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Climate Change and COVID-19: Is there any link for the worldwide pandemic condition?

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ABSTRACT

This research investigated the link between climate change and COVID-19 based on systematic literature review. Thematic analysis followed to find the relationship of climate change and COVID-19, challenges from the current worldwide pandemic, and measures to fight COVID-19 to reduce climate change impacts, synthesizing of 39 articles obtained from Scopus database until 30th June, 2020. COVID-19 is a zoonotic disease, which is spread with a mechanism of human-to-human transmission throughout the world due to climate change caused for the biodiversity crises, underpinning on the overuse of land for agriculture. This disease passes from animal to human for disturbing the ecosystem services. Temperatures and environmental factors contribute to the survival of different coronavirus, while there were no associations of epidemic growth with latitude and temperature, but weak negative associations with relative humidity. In addition, temperatures had a negative linear relationship with the COVID-19 in tropical climate in particular. This pandemic is a global threat to human health and economy that correlated between the disease and specific geophysical parameters-surface air temperature, precipitation, elevation, and human-related characteristics-CO2 and population density. The carbon footprint (CF) in the lockdown period is lower than the past, where environmental pollutants have a significant correlation with the COVID-19 pandemic. As such, the current crisis like other transnational threats such as climate change, extinction of biological species, SARS or Ebola, is conflicting with neoliberal economic models. Besides, 'fear of loss of loved ones, and fear of loss of love', wariness and uncertainty of climate, health and health care affect, climate characteristics, overtourism, and unique public health challenge are the important challenges imposed from the ongoing corona virus disease. However, meat equity globally could ensure the progress for future generations on 'spaceship' earth through controlling over population quality, thermostat and biodiversity to combat current COVID-19 and climate crisis. Besides, there are essential measures found for combating existing climate change impacts, COVID-19 and future pandemic like WHO's singular global authority, public health infrastructures reinforcement, implementation of Paris Agreement for climate, one Health measures in Africa, restrictions of mass gatherings, social distancing measures, school closure, "Sustainability transition policy", 5 key areas of public health systems – governance, information, services, determinants and capacity, and governmental measures. Hence, this study is not beyond limitation of empirical observation, what will be the future endeavor in the field.

Keywords: Climate change, COVID-19, environment, pandemic, temperatures, virus, zoonotic disease

Introduction

The current novel corona virus (COVID-19) disease is now a global problem. It has caused 24,854,140 confirmed cases and 8,38,924 deaths until 30th August, 2020, resulting 213 countries affected (WHO, 2020). This pandemic has triggered unprecedented preventative measures that have confined global population substantially and introduced social distancing as a global behavioral phenomenon (Manzanedo and Manning, 2020). This crisis has impacted in all sphere of life and work, global economy and offered insights on the global climate crisis. While present COVID-19 crisis is a wake-up call to act now and work even harder to prevent a climate crisis (Jin, 2020). There are many parallels between the challenges in fighting this global pandemic and fighting the climate change in the longer term. It is obvious people throughout the world will be affected severely by COVID-19. The consequences of climate change will impact all of us in some form at some point, whether it be droughts in California, flooding in Midwest plains, bushfires in Australia, growing deserts in central Asia, retreating glaciers in the Alps, or melting polar ice caps (*ibid*.1709).

The COVID-19 crisis blows a dramatic shock to the global economy that will affect progress on climate change manifestation (Hepburn *et al*., 2020). While fiscal recovery packages, along with possible shifts in power within and across national and international institutions, are the biggest driver of the long-term impact on climate. Green fiscal recovery packages will decouple economic growth from GHG (Green House Gas) emissions and reduce existing welfare inequalities, but it will be exacerbated by the pandemic in the short-term and climate change in the long-term. Whereas short-term reductions in GHG emissions resulting from lockdowns will have minor long-term effects, unless deeper and longer-term human, business, and institutional changes could not be done by the governments. However, there are few researches on finding correlation between climate change and COVID-19. Therefore, the current research will be an insight on relationship between COVID-19 and climate change, challenges from present pandemic, and what measures should have to take for fighting COVID-19 and amelioration of climate underpinning on the existing literature.

Literature review

A novel coronavirus disease (COVID-19) epidemic was reported in Wuhan, China, which is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in December 2019 (Zhu *et al*., 19; Maa *et al*., 2020). The COVID-19 outbreaks to worldwide pandemic, which has been affirmed to have human-to-human transmissibility, raising high attention not only in China but internationally. While meteorological parameters are the important factors influencing the infectious diseases like severe acute respiratory syndrome (SARS), influenza, and latest COVID-19. A positive association with COVID-19 daily death counts was observed for diurnal temperature, but negative association for relative humidity. Furthermore, one unit increase in diurnal temperature range was only associated with a 2.92% increase in COVID-19 deaths. However, increase of temperature and absolute humidity were related to the decreased COVID-19 death. Relationship among environment, climate change and public health is exemplified in the pandemic of COVID-19. In fact, finding the relationship between climate change and COVID-19 is imperative in enhancing disaster prevention and preparedness for the future pandemic (Ching and Kajino, 2020).

A number of temporary environmental side effects like reduced global emissions, cleaner air, less noise has resulted from lockdown imposed during COVID-19, that has aspired by the climate community to achieve over the years. However, these environmental impacts have been achieved at a massive cost to welfare and the economy (Howarth *et al*., 2020). There is a direct relationship with the population density, intra-provincial movement and the infection outbreak. Alternately, survival of virus relates on areas with low values of wind speed, humidity, and solar radiation exposure to a high rate of infection. For example, provinces like Tehran, Mazandaran, Alborz, Gilan, and Qom are more susceptible to infection because of high population density, intra-provincial movements and high humidity rate in comparison with Southern provinces of Iran (Ahmadi, *et al*., 2020). The effect of climatic factors on spreading of COVID-19 can play an important role in the new coronavirus outbreak. To this end, the pandemic has strengthened the case for an economic recovery that puts emissions reduction, and indeed climate resilience, at its heart.

Both climate change and COVID-19 exert global development challenges which require responses in all countries (The Economist, 2020). As COVID-19, climate change is an issue of cross borders, and the negative consequences are felt much beyond the place of occurrence of the problems. In addition, the COVID-19 pandemic starkly reveals the difficulty of implementing global efforts to curb global carbon emissions (Oldekop *et al*, 2020). The initiative like confinements in association with economic downturns predicts to 'lead to an annual global reduction in CO_2 emissions of between 4.2 and 7.5 percent in 2020' (Le Quéré *et al*., 2020). However, COVID-19 pandemic is considered as the most crucial global health calamity and the greatest challenge of the century. While still there is no approved antiviral drugs or vaccines effective against COVID-19. It spreads rapidly throughout the world, causing enormous health, economic, environmental and social challenges to the entire human population. Its outbreak is severely interrupting the global economy, whereas almost all the nations are bound to 'slow down the transmission of the disease by testing and treating patients, quarantining suspected persons through contact tracing, restricting large gatherings, maintaining complete or partial lock down' (Chakraborty and Maity, 2020). Importantly, pandemic have successfully recovered the environment to a large extent that should definitely set positive impact on global climate change. Whatever be the cause or origin, the occurrence of COVID-19 has emphasized to improve the mutually-affective connection between humans and nature.

The worldwide outbreak of novel coronavirus (COVID-19) pandemic with associated morbidity and mortality challenged the nations in health problems and climate change packages. During the COVID-19 pandemic, mental health problems have been faced by health care workers (HCW) (Spoorthy *et al*., 2020). While sociodemographic variables like gender, profession, age, place of work, department of work and psychological variables like poor social support, self-efficacy were associated with increased stress, anxiety, depressive symptoms, insomnia in HCW. For these regular screening of medical personnel involved in treating, diagnosing patients with COVID-19 should be done for evaluating stress, depression and anxiety by using multidisciplinary psychiatry teams (*ibid*:1-4). On the other hand, the response for COVID-19 crisis to reduce impacts of climate change more sustainable measures need to be taken 'as part of a more desirable, low carbon resilient future, in a more planned, inclusive and less disruptive way' (Howarth *et al*., 2020). In order to achieve this, a clearer social contract is necessary between citizens and the state. COVID-19 has demonstrated the behaviours of the causal virus can change abruptly which requires a 'social mandate' to ensure these changes remain in the long-term, and that science plays an important role in informing this process. Deliberative engagement mechanisms like citizens' assemblies and juries, could be a powerful way to build a social mandate for climate action post-COVID. In addition, climate change requires a more care-fully planned and calibrated, inclusive, less disruptive and more sustained response. To this end, behavioural changes enable to improve wellbeing and underpin climate action over the years ahead (Howarth *et al*., 2020).

Methods

Systematic Review Protocols

The current study has been conducted in accordance with the evidence-based guidelines for systematic reviews set according to the 'PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses)' statement to ensure quality (Liberati *et al.,* 2009). An electronic literature search conducted using the Scopus database until 30th June 2020. Successive terms in each search added sequentially in time, as the search was revised during the initial paper selection process as "(climate change) OR (COVID-19)" (Ramirez and Choucri, 2016).

Search Strategy and Eligibility Criteria

On one hand, the full-length articles retrieved only underpinning some inclusion criteria (Klettke *et al.*, 2014). While the focus provided on the climate change and COVID-19 diseases. Then, priority was given to the journals that illustrated correlation between climate change and corona virus disease. After that, the articles related with challenges imposed on the people, health care workers, officials and as a large extent to the states were important criteria for literature search. Next, national and international measures that have been taken for controlling COVID-19 pandemic with a greater target of mitigating climate change issues related articles were also documented. Therefore, the articles were analyzed and extracted results.

On the other hand, depending on exclusion criteria, different traits were focused like the publications which were written other than English excluded for syntactical analysis (Lastdrager, 2014). Additionally, the article titles that reported a virus or editorials, conference proceedings, and other than peer-reviewed articles were excluded from this systematic review. Then, time frame strictly followed which was fixed up to 30th June, 2020 to exclude the articles. The total number of articles found from Scopus was 75 for this review (**Figure 1**). Finally, 39 articles were fixed for the analysis of this review and 32 articles were excluded after screening the articles.

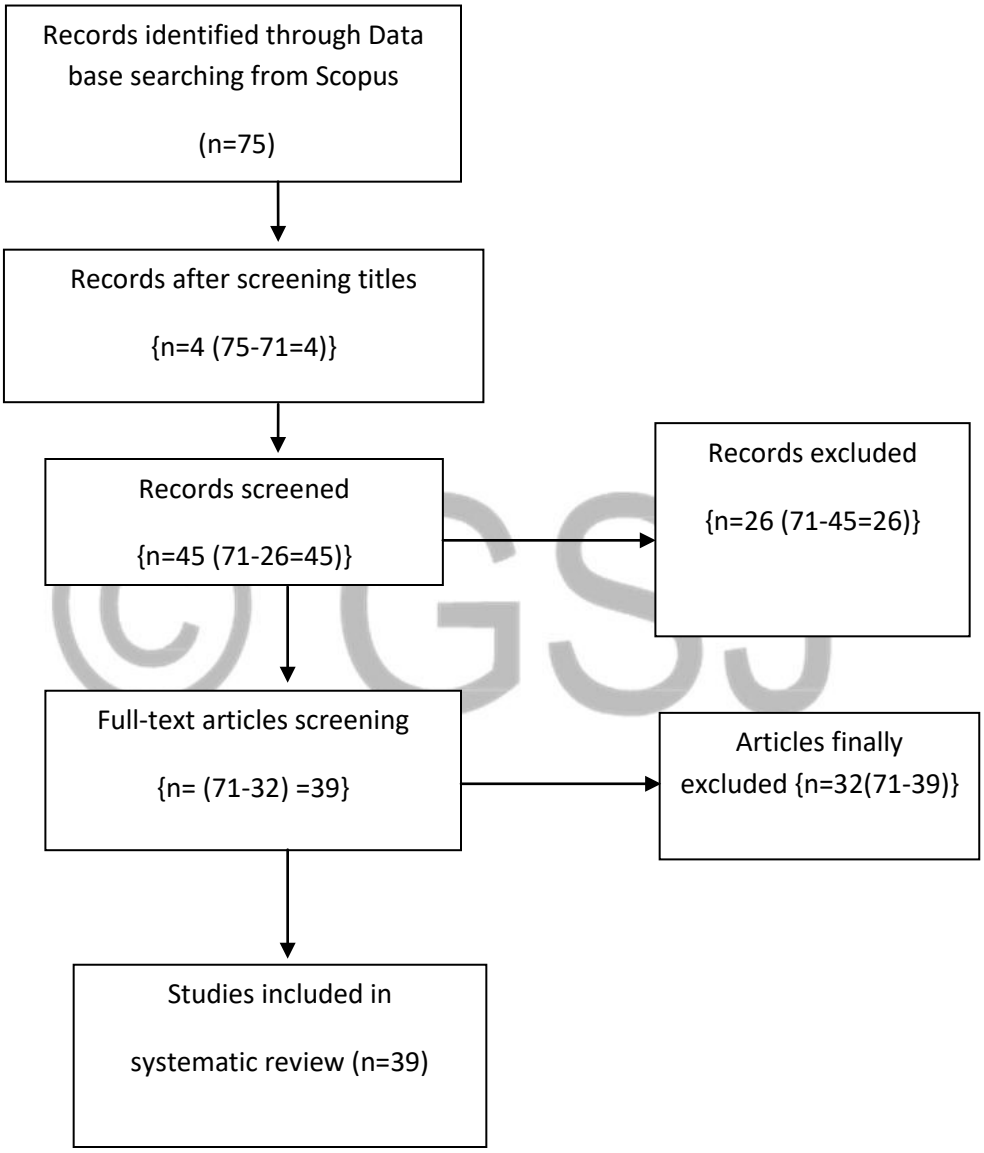

Figure 1: Flowchart for articles selection of the review (Klettke *et al.,* 2014)

Research design

This research is basically based on systematic literature review method (Booth *et al.*, 2012). Systematic literature review is the explicit 'accumulation, transparent analysis and reflective interpretation' of previous research findings and outcomes of 'a specific questions' (Rousseau *et al.*, 2008). This research conducted based on 'SALSA' mnemonic which comprises the four criteria, such as search, appraisal, synthesis and analysis (Sidebottom *et al.*, 2017). Articles were search based on Scopus database to collect information on 'climate change', 'covid-19', 'relationship between climate and covid-19','challenges' and 'measures' related with worldwide pandemic. Therefore, 'full text 39 articles' were selected depending on predetermined 'inclusion and exclusion criteria'.

Data analysis

Key analysis, after carefully reviewing sources, has been done through thematic analysis method to assess the relationship between climate change and COVID-19 for the worldwide (Castleberry and Nolen, 2018). For analyzing articles thematically, six steps were followed like 'familiarizing with documents' from the Scopus database, 'data generating initial codes, searching for themes, reviewing themes, defining and naming themes and producing the report' (Lawless and Chen, 2018). Finally, report production has been done after reviewing of themes, defining, naming and sub-themes creation to initiate the write up of this study (Thorne, 2000:69). Few findings were produced in graphs and tabular format to show the richness of the findings. Besides some sorts of findings were discussed elaborately to have an in-depth insight of the logics that provided in the searched articles regarding correlation between climate change and COVID-19 for the current outbreak of pandemic throughout the world.

Results

Climate change and COVID-19

Nowadays, *zoonotic diseases* – diseases that pass from an animal to a human–have gained international attention, which have relationship with climate change and recent pandemic of COVID-19 (coronavirus disease 2019), as shown in **Figure 2** (Everard *et al*., 2020). Climate change, overuse of antibiotics, and more intensified farming are thought to be increasing the rate of zoonotic diseases globally (Burkle, 2020). These are ultimately interlinked with *biodiversity crises* and water insecurity (Everard *et al*., 2020; Baudron and Liegeois, 2020; Helm, 2020). While human health is interdependent on animal health as well as ecosystem health. For example, hunting, butchering, and trading of bushmeat, especially in western and central Africa, including, Nigeria, Sierra Leone, and the Democratic Republic of Congo, among others, puts the human population at risk in terms of a zoonotic virus disease outbreak (Chauhan *et al*., 2020). Increasing human animal interactions are perceived as driving factors in pathogen transfer, emphasizing the close relationships between human, animal and environmental health. Human activities tend to convert beneficial ecosystem services into disservices, exacerbating risks related to zoonotic diseases (Everard *et al*., 2020). In addition, zoonotic disease generation and declining ecosystem capacities to provide essential services like fresh water for washing and sanitation, exacerbates overall risks to humanity. The COVID-19 pandemic is resulted from zoonotic spread, which is accelerated though rapid unsustainable urbanization, biodiversity loss, and climate change. Lower population densities, infectious disease outbreaks, epidemics, and pandemics were rare and driven almost exclusively by natural disasters, predatory animals, and war in past decades. Besides, zoonotic diseases that are spread from reservoir animals to human animals that now make up 71% or more of new diseases. Hence, these are exacerbated by an increasing number of vulnerable populations suffering from chronic deficiencies in food, water, and energy (Burkle, 2020).

The global emergence of the COVID-19 pandemic has opened avenue of a series of crises in various sectors (**Figure 2**). The *worsening of climate change* and the re-appreciation of the public and common domains have to respond by state, while it requires to recover the most immediate challenges regarding health, security, economic and social spheres within a context of crisis of 'neoliberal globalization' and of 'geopolitical competition' between old and new great powers (Pastor, 2020). However, the current pandemic is a *message from nature* to stop exploiting the earth (Weckert, 2020). There is no direct evidence of human actions for this pandemic, but it is evident that

deforestation and other environmental changes, together with climate change, do make it more likely that viruses will cross from wildlife to humans. Keeping wild animals in close proximity to humans in wet markets played a role, but not harming the planet in the way that humans are influencing climate change. It is claimed that harming or altering the environment in certain ways raises the probability of viruses crossing species. In addition, COVID-19 is a wakeup call to humanity. It was noted earlier that seeing the pandemic as the earth's immune system fighting back against the human virus is a metaphor. For example, it is sending us a message in the same sense that the fuel gauge on our car is sending us a message regarding the amount of fuel remaining in the tank. Changing the environment in ways that are detrimental to us as well as to other species is strong, for instance, by increasing the probability of severe fires or pandemics, but not always obvious at the time changes are made. Indigenous Australians view of the environment, or earth as our mother might be a useful way of keeping a focus on the importance of nature for human well-being and perhaps survival (*ibid*.1-5).

The regions (Philippines-Tagbilaran and Manila, Belgium-Brussels, Finland-Rovaniemi, Egypt-Cairo, and Australia-Melbourne, Sidney and Brisbane) without ongoing *human-to-human transmission* showed significantly higher temperatures when compared to China and countries (Italy-Lombardo and Veneto, South Korea-Daegu, Gyeongbuk, Gyeonggi, and Iran-Theran, Qom, Gilan) with ongoing human-to-human transmission, with over an 11 degree difference (**Figure 2**). The average rainfall was significantly higher in those regions without OHHT (ongoing human-to-human transmission) when compared to the Chinese provinces (Hubei, Guangdong, Henan, Hunan, Shan-dong, Jiangsu, Sichuan, Hebei, Zhejiang, and Anhui) with ongoing human-to-human transmission and the regions with active transmission of SARS-CoV-2 (COVID-19) (Del Rio and Camacho-Ortiz, 2020; Everard *et al*., 2020). There are significant differences between regions with ongoing human-to-human transmission of COVID-19 cases compared to those regions without horizontal transmission. In addition, temperatures and environmental factors contribute to the survival of different coronavirus. Low temperatures and dry conditions favor MERS-CoV survival and dissemination; nevertheless, high temperatures, coupled with high ultraviolet index, low wind speeds, and low relative humidity were contributors to increased MERS-CoV cases (Del Rio and Camacho-Ortiz, 2020:2). However, environmental climate changes may not favor respiratory virus pandemics as expected (*ibid*.2).

However, there were no associations of epidemic growth of COVID-19 with latitude and temperature, but *weak negative associations with relative humidity*, nevertheless, strong associations were found for restrictions of mass gatherings, school closures, and measures of social distancing, as shown in **Figure 2** (Mishra *et al*., 2020; Jüni *et al*., 2020). There was a strong association with the number of implemented public health interventions, whereas the association with absolute humidity was no longer significant. Conversely, public health interventions were strongly associated with reduced epidemic growth. However, these can interrupt disease transmissions. Only area-wide public health interventions were consistently associated with reduced epidemic growth, and the greater the number of co-occurring public health interventions, the larger the reduction in growth. Taken together, *seasonality* is likely to play only a minor role in the epidemiology of COVID-19, while public health interventions appear to have a major impact. The important effect of public health interventions needs to be weighed carefully against potential economic and psychosocial harms when deciding when and how to lift restrictions (*ibid*.7). On the other hand, Tosepu *et al*. (2020) argue, *only temperature average (°C) was significantly correlated* with COVID-19 pandemic among the five weather variables in Indonesia like temperature minimum, temperature maximum, temperature average, humidity, and rainfall. Temperature is also the environmental driver of the covid-19 outbreak in China. In spite of the weather, the high COVID-19 cases in Jakarta is also caused by the very high mobility of the people. As the capital city of Indonesia, Jakarta is the main economic destination for job seekers who come from various regions in Indonesia. Jakarta's population density is also very high and this allows covid-19 transmission to be very fast (Tosepu *et al*., 2020). In Wuhan, COVID-19 transmission is very important to be associated with transmission, there is a correlation between weather and disease spread, and weather factors will suppress disease when the weather warms up. Meteorological factors like humidity, visibility, and wind speed can affect environmental stability, or affect the viability of viruses. In addition, air temperatures have an impact on the transmission of the epidemic. Besides, absolute air temperature and humidity have been indicated to significantly affect COVID-19 transmission (*ibid*.2).

Furthermore, *temperatures* had a negative linear relationship with the number of confirmed cases in tropical climate like Brazil (**Figure 2**). However, it could not divulge a negative effect on COVID-19 infection for higher temperatures above 25 °C due to the lack of quantitative data to explore, or COVID-19 could fit these higher

temperatures (Prata *et al*., 2020). COVID-19 may not vanish by itself because the weather becomes warmer. While for the tropical temperatures of Brazil, the variation in annual average temperature ranges from 16.8 °C to 27.4 °C. The governance of healthcare public policies cannot wait for higher temperatures to defeat COVID-19. Hence, the efficient adoption of social distance policies was an improvement in the prevention and obstruction of the viral infection as it impacted in natural behavior of the virus (Mishra *et al*., 2020; Prata *et al*., 2020). On the other hand, there is uncertainty in correlation of Covid-19 pandemic and seasonality. In this regard, pollen-hay fever-is documented to invoke strong immune responses and might create an environmental factor that makes it more difficult for flu-like viruses to survive outside a host. There is a highly significant inverse correlation between pollen count and weekly changes in medical flu consults. This supports the idea that pollen is a direct or indirect factor in the seasonality of flu-like epidemics (Hoogeveen, 2020). Hence, the triggering of immune responses by pollen-coughing, sneezing, histamine responses-makes it more difficult for flu-like viruses as in the case of COVID-19 to penetrate a new host.

Economic activity has reduced which is resulted from global lockdowns due to the Covid-19 coronavirus pandemic. There are five sets of questions surmounting during this pandemic condition like the short-term impacts on emissions, the natural environment and environmental policy, including regulations and COP26 (UN Climate Change Conference 26); longer-term consequences from the deployment of macroeconomic monetary and fiscal stimuli, and investment in green deals; possible further *deglobalization and its impact on climate change and nature*; intergenerational environmental impacts including debt and pollution burdens on future generations; and possible behavioural changes to the environment, both positive and negative (**Figure 2**; Helm, 2020). While pollution has been associated with producing goods for consumption by the US and the EU comprising a significant share of world GDP, whereas China has contributed carbon emission in the atmosphere through using more coal in energy inputs to this production. The result has been a globalization of production and the extension of supply chains. Coronavirus will encourage a retreat to a greater emphasis on national production, and domestic security of supply, which will in turn reduce the pollution from shipping and aviation, and reduce global pollution. Globalization has been bad for the environment, in contrast, deglobalization will improve the environmental outcomes, and that the current pandemic has caused this deglobalization. In addition, climate change are essentially intergenerational problems. There have been short-term environmental gains from the reductions in emissions and the consequent improvements in air quality, and these will probably prove temporary when normality returns and GDP rebounds (Helm, 2020:36). Cheval *et al*. (2020) argue that the COVID-19 pandemic has led to numerous *environmental impacts*, both positive such as enhanced air and water quality in urban areas, and negative, such as shoreline pollution due to the disposal of sanitary consumables. The effects of COVID-19 are determined mainly by anthropogenic factors, becoming obvious as human activity diminishes across the planet, and the impacts on cities and public health will be continued in the coming years. Therefore, the consequence of abruptly closing economic sectors, like heavy industry, transport, or hospitality businesses, has affected the environment directly (*ibid*.5).

COVID-19 pandemic is a global threat to human health and economy that requires urgent prevention and monitoring strategies based on understanding the correlation between the *disease and specific geophysical parameters* (**Figure 2**). However, the pandemic does not present evident environmental hindrances in the infected countries. Notwithstanding, a lower rate of infections has been observed in some countries, which might be related to particular population and climatic conditions. A complex combination of the selected geophysical parameters-surface air temperature, precipitation, and elevation, and human-related characteristics-CO2 and population density, might be of integral importance to propagate COVID-19 among human populations, particularly in Europe (Coro, 2020). In general, a high infection rate in areas characterized by an annual moderate-high level of CO_2, moderate-low temperatures, and moderate precipitation. As such, climatic parameters like air temperature and precipitation or air humidity play a critical role of a high infection rate. While carbon dioxide is a crucial parameter, which is correlated directly with pollution and COVID-19 spread and indirectly with population density. Where elevation, as an infection factor, is also demonstrated by the variability in the altitudes of high-infection-rate Italian provinces (Coro, 2020). According to Norouzi *et al*. (2020), pandemics are a constant threat to society in spite of all the scientific and technological developments in the past one hundred years. While one of the aspects of a pandemic is the loss of human life, the outbreak has multi-dimensional impacts across regional and global societies. The *environmental analysis* demonstrates that the epidemic intensity significantly affects the

electricity and the petroleum demand, both directly and indirectly (**Figure 2**). The elasticity of petroleum and electricity demand toward the population of the infected people is −0.1% and −0.65%, respectively. Pandemic status has a significant impact on energy demand, and also its impacts can be tracked into every corner of human society (Norouzi *et al*., 2020:1). For instance, the outbreak in Wuhan, China caused a significant impact not only nationally but also on the global energy market. In addition, the infections across Middle East countries can damage oil supply significantly due to the lesser productivity. This energy demand reduction in the service and commercial sectors can be detected from the air pollution indexes, which is directly dependent on the energy demand in the cities and businesses. Remarkably, the impacts of the coronavirus in relation to energy and electricity, petroleum has a high sensitivity toward electricity demand, export income, and foreign investment variables (*ibid*.8).

There are unprecedented economic impacts generated from stringent lockdown measures implemented in Italy in this COVID-19 pandemic situation (Rugani and Caro, 2020). However, the environmental consequences associated with shutdown and recovery of industrial and commercial activities are still not fully understood. While 'the *carbon footprint (CF)* in the lockdown period is 20% lower than the mean CF calculated for the past' (**Figure 2**). It is evident that industrialized areas of Italy have been mostly affected by the outbreak. For example, GHG emissions associated with energy consumptions by industrial, agricultural, tertiary and housing sector and province areas of Italy have shown 20% decrease in the carbon footprint burden in this pandemic condition compared with 2015–2019 levels. A significant reduction in the consumption of natural gas, oil and petroleum products and electricity has been impacted on the CF level (*ibid*.12-13). On the other hand, *Environmental pollutants* such as PM10, PM2.5, SO2, NO2, and CO have a significant correlation with the COVID-19 epidemic in California, and limited human exposure to these pollutants will contribute to fight COVID-19 (Bashir *et al*., 2020). Lower environmental pollutant emissions have been achieved in adoption of less economic activities, less road traffic, and statewide mandatory "stay at home orders". Green environmental policies should be promoted to protect human life, especially most vulnerable sect of people, children and the elderly in particular, to curb infectious diseases (*ibid*.4). Therefore, this will encourage regulatory body to control pollution source which can reduce the harmful effects of environmental pollutants.

Chinese traveler's consumption patterns, such as the *growing popularity of free and independent travel, luxury trips and health and wellness tourism*, have been affected in this COVID-19 pandemic (**Figure 2**; Wen *et al*, 2020). While new forms of tourism like slow tourism and smart tourism might drive future tourism activities, which will force businesses to reconsider their service designs and distribution channels. Besides, travel movements have become more selective; predominantly, tourists may take fewer trips but spend longer in their chosen destinations. Consequently, these patterns will lessen the growing negative impacts of travel and tourism on climate change and environmental deterioration. Hence, public health crises represent sterling opportunities to view the industry holistically in terms of its effects on the environment, climate and traveler's (Wen *et al*, 2020:10). Shuja *et al.* (2020) argue 'the increase of infectious pandemics across the globe have been *accelerated by an increase in travel, international exchange and global changes in earth's climate*'. However, COVID-19 has several mental health issues like anxiety, obsessive compulsive disorder and post-traumatic stress disorder to create panic and stresses in masses (Shuja *et al*., 2020:32). Crossley (2020) states world is struggling with current pandemic and tourism halted, social media are surfacing with stories- 'wildlife is returning to quarantined cities and the Earth is healing itself'. The fixation on environmental healing evidenced in tourist social media can be interpreted as a response to widely felt '*ecological grief*', triggered by the events of COVID-19. Where ecological grief is defined as 'grief felt in relation to experienced or anticipated ecological losses, including the loss of species, ecosystems and meaningful landscapes due to acute or chronic environmental change' (Crossley, 2020:5). Environmental reparation can be connected to ecological grief. Hence, the notion that 'the Earth can heal itself' in the absence of human interference has brought comfort to millions of people (*ibid*.8).

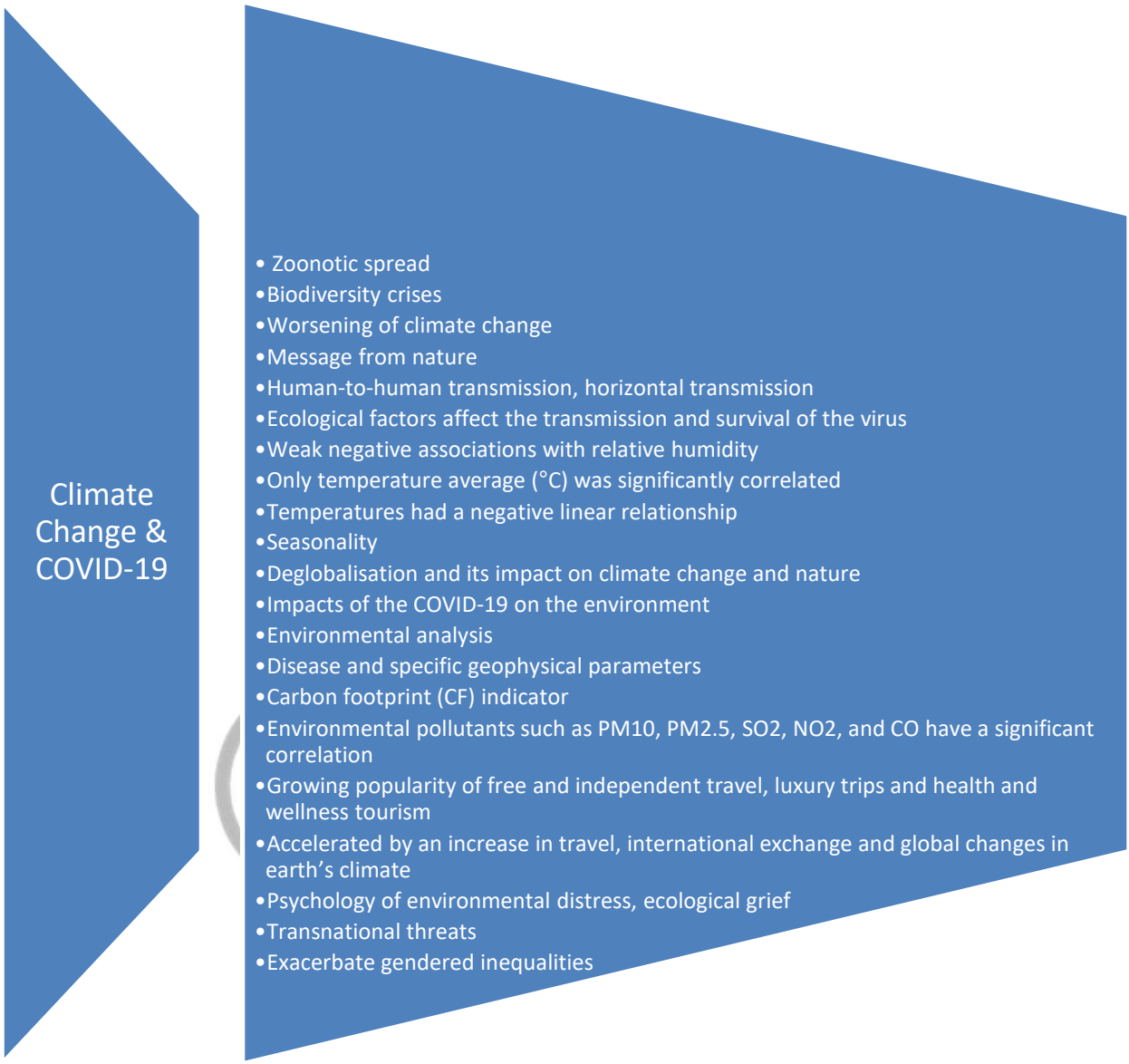

Figure:2 Relationship between climate change and COVID-19

The current COVID-19 as other *transnational threats* like climate change, the extinction of biological species, SARS or Ebola, is confronting with 'the modern utopia of rigid borders between nations and contemporary finance-led neoliberal economic models' (Milani, 2020). This pandemic has shown the genuine contemporary meaning of global human security. Its world-wide dissemination cannot be restricted by any borders, military power, and economic capacity. The complexity of the pandemic inter-linked with local and global scales, natural and social conditions, COVID-19's spatial, political and sociological consequences. In contrast to climate change, 'COVID-19 is an individual and subjective experience', which evolves without too much mediation and too many intervening agents. In addition, climate change seeks long-term social representations of sustainable livelihoods on the globe, whereas COVID-19 involves people, health workers, governments and international organizations on emergency basis (Milani, 2020:150). The health crisis is preparing, inducing, encouraging people to adapt and get ready for future transnational threats, including climate change. Future global, regional and state regulation will need to consider *transnational threats* to ensure the security of individuals and to guarantee the long-standing durability of the biosphere as a life-supporting system (**Figure 2**). However, Muehlenhoff *et al*. (2020) argue 'the European Union has faced several crises in the past decades, including the economic and financial crisis, Brexit, a migration,

climate change and security crisis, and the latest COVID-19 crisis'. Feminist scholars express that the causes and effects of the economic and financial crisis are strongly gendered. Additionally, present COVID-19 crises can open a window of opportunity for gender considerations but may also promote policies which *exacerbate gendered inequalities*. While it is still not known the impact of crises on the attention to gender equality in European Union's external relations. But, "EU's dealings with the latest crises, the COVID-19 pandemic and the concomitant economic recession, exemplify this". The gendered impacts like the disproportional consequences for underpaid care workers and the increase of gender-based violence have been prevalent in this crisis. In fact, EU's response to the crises of climate change and migration links development with these issues in new policy nexuses, where the EU lets gender equality slip off its development policy agenda, which used to be the most gender-friendly EU external policy (Muehlenhoff *et al*., 2020).

Challenges from the current worldwide pandemic

Fear of loss of loved ones, and fear of loss of love, is the primary source of fear and anxiety in human life, which is a challenge for fighting COVID-19 as shown in **Figure 3** (Steele, 2020). While the overwhelming trauma of the COVID-19 pandemic and public health crisis is that our political leaders, across the globe, have often been lacking in coherence, consistency, resources and guidance. When people are deprived of consistent, truthful information, non-truthful alternative theories thrive, and fear grows. And all the while the virus disproportionally harms poor, marginalized groups with the least resources-the elderly, the poor, immigrants and refugees. A world where the destructive influences of climate change are no longer denied by powerful leaders more interested in exploiting the earth's resources than nurturing and protecting the earth. This must be more than a hope to mitigate public health crisis, and climate-linked trauma like flood, storms and forest fires. For this, social distancing is required to reaching out to family, neighbors and strangers (Mishra *et al*., 2020; Steele, 2020). Next challenge is *COVID-19 provoked a generalized climate of wariness and uncertainty* among health professionals in particular, because of rapid spread of COVID-19, severity of symptoms, lack of knowledge of the disease, and deaths among health professionals. Organizational factors like depletion of personal protection equipment, concerns about not being able to provide competent care if deployed to new area, concerns about rapidly changing information, lack of access to up-to-date information and communication, lack of specific drugs, the shortage of ventilators and intensive care unit beds necessary to care for the surge of critically ill patients, and significant change in their daily social and family life, are also aggravated stress (El-Hage *et al*., 2020). Consequently, risk factors evident in this pandemic situation are concerns about health of self, fear of taking home infection to family members or others, and not having rapid access to testing through occupational health, being isolated, feelings of uncertainty and social stigmatization, overwhelming workload, or insecure attachment. Hence, "health care professionals are at an increased risk of high levels of stress, anxiety, depression, burnout, addiction and post-traumatic stress disorder, which could have long-term psychological implications" (El-Hage *et al*., 2020:1).

Then, *biodiversity crisis* is a leading factor for the emergence of COVID-19, and the outbreak of many past infectious diseases (**Figure 3**; Baudron and Liegeois, 2020). While *agriculture is a major driver of global biodiversity loss*. Agriculture is one of the "biggest killers" for 62% of the species listed as threatened or nearly threatened. Approximately 22% of the land area represented by 'Biodiversity Hotspots' is threatened by agricultural expansion. In addition, these areas often overlap with emerging disease "hotspots". Together with these, agricultural expansion, as well as agricultural intensification, are major drivers of biodiversity loss. This will cut farmers from vital ecosystem services, including soil fertility maintenance, pest control and regulation of microclimate. Feeding a growing human population in ways that minimize harm to biodiversity is thus imperative to prevent the next COVID-19 (Baudron and Liegeois, 2020).

Another *global challenges that will affect health and health care* are 'pan-national infections such as the new coronavirus COVID-19 and others that will be related to global warming' (as shown in **Figure 3**; Catton, 2020). Where climate change is the greatest threat the world is facing, though its impact health and health care have not been adequately brought to the public's attention. The consequences of global warming on health will be malnutrition as crop yields fall and food prices rise, infectious diseases, respiratory disease because of air pollution, and traumatic injury and subsequent hardship due to frequent extreme weather events. However, nurses will be required to react to these events though they have chances to be affected like other ordinary citizens. Hence, more nurses will be required for the future resilience to face the coming challenges (*ibid*.4). Bao-le *et al*. (2020)

argue that COVID-19 disease is caused by pestilential pathogen due to the specifically regional *climate characteristics of Wuhan City*, China, which is a challenge for controlling this disease. It is necessary to consider the local conditions and use the combination of TCM (traditional Chinese medicine) and western medicine to treat COVID-19 patients to control the epidemic at an early date. Based on different courses of disease, COVID-19 patients need to eliminate pathogens as soon as possible with defense-qi-nutrient-blood syndrome differentiation. Where the syndrome of the Defense-Qi-Nutrient-Blood is a collective term for diseases (or syndromes) of defense, Qi, nutrient, and blood. The Defense-Qi-Nutrient-Blood Syndrome Differentiation, also known as Four-aspect Pattern Identification, is syndrome differentiation or pattern identification of epidemic febrile diseases in accordance with the theory of defense, Qi, nutrient, and blood which indicate the stages of the course with corresponding pathological changes. The TCM therapy should be established according to the different affected organs and characters.

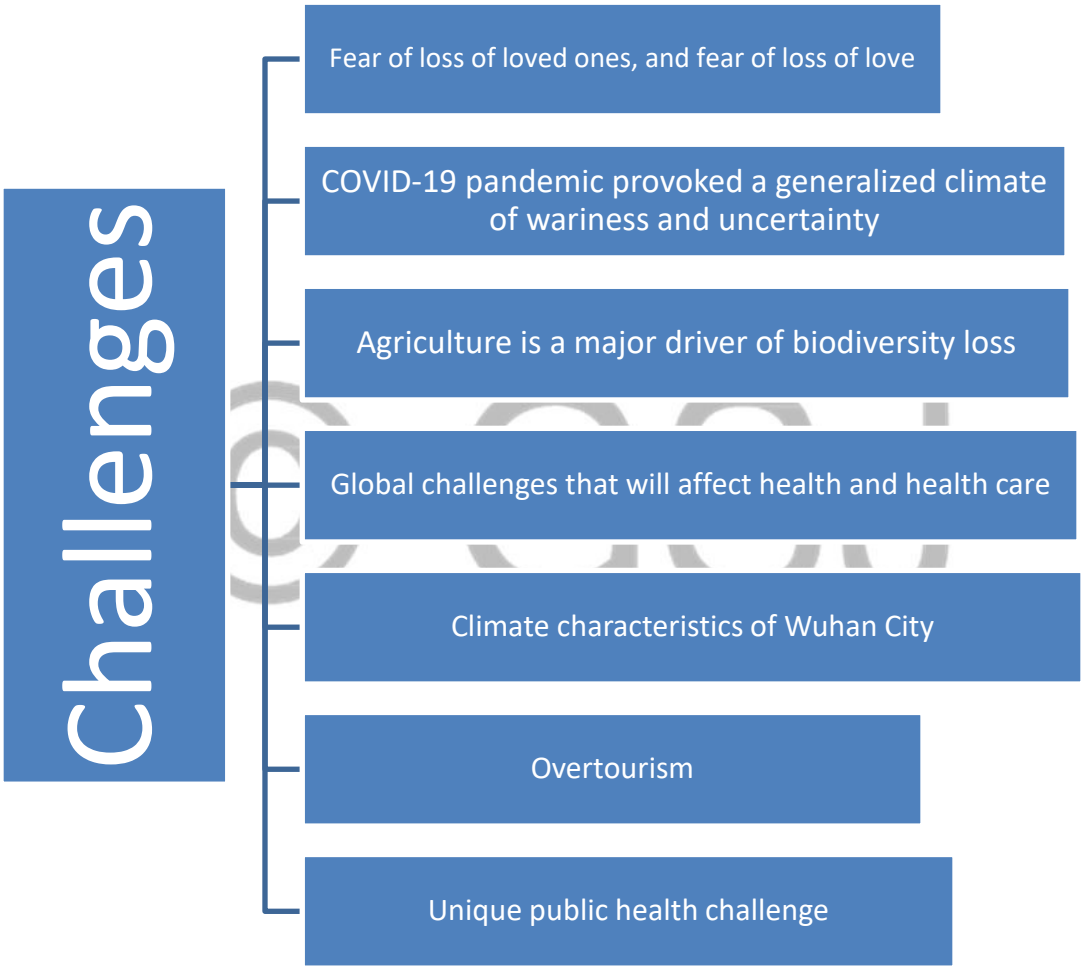

Figure: 3 Challenges from COVID-19 pandemic

Next, *overtourism* is a complicated and multi-dimensional phenomenon that challenges the residents' quality of life in Art Cities and World Heritage Sites like Florence, Edinburgh, Bordeaux, Porto, and Santiago de Compostela (**Figure 3**). Where overtourism is "an excessive number of tourist visits to a popular destination or attraction, resulting in damage to the local environment and historical sites and in poorer quality of life for residents" (de Luca *et al*., 2020:2). The current novel corona virous pandemic is a threat to the tourism industry which is highly vulnerable to climate change. However, the effects of climate change on tourism have not quantified. Overtourism can easily affect the social, economic, and environmental conditions of the Art Cities and World Heritage Sites, and it can lead to conflicts between residents and tourists to worsen the pandemic situation (*ibid*.7). The challenge is to

design for tourism futures by harnessing and channeling environmental hope in a way that truly does heal the natural world and, in the process, heals our ecological grief (Crossley,2020). Finally, the COVID-19 has envisaged the world and physicians with a *unique public health challenge* (Prasad *et al*., 2020). Due to its high transmissibility and large burden on the health care system, many hospitals and practices have opted to cancel elective surgeries in order to mobilize resources, ration personal protective equipment and guard patients from the virus. Additionally, physicians among a variety of specialties and settings have been told to work remotely from home given the current climate of social distancing. In the profound and unique context of social distancing and the COVID-19 pandemic, these acute effects can not only impact patient health, but also perhaps increase the psychological impact of their disease, recovery, and quarantine. While telemedicine includes a variety of domains, including patient education, diagnosis, and treatment. Specifically, such services have been designed for disaster scenarios, but implementation of telemedicine has been severely underutilized, even in such rare circumstances. In the current pandemic, telehealth services have grown in popularity and have been adopted by care teams in order to optimize workflow (*ibid*.1-3).

Measures for mitigating COVID-19 pandemic to reduce climate change impacts

The World Health Organization (WHO) and its International Health Regulation (IHR) Treaty, organized to manage population-based diseases like Influenza, severe acute respiratory syndrome (SARS), H1N1, Middle East respiratory syndrome (MERS), HIV, and Ebola, failing to meet expectations of population (Burkle, 2020). Political influence from powerful donors is the reason for this failure, which is most evident in the current COVID-19 pandemic fighting. While people will no longer tolerate an ineffectual and passive international response system and the self-serving political interference that authoritarian regimes and others have exercised over the WHO. Both the WHO with its IHR Treaty have the potential to become one of the most effective mechanisms for crisis response and risk reduction world-wide. Therefore, it is required a return of the *WHO's singular global authority*, and support highly coordinated population-based management to establish the proponent "one medicine, one health" to protect global public health from COVID-19 and any other future pandemic and to reduce consequences of climate change, as shown in the **Table 1**. Underpinning meat equity worldwide could lead to progress for future generations on *'spaceship' earth* by establishing control over population quality, thermostat and biodiversity (Williams and Hill, 2020). Where 'spaceship' earth is a world view encouraging everyone on Earth to act as a harmonious crew working toward the greater good. While nicotinamide homeostasis is a candidate common denominator to explain smooth transitions, whether demographic, epidemiological or economic. This 'NAD (nicotinamide adenine dinucleotide) world', dependent on hydrogen-based energy, is not widely recognized as it is neither measured nor viewed from a sufficiently multi-genomic or historical perspective. The 4 'D's' of progress mean the major inter-related transitions of Demography, Domestication, Development and Disease. Meat and nicotinamide balances during co-evolution, it suggests that populations only modernize and age well with low fertility on a suitably balanced diet. Imbalances on the low meat side lead to an excess of infectious disease, short lives and boom-bust demographics. If these do not address properly, basic human needs that start with diet could deteriorate fast with agriculture both being the cause and the casualty of climate change (*ibid*.7). However, Pastor (2020) argue another possible world would be achievable from the social movements that evolve from either *business as usual* or the neosocial-democratic recipe, or a *bottom-up alternative*. To this end, in this new era the coexistence with future insecurities will be normal.

Humans are mammals and welfare of people depend on the health of the earth. In addition, human being is not so different from other living creatures in this regard. It is in people's interests to look after the earth, something that Indigenous Australians knew well. *Mother Earth* must be cared for if she is to care for us. Nature perhaps is sending us a message in the same sense that my car does if I do not maintain it. It stops functioning properly (**Table 1**). We have to modify nature to satisfy our needs but we must be careful how we modify it (Weckert, 2020). Nature could be exploited for short-term gain to the extent where it will no longer be able to supply necessities in the longer term and, as in the cases of fires and viruses, could actually make life worse for us (*ibid*.1-5). *Public health infrastructures must be nourished and reinforced*, just as heroic economic and technological changes are needed, so that we may more effectively cope with the fears, destruction and death arising on a regular basis on account of the radical adverse events (hotter and bigger wild fires, longer and more damaging storms) brought on by climate changes, directly linked to foolish and greedy human choices and behaviors (Steele, 2020). With respect to the post-Corona world, it will be undeniably a new world compared to the pre-Corona

world, and ought to be a new world-where threats to public health are more closely monitored, tracked and prepared for (Steele, 2020:98).

Table 1: Measures for controlling COVID-19 and improvement of climate

Measures	Articles
WHO's singular global authority	Burkle, 2020
Spaceship earth	Williams and Hill, 2020
Bottom-up alternative	Pastor, 2020
Mother Earth	Weckert, 2020
Public health infrastructures must be nourished and reinforced	Steele, 2020
Paris Agreement for climate	Baudron and Liegeois, 2020
One Health measures in Africa	Chauhan *et al*., 2020
Restrictions of mass gatherings	Jüni *et al*., 2020
Social distancing measures	**Cheval *et al*, 2020**
Systemic policy change	Everard *et al*., 2020
Governmental measures	Kanniah *et al*., 2020
Promote changes in environmental policies as pollution source control	Bashir *et al*., 2020
5 key areas of public health systems–governance, information, services, determinants, and capacity	Sheehan and Fox, 2020
Community planning, a whole of-government commitment to equal access, and implementation of universal design strategies	Pineda & Corburn, 2020
Sustainability transition policy (STP)	Markard and Rosenbloom,2020
Glocalization	Goffman, 2020
Public health and healthcare management	Keenan, 2020
Waste management	Kalina and Tilley, 2020
The application of Ayurveda medicine	Mishra *et al*., 2020
Flattening the curve	Prideaux *et al*., 2020
Coordination between political and scientific levels	Ruiu, 2020

A global concerted effort similar to the *Paris Agreement for climate* is required to against future pandemic (**Table 1**; Baudron and Liegeois, 2020). As the burden of implementing should not be left to small-scale family farmers. Supportive policies and markets are needed, but unlikely to bring about the required changes alone. A large share of the global food produced does not enter the market, but is consumed by the small-scale family farmers who produce it. Reducing the negative impact of our agricultural systems on biodiversity will thus require a global, concerted effort. Although the importance of biodiversity for our very existence, raising public awareness of the consequences of the biodiversity crisis to the same intensity as awareness of the consequences of the climate crisis is critical. In a more-and-more connected world, we share joint responsibility for our global future. We must shoulder the burden of feeding humanity whist maintaining the very biodiversity that confers resilience on our increasingly cultivated planet against shocks such as the global pandemic of COVID-19 (Baudron and Liegeois, 2020:5). Active surveillance of viral diseases and strict implementation of *One Health measures in Africa* is essential to improve human public health and reduce the possibility of potential pandemics due to zoonotic viruses **(**Chauhan *et al*., 2020). While most countries responded to COVID-19 by *restrictions of mass gatherings* (Jüni *et al*., 2020), *social distancing measures* and severely diminished economic and other activities (Cheval *et al*, 2020; Pineda & Corburn, 2020). These activities create an opportunity for *systemic policy change*, placing scientific knowledge of the value and services of ecosystems at the heart of societal concerns as a key foundation for a more secure future from the Covid-19 pandemic (Everard *et al*., 2020).

Furthermore, the reduction in anthropogenic emissions due to COVID-19 and the related *governmental measures* to restrict its expansion is crucial to impacts on air pollution and economic growth (**Table 1**; Kanniah *et al*., 2020).

For instance, the Malaysian government implemented the Movement Control Order (MCO) for two weeks starting from 18 March, which was then extended to until 9 June, 2020. With this order, the Malaysian government shuts down public transport, educational institutes, busy central parks and other social interaction points in a way to curtail the spread and transmission of COVID-19. In addition, regulatory bodies should encourage to *promote changes in environmental policies as pollution source control*, which can reduce the harmful effects of environmental pollutants (Bashir *et al*., 2020). Similarly, the adoption of green environmental policies should be further promoted to protect most vulnerable like children and elder people from the outbreak of infectious diseases. As meteorological conditions are of eminent standing, a comprehensive evaluation must be conducted to analyze its association with the outbreak of infectious diseases, like COVID-19. Additionally, the 2020 response to COVID-19 revealed major gaps in public health systems around the world that perplexed world citizens by a quickly-spreading new coronavirus (Sheehan and Fox, 2020). This pandemic serves as a clarion call to governments and citizens alike to ensure public health systems are better prepared to meet the emergencies of the future, many of which will be climate-related. COVID-19 provides substantial lessons on health-related adaptive responses to climate change hazards. Hence, *5 (five) key areas of public health systems – governance, information, services, determinants, and capacity* – are essential to fight the coronavirus pandemic for climate change preparedness (Sheehan and Fox, 2020:264). Absence of focusing persons with disabilities (PWDs) living in cities in urban health policy, planning and practice, the COVID-19 pandemic response four times more likely to be injured or die PWDs than non-disabled persons. The "everyday emergencies" in cities for PWDs and that these can be avoided through more inclusive *community planning, a whole of-government commitment to equal access, and implementation of universal design strategies*. However, living in cities may already present health damaging challenges for PWDs, such as through lack of access to services and employment, physical barriers on streets and transportation, and smart-city technologies that are not made universally accessible. In fact, the current pandemic viewed as an opportunity for significant urban health reforms (Pineda and Corburn, 2020:1).

Governments around the world are mobilizing unprecedented public resources to mitigate economic collapse in this COVID-19 pandemic (Markard and Rosenbloom, 2020). However, these new programs run the risk of paying insufficient attention to the multiple sustainability crises. Climate change threatens human prosperity and requires societal mobilization in particular. The response to the coronavirus outbreak offers an opportunity to advance the climate agenda. Harnessing the disruptive forces of the COVID-19 pandemic to accelerate the decline of carbon-intensive industries, technologies, and practices, and leveraging responses to drive low-carbon innovation are two ways to response to climate change. "*Sustainability transition policy*" is a guide during these challenging times (**Table 1**). While this policy is underpinning on five principles that can be used to re-embed climate considerations within responses to the COVID-19 pandemic. These principles are STP targets both innovation and decline, it is tailored to transition phases, these are "context sensitive" in the sense of low-carbon transition plans, it carefully monitor the progress of the transition to reach decarbonization, and it is important to account for the crucial relevance of politics (*ibid*.56-57). Furthermore, *glocalization* is an opportunity in this coronavirus pandemic where people live local lives but with greater global awareness through a connective world brain. According to the Encyclopedia Britannica, glocalization is "the simultaneous occurrence of both universalizing and particularizing tendencies in contemporary social, political, and economic systems" (Goffman, 2020:49). As neoliberal version of globalization has stirred environmental devastation, economic inequality, and excessive global travel, glocalization should advance to air travel, local production, smart growth, and greatly reduced automobile trips, among other measures. With local adaptation but a global cooperative ethic, these measures would be the best possible way to alleviate the current pandemic and climate change problem simultaneously. In response to these transboundary threats, it is necessary to adopt polycentric, horizontal governance; sharing best practices across nations; and solving problems in local contexts (*ibid*.49). Keenan (2020) states that *public health and healthcare management* is essential to calibrate community resilience particularly in advance community health in the COVId-19 and climate change juncture. Various disaster, organizational, and engineering resilience activities have positively shaped COVID responses within the healthcare sector through the lens of the built environment. For example, 'disaster' and 'engineering' resilience are most widely utilized in domestic multi-hazard and climate change planning in the U.S. (*ibid*.5). Besides, *solid waste management* must play in a humanitarian response towards disasters, in particular the ongoing Covid-19 pandemic, and to other future disasters. As the current Covid-19 pandemic makes importance of waste management, but its urgency is deeply rooted in climate change. In response to state-issued instructions and guidelines for disaster preparedness, fears of contamination, social distancing regulations, and

stay-at-home orders have contributed to a visible resurgence in consumer preference for single-use products for both hygienic reasons, as well as convenience. For example, lockdown conditions in the Global North have corresponded to a dramatic increase in consumers flushing thick, fabriclike wipes down home toilets (*ibid*.203-204).

The invasion of present COVID-19 infections around the globe undermines the health system, demographic density, under climate change as the origin or career are the animals and they indirectly associated with climate change (Mishra *et al*., 2020). The present drivers of the pandemic or endemic viruses are zoonotic and undergoes continuous mutations or transformations like camels, bats, pangolin or aquatic species, it cannot be ignored that the viruses are not influenced by global climate change. For novel corona virus there is no vaccine found yet. While Ayurveda medicine mostly used in India would be a hope to control the pandemic (*ibid*.1589). But *the application of Ayurveda medicine*, its practices and practices followed by different countries are different (**Table 1**). COVID-19 has led to cessation of international travel which will need time to recover and the global effort will overlap to deal this problem with evolving climate crisis (Prideaux *et al*., 2020). The tourism industry thrives to adopt "*flattening the curve*" approach to return to the pre-COVID-19 normal to respond to the emerging transformation of the global economy to carbon neutrality. Flattening the curve approach is a measure taken to slow the rate of infection to allow a nation's healthcare system to cope with the number of hospital admissions and use of Intensive Care Unit (ICU) resources. Besides, the circular economy is a solution that is gaining support as a strategy to deal with economic factors causing climate change. While the current global economy is based on the linear economic production system based on a 'take, make, dispose' model where limited effort is made to recycle on a large scale. Whereas the circular economy model changes this narrative to 'recycle, reuse, repair' (*ibid*.5). During the first phase of the coronavirus pandemic, lack of coordination between political and scientific levels, and between institutional claim-makers and the media in the management of the crisis (Ruiu, 2020). The outbreak management suffered from the five communication weaknesses related to mixed messages from multiple messengers; delay in releasing information; paternalistic attitudes; lack of immediate reaction to rumours; and political confusion. The communication of uncertainty around an unknown threat should be accompanied by both political and scientific cohesion. However, both political and scientific dysfunctions caused the failure of several government efforts to contain the outbreak. For example, coronavirus outbreak management in Italy has been done by exploring the *combination of political, scientific, media and public responses* (*ibid*.1-14). In fact, this management is a lesson for others countries in the globe who encounter this crisis.

Discussion

The current study revealed that climate change and COVID-19 are interrelated where coronavirus has zoonotic disease characteristics that is disease pass from an animal to a human. Climate change, overuse of antibiotics, and more intensified farming are the reasons for spreading of zoonotic diseases (Everard *et al*., 2020; Burkle, 2020). Kelvin and Rubino (2020) supported that zoonotic diseases continues to repeat itself over time like COVID-19. However, it is required to know the pathogenetic mechanism of SARS-CoV-2 in order to build reproducible animal models to develop effective measures to combat zoonotic viruses that potentially evolving into pandemics (Contini *et al*., 2020). In addition, COVID-19 disease has inter-linked with biodiversity crises (Everard *et al*., 2020; Baudron and Liegeois, 2020; Helm, 2020), climate change (Pastor, 2020), nature (Weckert, 2020), human-to-human transmission (Del Rio and Camacho-Ortiz, 2020; Everard *et al*., 2020), weak negative associations with relative humidity (Mishra *et al*., 2020; Jüni *et al*., 2020), seasonality (Hoogeveen, 2020), significantly correlated with temperature (Tosepu *et al*., 2020), specific geophysical parameters (Coro, 2020), carbon footprint (Rugani and Caro, 2020), environment (Cheval *et al*. (2020), environmental pollution (Bashir *et al*., 2020; Shuja *et al*., 2020) , and independent travel (Wen *et al*, 2020). It is supported that COVID-19 pandemic caused by a novel coronavirus known as SARS-CoV-2 has caused tremendous suffering and huge economic losses (Lal *et al*., 2020). While the majority of the cases were recorded from Western countries, where mortality rates were strongly positively correlated with age, the number of cases in tropical regions was relatively lower than European and North American regions, possibly attributed to faster human-to-human transmission. An increasing coverage of high COVID-19 hazard at absolute humidity levels ranging from 4 to 9 gm−3 across a large part of the globe during April–July 2020 due to a high prospective meteorological suitability for COVID-19 spread (*ibid*.1)Apart from China, countries of the Western Hemisphere(USA and Europe) were the worst affected regions by the uncontrolled

progression of COVID-19 in recent days, where a marginal rise in temperature (from 4 °C to 6 °C) during the 1st-12th week was observedCOVID-19 is more likely to spread in low to moderate temperature zones (<19 °C) and regions with mean temperatures of <10°C (Bu et al., 2020). In fact, climate change and COVID-19 are related for the current pandemic throughout the world.

It is evident that the current worldwide coronavirus pandemic imposes challenges for humankind and climatic condition. This research documented fear of loss of loved ones, and fear of loss of love (Steele, 2020); COVID-19 provoked a generalized climate of wariness and uncertainty (El-Hage et al., 2020); global biodiversity loss (Baudron and Liegeois, 2020); health and health care affect (Catton, 2020); climate characteristics (Bao-le et al., 2020); overtourism (de Luca et al., 2020:2); and unique public health challenge (Prasad et al., 2020) are the major challenges exert from the ongoing corona virus crisis. Sovacool *et al*, (2020) state that the global Covid-19 pandemic has rapidly overwhelmed our societies, shocked the global economy and overburdened struggling health care systems and other social institutions around the world. While such impacts of Covid-19 are becoming clearer, the implications of the disease for energy and climate policy are more prosaic. However, the emerging connections between Covid-19 and energy supply and demand, energy governance, future low-carbon transitions, and social justice are predominant in national and international level (*ibid*.2). In addition, anthropogenic climate change is increasing the frequency and severity of the physical threats to human and planetary wellbeing (Davies *et al*., 2020). Climate change adaptation and mitigation pose complex and interdependent social and ethical dilemmas that will need to be explicitly confronted in any activation of "Green New Deal" strategies currently being developed internationally. Such critical insights about the layered, unequal and institutional dimensions of risks are of paramount import when considering other riskscapes pertaining to conflict and war, displaced people and pandemics like the 2019–2020 global COVID-19 pandemic (*ibid*.9-10). Hence, without careful guidance and consideration, Covid-19 could very well collapse in on itself with bloated stimulus packages that counter sustainability goals, misaligned incentives that exacerbate climate change, the entrenchment of unsustainable practices, and acute and troubling consequences for vulnerable groups (Sovacool *et al*., 2020:5).

Though no COVID-19 vaccine has been invented appropriately in the world yet, but various governments have been followed the directives of World Health Organization and implemented indigenous knowledge to fight against corona virus. Besides, this study found that WHO's singular global authority, (Burkle, 2020); 'spaceship' earth (Williams and Hill, 2020); bottom-up alternative (Pastor, 2020); care for Mother Earth (Weckert, 2020); reinforcement of public health infrastructures (Steele, 2020); implementation of Paris Agreement for climate (Baudron and Liegeois, 2020); one Health measures in Africa **(**Chauhan et al., 2020); restrictions of mass gatherings (Jüni et al., 2020), social distancing measures (Cheval et al, 2020; Pineda and Corburn, 2020); systemic policy change (Everard et al., 2020); "Sustainability transition policy" (Markard and Rosenbloom, 2020), and governmental measures (Kanniah et al., 2020) are the important measures for combating existing climate change impacts and COVID-19 and future pandemic. Menut *et al*. (2020) supported that the lockdown effect on atmospheric composition, in particular through massive traffic reductions, has been important for several short-lived atmospheric trace species, with a large reduction in NO2 concentrations, a lower reduction in particulate matter concentrations and a mitigated effect on ozone concentrations due to non-linear chemical effects. Further, it is substantiated that various measures like 'mobility restrictions, physical distancing, hygienic measures, socio-economic restrictions, communication and international support mechanisms' have been clustered for fighting COVID-19 with an ultimate goal of reducing climate change impact to avoid future pandemic (Bruinen de Bruin *et al*., 2020). However, it is being hard to change cultural habits and behaviour regarding 'wet' markets exist in several other places around the world such as in Africa, Asia and South America. Furthermore, Leung *et al*. (2020) argue in the absence of specific and well-tested pharmaceutical interventions, masks might well play a role in reducing transmission, in particular when physical distancing is not possible. In addition, a combination of mitigation measures–even those without current clear scientific evidence, for instance, school closures (Anderson *et al*., 2020)–is the best practice to gain most time in decreasing the rate of new infections (Hellewell *et al.*, 2020). The global response to the COVID-19 pandemic has led to a sudden reduction of both GHG emissions and air pollutants, in contrast, with an economic recovery tilted towards green stimulus and reductions in fossil fuel investments, it is possible to avoid future warming of 0.3 °C by 2050 (Forster *et al*., 2020). Therefore, the response to the COVID-19 threat as a "trial run" for future climate action would increase climate-change concern and mitigation support, and whether portraying climate change as a concern that needs to take a "back seat" while

focus lies on economic recovery would decrease climate-change concern and mitigation support (Ecker *et al*., 2020).

Conclusion

The current COVID-19 disease outbreaks worldwide pandemic, which has interlinked with the emerging climate change. This disease originated from Wuhan, China, but spread globally, tolling huge deaths particularly among the elderly people. COVID-19 is a zoonotic disease which is the resultant of biodiversity loss due to huge agricultural activities to destroy various species, ecosystem services, soil fertility, and microclimate. There are no associations of epidemic growth with latitude and temperature, but weak negative associations with relative humidity. In addition, temperatures had a negative linear relationship with COVID-19 in tropical climate as in Brazil. But there is uncertainty between the link of Covid-19 pandemic and seasonality. While globalization is bad for the climate, whereas deglobalization will improve the climatic outcomes and the current pandemic. This pandemic incurs numerous environmental impacts like improvement of air and water quality in urban areas, and cause coastal pollution because of throwing of sanitary wastage. In case of tourism, Chinese travel's life style have been changed for the sake of wellness, hence, the current pandemic is creating opportunities for wildlife to return their habitat and healing of earth. However, in curbing Covid-19 and improving climate strong associations were found for restrictions of mass gatherings, school closures, and measures of social distancing. Whereas the unprecedented economic impacts found from stringent lockdown measures as in Italy.

Furthermore, 'fear of loss of loved ones and fear of loss of love' are challenges found for fighting the present corona virus disease. Rapid spread of COVID-19, severity of symptoms, lack of knowledge of the disease, and deaths among health professionals are challenges for COVID-19 pandemic which is an impetus for climate of wariness and uncertainty. New coronavirus COVID-19 and global warming are imposing threats to health and health care which is a global challenge, what is expected by the public for improvement. In addition, climatic characteristics and overtourism are great challenges to control COVID-19 with an intention to ameliorate climate change condition. On the other hand, "one medicine, one health" is required to protect global public health from COVID-19 and to reduce climate change impacts. For this, WHO's singular global authority is imperative to coordinate population-based management worldwide. Besides, neosocial-democratic recipe, treating the world as 'Mother Earth', implementation of Paris Agreement for climate, and restrictions of mass gatherings, social distancing measures and combination of political, scientific, media and public responses should follow to fight COVID-19, climate change and regain economy in this neoliberal globalization era. However, this study is not beyond the limitation which is urging for empirical observation in this filed.

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