

Review on Epidemiology and Pandemic Impacts of COVID-19

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Abstract: COVID 19 is one of the seven human coronavirus and the third Coronavirus that has been recognized in the last two decades next to SARS and MERS causing severe large-scale pandemic impacts resulting in death of more than one and half million people and collapsing global economy. This manuscript is designed to review the epidemiology of coronavirus disease 2019 and its associated pandemic impacts. The disease was spread in to several countries within a month so that on 30 January 2020, WHO declared this first outbreak of novel coronavirus a 'public health emergency of international concern' and a global pandemic on 11 March 2020. Now days, the disease has spread in to almost all countries transmitting through droplets, contact and aerosol ways. The virus was seemed to be identified from bats exhibiting major clinical signs like fever, cough and shortness of breath. Older age, obesity, patients with underlying comorbidities such as hypertension, diabetes, cardiovascular disease and male patients are among the common contributing factors to severity and mortality of the disease. There is no specific drug for the treatment of the disease unless control and prevention methods such as hand washing, using disinfectant solutions, avoiding contact with patients, elimination of the source of infection, isolation and supportive treatments are implemented. Global occurrence of COVID 19 resulted in serious economic crisis disrupting an interconnected world economy through disruptions to both supply and demand due to morbidity, quarantines and unemployment; lockdowns of schools, religious centers and worsened economic prospects reducing household consumption and firms' investment. Therefore, governments, public health professionals and other concerned bodies should be able to take appropriate protective measures in order to save our globe from the pandemic and its associated economic crises.

Key words: COVID-19 • Epidemiology • Impact • Pandemic • SARS CoV -2

INTRODUCTION

Coronaviruses are enveloped single-stranded RNA viruses that are zoonotic in nature and cause symptoms ranging from those similar to the common cold to more severe respiratory, enteric, hepatic and neurological symptoms [1, 2]. Other than SARS CoV 2, there are six known coronaviruses in humans: HCoV-229E, HCoV-OC43, HCoV-NL63, HCoV-HKU1, SARS CoV (severe acute respiratory syndrome coronavirus) and MERS CoV (Middle East respiratory syndrome coronavirus) [3-5]. Before the emergence of SARS CoV 2 (severe acute respiratory syndrome coronavirus 2), Coronavirus has caused two large-scale pandemics in the last two decades: SARS [6] and MERS [7]. Prior to 2003

members of this family were believed to cause only mild respiratory illness in humans, other coronaviruses then known being largely of importance only to the livestock industry. But the emergence of SARS CoV that year stimulated major research into these viruses, to the effect that many new coronaviruses have since been discovered, some with zoonotic potential of causing serious outbreaks of disease in humans. For instance SARS CoV, MERS CoV [8] and COVID 19 are the zoonotic coronaviruses causing serious pandemic health and economic impacts [9].

On 31 December 2019, the Wuhan Municipal Health Commission in Wuhan City, Hubei province, China, reported a cluster of 27 pneumonia cases (including seven severe cases) of unknown etiology, with a common

reported link to Wuhan's Huanan Seafood Wholesale Market, a wholesale fish and live animal market [10]. According to the Wuhan Municipal Health Commission, samples from the market tested positive for novel coronavirus [11]. It is rapidly spread, resulting in an epidemic throughout China, followed by an increasing number of cases in other countries throughout the world. In February 2020, the WHO designated the disease COVID 19 (coronavirus disease 2019) [12]. The virus that causes COVID 19 is designated severe acute respiratory syndrome coronavirus 2 (SARS CoV 2); previously, it was referred to as 2019-novel corona virus (2019-nCoV). By 20 January 2020, there were reports of confirmed cases from three countries outside China: Thailand, Japan and South Korea. These cases had all been exported from China. The first European case was reported from France on 24 January 2020. This case had a travel history to China [13].

On 30 January 2020, WHO declared this first outbreak of novel coronavirus a 'public health emergency of international concern'. During the following weeks, several countries implemented entry screening measures for arriving passengers from China. Soon, several major airlines suspended their flights from and to China [14]. Several countries repatriated citizens living in Wuhan. Over the following days, cases were reported from several other regions. Transmission appears to have occurred locally, in contrast to first-generation transmission from people returning from affected areas. ECDC [12] and WHO [15] declared COVID 19 a global pandemic on 11 March 2020.

The results of next-generation sequencing indicated that SARS CoV 2 was more distant from SARS CoV (with about 79% sequence identity) and MERS CoV (with about 50% sequence identity) than from two bat-derived SARS-like coronaviruses, bat-SL-CoVZC45 (with 87.9% sequence identity) and bat-SL-CoVZXC21 (with 87.2% sequence identity)[16] even though both SARS CoV and MERS CoV originate in bats[17]. Thus, the evidence from the phylogenetic analysis indicates that the COVID 19 belongs to the genus betacoronavirus, which includes SARS CoV that infects humans, bats and wild animals [2]. Studies also reported that COVID 19 S-protein supported strong interaction with human ACE2 (angiotensin converting Enzyme 2) molecules despite the dissimilarity of its sequence with that of SARS CoV [18]. WHO has classified COVID 19 as a β -CoV [19]. Genome sequences of COVID 19 obtained from a total of nine patients exhibited 99.98% sequence identity [20].

The comparatively strong genetic sequence homology between the COVID 19 virus and beta coronavirus isolated from bats suggests that ancestors of the COVID 19 virus were circulating in bats in the *Rhinolophus* genus. Bats belonging to the *Rhinolophus* genus are widely distributed across Asia, the Middle East, Africa and Europe [21]. The disease becomes the most devastating problem causing several millions of morbidity and over one million of mortality resulting in global economic crisis. Therefore, this manuscript was designed to review the epidemiology of coronavirus disease 2019 and its associated pandemic impacts.

Epidemiology of COVID-19

Geographic Distribution: Between 31 December 2019 and 2 January, 2021, COVID 19 pandemic affected 224 countries causing 82, 356, 727 cases and 1, 815, 433 deaths (CFR= 2.20%) globally. As of 2 January, 2021, the USA reported the highest number of cases 19, 578, 217 and deaths 339, 550 with CFR of 1.73% followed by India 10, 305, 788 cases and 149, 218 deaths with a CFR of 1.45% and Brazil 7, 675, 973 cases and 194, 949 death with CFR of 2.54 (Table 1). Among the confirmed cases the highest proportion of death occurred in Yemen with CFR of 29.03% (2105 cases and 611 death) followed by Mexico with CFR of 8.82 (1, 426, 094 cases and 125, 807 death) [22, 23]. In Africa, a total of 1, 919, 903 cases and 42, 697 deaths were reported across the continent (CFR=2.35%). Nearly 78% of the COVID 19 cases in Africa were reported from South Africa and Morocco and deaths 72.5% from South Africa and Egypt [22] (Table 2).

Risk Factors of COVID 19: At the beginning of the outbreak, COVID 19 cases were mostly observed among elderly people [3]. As the outbreak continued, the number of cases among people aged 65 years and older increased further, but also some increase among children (<18 years) was observed. The number of male patients was higher initially, but no significant gender difference was observed as case number increased [24, 25]. The study of 85 fatal COVID 19 patients with median age of 65 years in Wuhan showed that the majority of patients died from multi-organ failure as respiratory failure, shock and ARDS were seen in 94, 81 and 74% of cases, respectively [24]. Such outcomes were associated with comorbidities, including hypertension, cardiovascular disease and lung disease. These conditions are more prevalent in men and linked to smoking and drinking alcohol [26, 27].

Table 1: Global trends of COVID 19 in top ten countries (as of 2 January, 2021)

Countries	No of confirmed cases	Countries	No of death	CFR (%)
Global	82, 356, 727	Global	1, 815, 433	2.20
USA	19, 578, 217	USA	339, 550	1.73
India	10, 305, 788	Brazil	194, 949	2.54
Brazil	7, 675, 973	India	149, 218	1.45
Russia	3, 186,336	Mexico	125, 807	8.82
France	2, 576, 420	Italy	74, 159	3.52
UK	2, 488, 784	UK	73, 512	2.95
Italy	2, 107, 166	France	64, 254	2.49
Spain	1, 893, 502	Russia	57, 555	1.81
Germany	1, 742, 661	Iran	55, 337	4.49
Columbia	1, 642, 775	Spain	50, 442	2.66

CFR= Case fatality rate, UK= United Kingdom, USA= United State of America Source [23].

Table 2: Situation of COVID 19 in top ten African countries (as of 2 January, 2021)

Countries	No of confirmed cases	Countries	No of death	CFR (%)
The whole Africa	1, 919, 903	The whole Africa	42, 697	3.42
South Africa	1, 057, 561	South Africa	23, 276	2.69
Morocco	440, 970	Egypt	7687	5.51
Tunisia	140, 557	Morocco	7425	1.68
Egypt	139, 471	Tunisia	4730	3.37
Ethiopia	124, 264	Algeria	2756	2.77
Libya	100, 744	Ethiopia	1923	1.55
Algeria	99, 610	Kenya	1670	1.73
Kenya	96, 458	Libya	1487	1.48
Nigeria	87, 510	Sudan	1468	6.30
Ghana	54, 771	Nigeria	1289	1.47

CFR= Case fatality rate Source: [23]

Hosts of the Virus: There is evidence that the transmission of SARS CoV from an animal reservoir to humans involved an intermediate host (civets were implicated as an intermediate host for SARS CoV). Owing to similarities between SARS CoV and the COVID 19 virus, including the circumstances around their emergence and considering the absence of other plausible theories an alternative assumption is being made that the transmission route of the COVID 19 virus to humans involved an intermediate animal host which has yet to be identified as opposed to direct bat to human transmission. Information from these investigations is critical because it may hold the key to preventing further introductions of the virus into the human population and it may also provide useful insights to reduce the risk of future spill over events from animals to humans. In the absence of detailed epidemiological data, several hypotheses exist for the introduction of the COVID 19 virus from animals to humans at the market. These include that:

- The virus was introduced to the human population from an animal source at the market and

- A human introduced the COVID 19 virus to the market (following exposure to the virus outside the market) and the virus was then amplified in animals which then infected humans [21].

Routes of Transmission: The latest guidelines from Chinese health authorities [28] described three main transmission routes for the COVID-19: 1) droplets transmission, 2) contact transmission and 3) aerosol transmission. Droplets transmission was reported to occur when respiratory droplets (as produced when an infected person coughs, sneezes or talks) are ingested or inhaled by individuals nearby in close proximity; these droplets can settle in the mouth or nasal mucosa and lungs of people with inhaled air. Contact transmission may occur when a subject touches a surface or object contaminated with the virus and subsequently touch their mouth, nose, or eyes; and aerosol transmission may occur when respiratory droplets mix into the air, forming aerosols and may cause infection when inhaled high dose of aerosols into the lungs in a relatively closed environment [29, 30].

Viral RNA levels appear to be higher soon after symptom onset compared with later in the illness [31]; this raises the possibility that transmission might be more likely in the earlier stage of infection, but additional data are needed to confirm this hypothesis. According to a joint WHO-China report, the rate of secondary COVID 19 ranged from 1 to 5 percent among tens of thousands of close contacts of confirmed patients in China [32]. In the United States, the symptomatic secondary attack rate was 0.45% among 445 close contacts of 10 confirmed patients [33]. The extent to which transmission of SARS CoV 2 from asymptomatic individuals (or individuals within the incubation period) occurs remains unknown [34]. Live virus has been cultured from stool in some cases [35], but according to a joint WHO-China report, fecal-oral transmission did not appear to be a significant factor in the spread of infection [1].

Pathogenesis: Although the pathogenesis of COVID 19 is poorly understood, the similar mechanisms of SARS CoV and MERS CoV still can give us a lot of information on the pathogenesis of SARS CoV 2 infection. The virus pass through the mucous membranes, especially nasal and larynx mucosa then enters the lung through the respiratory tract. Then the virus would attack the targeting organs that express angiotensin converting enzyme 2 (ACE2), such as the lungs, heart, renal system and gastrointestinal tract [3, 36]. When SARS CoV 2 binds to ACE2, the expression of ACE2 in alveolar epithelial cells is down-regulated and then the increased concentration of angiotensin II leads to inflammatory response and exudation of neutrophils, macrophages and fibrinous, resulting in loss of pulmonary ventilation function and difficulty in maintaining oxygenation. At the same time, viral infection will cause the imbalance of T helper-1 and T helper-2 responses and induce an inflammatory storm by increasing the levels of inflammatory factors such as interleukin-4, interleukin-6 and interleukin-10. Then inflammatory storm in critical patients' releases cytokines, causing systemic immune injury, which may be an important cause of multiple organ failure and even death [37, 38].

While the virus enters the cells, antigenic peptides are presented by major histocompatibility complex (MHC) and then recognized by virus-specific cytotoxic T lymphocytes. Antigen presentation subsequently stimulates the body's humoral and cellular immunity, which are mediated by virus-specific B and T cells. The acute phase response in patients with SARS CoV is

associated with severe decrease of CD4 and CD8 T cells. ARDS is the common cause of death and immune pathological event for SARS CoV 2, SARS CoV and MERS CoV infections [39]. One of the main mechanisms for ARDS is the cytokine storm, the deadly uncontrolled systemic inflammatory response resulting from the release of large amounts of pro-inflammatory cytokines and chemokines by immune effector cells in SARS CoV infection [40]. The cytokine storm will trigger a violent attack by the immune system to the body, causing ARDS and multiple organ failure and finally lead to death in severe cases of SARS CoV 2 infection [39].

Clinical Signs and Symptoms: Before SARS CoV cases, it was thought that human CoVs leads to cold-like upper respiratory infection and self-limiting lower respiratory infection. As in other respiratory infected viruses and previous beta-CoVs, similarities present in the clinical aspects of COVID 19 infections, it is known that clinical picture varies from simple respiratory infection findings to septic shock. Similar to SARS CoV and MERS CoV that caused epidemics in the past years, the first symptoms are commonly defined as fever, cough and shortness of breath [19]. In several studies, myalgia, fatigue, chest pain, confusion, nausea and vomiting and less often, symptoms of expectoration, headache and hemoptysis were noted [3]. The WHO has reported an incubation period for COVID 19 between 2 and 10 days. However, some literature suggests that the incubation period can last longer than two weeks. Many studies support a 14-day medical observation period for people exposed to the pathogen. The severity of the clinical picture seems to be correlated with age (>70 years) [15].

There are no specific clinical features that can yet reliably distinguish COVID 19 from other viral respiratory infections. In addition to respiratory symptoms, gastrointestinal symptoms (e.g. nausea and diarrhea) have also been reported [27, 39, 41]. The possibility of COVID 19 should be considered primarily in patients with new onset of fever and/or respiratory tract symptoms (e.g., cough, dyspnea) [42, 43]. It should also be considered in patients with severe lower respiratory tract illness without any clear cause. The period from the onset of COVID 19 symptoms to death ranges from 6 to 41 days with a median of 14 days [44]. This period is dependent on the age of the patient and status of the patient's immune system. It was shorter among patients >70-years old compared with those under the age of 70 years [1].

Diagnosis: Clinical diagnosis of COVID 19 is mainly based on epidemiological history, clinical manifestations and some auxiliary examinations, such as nucleic acid detection, CT scan, serology (ELISA) and blood culture. The most common diagnostic methods are molecular methods like PCR using RNA from respiratory samples such as oropharyngeal swabs, sputum, nasopharyngeal aspirate, deep tracheal aspirate, or bronchoalveolar lavage [2]. RT-PCR is the most common, effective and straightforward method for detecting pathogenic viruses in respiratory secretions and blood [45]. However, the applicability of this test in diagnosis and surveillance is challenged by a global shortage of reagents and the lack of well-equipped laboratories with specialized staff in several low- and middle-income countries.

Treatment: Since there is no empirical treatment for COVID 19, supportive treatment, including oxygen therapy, fluid management and the use of broad-spectrum antibiotics to cover secondary bacterial infection, remains to be the most important management strategy [40]. Remdesivir, an adenosine analogue that can target the RNA dependent RNA polymerase and block viral RNA synthesis, has been a promising antiviral drug against a wide array of RNA viral infections in cultured cells, mice [46] and nonhuman primate models. The Washington Department of Health administrated remdesivir intravenously first and found that remdesivir might have potential protection from SARS CoV 2 infection. Then remdesivir and chloroquine have been demonstrated to inhibit SARS CoV 2 effectively in vitro. Blocking the binding of S protein with ACE2 is also a meaningful strategy against SARS CoV 2 infection [47]. It has also been reported that there are many convalescent patients donating plasma against SARS CoV 2, just as SARS CoV. It has preliminary acquired favorable results in acute, severe SARS CoV 2 patients. SARS CoV specific human monoclonal antibody can bind potently with the receptor-binding domain of SARS CoV 2 and has the potential to be developed as candidate therapeutics of SARS CoV 2 infections [48].

Dexamethasone is associated with reduced mortality risk in patients with severe COVID 19 according to results from the Recovery trial in the UK. It was found to reduce deaths by one third in patients who were ventilated and by one fifth in patients who were receiving oxygen only. There were no excess harms identified in using this dose in this patient population. There was no benefit among patients who did not require respiratory support.

Furthermore, there are a number of other compounds that are in development. However, as for a novel disease, common people have more panic and anxiety on it than other diseases. Therefore, psychological counseling should be involved in treatment ingredients [49].

Prevention and Control: 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 and for avoiding unnecessary panic [3]. Currently, since there is no confirmed effective vaccine to prevent COVID -19 and even if it will be confirmed effective, it takes long times to manufacture and distribute to the required amount for the globe, the best way to prevent illness is to avoid being exposed to the virus. As the primary mode of transmission is droplet transmission, the preventive measures mainly focus on eliminating exposure to the droplets. To avoid droplets transmission and spread of infection the main measures that should be adopted are the following: washing hands often with soap and water for at least 20 seconds especially after travelling to public place; avoid touching mouth, nose and eyes; stay at home when get sick; using hand sanitizers that contains at least 60% alcohol; avoiding close contact with people who are sick; keeping social distance for 2 meter; wearing face mask and cleaning and disinfecting frequently touched surfaces [50, 51].

Major prevention and control measures including travel screenings should be implemented to control further spread of the virus [52]. Currently, one vaccine is authorized and recommended to prevent COVID-19 that is Pfizer-BioNTech COVID-19 vaccine. Among the several COVID 19 vaccines under trial, AstraZeneca's COVID-19 vaccine, Janssen's COVID-19 vaccine and Moderna's COVID-19 vaccine are under Phase 3 clinical trials and in progress in USA [53].

Pandemic Impacts of COVID-19

Socio-Economic Impact: The COVID 19 pandemic is a global shock involving simultaneous disruptions to both supply and demand in an interconnected world economy. On the supply side, infections reduce labour supply and productivity, while lockdowns, business closures and social distancing also cause supply disruptions. On the demand side, layoffs and the loss of income (from morbidity, quarantines and unemployment) and worsened economic prospects reduce household consumption and firms' investment (Table 3) [54, 55].

Table 3: Global effects of China’s slowdown through global value chains, most affected countries (US\$ million from a 2% reduction of China exports in intermediate inputs)

Countries	Automotive	Communication Equipment	Electrical Machinery	Leather Products	Various Machineries	Metals and Metal Products	Paper products	Chemicals	Others	Total
European Union	2543	498	1191	56	4061	1171	188	2653	3237	15597
Japan	974	395	558	1	1711	343	48	352	806	5187
Korea	578	687	336	1	1104	492	40	172	404	3816
Malaysia	32	268	78	1	124	25	325	10	69	1077
Mexico	32	268	78	1	449	25	10	69	145	1369
Singapore	96	1027	367	4	363	30	16	77	185	2165
Switzerland	42	17	65	0	201	87	9	283	383	1087
Taiwan	147	674	295	2	630	213	51	164	471	2645
Thailand	91	99	85	4	155	27	12	100	159	733
UK	669	68	45	5	321	135	24	268	382	1917
US	845	391	396	13	1129	298	99	778	1840	5779
Vietnam	29	881	88	368	532	7	5	9	378	2296

Source: [55]

Key challenges for any empirical economic analysis of COVID 19 are how to identify this unprecedented shock, how to account for its non-linear effects, how to consider its cross-country spillovers (and other observed and unobserved global factors) and how to quantify the uncertainty surrounding forecasts, given its unprecedented nature [54].

Although it is difficult to measure the exact impact of COVID 19 on the world economy, some stylized facts can show how the world economy will be affected. The European Union, the United States and Japan account for half of the world’s GDP (growth domestic products). These economies are based on trade, services and industries. However, measures to halt the pandemic have forced them to close their borders and drastically reduce economic activities; which will lead to recession in some of these developed economies. The Chinese economy accounts for about 16% of global GDP and it is the largest trading partner of most African countries and the rest of the world. The OECD (organization for economic cooperation and development) forecasts a decline in economic growth rates for these major economies as follows: China 4.9% instead of 5.7%, Europe 0.8% instead of 1.1%, the rest of the world 2.4% instead 2.9%, with world GDP falling by 0.412 from the first quarter of 2020 [56].

A Considerable Tumble in Commodity Prices: Oil prices lost about 50% of their value dropping from US\$ 67 a barrel to below US\$ 30 a barrel. In response to support crude oil prices hit by the pandemic Coronavirus disease, major oil producers proposed to reduce production, as people consume less and decline in travel. The Oil exporters’ group OPEC (Organization for Petroleum

Exporting Countries) agreed to cut supply by 1.5 million barrels per day until June and the plan was for non-OPEC states, including Russia, to follow the trend. However, this did not happen as Saudi Arabia on 08 March announced that it would increase production, which escalated oil wars as non-OPEC members retaliated, resulting in tumbling oil prices [57]. Already, crude oil prices have fallen by 54% in the first three months since the start of the pandemic, with current prices falling below \$30 per barrel. Non-oil commodity prices have also declined since January, with natural gas and metal prices dropping by 30 and 4%, respectively [58]. Global prices for key food commodities, such as rice and wheat, can also impact African countries. Several African countries are net importers for these products [57].

Impact on Aviation and Travel Industry: Aviation industry revenues were projected at \$ 872 billion in 2020. As the number of new infections continues to surge in every part of the world, governments are working tirelessly to slow the contagion. Many countries have put a halt on long-distance. On 5th March 2020, IATA (International Air Transport Association) has projected that COVID 19 could seriously disrupt the industry and cause a loss of about US \$ 113 billion [59]. According to the United Nations World Tourism Organization (UNWTO) latest estimate, there will be an expected fall of between 20-30% that could translate into a decline in international tourism receipts (exports) of between US\$300-450 billion, almost one third of the US\$ 1.5 trillion generated in 2019. The unprecedented introduction of travel restrictions across the world, the international tourist arrivals will fall by 20 to 30% in 2020 when compared with 2019 figures. Many millions of jobs in the

industry are at risk of being lost as around 80% of all tourism businesses are small-and-medium-sized enterprises (SMEs). The Hotel and Hospitality Industry would lose 20% of its turnover and this percentage can be as high as 40 to 60% for countries like Cambodia, Vietnam and Thailand (where the sector represents around 20% of the employment). Tourism together with travel support one in 10 jobs (319 million) in the world and generating 10.4% of world GDP. The lock down in these countries shows how heavy the impact of Covid19 will be on tourism industry in the world [56].

Implications for Labour Income and Working Poverty:

Labour supply is declining because of quarantine measures and a fall in economic activity. Overall losses in labour income are expected in the range of between 860 and 3,440 billion US\$. The loss of labour income will translate into lower consumption of goods and services, which is detrimental to the continuity of businesses and ensuring that economies are resilient. The crisis has already transformed into an economic and labour market shock, impacting not only supply (production of goods and services) but also demand (consumption and investment). Following travel bans, border closures and quarantine measures, many workers cannot move to their places of work or carry out their jobs, which have knock-on effects on incomes, particularly for informal and casually employed workers. Consumers in many economies are unable or reluctant to purchase goods and services. Given the current environment of uncertainty and fear, enterprises are likely to delay investments, purchases of goods and the hiring of workers. Swift and coordinated policy responses are needed at national and global level, with strong multilateral leadership, to limit the direct health effects of COVID 19 on workers and their families, while mitigating the indirect economic fallout across the global economy [60].

Impacts on African Economic Growth: African Union estimated a 7% growth rate for the continent to significantly reduce poverty. The forecasts with average scenario give a growth of 3.4% in 2020 [61]. However, with the negative impact on key sectors of the economy such as tourism, travel, exports; with falling commodity prices, declining governments' resources to finance public investment, it would be quasi impossible to achieve this optimistic forecast of growth rates in 2020 [56]. The COVID 19 pandemic has hit all African countries and appears poised to worsen dramatically. The disruption of the world economy through global value chains, the

abrupt falls in commodity prices and fiscal revenues and the enforcement of travel and social restrictions in many African countries are the main causes of the negative growth. Exports and imports of African countries are projected to drop by at least 35% from the level reached in 2019. Thus, the loss in value is estimated at around US\$ 270 billion. To fight against the spread the virus and medical treatment will lead to an increase of public spending in Africa estimated to be at least US\$ 130 billion [56].

Tourism, an important sector of economic activity for many countries in Africa, will be heavily affected by COVID 19 with the generalization of travel restrictions, closing of borders and social distancing. IATA estimates the economic contribution of the air transport industry in Africa at US\$ 55.8 billion dollars, supporting 6.2 million jobs and contributing 2.6% of GDP. These restrictions affect international airlines including African giants Ethiopian Airlines, Egyptian, Kenya, South African Airways, etc. The first effects will result in the partial unemployment of airlines staff and equipment. However, in normal times, airlines transport around 35% of world trade and each job in air transport supports 24 others in the travel and tourism value chain, which creates around 70 million jobs. According to the latest data, African airlines have already lost US\$ 4.4 billion in revenue by March 11, 2020 due to COVID19. Ethiopian Airlines has indicated a loss of \$190 million [62].

Corona Virus blow to economy Growth expected to drop from 3.2 to 1.8% in Africa due to: Disruption of global supply chains - drop in value creation; Demand side shocks: Oil, tourism; Slowdown in investment hence job losses; For oil exporters, revenue losses of up to US\$ 65 billion; Inflationary pressures due to supply side shortages (Food and Pharma); Unanticipated increases in Health Spending of up to US\$ 10.6 billion; Revenue losses could lead to unsustainable debt. Assuming identical volume of barrels of fuels to be exported in 2020 as in average 2016-18 period, with average 2020 price at US\$ 35, COVID 19 could lead to Africa's export revenues from fuels falling to around US\$ 101 billion in 2020 (in fuels exporting African countries); Further drops in demand could compound price drops: (e.g. cancellation of flights, lower use of cars due to lock downs and quarantine measures, etc.)[63]. COVID 19 will have far-reaching impacts on labor market outcomes [64].

Educational and Religious Impacts: The COVID 19 pandemic has caused the largest disruption of education in history, having already had a near universal impact on

learners and teachers around the world, from pre-primary to secondary schools, technical and vocational education and training (TVET) institutions, universities, adult learning and skills development establishments. By mid-April, 2020, 94% of learners worldwide were affected by the pandemic, representing 1.6 billion children and youth, from pre-primary to higher education, in 200 countries. The disruption also concerns health and psychosocial services, since education institutions also serve as platforms for prevention, diagnosis and counseling [65].

The pandemic has impacted religion in various ways, including the cancellation of the worship services of various faiths, the closure of Sunday Schools, as well as the cancellation of pilgrimages surrounding observances and festivals [66]. Relief wings of religious organizations have dispatched disinfection supplies, powered air purifying respirators, face shields, gloves, ventilators, patient monitors, syringe pumps, infusion pumps and food to affected areas. Adherents of many religions have gathered together to pray for an end to the pandemic, for those affected by it, as well as for the God they believe in to give physicians and scientists the wisdom to combat the disease [67, 68]. In the United States, Trump designated 15 March 2020 as a National Day of Prayer for "God's healing hand to be placed on the people of our Nation"[68-70].

CONCLUSION AND RECOMMENDATIONS

It is concluded that COVID-19, caused by SARS CoV 2 virus, is newly emerged pandemic viral diseases resulting in severe morbidity and mortality as well as socioeconomic deterioration. The disease assumed to be originated from *Rhinolophus* genus of bats with the symptoms of high fever, cough and shortness of breath. The disease has comparable spread with its relatives such as SARS and MERS although it exhibits lower mortality rates. Extensive measures to reduce person-to-person transmission of COVID 19 are required to control the current outbreak. Special attention to protect or reduce transmission should be applied in high risky populations including health care providers and elderly people. As the primary mode of transmission is droplet transmission, the preventive measures mainly focus on eliminating exposure to the droplets. The disease has already brought considerable human suffering and major economic disruption through direct disruption by limiting demand and supply of varieties of commodities because of business closures; weaker the demand for imported goods

and services; the wider declines in regional and international aviation and travel industry, manufacturing sectors, imports and exports of different commodities and reduction of labors income because of quarantine, morbidity, mortality and lockdowns of industries.

Therefore, depending up on the above conclusion the following recommendations are pinpointed.

- Governments, public health professionals and other concerned bodies should be able to take appropriate protective measures in order to save the society from the pandemic and their countries from economic crisis resulted from the disease.
- The society must be aware of the economic and public health impact of the disease in order to protect itself, family in particular and our globe in general.
- The vaccines on the trials are, once proved safe and effective, need to be manufactured and distributed proportionally to all countries as much as necessary.
- Research should be conducted to provide a framework for which more specific and detailed information about the disease for health professional in particular and society in general to implement appropriate preventive measures.

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