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The fragility of the Brazilian health system and social vulnerability in front of COVID-19

A fragilidade do sistema de saúde brasileiro e a vulnerabilidade social diante da COVID-19

La debilidad del sistema de salud brasileño y la vulnerabilidad social ante la COVID-19

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ABSTRACT

Objective: To demonstrate the possible impacts of the COVID-19 pandemic, the social vulnerability on the national scene, and the possible controlling measures in the face of the new pandemic. **Methods:** This is an exploratory bibliometric study that collected data from the last 10 years on the following data platforms: Department of Informatics of the Unified Health System (DATASUS), Health Information (TabNet), and Brazilian Institute of Geography and Statistics (IBGE). Moreover, a search was conducted on secondary sources (PubMed, Ministry of Health, World Health Organization, CAPES, and SciELO journals). The descriptors used were ethics based on principles, social vulnerability, bioethics, coronavirus, and pandemic. Analyzes and interpretations took place between February and March 2020. **Results:** In Brazil, 25,262 cases of COVID-19 were reported, and 1,532 people died in the period mentioned. IBGE data from 2019 point to about 119.3 million Brazilians living in extreme poverty, with income below one minimum wage per month. Besides, according to the 2010 Census, only 3.8% of the Brazilian population has access to drinking water, which can hinder preventive measures. **Conclusion:** Given the pandemic scenario, there is a need for more attention to people who are socially vulnerable in Brazil.

Descriptors: Social Vulnerability; Coronavirus Infections; Pandemics.

RESUMO

Objetivo: Demonstrar os possíveis impactos da pandemia da COVID-19, a vulnerabilidade social no cenário nacional e as possíveis medidas de contenção diante da nova pandemia. **Métodos:** Estudo bibliométrico exploratório no qual foram coletados dados dos últimos 10 anos nas seguintes plataformas de dados: Departamento de Informática do Sistema Único de Saúde (DATASUS), Informações em Saúde (TabNet) e Instituto Brasileiro de Geografia e Estatística (IBGE). Além disso, realizou-se uma busca em fontes secundárias (PubMed, Ministério da Saúde, Organização Mundial da Saúde, Periódicos CAPES e SciELO). Os descritores utilizados foram “ética baseada em princípios”, “vulnerabilidade social”, “bioética”, “coronavírus”, “pandemia”. As análises e interpretações ocorreram entre fevereiro e março de 2020. **Resultados:** No Brasil, no período analisado, 25.262 casos de COVID-19 foram divulgados e 1.532 pessoas foram a óbito. Dados do IBGE de 2019 apontam cerca de 119,3 milhões de brasileiros vivendo em situação de miséria, com renda menor que um salário mínimo por mês. Além disso, segundo o Censo 2010, somente 3,8% da população brasileira tem acesso à água potável, o que pode dificultar medidas de prevenção. **Conclusão:** Há, diante do cenário da pandemia, a necessidade de uma maior atenção às pessoas que se encontram em vulnerabilidade social no Brasil.

Descritores: Vulnerabilidade Social; Infecções por Coronavírus; Pandemias.

RESUMEN

Objetivo: Demostrar los posibles impactos de la pandemia de la COVID-19, la vulnerabilidad social en el escenario nacional y las posibles medidas de restricción ante la nueva pandemia. **Métodos:** Estudio bibliométrico exploratorio en el cual se ha recogido datos de los últimos 10 años de las plataformas de datos a continuación: el Departamento de Informática del Sistema Único de Salud (DATASUS), las Informaciones de Salud (TabNet) e el Instituto Brasileño de Geografía y Estadística (IBGE). Además,



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se ha realizado una búsqueda de fuentes secundarias (PubMed, Ministerio de la Salud, Organización Mundial de la Salud, Periódicos CAPES y SciELO). Los descriptores utilizados fueron “ética basada en principios”, “vulnerabilidad social”, “bioética”, “coronavirus”, “pandemia”. Los análisis e interpretaciones se dieron entre febrero y marzo de 2020. **Resultados:** En Brasil, en el periodo analizado, 25.262 casos de COVID-19 han sido divulgados y, de ellos, 1.532 personas han muerto. Los datos del IBGE de 2019 apuntan cerca de 119,3 millones de brasileños viviendo en el estado de miseria con la renta menor que un sueldo mínimo al mes. Además de eso, según el Censo 2010, solamente el 3,8% de la población brasileña tiene el agua potable lo que puede dificultar las medidas de prevención. **Conclusión:** Ante el escenario de la pandemia existe la necesidad de más atención para las personas que están socialmente vulnerables en Brasil.

Descritores: Vulnerabilidad Social; Infecciones por Coronavirus; Pandemias.

INTRODUÇÃO

In the last century, several pathologies have appeared in the world, with a high level of contamination among human beings, leading to the death of almost four million people. Among these pathologies, the following stand out: the Spanish flu, influenza A subtype H1N1, influenza A subtype H2N2, influenza A subtype H3N8, and Severe Acute Respiratory Syndrome (SARS, in English or SRAG, in Portuguese)⁽¹⁻³⁾.

In December 2019, there was a genetic variation in SARS-CoV, identified as the etiologic agent of the syndrome, generating a new coronavirus, called severe acute respiratory syndrome 2 (SARS-CoV-2), COVID-19 virus, which is high contamination rate among humans^(3,4). The first report of the new disease occurred in Wuhan province, China⁽⁵⁾.

COVID-19 was defined as a public health threat of international interest⁽⁶⁻⁹⁾. The disease virus belongs to the family Coronaviridae and is a betacoronavirus^(4,10) responsible for several diseases, such as SARS-CoV and Middle Eastern coronavirus respiratory syndrome (MERS-CoV)^(11,12). Previous studies demonstrated the need for an intermediate host to disseminate the diseases mentioned. It is believed that the new type of coronavirus is very similar to the Pangolin coronavirus (Pangolin-CoV), found in the lungs of pangolin⁽⁵⁾.

The most-reported clinical symptoms among patients with COVID-19 are: fever, dyspnoea, headache, myalgia, diarrhea, increased nasal secretions, and in some cases, progresses to pneumonia. It is worth mentioning that its symptoms are different from the symptoms of a cold or flu⁽¹³⁾. Most cases progress to acute respiratory distress syndrome (ARDS), especially in patients who have other comorbidities. Besides, some patients may develop secondary injuries, such as cardiac injuries, kidney failure, and, in some cases, multiple organ failure^(14,15).

At the end of February 2020, the first case of COVID-19 in Brazil was reported, and data show that the virus's entry into the national territory may have occurred in different ways^(16,17). To hold the progress and spread of the disease, protocols were developed and validated by the World Health Organization (WHO). These protocols consist of keeping patients with mild symptoms in isolation in their homes, so reducing the flow of patients contaminated by COVID-19 in hospitals⁽¹⁸⁾, beyond the quarantine establishment.

In Brazil, in 1988, after the re-democratization, a new Federal Constitution was elaborated. Shortly afterward, a program was created with principles of universal access to public health and free of charge for all Brazilians, with an institutional and legal configuration of a social protection regime, entitled Unified Health System (*Sistema Único de Saúde - SUS*). SUS is based on the principles of universalization, equity, integrality, regionalization, and hierarchy. SUS works through decentralized spheres and based on health strategies developed by the Ministry of Health (*Ministério da Saúde - MS*)⁽¹⁹⁾.

However, the lack of investment in SUS and its scrapping over the years has been a concern throughout the country, as the cuts in the health budget directly affected the prevention and promotion of this fundamental public care tool in the fight against COVID-19⁽²⁰⁾.

Social vulnerability is described as fragility, social exclusion, disadvantage, helplessness, abandonment, or violation of the rights of a group of individuals of a society. The concept of vulnerability is quite broad and can encompass various forms of social exclusion, such as the social isolation of small or large groups; generally, hindering and preventing access to techno-scientific advances, discoveries, and / or the benefits provided by technological development. In the context of research ethics, social vulnerability is understood as the circumstances of life capable of affecting an individual or a group of individuals and their quality of life about inclusion or exclusion in society⁽²¹⁻²³⁾.

The objective of this study is to demonstrate the possible impacts of the COVID-19 pandemic, the social vulnerability in the national scenario and the possible measures of containment in the face of the new pandemic.

METHODS

This is an exploratory bibliometric review study, in which data were collected on platforms and secondary sources.

An analysis of the parameters was carried out: population resident in Brazil, illiteracy rate, illiteracy rate by age group, and water supply in Brazil. We surveyed the following platforms: Department of Informatics of the Unified Health System (*Departamento de Informática do Sistema Único de Saúde - DATASUS*), Health Information (TabNet), and Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística - IBGE*). The data were separated by the five regions of the country (North, Northeast, South, Southeast, and Midwest) and their analysis and interpretation occurred between February and March 2020.

In addition, a search for data was carried out on secondary sources (PubMed, Ministry of Health, World Health Organization, CAPES and SciELO journals). The descriptors used to search for articles were: “ethics based on principles”, “social vulnerability”, “bioethics”, “Coronavirus”, and “pandemic”, as well as their respective versions in Portuguese.

985 scientific articles were found during the data identification period. Among them, duplicate articles were excluded, leaving 156 scientific articles. Then, another screening was carried out, choosing 43 works for the preparation of this article. 113 publications were excluded due to methodological inconsistencies observed when compared to other studies already published (Figure 1).

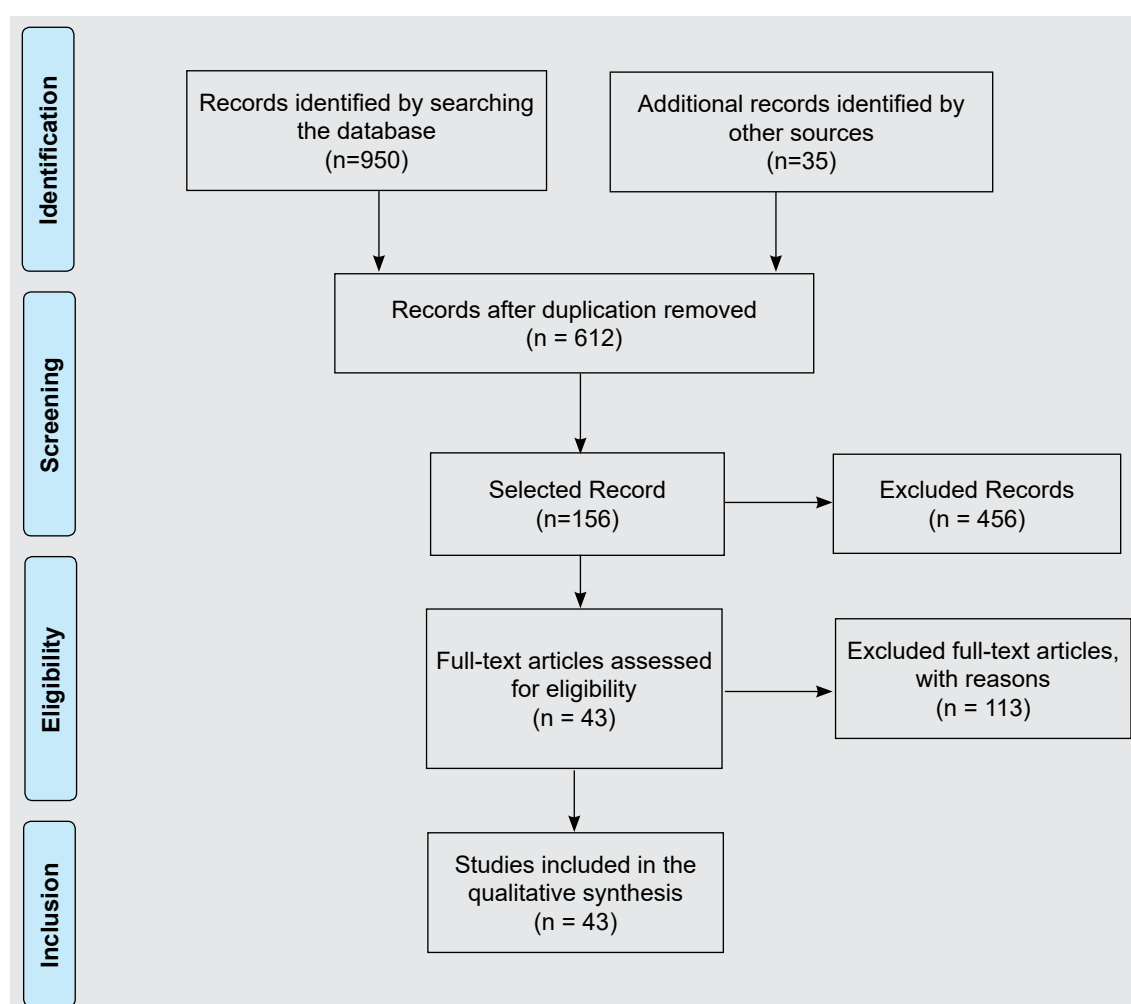


Figure 1 - Study selection flowchart.

RESULTS

There was a wide variety of scientific data in the studies found. Most works are letters to the editor or editorial comments. These scientific articles do not go through peer reviews; however, this does not hurt your credibility or the relevance of your material. There are still few original scientific articles and review articles on COVID-19, however, the

importance of these reports is understood, as they bring useful and quick information about the worldwide progress of the disease (Table I).

Table I - Characterization of scientific articles published in the literature on covid-19 summarized in author, type of study, year of publication, country and main findings.

Author	Type of study	Year	Country	Main findings
Rello et al. ⁽³⁾	Editorial	2020	Spain, France, Greece, Sweden and Australia	The authors describe that it is necessary to take advantage of previous experiences and to identify similarities between the influenza A H1N1 pandemic in 2009 and the COVID-19. But they reiterate that there is a huge difference between the disease of the new Coronavirus and the flu caused by influenza, concerning the impact and its spread in society. They also describe the vulnerability of health professionals during a pandemic, as patients with COVID-19 release a large amount of virus.
Han e Yang ⁽⁴⁾	Original article	2020	China	The authors report that the SARS-CoV-2 virus has powerful pathogenicity and transmissibility and deserves attention from all countries in the world. It can be transmitted by asymptomatic patients and, in addition, we still need to investigate more about a possible transmission from the mother to the fetus.
Zhang et al. ⁽⁵⁾	Letter to the editor	2020	China	It is a letter to the editor with highly relevant information. Based on published metagenomic data, this study provides the first report on a potentially related patient (Pangolin-CoV) of Sars-CoV-2, which was discovered in dead Malaysian pangolins. Pangolin-CoV is more closely related to SARS-CoV-2, considering the widespread of SARS-CoV in natural reservoirs, such as bats, camels, and pangolins. The study is important to find new intermediate hosts for SARS-CoV-2 to block transmission between species.
Lin et al. ⁽⁶⁾	Original article	2020	Canada	The authors highlight some factors that can contribute to infection prevention and control teams in large hospitals. These protocols force a collection of infectious disease surveillance data. Demonstrate why patients come to the emergency department and, consequently, describe how to reduce the flow of patients with COVID-19 in-hospital emergencies.
Chan et al. ⁽⁷⁾	Original article	2020	China	This work described the development of an in vitro assay to diagnose COVID-19. These assays use two reagents: COVID 19 RdRp / Hel and RdRp-P2. However, in this work, the authors had some limitations for purchasing products such as commercial reagents, primer/probe concentrations, and viral cycling conditions. The lack of continuity in these products and methods made it difficult to determine the root of the difference in insensitivity. However, data from that study showed that the newly established COVID-19-RdRp / Hel was highly sensitive and specific for the detection of SARS-CoV-2 RNA in vitro and clinical samples from the respiratory and non-respiratory tracts. Besides, they point out that the PCR assay can be especially useful to detect cases of COVID-19 with low viral loads and to test samples from patients of the upper respiratory tract, saliva, and plasma.
Johnson et al. ⁽⁸⁾	Editorial comment	2020	Sweden	The authors report the importance of public health agencies and research institutions in assessing the situation and effectiveness of targeted interventions with new tests, treatments, and vaccines as they are developed. They emphasize the need to strengthen measures to protect citizens' health, such as strengthening their risk communication efforts and reviewing their pandemic preparedness plans, to ensure that they are ready to prevent or respond to a wider circulation of the virus.
Spiteri et al. ⁽⁹⁾	Editorial comment	2020	Sweden, Denmark, Germany, France, Italy, Spain, Russia, Belgium and Finland	The authors describe that surveillance and immediate sharing of information about cases and contacts through international notification systems, such as the International Health Regulations (IHR) mechanism and the European Commission's European Early Warning and Response System, is essential for containing the international spread of the infection. Furthermore, they corroborate that the testing of suspicious cases is fundamental for the understanding of the spread of the virus and that this information is fundamental in the additional approaches to guarantee the early detection of the local circulation of COVID-19, including through the test of severe acute respiratory infections. in hospitals, regardless of travel history, as recommended in the World Health Organization case definition.
Wang et al. ⁽¹⁰⁾	Original article	2020	China and Singapore	The authors report that, during the initial phase of the COVID-19 outbreak in China, a questionnaire with 1,210 people was applied to assess the degree of stress, anxiety, and depression. From it, they found that more than half of the respondents rated their psychological impact as moderate or severe. This study contributes to the need to formulate psychological interventions to improve mental health and psychological resilience during the pandemic.

Kumar et al. ⁽¹¹⁾	Editorial	2020	India	The authors report that the Coronavirus was previously characterized by Sars-CoV and Mers-CoV. This virus was found in bats and the infection to humans occurred from civet cats and camels. Chinese scientists are thinking about starting the therapeutic use of Remdesivir against the disease, probably considering its high potency against other strains of Sars-CoV-1.
Murthy et al. ⁽¹⁴⁾	Editorial comment	2020	Canada and China	The authors state that preventing transmission and decreasing the rate of new infections are the main objectives for the pandemic. However, it remains to be seen whether SARS-CoV-2 infection can promote other pathologies. Given this risk, different treatment protocols have been debated by the scientific community.
Jiang et al. ⁽¹⁵⁾	Review article	2020	China	The authors demonstrate that there are several initial symptoms and that most patients with COVID-19 have a fever and respiratory symptoms. For the time being, travel history to epidemic areas is important for diagnosis and should be obtained in all patients with flu-like syndromes. If so, timely referral to public health authorities for testing is crucial. Frontline medical personnel are at risk and should employ protective measures. Treatment is mainly supportive and symptomatic, although trials of vaccines and antivirals are being carried out.
Rodrigues-Morales et al. ⁽¹⁶⁾	Original article	2020	Peru, Argentina, Bolivia, Chile, Honduras, Mexico, Panama, Paraguay, Uruguay and Brazil	This article describes that the spread of COVID-19 to other countries bordering Brazil is expected and probably inevitable, due to the arrival of suspicious cases from Italy, China, and other countries. Characterizes the significant expansion of COVID-19 in Brazil, because São Paulo has high flight connectivity in Latin America. Also, Brazil connects with other countries, such as Chile, Argentina, and Bolivia, by rail connections and seaports. The authors also describe that the health system in Latin America is fragile, and other social and economic issues are highlighted as responsible for the progression of COVID-19 in Latin America.
Candido et al. ⁽¹⁷⁾	Editorial comment	2020	United Kingdom, United States of America, Canada and Brazil United Kingdom	The authors talk about the possible routes of entry of the COVID-19 virus in the Brazilian territory from travelers who had their destination in Brazil. Also, they highlight São Paulo as the main place of arrival for travelers who came from China, France, and Italy.
Glauser ⁽¹⁸⁾	Editorial comment	2020	Canada	There is a description of a protocol that can be used against COVID-19. Suspicious people would be assessed and monitored at home by paramedics specially trained with protective equipment, instead of being tested in the hospital, in addition to monitoring mild and moderate cases over time, allowing them not to need hospitalization and also allowing saving precious resources.
Kupferschmidt e Cohen ⁽²⁸⁾	Editorial comment	2020	United Kingdom	It proposes containment measures, mainly quarantine, which has a great purpose of reducing cases of infection and transmission between people. Furthermore, it reports that the population agreed with the quarantine decree and that there was a decrease in positive cases of COVID-19 since the transmission in the streets was reduced.
Yang e Yan ⁽³⁴⁾	Letter to the editor	2020	China	In this letter to the editor, the authors state that chest computed tomography may play a fundamental role in the early detection and management of COVID-19, but positive patients may have normal findings. However, it is worth mentioning that computed tomography of the normal chest does not exclude the diagnosis of COVID-19, especially in patients with early onset of symptoms. The final diagnosis must be confirmed by a positive PCR test.
Andersen et al. ⁽³⁵⁾	Letter to the editor	2020	United Kingdom, United States of America and Australia	The authors expose the importance of knowing the origins of the COVID-19 pandemic. They describe that a detailed understanding of how an animal virus "jumped" species limits to infect humans so productively will help prevent future zoonotic events. Also, they emphasize that more studies should be done in animals to identify the origin of the genetic mutation of the new Coronavirus for man.
Lippi e Plebani ⁽³⁶⁾	Letter to the editor	2019	Italy	The authors explain that laboratory tests are extremely important in the diagnosis of COVID-19. In this study, it was demonstrated that, although procalcitonin is a good indicator, in the most severe form of the disease and some other situations the reference values may be unchanged.
Zheng et al. ⁽³⁷⁾	Editorial comment	2020	China	According to this editorial comment, SARS-CoV-2 is believed to infect host cells through the angiotensin-converting enzyme 2 to cause COVID-19, in addition to causing damage to the myocardium, although the specific mechanisms are uncertain. Patients with COVID-19 and underlying cardiovascular disease have an adverse prognosis, so special attention should be paid to cardiovascular protection during treatment of COVID-19.
Thomson ⁽³⁸⁾	Letter to the editor	2020	United Kingdom	The author describes that the risk of lethality is higher in patients over 40 years of age. Also, health factors, such as heart problems, may be responsible for this high number of lethality from this age group. It also describes that children show mild signs of the disease when purchased with adults. It also discusses that transmission can present itself in other ways, such as via the fecal-oral route and the respiratory route; however, there is little evidence of fecal-oral transmission. Finally, it reports the importance of screening, public health policies, and prevention of the most vulnerable.

Chen et al. ⁽³⁹⁾	Original article	2020	China and United States of America	The authors point out that there is a concern with pregnant women with COVID-19 and debate whether these patients would transmit it to their fetuses. Evidence of vertical transmission was assessed by testing for the presence of the virus in amniotic fluid, umbilical cord blood, breast milk and neonatal throat swab in pregnant women with the disease. The results were negative in all analyzed patterns.
Quião ⁽⁴⁰⁾	Editorial comment	2020	China	The author corroborates that the work of Chen et al. [43] it is extremely important, in addition to being extremely valuable, due to the great concern with this segment during the pandemic. He also reported that there are similarities between Sars-CoV 1 and Sars-CoV-2 and that the pathogenesis can be similar and, consequently, the risk of vertical transmission is low, as is the case for patients who have had Sars-CoV 1.
Mahase ⁽⁴²⁾	Letter to the editor	2020	United Kingdom	This work described the first COVID-19 lethality reported in England. The patient was an elderly person with pathologies that preceded COVID-19. There are reports that there were few patients tested for COVID-19 at the time and, in early March, mass testing began, through which they identified 163 positive cases in the country.
Gao et al. ⁽⁴³⁾	Letter to the editor	2020	China	The authors describe that chloroquine is used to prevent and treat malaria and is effective as an anti-inflammatory agent in the treatment of rheumatoid arthritis and lupus erythematosus. Studies have revealed that it also has potential broad-spectrum antiviral activity, increasing the endosomal pH required for virus/cell fusion, as well as interfering with the glycosylation of cell receptors used by Sars-CoV-2. They also describe that pharmacological activities can assist in the treatment of patients with COVID-19 pneumonia.
Devaux et al. ⁽⁴⁴⁾	Original article	2020	France	The authors demonstrated that, in theory, chloroquine is capable of inhibiting the in vitro replication of various corona viruses. Recent publications support the hypothesis that chloroquine may improve the clinical condition resulting from patients infected with Sars-CoV-2. This medication can act directly by reducing the production of pro-inflammatory cytokines and/or by activating CD8 + T cells against Sars-CoV-2.
Cortegiani et al. ⁽⁴⁵⁾	Review article	2020	Italy and Israel	The authors point out that, although chloroquine has good results and the use of this drug may be supported by the opinion of some experts, more studies need to be done, following the recommendation of the World Health Organization. Even though the need for drug prescription is urgent, data from coordinated, high-quality clinical trials from different parts of the world will be needed to support the efficacy of chloroquine in patients with COVID-19.
Al-Tawfiq et al. ⁽⁴⁹⁾	Letter to the editor	2020	Saudi Arabia and United States of America	The authors describe that the time to clinical recovery (TTCR) is a maximum of 28 days. They define RTCT as the time (in hours) from the beginning of the study treatment (active or placebo) until the normalization of fever, respiratory rate, oxygen saturation, and cough relief, maintained for at least 72 hours. They also argue that another multicenter, phase 3, randomized, double-blind, placebo-controlled study is evaluating the efficacy and safety of Remdesivir in 452 adult patients hospitalized with COVID-19 and that any effect of Remdesivir treatment is still unknown.
Klomplas ⁽⁵¹⁾	Editorial comment	2020	United States of America	This commentary deals with some measures to control the spread of COVID-19 in hospitals and the difficulty in complying with it, as restricting the entry of visitors will be psychologically difficult for patients, and maintaining precautions to control the spread of the disease increases spending on hospital supplies and materials, in addition to reducing the capacity of hospital beds. These measures also change the staff of the unit.
Chen e Yu ⁽⁵²⁾	Original article	2020	United States of America	The authors describe that the Coronavirus pandemic appeared nonlinear and chaotic and responded to effective interventions. The methods used in the study can be applied in surveillance to inform and encourage the public, public health professionals, clinicians, and decision-makers to undertake coordinative and collaborative efforts to control what was, until then, an epidemic.

Data indicate that COVID-19 has already infected 1,918,138 people worldwide and has already killed 123,126 people in more than 205 countries, with a lethality rate of 6.4%, according to the World Health Organization (WHO)⁽²⁴⁾. In Brazil, at the time of this review, COVID-19 infected 25,262 people and killed 1,532 people, with a lethality rate of 6.1%⁽²⁵⁾.

The following data refer to the indexes found in the IBGE data, which indicate that approximately 59.6% of the population, equivalent to 119.3 million Brazilians, lives in a situation of poverty. Besides, approximately 104 million earn less than R\$ 413.00 per month, and 15.3 million live with less than R\$ 140.00 per month (Table II)⁽²⁶⁾.

Furthermore, according to data found in the 2010 Census, 8.4 million Brazilians receive drinking water from the general distribution network, while 31 million Brazilians do not have access to drinking water (Table II)⁽²⁷⁾. Another fact

to be highlighted is that, according to the 2010 Census, Brazil has approximately 13 million illiterates, in different age groups and the regions of the country, with the Northeast region having the highest illiteracy rate, with approximately 4 million illiterates (Table II)⁽²⁷⁾.

Table II - Data from the federal government on the population of residents in Brazil, illiteracy rate and water supply.

	North Region	Northeast Region	South Region	Southeast Region	Midwest Region	Total
Resident population in Brazil *	18.430.980	57.071.654	29.975.984	88.371.433	16.297.074	210.147.125
Illiteracy rate	-	-	-	-	-	-
Urban area	641.169	4.000.710	774.090	2.691.834	573.988	8.681.791
Rural region	564.157	3.197.898	280.188	611.458	162.584	4.816.285
Urban region (%)	7.8	13.9	4.3	4.6	6.1	7.1
Rural region (%)	21.4	32.2	8.8	14.6	14.5	22.9
Illiteracy rate by age group	-	-	-	-	-	-
15 to 24 years	109.649	441.652	39.308	133.213	26.894	750.716
25 to 39 years	270.036	1.572.131	121.625	450.091	110.396	2.524.279
40 to 59 years	439.668	2.658.779	363.293	1.135.123	277.541	4.874.404
60 to 69 years	195.694	1.226.158	236.290	690.139	153.244	2.501.525
70 to 79 years	125.584	814.513	188.748	565.056	113.040	1.806.941
80 years and over	64.695	485.375	105.014	329.670	55.457	1.040.211
Water supply - Brazil	-	-	-	-	-	-
General network - no channel information	8.427.512	39.720.159	23.122.501	71.735.421	11.354.585	154.360.178
Well or spring water - no channel information	4.820.035	4.420.860	3.025.376	5.565.607	2.108.192	19.940.070
Another way - Well or spring outside the property	1.083.716	3.831.676	933.920	1.697.065	291.312	7.837.689
Another way - Water tank	25.511	944.512	7.375	161.013	12.916	1.151.327
Another way - Rainwater stored in a cistern	11.698	1.153.034	4.561	63.059	21.334	1.253.686
Other forms not specified	1.261.424	2.703.578	110.644	577.733	148.020	4.918.446

Source: Brazilian Institute of Geography and Statistics (IBGE). Estimated number of residents in Brazil made by IBGE for 2019

DISCUSSION

Data show that the COVID-19 infection rate is high worldwide. A recent study proposed that containment measures be applied, such as horizontal isolation, which would be the home isolation of all people, not only from certain groups, restricting contact between people as much as possible, to reduce the number of new cases of COVID-19. This measure is a tool that, according to its authors, can lead to the control of the infection rate and, consequently, the lethality rate of the disease⁽²⁸⁾.

The main control measures to prevent the spread of COVID 19 in Brazilian society, as indicated by the Ministry of Health, are the use of masks by the general population and personal protective equipment by health professionals, besides the use of 70% alcohol in gel and hand hygiene with soap and water⁽¹³⁾. However, these measures can be difficult to apply in Brazil due to the socioeconomic factors already mentioned⁽²⁶⁾.

The price of gel alcohol has increased a lot in the last two months (February to March 2020) and the Consumer Protection and Orientation Program (*Programa de Orientação e Proteção ao Consumidor - Procon*) showed that the amounts charged for alcohol gel and surgical masks increased by 500% in some regions of Brazil⁽²⁹⁾. With the high value and the high demand, a large part of the Brazilian population has or will have difficulty purchasing these products, since the IBGE data indicate that almost half of the population lives in a situation of misery⁽²⁶⁾.

In Brazil, social policies implemented between 2000 and 2010 tried to provide poverty reduction, the appreciation of the minimum wage, and the formalization of work, among other actions. However, social vulnerability and misery are increasing throughout the national territory^(30,31). According to the 2010 Census, only 3.8% of the Brazilian population has access to drinking water from the general distribution network⁽²⁷⁾, which can hinder the population's adherence to the preventive hand hygiene measure, indicated by the Ministry of Health.

Also, the number of unemployed in the fourth quarter of 2019 was very high. According to the IBGE, there are currently 11.6 million unemployed, 4.6 million discouraged, and a 23% underutilization rate. During the first quarter of 2020, when there was the first report of COVID-19 in Brazil, the unemployment rate increased by 11.6%^(32,33).

Another problem faced on the world scene is related to the diagnosis of COVID-19. The most suitable method to diagnose the disease is the polymerase chain reaction (PCR)^(34,35) technique, however, high costs and the absence of diagnostic kits are still a barrier in developed and underdeveloped countries to obtain precision in the diagnosis of the disease, postponing the isolation of contaminated patients and causing the symptomatic treatment of these patients⁽⁷⁾.

Therefore, other methods for diagnosing COVID-19 have been studied. One study described that procalcitonin measurement proved to be a tool that can help control progression in infected patients. However, patients who do not have the severe form of the disease or who do not have co-infection with other pathogens do not present changes in the values of procalcitonin, demonstrating that this method may present flaws⁽³⁶⁾.

Patients with cardiovascular diseases and infected with COVID-19 have been drawing the attention of the scientific community because there are theories that SARS-CoV 2 shows tropism for angiotensin-converting enzyme 2 receptors that are arranged in the cardiovascular, respiratory and urinary systems. These patients develop more severe symptoms of the disease that may be associated with increased angiotensin-converting enzyme 2 receptors in cardiovascular disease. Although the mechanisms are still not well understood, it is believed that COVID-19 promotes damage to the myocardium, making it necessary to monitor daily the following markers: cardiac troponin, myoglobin, C-reactive protein and interleukin-6^(37,38).

Another concern is the possible transplacental transmission, however, a study indicates that women in the third trimester of pregnancy and who were with COVID-19 did not transmit the virus to the fetus and there was no presence of the virus in the amniotic fluid, in the umbilical cord blood, in breast milk, or the smear of the neonatal throat^(39,40).

Recent studies indicate that chloroquine, previously tested in vitro against the SARS-CoV 2 virus, demonstrated inhibition of virus growth, but no benefit was found in animal models of experimentation^(41,42). In humans, chloroquine can reduce hospital stay and improve the evolution of patients with COVID-19 and the recommended dose would be 500 mg twice daily in patients with mild, moderate and severe forms⁽⁴³⁾.

Other authors described that patients with COVID-19 treated with chloroquine showed clinical improvement, in addition to being able to reduce pro-inflammatory cytokines and/or T-CD8 + anti-SARS-CoV cell activation^(44,45). However, the authors report that more studies should be performed. Also, it should be noted that adverse effects caused by the use of chloroquine have already been reported in the literature, including renal changes⁽⁴⁶⁻⁴⁸⁾.

Other pharmacological treatment options have been discussed in the literature. Remdesivir has emerged as a good option, however, the treatment has not shown improvement in patients^(11,42,49). Lopinavir was identified after the SARS-CoV outbreak in 2003, however there is a lack of evidence of its effectiveness and its effect on SARS-CoV-2. Interferon β promotes lung defense and may be useful in combination with another drug to fight SARS-CoV-2, having been tested in phase two of the clinical trials and patients with asthma, and the data indicate that it promoted improvements in lung function; however, there is a lack of evidence of its effectiveness in Sars-CoV 2⁽⁴²⁾. A study in humans with the associated treatment of chloroquine combined with azithromycin showed improvement in patients infected with the COVID-19 virus⁽⁵⁰⁾.

Although there is still no pharmacological treatment with an effective protocol against COVID-19, the main weapon against the progress of the disease seems to be social distance, controlling its spread⁽²⁸⁾.

Some operational protocols have already been described in the literature and have been an effective tool against the disease. One of them is the hospital reception of patients with COVID-19 or other respiratory viruses, because, nowadays, it is already known that there is a need to be more cautious about the detection of cases. There are flaws in hospital protocols and patient screening, which are focused on identifying patients who have had contact with suspected or confirmed cases of COVID-19 or who have traveled abroad. The reality is already different. Only these groups no longer reflect the current scenario, making it necessary to test and monitor patients with mild signs, without taking into account travel or contact with suspected cases^(51,52).

The search for actions to combat the COVID-19 virus in the hospital environment is extensive, and the entire protection approach must be given with the same seriousness to other respiratory viruses that lead to substantial morbidity

and mortality⁽⁵¹⁾. Passive driving of respiratory viruses occurs in most hospitals: when healthcare professionals are not allowed to be exempt from work even with upper respiratory tract infections, as long as they do not have a fever; when personal protective equipment (PPE) is restricted to masks only, disregarding fomites and contact with the oral, nasal and ocular mucosa; when precautions are ceased for patients with acute respiratory syndromes who are negative for respiratory virus tests; and when they allow free movement of visitors with mild respiratory symptoms by the hospital⁽⁵¹⁾.

It is necessary to understand the risks that respiratory viruses provide, with the need to impose restrictive measures on patients, visitors, and the health team. It is also worth mentioning that some health policies must be adopted, such as limitation of the work of health professionals who show symptoms of respiratory tract infection, even without signs of fever; use of PPE when the patient has possible symptoms of acute respiratory syndromes, even if the result was negative; screening of all patients and tests for respiratory virus, regardless of the severity of the disease; screening of visitors showing symptoms of the respiratory tract and, if confirmed their relationship with viruses, do not allow the patient to visit⁽⁵¹⁾.

Also, an interesting measure would be to propose that people with symptoms of COVID-19 should be tested, evaluated and monitored at home, by competent and properly equipped medical staff, in the case of mild to moderate cases. Thus, they would not need hospitalization, they would reduce the chances of more infections and more transmission, promoting the saving of resources and avoiding the overload of the health system and resources. Similar actions were carried out in Gloucester (Ontario, Canada) between 2018 and 2019 in patients with suspected influenza. Rapid visits and tests were carried out, as a result, approximately 99% of patients did not visit hospitals at first^(18,51).

The number of beds in intensive care units (ICU) is still low and most beds are occupied by patients who are treated for other illnesses⁽⁵³⁾, demonstrating that Brazil is not yet prepared for this international public health threat, the COVID-19 virus pandemic⁽¹⁶⁾.

The cases of the disease are increasing daily in Brazil, but they often do not evolve to the severe form. The number of ICU beds is still insufficient, it is believed that approximately 165 million people depend on SUS and the patient bed ratio is approximately 0.01%. SUS has around 27,445 ICU beds, with an occupancy rate of approximately 21,407 ICU beds, around 78% of SUS capacity⁽⁵³⁾. These data reveal that Brazil does not have enough ICU beds if COVID-19 spreads faster across the country.

It is worth mentioning that more than half of the Brazilian population lives with less than a minimum wage or in the informal sector⁽²⁷⁾. In this context, with quarantine measures in all states of the federation, these people are in a situation of social vulnerability, as they may not have income or water in their homes and/or simply do not understand what are the preventive measures indicated against COVID-19.

The failure of the containment measures and the unpreparedness against the pandemic is not directly the responsibility of the current executive branch. In 2009, the country went through a similar pandemic situation, which was influenza A H1N1⁽⁵⁴⁾, and, possibly, there was no creation of protocols to contain possible pandemics.

The present study found limitations that should be highlighted. Only the numbers of ICU beds available in the Unified Health System were used in all states, not including private network ICU beds.

Most of the works published in the literature are letters to the editor, most of the studies have not been peer-reviewed, and there are still few review papers and original articles about COVID-19 in the literature during the current investigation period. Another limitation is that data from the 2010 Census were used, as IBGE has not yet carried out the 2020 Census due to the pandemic.

CONCLUSION

It is concluded that there is a need for greater attention to people who are socially vulnerable in Brazil in the face of the pandemic. Therefore, information and guidance for vulnerable Brazilians is essential, as well as actions at the municipal, state and federal levels.

CONTRIBUTIONS

Marcello Henrique Araújo da Silva and **Isabella Mendes Procópio** contributed to the elaboration and design of the study; the acquisition, analysis and interpretation of data; and the writing of the manuscript.

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CONFLICTS OF INTEREST

The authors state that there were no conflicts of interest in carrying out this research.

REFERENCES

1. Martini M, Gazzaniga V, Bragazzi NL, Barberis I. The spanish influenza pandemic: a lesson from history 100 years after 1918. *J Prev Med Hyg.* 2019 Mar;60(1):E64-E7.
2. Karasin AI, West K, Carman S, Olsen CW. Characterization of avian H3N3 and H1N1 influenza A viruses isolated from pigs in Canada. *J Clin Microbiol.* 2004 Sep;42(9):4349-54.
3. Rello J, Tejada S, Userovici C, Arvaniti K, Pugin J, Waterer G. Coronavirus Disease 2019 (COVID-19): a critical care perspective beyond China. *Anaesth Crit Care Pain Med.* 2020;39(2):167-9.
4. Han Y, Yang H. The transmission and diagnosis of 2019 novel coronavirus infection disease (COVID-19): a Chinese perspective. *J Med Virol.* 2020 Mar 6.
5. Zhang T, Wu Q, Zhang Z. Probable Pangolin Origin of SARS-CoV-2 Associated with the COVID-19 Outbreak. *Curr Biol.* 2020;30(7):1346-51.
6. Lin M, Beliaevsky A, Katz K, Powis JE, Ng W, Williams V, et al. What can early Canadian experience screening for COVID-19 teach us about how to prepare for a pandemic? *CMAJ.* 2020 Mar;192(12):E314-E8.
7. Chan JF, Yip CC, To KK, Tang TH, Wong SC, Leung KH, et al. Improved molecular diagnosis of COVID-19 by the novel, highly sensitive and specific COVID-19-RdRp/Hel real-time reverse transcription-polymerase chain reaction assay validated in vitro and with clinical specimens. *J Clin Microbiol.* 2020 Mar;58(5).
8. Johnson HC, Gossner CM, Colzani E, Kinsman J, Alexakis L, Beute J, et al. Potential scenarios for the progression of a COVID-19 epidemic in the European Union and the European Economic Area, March 2020. *Euro Surveill.* 2020 Mar;25(9).
9. Spiteri G, Fielding J, Diercke M, Campese C, Enouf V, Gaymard A, et al. First cases of coronavirus disease 2019 (COVID-19) in the WHO European Region, 24 January to 21 February 2020. *Euro Surveill.* 2020 Mar;25(9).
10. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. *Int J Environ Res Public Health.* 2020 Mar 6;17(5).
11. Kumar S, Poonam, Rath B. Coronavirus Disease COVID-19: A New Threat to Public Health. *Curr Top Med Chem.* 2020;20(8).
12. Hageman JR. The Coronavirus Disease 2019 (COVID-19). *Pediatr Ann.* 2020 Mar;49(3):e99-e100.
13. Ministério da Saúde. O que é coronavírus? (COVID-19) [Internet]. 2020 [accessed on 2020 Mar 18]. Available from: <https://coronavirus.saude.gov.br/sobre-a-doenca>
14. Murthy S, Gomersall CD, Fowler RA. Care for Critically Ill Patients With COVID-19. *JAMA.* 2020 Mar 11.
15. Jiang F, Deng L, Zhang L, Cai Y, Cheung CW, Xia Z. Review of the Clinical Characteristics of Coronavirus Disease 2019 (COVID-19). *J Gen Intern Med.* 2020;365(5).
16. Rodriguez-Morales AJ, Gallego V, Escalera-Antezana JP, Mendez CA, Zambrano LI, Franco-Paredes C, et al. COVID-19 in Latin America: the implications of the first confirmed case in Brazil. *Travel Med Infect Dis.* 2020 Feb 29:101613.
17. Candido DDS, Watts A, Abade L, Kraemer MUG, Pybus OG, Croda J, et al. Routes for COVID-19 importation in Brazil. *J Travel Med.* 2020 Mar 23.
18. Glauser W. Proposed protocol to keep COVID-19 out of hospitals. *CMAJ.* 2020 Mar 9;192(10):E264-E5.
19. Goya N, Andrade LOM. O sistema único de saúde e o desafio da gestão regionalizada e contratualizada. *Rev Bras Promoç Saúde.* 2018;31(4):1-10.

20. Figueiredo JO, Prado NMBL, Medina MG, Silva Paim JS. Gastos público e privado com saúde no Brasil e países selecionados. *Saúde Debate*. 2018;42(2):37-47.
21. Alves EF, Silva MHAD, Olivera FA, Silva TT. Vulnerabilidade social diante da fosfoetanolamina a partir da teoria principalista. *Rev Bioét*. 2019;27(1):173-8.
22. Cutter SL. A ciência da vulnerabilidade: modelos, métodos e indicadores. *Rev Crít Ciênc Soc*. 2011;93:59-69.
23. Carmo MED, Guizardi FLT. The concept of vulnerability and its meanings for public policies in health and social welfare. *Rep Public Health*. 2018;34(3):e00101417.
24. Organização Mundial da Saúde. Coronavirus disease (COVID-19) situation dashboard [Internet]. 2020 [accessed on 2020 Abr 12]. Available from: <https://who.sprinklr.com>
25. Ministério da Saúde. Painel COVID-19 [Internet]. 2020 [accessed on 2020 Mar 30]. Available from: <https://covid.saudegov.br>
26. Instituto Brasileiro de Geografia e Estatística. Extrema pobreza atinge 13,5 milhões de pessoas e chega ao maior nível em 7 anos [Internet]. 2019 [accessed on Nov 6]. Available from: <https://agenciadenoticias.ibge.gov.br/agencia-noticias/2012-agencia-de-noticias/noticias/25882-extrema-pobreza-atinge-13-5-milhoes-de>
27. Instituto Brasileiro de Geografia e Estatística. Censo IBGE 2010 [Internet]. 2010 [accessed on 2020 Mar 25]. Available from: <https://censo2010.ibge.gov.br>
28. Kupferschmidt K, Cohen J. Can China's COVID-19 strategy work elsewhere? *Science*. 2020 Mar 6;367(6482):1061-2.
29. Programa de Orientação e Proteção ao Consumidor (RJ). Procon-RJ flagra farmácia vendendo álcool acendedor como álcool em gel [Internet]. 2020 [accessed on 2020 Mar 22]. Available from: <http://www.procon.rj.gov.br/index.php/publicacao/detalhar/4460>
30. Costa MA, Santos MPG, Marguti B, Pirani N, Pinto CVS, Curi RLC, et al. TD 2364 - Vulnerabilidade social no Brasil: conceitos, métodos e primeiros resultados para municípios e regiões metropolitanas brasileiras [Internet]. 2018 [accessed on 2020 Mar 22]. Available from: https://www.ipea.gov.br/portal/index.php?option=com_content&view=article&id=32296%3Atd-2364-vulnerabilidade-social-no-brasil-conceitos-metodos-e-primeiros-resultados-para-municipios-e-regioes-metropolitanas-brasileiras&catid=411%3A2018&directory=1&Itemid=1
31. Verdélio A. Vulnerabilidade social no Brasil aumenta entre 2014 e 2015. 2017 [accessed on 2020 Mar 22]. Available from: <http://agenciabrasil.ebc.com.br/geral/noticia/2017-08/vulnerabilidade-social-no-brasil-aumenta-entre-2014-e-2015>
32. Instituto Brasileiro de Geografia e Estatística. Desemprego [Internet]. 2020 [accessed on 2020 Abr 12]. Available from: <https://www.ibge.gov.br/explica/desemprego.php>
33. Instituto Brasileiro de Geografia e Estatística. Desemprego aumenta para 11,6% no trimestre encerrado em fevereiro [Internet]. 2020 [accessed on 2020 Abr 12]. Available from: <https://agenciadenoticias.ibge.gov.br/agencia-noticias/2012-agencia-de-noticias/noticias/27260-desemprego-aumenta-para-11-6-no-trimestre-encerrado-em-fevereiro>
34. Yang W, Yan F. Patients with RT-PCR Confirmed COVID-19 and Normal Chest CT. *Radiology*. 2020 Mar 6:200702.
35. Andersen KG, Rambaut A, Lipkin I, Holmes EC, Garry RF. The proximal origin of SARS-CoV-2. *Nat Med*. 2020;26(4):450-2.
36. Lippi G, Plebani M. Procalcitonin in patients with severe coronavirus disease 2019 (COVID-19): a meta-analysis. *Clin Chim Acta*. 2020;505:190-1.
37. Zheng YY, Ma YT, Zhang JY, Xie X. COVID-19 and the cardiovascular system. *Nat Rev Cardiol*. 2020;17(5).
38. Thomson GA. Where are we now with COVID-19? *Int J Clin Pract*. 2020 Mar 11:e13497.
39. Chen H, Guo J, Wang C, Luo F, Yu X, Zhang W, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet*. 2020 Mar 7;395(10226):809-15.

40. Qiao J. What are the risks of COVID-19 infection in pregnant women? *Lancet*. 2020 Mar 7;395(10226):760-2.
41. Colson P, Rolain JM, Lagier JC, Brouqui P, Raoult D. Chloroquine and hydroxychloroquine as available weapons to fight COVID-19. *Int J Antimicrob Agents*. 2020 Mar 4:105932.
42. Mahase E. Covid-19: what treatments are being investigated? *BMJ*. 2020;368:m1252.
43. Gao J, Tian Z, Yang X. Breakthrough: Chloroquine phosphate has shown apparent efficacy in treatment of COVID-19 associated pneumonia in clinical studies. *Biosci Trends*. 2020 Mar 16;14(1):72-3.
44. Devaux CA, Rolain JM, Colson P, Raoult D. New insights on the antiviral effects of chloroquine against coronavirus: what to expect for COVID-19? *Int J Antimicrob Agents*. 2020 Mar 11:105938.
45. Cortegiani A, Ingoglia G, Ippolito M, Giarratano A, Einav S. A systematic review on the efficacy and safety of chloroquine for the treatment of COVID-19. *J Crit Care*. 2020 Mar 10.
46. Krzeminski P, Lesiak A, Narbutt J. Seizures as a rare adverse effect of chloroquine therapy in systemic lupus erythematosus patients: a case report and literature survey. *Postepy Dermatol Alergol*. 2018 Aug;35(4):429-30.
47. Balamurugesan K, Davis P, Ponprabha R, Sarasveni M. Chloroquine induced urticaria: a newer adverse effect. *J Family Med Prim Care*. 2019 Jul;8(7):2545-7.
48. Wang B, Guo H, Ling L, Ji J, Niu J, Gu Y. The Chronic Adverse Effect of Chloroquine on Kidney in Rats through an Autophagy Dependent and Independent Pathways. *Nephron*. 2020;144(2):96-108.
49. Al-Tawfiq JA, Al-Homoud AH, Memish ZA. Remdesivir as a possible therapeutic option for the COVID-19. *Travel Med Infect Dis*. 2020 Mar 5:101615.
50. Gautret P, Lagier JC, Parola P, Hoang VT, Meddeb L, Mailhe M, et al. Hydroxychloroquine and azithromycin as a treatment of COVID-19: results of an open-label non-randomized clinical trial. *Int J Antimicrob Agents*. 2020 Mar 20:105949.
51. Klompas M. Coronavirus Disease 2019 (COVID-19): Protecting Hospitals From the Invisible. *Ann Intern Med*. 2020;172(9):619-20.
52. Chen X, Yu B. First two months of the 2019 Coronavirus Disease (COVID-19) epidemic in China: real-time surveillance and evaluation with a second derivative model. *Glob Health Res Policy*. 2020;5:7.
53. Goldwasser RS, Lobo MSDC, Arruda EFD, Angelo SA, Silva JRL, Salles AAD, et al. Dificuldades de acesso e estimativas de leitos públicos para unidades de terapia intensiva no estado do Rio de Janeiro. *Rev Saúde Pública*. 2016;50(19):1-10.
54. Pawaiya RVS, Dhama K, Mahendran M, Tripathi BN. Swine flu and the current influenza A (H1N1) pandemic in humans: a review. *Indian J Vet Pathol*. 2009;33(1):1-17.

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