscent of a crown or a solar corona around the virions when viewed under two-dimensional transmission electron microscopy. This appearance is produced by the peplomers of the spike (S) glycoprotein radiating from the virus lipid envelope. The genome size of coronaviruses ranges 80–160 nm and 27–34 kilobases in length with positive polarity (Figure 1) (Woo et al., 2010; Masters, 2019). Twenty-six different species of CoV are known and have been divided into four genera () characterized by different antigenic cross-reactivity and genetic makeup. Only the  and  coronavirus genera include strains pathogenic to humans (Cleri et al., 2010; Paules et al., 2020).



**Figure 1:** Shape of SARS-CoV-2. Source: (CDC, 2020).

 There are four conserved viral genome structural proteins across CoVs (Figure 2): the spike (S), membrane (M), envelope (E), and nucleocapsid (N). The S glycoprotein is located outside the virion and gives the virion the typical shape. It forms homotrimers, which allow the formation of sun-like morphologies for the name of coronavirus. It governs binding to host cell receptors and virus entry into cells (Graham & Baric, 2010). The M glycoprotein has three transmembrane regions and glycosylated in the Golgi apparatus. It is crucial for the virion to fuse into the cell and to make protein antigenic. It is involved in budding and envelope formation (de Haan et al., 2003). The E glycoprotein is small protein that is composed of 76 to 109 amino acids. It is a part of the nucleocapsid of viral particles. It plays a critical role in the assembly and morphogenesis of virions within the cell (Raamsman et al., 1998). The N protein is phosphoproteins that is capable of binding to helix and has flexible structure of viral genomic RNA (gRNA). It plays an important role in virion structure, replication and transcription of coronaviruses (Raamsman et al., 1998).



**Figure 2:** Virion structure of the coronavirus. Source: (Tok & Tatar, 2017).

 The S, E, and M are embedded in a membrane envelope derived from the site of budding, the Golgi-endoplasmic reticulum intermediate compartment. The RNA molecule has a 5'-cap, 5'-untranslated region (UTR), open reading frames, a 3'-UTR, and 3'-poly (A) tail (Ziebuhr, 2005; Lo et al., 2019; Masters, 2019). The 2019-nCoV is a β-CoV of group 2B with over 70% similarity in genetic sequence to SARS-nCoV (Hui et al., 2020). The S protein of both SARS-CoV and SARS-CoV-2 is most closely related to bat coronaviruses BatCoV and RaTG13 (Benvenuto et al., 2020; Robertson, 2020). Three new human coronavirus species are SARS-CoV, MERS-CoV and SARS-CoV-2 (Chen, 2020).

1. **Types of Coronaviruses**

 Coronaviruses (CoV) are a large family of non-segmented, enveloped, positive-sense, single-stranded RNA viruses that typically cause mild to severe respiratory disease in humans. There are seven known types of human CoV. Four types, i) 229E, ii) NL63, iii) OC43, and iv) KHU1 are common and cause mild to moderate respiratory infections (e.g., the common cold) and there is no evidence of death from these viruses (Chen, 2020; Crossley et al., 2012). Other two types, v) Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) likened to Cinderella (Li, 2013), and vi) Middle East Respiratory Syndrome Coronavirus (MERS-CoV), can cause severe respiratory infections (Assiri et al., 2013; de Groot et al., 2013). The seventh type, a novel coronavirus vii) 2019-nCoV or SARS-CoV-2 is a new coronavirus recently discovered in China that has not been previously found in people. The MERS-CoV, SARS-CoV and SARS-CoV-2 viruses have their origins in birds (e.g., bats) and animals (e.g., camels) and can transform from human to human (Li et al., 2020).

1. **Historical Evidence of Coronavirus**

 Coronaviruses were first discovered in the 1960s in chickens infected by bronchitis virus and human patients by two viruses HCoV-229E and HCoV-OC43 (Crossley et al., 2012). In 2001, more than 500 patients presented with flu-like symptoms in Canada. Virological analyses showed that 3.6% of these cases were positive for the HCoV-NL63 strain by polymerase chain reaction (PCR) (Al-Osail & Al-Wazzah, 2017). Severe Acute Respiratory Syndrome (SARS) is a type of coronavirus infection discovered in Guangdong province in China in 2002 (Li, 2013). Nosocomial transmission of SARS-CoV was common while the primary reservoir was putatively bats and it was transmitted from civet cats to humans (Hui & Zumla, 2019). The virus of this fever SARS-CoV has been identified in 2003. It is transmitted from person to person through respiratory droplets when they come in close contact (Heymann et al., 2013; Li et al., 2005). The 2002-2003 outbreaks became a global health threat; about 8,100 people infected in 33 countries of North America, South America, Europe, and Southeast Asia, over a period of 8 months (from 16 November 2002 to July 2003), about 10% (800 patients) died. The Centers for Disease Control and Prevention (CDC) and World Health Organization (WHO) declared a state of emergency in this regard (CDC, 2003; Peiris et al., 2003; WHO, 2003; Hui & Zumla, 2019). Experience of SARS-CoV infectious disease enables China to respond more effectively to subsequent health threats, such as H7N9 avian influenza and Covid-19 (Zhang, 2013; Hui et al., 2020).

 Other two members HCoV-NL63 discovered in 2004 and HKU1 discovered in 2005. Another type of coronavirus infection is Middle East Respiratory Syndrome (MERS) which is a novel lethal zoonotic (animal to human) disease, discovered in 2012. The novel β-CoV is responsible for the disease that appears to have originated in bats and uses dromedary camels as intermediate hosts (Zaki et al., 2012; Cho et al., 2018; CDC, 2019). The first cases of MERS-CoV infection in Jeddah of Saudi Arabia were reported on 13 June 2012 and continued to spread overseas to many countries in Asia, Africa, Europe, and America (Zumla et al., 2015; Al-Osail & Al-Wazzah, 2017). It is transmitted to humans from bats or camels’, as it is related to bat or camels’ coronaviruses HKU4 and HKU5, and had the capability for human to human transmission through respiratory droplets when come in close contact (Yang et al., 2014). This virus causes severe viral infections with high mortality rates. About 2,500 people of Bahrain, Iraq, Iran, Israel, The West Bank and Gaza, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, The United Arab Emirates (UAB), Egypt, and Yemen have been identified with MERS and more than 850 (36%) died. The virus also spread in France and the UK (Geller et al., 2012; Assiri et al., 2013; de Groot et al., 2013; Azhar et al., 2019). On 30 December 2019, a cluster of patients with pneumonia of unknown etiology was observed in Wuhan, China. On 7 January 2020, a new coronavirus SARS-CoV-2 is discovered which spread globally through person to person contact. On 11 February 2020, WHO named it COVID-19 (Guarner, 2020; Li et al., 2020).

1. **Symptoms of CoV**

 COVID-19 is a new illness that is caused by a virus called SARS-CoV-2. The infections often occur in the winter and spring after an incubation period of approximately 5.2 days (Li et al., 2020). Most patients infected with COVID-19 virus have mild disease and recover (Lu et al., 2020). Major and minor symptoms of this illness are fever (>100.4°F/38°C), dry cough, fatigue, sputum production, dyspnoea, shortness of breath, lymphopenia, anorexia, headache, hypoxemia, chills, nausea or vomiting, rhinorrhoea, muscle or joint pain, grand-glass opacities, myalgia, haemoptysis, sore throat, sneezing, nasal congestion, RNAaemia, diarrhea, etc. (Carlos et al., 2020; Huang et al. 2020; Ren, et al., 2020; Wang et al., 2020a). Symptoms depend on the type of coronavirus and generally seen between 2 and 14 days of expose, on an average 5 days. In some cases the symptoms transform to pneumonia (infection of the lungs), multi-organ failure (e.g., kidney), and even to death (Pan et al., 2020). The period from the onset of COVID-19 symptoms to death ranged from 6 to 41 days with a median of 14 days (Wang et al., 2020b).

1. **Transmission of CoV**

 The 2019-nCoV outbreak was started from a local Huanan Seafood Wholesale Market (also sold live animals) of Wuhan, China which was shut down and disinfected. Three human coronaviruses; SARS-CoV, MERS-CoV, and SARSCoV-2 are thought to spread from infected animals to people through contact (Guarner, 2020; Wang et al., 2020a). It is now quite clear that large-scale human to human transmission of this virus appears (Chan et al., 2020). In China, men had a death rate of 2.8% while women had a death rate of 1.7% (Feng et al., 2020).

 The virus accesses host cells through angiotensin-converting enzyme 2 (ACE2), which is found in various organs of the body, but it is most abundant in the type II alveolar cells of the lungs. That is why lungs are the most affected organs and severe acute respiratory syndrome (SARS) develops; as a consequence respiratory failure happens and finally died (Zhang et al., 2020; Xu et al., 2020).

 The basic reproduction number (from mathematical equation), , is the average number of people who will catch a disease from one contagious person, i.e., how contagious an infectious disease is. If  (e.g., for MERS-CoV), the disease will decline and eventually disappear, if , the disease will stay alive, but there will not be an epidemic. If , cases could grow exponentially and cause an epidemic to a pandemic. It is experimentally found that value for 2019-nCoV is 1.4–2.5 (WHO, 2020h). The range of  value for SARS-CoV is 2–5. The value of SARS-CoV-2 is increasing very rapidly. Some researchers found that the range of  value of are 3.3–5.5 (Zhao et al., 2020), 3.6–4.0 (Read. et al., 2020), and 4.5–4.9 (Shen et al., 2020), respectively. Later, it is calculated that the  value is more infectious than initially estimated and it is likely to be 4.7–6.6 (Tang et al., 2020).

 The virus is transmitted mainly from person to person in close contact with others. Respiratory droplets transform from infected person by coughs or sneezes, touching an object or surface with the virus on it and then touching mouth or eyes before washing hands (Chan, et al., 2020; WHO, 2020i). Droplets only stay suspended in the air for a short time but may stay viable and contagious on metal, glass, plastic or any solid surface (Kampf et al., 2020). Most of these droplets fall on nearby surfaces and objects, such as desks, tables, mouse, keyboards, telephones, etc. People may infect by touching contaminated surfaces or objects, and then touching their eyes, nose or mouth. If people stand within one meter of a COVID-19 infected person, they can infect catch by droplets through breathing (WHO, 2020g).

 On 13 January 2020 the virus was infected outside China in Thailand. On 26 February 2020, it suddenly increased in Italy, Iran, Japan, and South Korea, all of which were exported from China (WHO, 2020d). The virus has infected in the North and South America, Europe and the rest of the world (Holshue et al., 2020). The current COVID-19 outbreak caused about 7,000 patients in China during the first month after initial reports (January 2020), with a further 80,000 patients globally during the second month (February 2020). Of these first 87,000 patients, about 3,000 died (Feng et al., 2020).

 On 10 March 115 countries and territorieswere affected around the world; about 114,431 patients were identified and about 4,027 died and 64,099 recovered. On 12 March 118 countries and territories were affected around the world; about 127,863 patients were identified and about 4,600 died. On 19 March 161 countries and territories were affected; about 230,000 (about 36,000 in Italy) patients were identified and about 10,000 (about 3,000 in Italy) died (The Prothom Alo, 20 March 2020). On 21 March 161 countries and territories were affected; about 275,000 (about 36,000 in Italy) patients were identified and about 12,787 (about 4,885 in Italy) died. Record 793 had died in a day in Italy. On 26 March 500,000 people are infected and death reached to 21,000+ (Channel 24, 2020).

1. **Diagnosis of CoV**

 Diagnostic test for SARS-CoV-2 is undertaken using two approaches; i) whole genome sequencing and ii) real-time reverse transcriptase PCR (rRT-PCR), which is standard method of testing. Protocols for rRT-PCR tests kits are developed by Germany, Hong Kong, China CDC, Thailand, and Japan; almost all diagnostic tests are done by using this kit (Center for Health Security, 2020c).

 The rRT-PCR laboratory tests for respiratory secretions, such as nasal or oral swabs or sputum blood samples are needed to diagnose of SARS-CoV-2, with results within a few hours to 2 days (WHO, 2020b). The first laboratory test of SARS-CoV-2 was at the Wuhan Institute of Virology, Wuhan, Hubei Province, China; a team led by virologist Zheng-Li Shi. The virus can kill cultured human cells (Callaway, 2020). Laboratory diagnosis of SARS-CoV-2 infections relies on nucleic acid based testing early in the clinical course and serology later on. Serology tests are blood-based tests that can be used to identify whether people have been exposed to a particular pathogen that analyze the serum (antibodies to specific components of pathogens, called antigens) component of whole blood. At present no serology tests are available for COVID-19 (Center for Health Security, 2020d). An alternative method of diagnosis is looking for visual signature patterns of COVID-19 in X-rays or CT scans of the lungs, respiratory secretions, blood, urine, and fecal samples for diagnostic testing. Signs of pneumonia may be confirmed through rRT-PCR (BioFire, 2020; CDC, 2020; Zhu et al., 2020).

1. **Prevention and Treatment Techniques**

 The virus has no vaccine or specific antiviral treatment. Antibiotics do not work against viruses. The infected patient must contact with healthcare provider. The patient must take diagnosis, treatment according to the advice of healthcare providers. Treatment consists of supportive care and relief of symptoms. Supportive treatments are; i) rest isolate, ii) take pain and fever medications expect aspirin, iii) drink plenty of liquids, iv) use a room humidifier, and v) take a hot shower to help ease a sore throat and cough. Other supportive treatments for critically ill patients are supplemental oxygen, fluid administration, being managed in intensive care units (ICUs) and receiving rescue therapies, such as extracorporeal membrane oxygenation (Center for Health Security, 2020a).

 To prevention COVID-19 many measures should be taken, such as timely publication of epidemic information for elimination of the source of infection, early diagnosis, reporting, isolation, supportive treatments, avoid of unnecessary panic, etc. Precautionary actions, such as the provision of medicines supply chains, personal protective equipment (PPE), and hospital supplies are necessary in a short time for the protection of the disease (Sahin et al., 2020). Separates sick people with a contagious disease from people who are not sick is called isolation. Separates and restricts the movement of people who are not sick but may have exposed to a contagious disease (the people who are in contact of an infected person or have come from infected area) to see if they become sick is called quarantine. Isolation and quarantine help protect the public by preventing exposure to people who have or may have an infection of COVID-19 (CDC, 2020).

 Prevention is better way to protect this virus (CDC, 2020). The prevention techniques are as follows (Kampf et al., 2020; WHO, 2020e; UK, 2020):

* Wash hands vigorously with soap and water for at least 20 seconds after going to the toilet, after coughing and sneezing, before and after caring for an ill person, after caring healthy or sick animals, before preparing and serving foods, and before eating. After hand washing, dry with tissue, clean towel or hand dryer.
* If soap and water is not available, use a 62–71% alcohol-based hand sanitizer.
* Avoid close contact, such as kissing, sharing cups, or sharing eating utensils with sick people.
* Isolatequarantine at home or hospital if anybody feels sick.
* Cover nose and mouth with a tissue when coughing or sneezing, cannot use this tissue for several times and throw the tissue in the covered trash immediately.
* Avoid touching eyes, nose, or mouth with unwashed hands.
* Avoid hand shaking.
* Avoid contact with sick animals and infected people.
* Wash hands after animal contact and after visiting farms, markets, barns, petting zoos and agricultural fairs, and then touch the nose, eyes or mouth.
* Maintain healthy habits, such as get enough exercise, a well-balanced diet, eat healthy foods, thoroughly cooked meat and animal products, drink sufficient water and fruit juices, get sufficient sleep, manage stress, and avoid smoking and alcohol taking.
* If any healthy person has traveled from an affected area, there may be restrictions on movements for up to 2 weeks.
* Clean and disinfect objects (e.g., doorknobs, light switches, water tap, railings of stairs, etc.), touched surfaces, and clean floor where the patients stay.
* Maintain at least one meter (3 feet) distance from people who are coughing, not touching face with unwashed hands, etc.
* Everybody infected or uninfected must cover nose and mouth with a tissue or a bent elbow when coughing.
* Masks use who are infected with the virus and who are taking care of the patients but not for the general public. Avoid touching the mask while using it, remove the mask using the lace from behind, do not touch the front of a mask and do not reuse single use masks.
1. **High Risk People and Reduction of the Risk**

 All people are in the risk of SARS-CoV-2. Children seem to handle the disease better than adults as the symptoms are usually milder. People at higher risk for severe disease and death are i) who had weakened immune systems, ii) older people whose age are more than 50 years, iii) hypertension, cardiovascular disease, chronic respiratory illness, cancer and diabetes patients, and pregnant women (WHO, 2020e; CDC, 2020).

 COVID-19 infected persons should isolate at home or in hospital and cannot go to work, stores, tea stall, rally, stadiums, theatres, educational institutions (e.g., school, college, university, etc.), busy prayer places (e.g., church, mosque, temple, etc.), public transport or any public congregation. The suspected persons must avoid using public transportation, ride-sharing, or taxis; avoid migration, should stay in a specific room and away from other people in home (home quarantine), and also should use a separate bathroom (WHO, 2020e; CDC, 2020). Healthcare providers must wear personal protective equipments (PPEs), such as gown, gloves, a face shield, mask or respirator, goggles or eye masks and N95 masks during the COVID-19 examination of patients or travel of highly infected area (Chen et al., 2020).

1. **Financing for SARS-CoV-2**

 There are some major sources of money for the epidemic response activities. These could be used to support pandemic outbreak. UN releases $15 million from the Central Emergency Response Fund (CERF) to help fund global efforts to contain the COVID-19 virus. The WHO has called for $675 million to fund the fight against COVID-19. Some such sources of funding are as follows (Center forHealth Security, 2020b):

**13.1 The World Bank**

 The World Bank Group’s Pandemic Emergency Financing Facility (PEF) has a fund to respond during pandemics. It has a cash window and an insurance window. The cash window provided about $50 million for Ebola epidemic in the Democratic Republic of the Congo (World Bank, 2019). The COVID-19 pandemic that killed more than 21,500 people would trigger a full payout of the Class B notes, raising $95 million. It would also trigger a 16.67% payout of the Class A notes, raising an additional $37.5 million (IBRD, 2017).

**13.2 IDA Crisis Response Window**

 The International Development Association (IDA) is the part of the World Bank that gives loans (credits) to low resource countries for development. For IDA credits, a country must have a per capita annual income of less than $1,145. IDA meets every 3 years to raise money and decide how the funds will be spent; these are called Replenishment meetings. The 18th Replenishment (IDA18) finances projects from 1 July 2017 to 30 June 2020. Most IDA money is used for long-term development projects (IDA, 2017). The Crisis Response Window (CRW) is a special pool of money devoted to help countries respond to disasters. It spent $420 million to fight the 2014-2016 West Africa Ebola outbreaks. The IDA18 replenishment raised $3 billion for crisis response, and as of early 2020, $2 billion was still unspent and available for immediate use. The IDA19 allocated $2.5 billion to the CRW, to become available on 1 July 2020 (IDA, 2019).

**13.3 IMF**

 The International Monetary Fund (IMF) has about $1 trillion fund to lend, which are not for aid. If any country borrows any amount from this fund with negotiation, after a stipulated period must be repaid with interest (IMF, 2019).

**13.4 Private Charity**

 The total endowment of the top forty wealthiest charitable foundations is currently about $500 billion but many of these are not involved in health. In certain circumstances part of this fund might be used for pandemic (Wikipedia, 2020b).

**13.5 National Governments**

 Total international development aid from governments is about $200 billion per year. A partial amount of it could be used for a pandemic. But with a sufficient global coordination, the total amount might be used for a pandemic (Wikipedia, 2020a).

1. **Conclusions and Recommendation**

 In this study we have tried to discuss aspects of the pandemic outbreak COVID-19. We have seen that COVID-19 epidemic has spread very quickly within 30 days to expand from Hubei to the rest of Mainland China. In March 2020 the disease spread very quickly, both infection and mortally rate increase very rapidly. In this study we have briefly discuss the morphology and structure, types, and historical evidence of coronaviruses. We further take an endeavor to discuss the symptoms, transmission, diagnosis, prevention, and treatment of this fatal disease. Timely diagnosis, isolation, quarantine, reduced traveling can reduce both infection and death. Distribution of more PCR- fluorescent probe kits can control the outbreak.

 Invention of COVID-19 vaccine can prevent the dieses in future and the developed countries in medicine can take bold steps in this regard. The outbreak of the COVID-19 is spreading fears around the globe and is severely dis­rupting the global economy. Most people are under quarantine, and much of the rest of the populace has been told not to go to work and to stay in their homes. Most global airlines have stopped. Some countries are fully or partially lockdown. As a result global economic loss becomes a large amount.

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