

OS IMPACTOS DA COVID-19 NO TRIPÉ SOCIAL, ECONÔMICO E AMBIENTAL

THE IMPACTS OF COVID-19 ON THE SOCIAL, ECONOMIC AND ENVIRONMENTAL TRIPOD

Flavio Henrique Mendes - Universidade de São Paulo, Escola Superior de Agricultura "Luiz de Queiroz"
friquemendes@usp.br

Carolina Matteussi Lino - Universidade Estadual de Campinas, Faculdade de Odontologia de Piracicaba
carolina.matteussi@gmail.com

Resumo

Cada vez mais há mais preocupações com a sustentabilidade global, para que as ações sejam socialmente justas, economicamente viáveis e ambientalmente corretas. No entanto, desde março de 2020, a pandemia do Coronavírus (COVID-19) afetou esse tripé, gerando dúvidas nos governos e na sociedade sobre o potencial do vírus e quais ações devem ser tomadas. Assim, muitos países colocaram suas populações em quarentena: (i) socialmente, o número de infectados e mortes em um nível exponencial tem gerado pânico nas pessoas; (ii) economicamente, a escassez de giro de capital no mercado e as incertezas futuras promoveram grandes quedas nas principais Bolsas de Valores; (iii) ambientalmente, único pilar positivo, apresentou melhorias na qualidade do ar em praticamente todo o mundo, ao reduzir poluentes como o NO₂, exceto em Teerã (Irã), que teve seus índices ainda maiores, classificando-a como a região mais poluída do período analisado. A análise foi baseada em dados oficiais da Organização Mundial da Saúde (OMS), Johns Hopkins University (saúde pública), Morningstar Inc. (aspectos econômicos) e Ventusky (questões ambientais). Como o tripé da sustentabilidade se comportará nos próximos dias, meses ou anos?

Palavras-chave: Coronavírus; pandemia; sustentabilidade; mortes; qualidade do ar.

Abstract

Increasingly, there are more concerns about global sustainability, so that actions are socially fair, economically viable and environmentally correct. However, since March 2020, the Coronavirus pandemic (COVID-19) has affected this tripod, causing doubts in governments and society about the potential of the virus and what actions should be taken. Thus, many countries have put their populations in quarantine: (i) socially, the number of infected and deaths at an exponential level has generated panic in people; (ii) economically, the scarcity of capital turnover in the market and the future uncertainties promoted great falls in the main Stock Exchanges; (iii) environmentally, unique positive pillar, showed improvements in air quality practically all over the world, by reducing pollutants such as NO₂, except in Tehran (Iran), which had its rates even higher, classifying it as the most polluted region in the analyzed period. The analysis was based on official data from the World Health Organization (WHO), Johns Hopkins University (public health), Morningstar Inc. (economic aspects) and Ventusky (environmental issues). How will the sustainability tripod behave for the next days, months or years?

Keywords: Coronavirus; pandemic; sustainability; deaths; air quality.

Introduction

The year 2020 will certainly be marked by the effects of the Coronavirus (COVID-19). What is the first word that comes to mind when you hear that? Panic, deaths, uncertainties, insecurities, business opportunities or environmental improvements? The COVID-19 pandemic is a result of infection by the severe acute respiratory syndrome coronavirus 2 virus (SARS-CoV-2), responsible for the development of respiratory diseases in humans, which can vary from a common cold to a severe respiratory syndrome, and was epicenter the populous Chinese city Wuhan, in late December 2019 (WHO, 2020a). Although its lethality rate - still under study - is considered low, from 2 to 4% (WESTON; FRIEMAN, 2020), because it is a virus with an accelerated rate of transmission, it has spread rapidly in several countries, demanding from authorities and organizations decision-making - such as early detection of cases, quarantine and social isolation - in order to reduce the transmission and effects of this

infection (WHO, 2020a), consequently impacting health services, food, environment, economy and also in communication and access to information.

Globalization and accessibility to the internet imply large circulation of information, especially on social networks such as WhatsApp, Facebook, Instagram, YouTube and Twitter, which end up disseminating types of news and feelings, whether they are true or not. Thus, with the same exponential behavior as COVID-19, these Fake News quickly take on large proportions and their effects are immediate: shortages of Personal Protective Equipment (PPE) in supermarkets and pharmacies, disclosure of wrong treatment options and, still, the politicization of the infection, pressing from health professionals, specialists and authorities the speed for the necessary clarifications. At least in theory, the search for sustainability is a consensus, a concept that brings together socially fair, economically viable and environmentally correct actions. So, the objective of this research was to analyze the impacts of COVID-19 on this tripod, worldwide.

Methods

To analyze the effects of COVID-19 on the Sustainability Pillar, the Social part was based on official data from the World Health Organization (WHO, 2020a; WHO, 2020b) and Johns Hopkins University (JHU, 2020). The Economic analysis was based on the responses of the markets to the pandemic in the period from January 2020 (tops) to end of March 2020 (bottoms), based on Morningstar Inc. (2020), about the behavior of the main Stock Exchanges and, finally, the Environmental question was about the quantification and spatialization of the NO₂ pollutant for a period of 40 days on the globe, i.e., between February 15, 2020 and March 26, 2020, through instant monitoring by Ventusky (2020), an interactive map product developed by the meteorological company InMeteo, situated in Pilsen, Czech Republic.

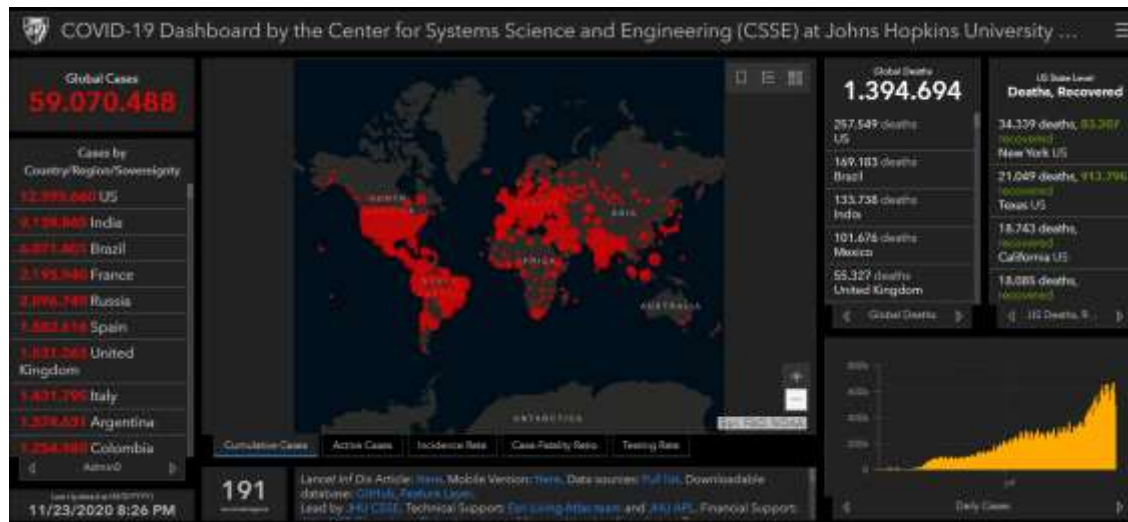
Analysis

Social

Epidemiological data released by the WHO show that, three months after the first infection in Wuhan, i.e., March 31, 2020, there were approximately 800 thousand cases of COVID-19 in the world with 40 thousand deaths, spread in 203 countries (or territories), which results in a lethality of almost 5%, with Italy being the country with the highest lethality, with 11.4%, since the demographic profile of its population is composed mainly of elderly people. Six months after the beginning of the first case (July 2020), the world accounts for more than 11 million people infected, while, almost nine months after (November 2020), this number rose to 59 million people infected, with emphasis on the USA, India, Brazil and Russia, corresponding, together, for half of the absolute cases worldwide, representing more than 25% of the world population (WHO, 2020b). Few countries are exempt from confirmed cases so far, either due to socioeconomic difficulties and internal conflicts that may generate underreporting or due to the different geographical region, such as Oceania, composed of several islands that guarantee social isolation.

The global threat of the COVID-19 pandemic, with the potential entry of the virus in countries, the need for more robust results from clinical trials - aimed at the treatment and preparation of the vaccine -, the high rate of hospitalizations and lethality, mostly associated with the elderly and/or people with comorbidities that affect the immune system, have demonstrated the fragility of health systems, as well as the arrival of a “second wave” in European countries (as France, Spain, United Kingdom and Italy) have demonstrated the weakness of health systems, the importance of preventive actions and infection control aiming at flattening the transmission curve, as well as the need and incentive for scientific research and health surveillance at local and global levels. The advancement of technology has led to the expansion of access to information, including health, in addition to the use of mapping and monitoring tools for diseases and conditions, allowing for a better epidemiological analysis of the cases studied, subsidizing research and proposing actions based on the information obtained (CHOWELL; ROTHENBERG, 2018). For this reason, the Center for Science and Systems Engineering (CSSE) at Johns Hopkins University (JHU, 2020) has developed a panel for real-time monitoring of COVID-19 cases worldwide, based on information from official organizations health, in addition to WHO, such as the Centers of Disease Control and Prevention (CDC), European Centre for Disease Prevention and Control (ECDC) and National Health Commission (NHC) (Figure 1).

Figure 1. Global COVID-19 cases with real-time updates



Source: Center for Science and Systems Engineering (CSSE) at Johns Hopkins University (JHU). Updated November 23, 2020

In view of this scenario, one of the containment measures proposed by WHO and adopted by several countries with confirmed cases has been quarantine for suspected cases and social isolation for the population, which involves reducing the working hours or even closing establishments and schools, in addition to reducing agglomerations. From this measure, governments try to flatten the transmission curve in order to obtain a more symmetrical distribution and reduce the transmission chain, consequently, amortizing the demand for health services and inpatient units. The pandemic has shown a deficit in health services, including in developed countries, due to the population's lack of access to health services, insufficient number of PPE for health professionals, deficit in the front line of professionals - often due to an exhausting journey of work and contact with infected patients -, overload of health services, absence of Intensive Care Unit (ICU) beds and restricted access to diagnostic tests, as well as underreporting the cases.

In developing countries or with populations that need humanitarian assistance, these challenges are even greater, since only the recommended guidelines may not be sufficient and health services already have a history of difficult access and scarcity of resources, as these countries already present themselves in social and economic

vulnerability. Give this scenario, according to the forecast made by Poole et al. (2020), these populations were susceptible to COVID-19 due to low income, the difficulty or following social isolation due to working conditions, the lack of adequate housing conditions (overcrowding, basic sanitation and hygiene conditions inadequate), dehydration, malnutrition and limited or scarce access to health. In a study by Walker et al. (2020) the association between Gross Domestic Product (GDP) and demographic profile of the population became evident, demonstrating that low and middle income countries, characterized by the smallest elderly population, do not necessarily have lower cases of COVID-19, since who also have risk groups due to the high rates of chronic and infectious diseases and the sociodemographic conditions of their population. In addition to all these difficulties that contributed to the cases reaching the peripheries, this same population will not have the same conditions for immediate treatment and/or prevention, such as vaccines.

Economic

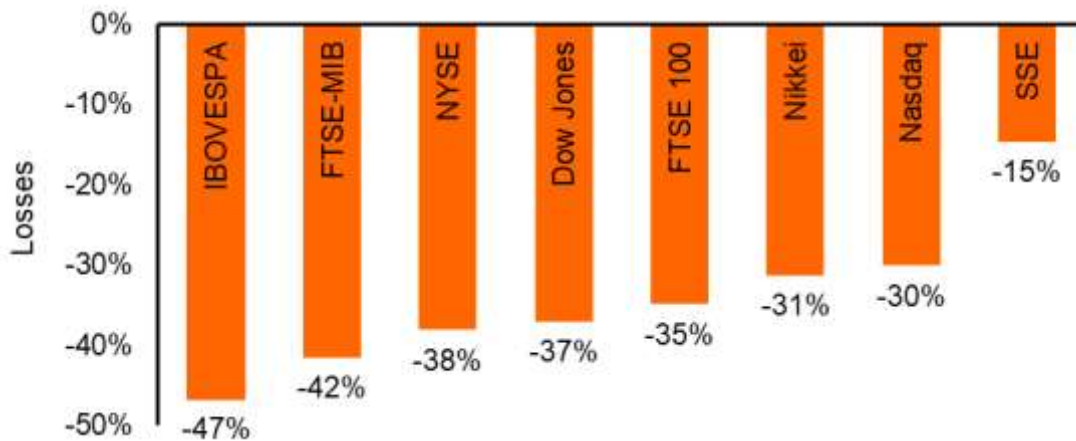
Depending on the duration of the pandemic's impact on society, the next pillar to note the effects is the economic. With horizontal social isolation (which can be from a few days to weeks or months), those who have the possibility work home-office, however, even a globalized world, with several internet cables below the oceans, this is not the reality of the majority, especially for low and middle-income countries, standing at a crossroads between health and employment, mainly the comprehensive branch of Civil Construction, which feels the effects of the situation more directly. Thus, questions arise about the real potential of the virus and whether actions to combat the pandemic will kill more than the virus itself, indirectly, with “invisible deaths”, since, on “normal days”, traffic-accidents and other illnesses also lead to death, and yet people do not abandon their own cars and unregulated and fatty food.

Another economic concern is the so-called “essential services”, which need to be fully operational to avoid the total collapse. They are water, energy and food, together with health services. But all these need logistics with transport and fuel, which also makes them essential. And the inspections on them. At the same time, all the services that surround the issue are also fundamental, realizing the great interconnection that exists between the sectors, making it difficult to separate how essential a service is. The

companies with the greatest resilience to the crisis will be those with low fixed costs and most of them classified as variable costs, since, with less demand for the product or service, they have greater flexibility to reduce their costs.

One of the main global commodities, oil, has suffered hard drops in the price since January 2020, exceeding 70%. Brent oil, an international reference, fell from \$ 70 a barrel to less than \$ 20 in less than four months (OIL PRICE, 2020), with Saudi Arabia, the main exporter, seeking to retake the commodity's sovereignty, especially against Russia and the USA. All this impact, of course, was reflected in the Stock Exchanges and their assets: IBOVESPA (São Paulo), FTSE-MIB (Milan), NYSE (NY), Dow Jones (NY), FTSE 100 (London), Nikkei (Tokyo), Nasdaq (NY) and SSE (Shanghai) are some examples that have lost value (Figure 2), as international investors, in view of the economic instabilities and uncertainties arising from COVID-19, withdraw their funds to invest mainly in dollar and gold, traditional reserves for a highly volatile environment in the market. Among the assets that had great losses in market value are airlines and commodities companies, which was more predictable, given the great importance of China in world trade. Complementarily, this economic recession is not exclusive to large investors, but to everyone, since a smaller amount of money in circulation means lower government revenues and, consequently, less applications in health, education, security and infrastructure. There are uncertainties regarding the resumption of economies, whether it will be in “V”, “W”, “U”, “L” or how much time will take to recover the losses. Since there are many borders closed, import and export volumes tend to decrease and, therefore, a stronger domestic market, especially those based on agriculture, represents greater resilience in this moment of crisis.

Figure 2. Comparison of the loss of market value of the main Stock Exchanges in the period from January 2020 (tops) to end of March 2020 (bottoms).



Source: Based on Morningstar Inc. (2020)

Environmental

Certainly, the only pillar that has been obtaining positive results of sustainability is the environmental. With images from the Sentinel-5P satellite, National Aeronautics and Space Administration (NASA, 2020) identified improvements in air quality, with reductions in NO₂ levels. Known as nitrogen dioxide, it is a gas emitted by explosion engines, such as automobiles and industries, responsible for causing and aggravating respiratory problems.

Ventusky's instant monitoring clearly revealed an improvement in air quality on the globe. On February 15, 2020, the eastern and California regions of the USA, central-eastern Europe, the Middle East, northern India and southeastern China had large patches of pollution (Figure 3), while 40 days after isolation, showed a reduction in such rates (Figure 4).

Figure 3. NO₂ concentration on February 15, 2020



Source: Ventusky (2020)

Figure 4. NO₂ concentration on March 26, 2020

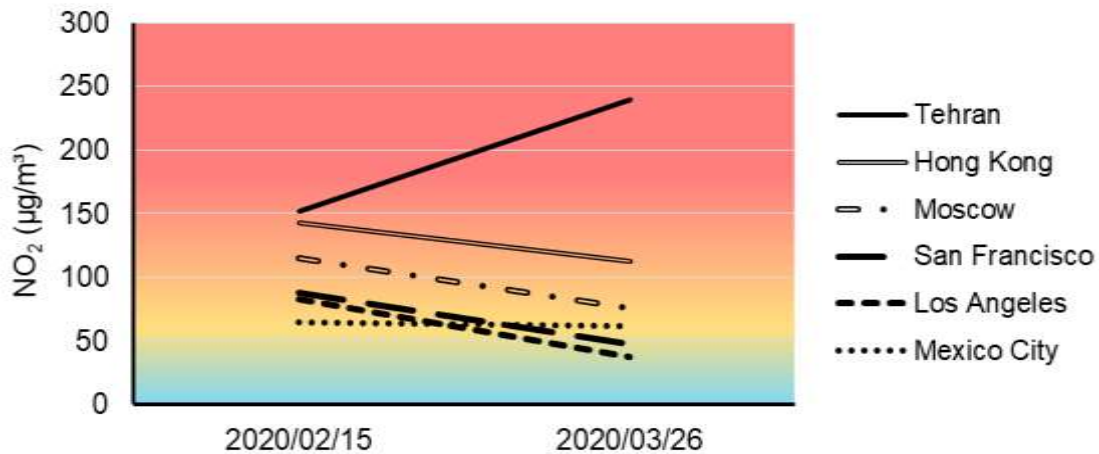


Source: Ventusky (2020)

In February, the locations with the highest concentrations of NO₂ were represented by the cities (and adjacent areas) of Tehran (Iran), Hong Kong, Moscow (Russia), San Francisco (USA), Los Angeles (USA) and Mexico City (Mexico), with values close or

greater than $100 \mu\text{g}/\text{m}^3$, which represents risks to human health, since values between 50 and $100 \mu\text{g}/\text{m}^3$ representing an alert state, according Ventusky (2020) (Figure 5).

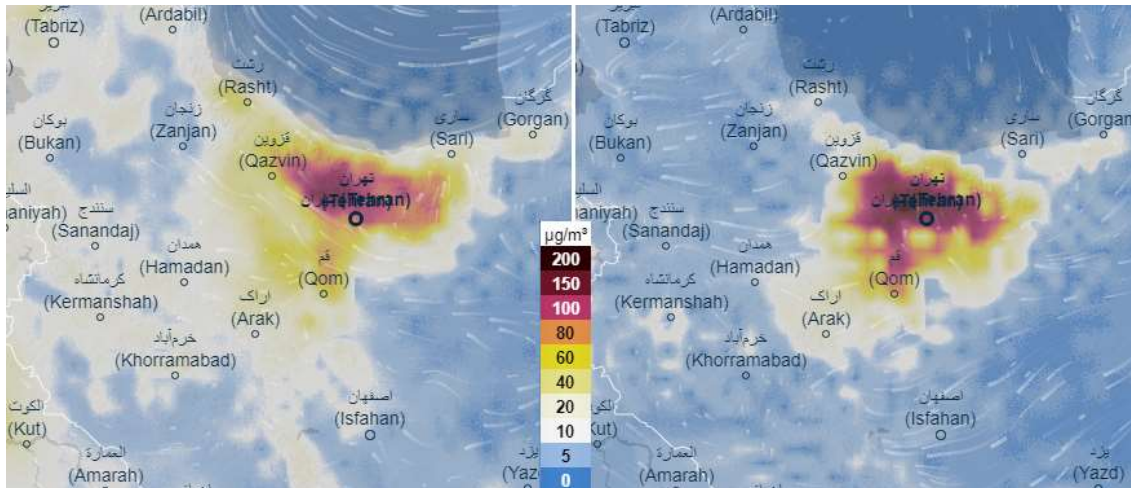
Figure 5. Variation of the concentration of NO_2 in a period of 40 days for the most critical cities



Source: Based on Ventusky (2020)

While the two cities in the USA reduced the concentration of the pollutant by almost 50%, the only case that stands out negatively was the capital of Iran, whose adjacent areas recorded an increase of almost 40% in the concentration of NO_2 , i.e., from 152 to $240 \mu\text{g}/\text{m}^3$, classifying it as the most polluted in the analyzed period. The NO_2 emitted by the large number of cars and industries has difficulty for the dispersion by the wind regime, given the topographic conditions of the place, which is surrounded by mountain ranges, such as the Zagros Mountain to the southwest and the Alburz Mountain to the north, with more than 4,000 m of altitude (Figure 6).

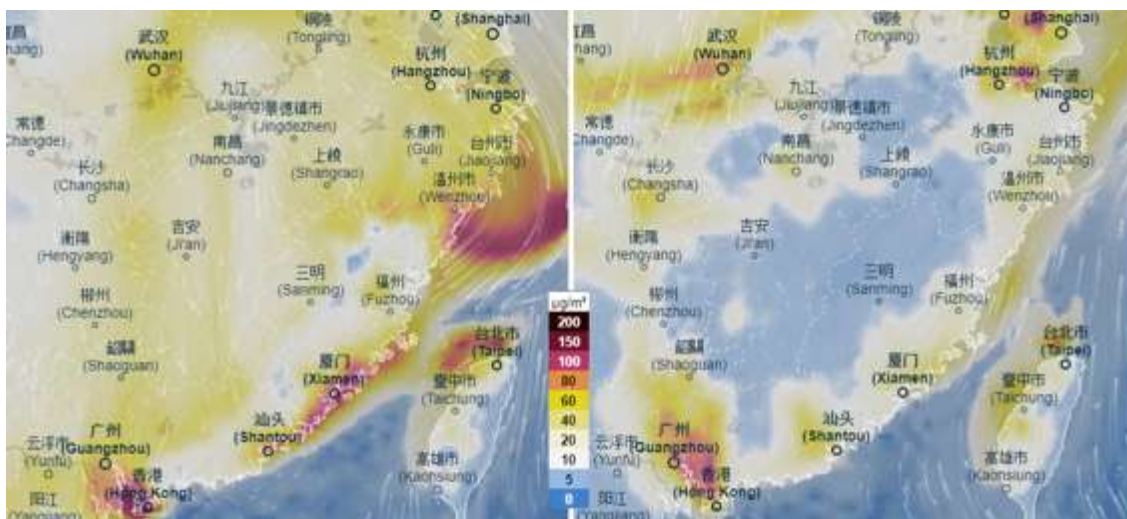
Figure 6. Variation of NO_2 concentration between February 15 and March 26, 2020 in Tehran (Iran)



Source: Adapted from Ventusky (2020)

Another interesting example is the southeast of China, in which the wind regime clearly emphasizes its importance in the dispersion of pollutants: in February, the north winds passed through Shanghai towards Xiamen, while in March, the change in the direction of the winds (from the south) avoid that the pollution from Shanghai and its neighbors reach to Xiamen, associated with the fact of social isolation due to COVID-19 (Figure 7).

Figure 7. Variation of NO₂ concentration between February 15 and March 26, 2020 in southeastern China, whose winds are represented by white arrows



Source: Adapted from Ventusky (2020)

Final Consideration

The solution to this generalized COVID-19 crisis is complex, given the high degree of uncertainty. If there was a right measure that reconciled the social, the economic and the environmental pillars, this would already be into practice. There are possibilities, whose mistakes and successes will be noticed only with time, in a future that is constantly updated, depending on today's actions. One thing is sure: the three pillars of sustainability were presented in order of impact and perception by society and the media.

References

CHOWELL, G.; ROTHENBERG, R. Spatial infectious disease epidemiology: on the cusp. **BMC Medicine**, v. 16, p. 1-5, 2018.

JHU - JOHNS HOPKINS UNIVERSITY. **Coronavirus COVID-19 Global Cases by Center for Systems Science and Engineering**. 2020. Available at: <<https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6>>. Accessed on: November 23, 2020.

MORNINGSTAR INC. **Home page**. Available at: <<https://www.morningstar.com/>>. Accessed on: March 26, 2020.

NASA - NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. **Airborne Nitrogen Dioxide Plummets Over China**. 2020. Available at: <<https://earthobservatory.nasa.gov/images/146362/airborne-nitrogen-dioxide-plummets-over-china>>. Accessed on: March 26, 2020.

OIL PRICE. **The No. 1 Source for Oil & Energy News**. 2020. Available at: <<https://oilprice.com/oil-price-charts/46>>. Accessed on: Apr 21, 2020.

POOLE, D.N. et al. Responding to the COVID-19 pandemic in complex humanitarian crises. **International Journal for Equity in Health**, v. 19, article 41, 2020.

VENTUSKY. **About us**. 2020. Available at: <<https://www.ventusky.com/>>. Accessed on: March 26, 2020.

WALKER, P.G.T. et al. **The Global Impact of COVID-19 and Strategies for Mitigation and Suppression**. WHO Collaborating Centre for Infectious Disease Modelling, MRC Centre for Global Infectious Disease Analysis, Abdul Latif Jameel Institute for Disease and Emergency Analytics, Imperial College London, 2020.

WESTON, S.; FRIEMAN, M.B. COVID-19: Knowns, Unknowns, and Questions. **mSphere**, v. 5, n. 2, p. 1-5, 2020.

WHO - WORLD HEALTH ORGANIZATION. **Origin of SARS-CoV-2**. 2020a. Available at: <<https://www.who.int/health-topics/coronavirus/who-recommendations-to-reduce-risk-of-transmission-of-emerging-pathogens-from-animals-to-humans-in-live-animal-markets>>. Accessed on: March 29, 2020.

WHO - WORLD HEALTH ORGANIZATION. **Coronavirus disease (COVID-19) Pandemic**. 2020b. Available at: <<https://www.who.int/emergencies/diseases/novel-coronavirus-2019>>. Accessed on: March 28, 2020.