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Syndemic aspects between COVID-19 pandemic and social inequalities

Jonathan Santos Apolonio, Ronaldo Teixeira da Silva Júnior, Beatriz Rocha Cuzzuol, Glauber Rocha Lima Araújo, Hanna Santos Marques, Isadora de Souza Barcelos, Luana Kauany de Sá Santos, Luciano Hasimoto Malheiro, Vinícius Lima de Souza Gonçalves, Fabrício Freire de Melo

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Jonathan Santos Apolonio, Ronaldo Teixeira da Silva Júnior, Beatriz Rocha Cuzzuol, Glauber Rocha Lima Araújo, Isadora de Souza Barcelos, Luana Kauany de Sá Santos, Luciano Hasimoto Malheiro, Fabrício Freire de Melo, Universidade Federal da Bahia, Instituto Multidisciplinar em Saúde, Vitória da Conquista 45029-094, Bahia, Brazil

Hanna Santos Marques, Vinícius Lima de Souza Gonçalves, Universidade Estadual do Sudoeste da Bahia, Campus Vitória da Conquista, Vitória da Conquista 45083-900, Bahia, Brazil

Corresponding author: Fabrício Freire de Melo, MSc, PhD, Postdoc, Professor, Universidade Federal da Bahia, Instituto Multidisciplinar em Saúde, Rua Hormindo Barros, 58, Quadra 17, Lote 58, Vitória da Conquista 45029-094, Bahia, Brazil. freiremelo@yahoo.com.br

Abstract

Although the coronavirus disease 2019 (COVID-19) pandemic has reached all over the world population, it has demonstrated a heterogeneous impact on different populations. The most vulnerable communities which coexist daily with the social inequalities like low access to hygiene and personal protection products, crowded residences, and higher levels of chronic diseases have a higher risk of contact and the spread of infection, beyond unfavorable clinical outcomes. The elevation of the risk of infection exposure can be related to gender due to the presence of a larger contingent of women in essential services, as well as frontline and cleaning professionals who regardless of gender have the greatest exposure to the virus. Such exposures can contribute to the development of fear of contaminating themselves or their family members associated also with the work stress, both of which are related to the emergence of mental disturbances in these populations. Furthermore, conditions of unsanitary living and low socioeconomic status, populations at war, pre-existing social barriers, and ethnicity have contributed to more impact of the pandemic both in the exposure to the virus and access to health services, COVID-19 management, and management of other pathologies. At the same time, factors such as the closing of non-essential services, the loss of jobs, and the increase in household spending aggravated the social vulnerabilities and impacted the family economy. Lastly, the COVID-19 pandemic contributed still more to the impact on women's health since it propitiated a favorable environment for increasing domestic violence rates, through the segregation of women from social life, and increasing the time of the victims with their

aggressors.

Key Words: COVID-19; Minority groups; Pandemic; Social inequalities; Socioeconomic factors

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Core Tip: The social inequalities interact continuously with the coronavirus disease 2019 pandemic, influencing the development and heterogeneity of the disease while they are potentiated by the pandemic context. Therefore, understanding the individual features of each group is of fundamental importance to the compression of the illness risk, morbidity, and mortality of the infection, data that can be used to create specific measures for health prevention and recovery of the population.

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INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), had its first case in Wuhan, China in 2019, quickly spreading to other countries[1-3]. This virus colonizes the respiratory tract causing, normally, mild symptoms such as cough, fever, dyspnea, sputum, and sneezing. Severe cases of cardiac damage, shock, kidney, and respiratory failure can occur, mainly in individuals with pre-existing chronic diseases[4,5].

On the other hand, the severity of the disease can also be influenced by the social context in which the person is inserted since unique features of each population can propitiate the elevation of the risk of contagion and increase the morbimortality of the infection[6]. Studies have demonstrated that during the pandemic, the social inequalities have been responsible for aggravating the damages caused by COVID-19[7]. Therefore, in addition to considering the biological characteristics of the virus and individual, it is also essential to evaluate the functional vulnerabilities of the population such as the necessity to exercise the work activity during the lockdown because both are important predictors of the illness risk[8].

Thus, although the COVID-19 pandemic has affected the world, its dissemination and impact on the health of different social groups have been demonstrated not to be homogeneous[9]. Access to health information, different age groups, gender, minority groups, socioeconomic and schooling levels[10], inadequate housing quality, absence of potable water and electricity, overcrowding, and bad sanitary conditions can influence the infection heterogeneity[11]. Such conditions are visualized in populations that daily coexist with armed conflicts, in regions historically more vulnerable with low access to health services, provisions, high rates of infectious and chronic diseases, and factors able to add to the COVID-19 pandemic and potentiate its impact on health[12].

Besides the grievances on population health, the proper pandemic also significantly influences the increase of these inequalities[7], reverberating also on the world and family economy. Data from 2020 demonstrate that during this period, there was increasing poverty and hunger, and jobs were lost with an approximate mark of 400 million, beyond the reduction in the workers' income worldwide[13]. The lockdown, although it has been an effective measure to control the spread of COVID-19, also contributed to negative impacts on family economy through the closing of some non-essential services, an increase in the unemployment rates, and the impossibility of going to work while there was an increase of household expenses with personal entertainment, toiletries, cleaning products, and face masks and gloves[14]. Although such misfortunes can reach all the population, they affect with more intensity the populations more vulnerable and with a low socioeconomic level, contributing to the increase of socioeconomic fragility of these groups[15]. Besides that, both the prioritization of essential or non-essential services and the contagion fear resulted in the reduction of access and seeking for health services such as sexual and mental health and oncology, influencing the increase of the vulnerability of these populations[16].

Lastly, although masked by the impacts of the pandemic, domestic violence emerges as an important aggravating factor for women's health in the current times[17]. The lockdown made possible a greater psychological and financial domain of abusers on their victims while making it difficult for these women to seek help[18]. This exposure to violence was related to the elevation of the risk of death and suicide in females, as well as the development of mental disturbances such as post-traumatic stress

disorder, anxiety, and depression[17]. Table 1 synthesizes the relation between the individual characteristics of the populations and the impacts of the COVID-19 pandemic.

The present article aims to evaluate the socioeconomic aspects that permeate the COVID-19 pandemic and how these influence the disease.

METHODOLOGY

The present minireview was based on the articles published in the United States National Library of Medicine (PubMed), which were searched using the following descriptors: COVID-19; SARS-CoV-2; gender; pandemic; disparity; chronic diseases; inequalities; socioeconomic; race; ethnicity; home working; social impact; social distancing; essential services; unemployment rate; domestic violence; vaccine; war situation; and indigenous people. Initially, 5908 articles were found. The inclusion criteria encompassed articles that presented the descriptors in their title or abstract, and manuscripts were written in the last 10 years in the English language. Paid manuscripts, articles not available in full text, and texts that do not address the research topic were considered the exclusion criteria. Lastly, the repeated articles were excluded and 136 were used in the construction of this minireview.

MINORITY GROUPS DURING THE PANDEMIC

The concept of ecopandemic injustice, which seeks to explain the interrelations between pandemic and ecological systems, demonstrates how COVID-19 reveals and deepens the structural inequalities that are formed along the lines of environmental health[19]. Some individual features such as gender, socioeconomic conditions, and ethnicity play a major role in COVID-19 susceptibility and progression, leading to a higher risk of infection, mortality, and hospitalization in the most vulnerable groups[20-22]. On the other hand, the global crisis triggered by the pandemic made the links between racism, poverty, and health more visible and exacerbated[19,23].

Gender

Although men and women are equally susceptible to COVID-19, studies demonstrated that the rates of fatality and admission to the intensive care units (ICUs) are higher in males[20,24,25]. Hypotheses such as the differences in the angiotensin-converting enzyme 2 (ACE2) expression between genders seek to explain these sex disparities[24,25]. Many studies have shown that ACE2 expression is higher in males than in females, probably due to differences in sex hormone activity[20,25,26], since estrogen may present a regulatory effect on ACE2, controlling its expression in human bronchial epithelial cells[26, 27]. Besides that, the transmembrane protease serine 2 (TMPRSS2), an enzyme necessary for the priming of the viral S protein and for spreading the virus in the body[26], suffers from the influence of androgen receptors (ARs), higher expressed in males due to the presence of dihydrotestosterone and acting in the transcription of TMPRSS2[24,26]. Lastly, behavioral and underlying comorbidity differences, such as alcoholism, smoking, and hypertension, are higher among men than women and contribute to the gender gaps in COVID-19 mortality[20,28].

Nevertheless, the women face secondary effects of the pandemic that place them in a vulnerable condition. The female gender represents most of the essential care employees such as frontline health care professionals[20,29], laundry and cleaning staff, administrative assistants working in hospitals, social workers, cashiers, and food service workers. Their close physical proximity to the population in general and high interaction with others contribute to increasing the risk of exposure and infection[20, 30,31], which also can elevate the hospitalization and death risk[32]. In addition, pregnant women are considered one of the most vulnerable groups regarding COVID-19[33], because they present a greater risk of developing severe complications in respiratory infections. On the other hand, these individuals must continue with prenatal care appointments, which may increase the risk of exposure to the virus[33, 34]. Studies have reported that the crowded hospitals and staff and supply shortages may affect the quality of care and increase the risk of obstetrics complications[33]. Lastly, life-saving treatments and vaccines may be denied or hampered to pregnant women due to a lack of data or concern for fetal safety [34,35].

Socioeconomic conditions

Lower socioeconomic status has been related to higher SARS-CoV-2 infection rates and worse clinical outcomes[36-38]. Such facts can be explained by delay in seeking help in COVID-19 cases[37] and higher rates of comorbidities, such as cardiovascular diseases, diabetes, and cancer in the most vulnerable populations[21,39]. In addition, the use of public transportation, lack of adequate personal protective equipment, poor general health and nutritional status, housing conditions, living in poverty or deprivation, lack of insurance, household overcrowding, lower level of education, speaking in a language other than the national language in a country, being an immigrant, and unemployment are

Table 1 Relation between individual characteristics and the coronavirus disease 2019 pandemic

Individual characteristic	Risk factors	Repercussion
Gender	Higher expression of ACE2 and ARs in males[20,25,26]	Higher mortality among men[20,28]
	Greater rates of alcoholism, smoking, and hypertension in men[20,28]	
Socioeconomic conditions	Women as most of the essential care employees[20,29]	Increased risk of exposure among women[20,31]
	Delay in seeking help and higher rates of comorbidities[37,39]	Higher infection rates and worse clinical outcomes[36,37]
Ethnicity	Use of public transportation, household overcrowding, lack of personal protective equipment, smoking, alcoholism, poor diet, and being an immigrant[36,37,40,41]	Higher exposure and mortality[36,37,40,41]
	High rates of comorbidities in the minority ethnic groups[51]	Risk of severe forms of COVID-19[22,45]
	Household crowding, language barriers, and difficulties in accessing healthcare systems[22,52]	Increased mortality for COVID-19[50]
Health service accessibility	Usually workers in essential industries[51,52]	Higher exposure to the virus[51,52]
	Resources reallocation to COVID-19 management[76]	Delay in the realization of elective surgeries[78]; reduction of managing chronic disease[84], services of sexual education[82] and family planning[79,82,83]
	High cost of vaccines against COVID-19[92] and discrepancies in the immunization strategies[93]	Reduction of the vaccine access, increase in the infection and death rates[92,93]
	Language Barriers[97]	Low knowledge about the vaccination process[97]
Labor vulnerability	Mistrust with the health systems[95,96], immigrants with pending documentation, negativism, and having to work during the vaccination process[94]	Reduction of vaccine access by minority groups[94,96,97]
	Frontline or essential work[100]	Higher exposition rates, sleep disturbances, suicide anxiety, depression, PTSD[104]
	Marginalized population, low level education[99], and lockdown policies[104]	Unemployment, reduced family income, food insecurity[98]
Domestic violence	Work at home[116]	Sedentary lifestyle, risk of cardiovascular events[115,117]
	Less social interaction and opportunities for denouncing, and socioeconomic problems[119,125]	Physical and psychological consequences (anxiety, depression, and stress)[132]

COVID-19: Coronavirus disease 2019; ACE2: Angiotensin-converting enzyme 2; ARs: Androgen receptors; PTSD: Post-traumatic stress disorder.

factors that may increase the exposure to and mortality of COVID-19[36,37,40,41].

In association with the aforementioned, lower education levels and lack of information may influence lifestyle and behavior, leading to habits such as smoking, drinking, and poor diet, which are risk factors for severe forms of COVID-19[40]. People with lower education levels tend to work in jobs that do not offer the opportunity to work remotely, increasing the exposure risk[39]. Correspondingly, one study conducted in Spain in 2021 reported that workers with low salaries, unemployed, and people on minimum integration income had an increased probability to contract COVID-19 than workers with salaries equal to or higher than €18000 per year[42]. In this context, in certain communities, social distancing is an inaccessible privilege, because it is impossible to depart from work for the period necessary to carry out quarantine[23,43]. Similarly, homeless people, displaced populations, and prisoners cannot choose to be physically distant from each other, which impairs the realization of isolation[43].

On the other hand, past evidence and experience suggest that marginalized and low-income communities suffer the greatest impact from the current pandemic, since they have health systems historically fragile, overloaded, and with few resources. Therefore, it is clear that COVID-19 shows disparities in several areas, particularly the potentially serious healthcare discrepancies[23,43]. Consistent with this, although medical advice is the adoption of safe practices which include hand hygiene and the use of masks in public environments[23], the water insecurity, and lack of access to basic sanitation and hygiene products in many parts of the world[42] create a new barrier for certain marginalized groups[23]. Such facts are corroborated by current data suggesting that 1 in 4 people of the global population do not have access to clean water or soap to wash their hands at home[44].

Ethnicity

The racial/ethnic minority population also face gaps and disparities in the COVID-19 pandemic[22,45]. In a systematic review conducted with 52 studies, 11 reported that racial/ethnic minority groups were at higher risk of exposure to COVID-19 when compared to the White population and 11 studies demonstrated an increased risk of death for these minority groups[40]. Data from National Center for Health Statistics report that Hispanic populations represent approximately 21% of excess deaths[45], which is related to another study that reported a two times higher risk of Hispanics dying from COVID-19 than Whites[45]. This research also demonstrated that American/Black and Hispanic populations present an increased risk of contracting COVID-19 and similar rates of case fatality[46].

The disparity in the consequences of the pandemic among ethnic groups is so evident that The Washington Post revealed in one of its articles that African-American people are contracting SARS-CoV-2 at higher rates and are more likely to die[23]. The Centers for Disease Control and Prevention's Morbidity and Mortality Weekly Report (MMWR) reported that the Black population is disproportionately affected by COVID-19, accounting for 33.1% of hospitalizations for the disease, despite representing only 18% of the population in the area analyzed[47]. Similarly, data from the Johns Hopkins University and American Community Survey revealed that the infection rate is 3 times higher and the mortality rate is 6 times higher in municipalities with a predominance of Black residents when compared to those with White predominance[23]. Such data correspond to the findings of other studies that described that regions where the Black population was present in an above-average proportion also had higher rates of cases, moderated by social segregation[48], and deaths from COVID-19[49].

Some hypotheses such as the greater burden of obesity and other comorbidities in the minority ethnic groups[50], along with ethnic differences in economic status, the density of residence, household crowding[22,51], language, and other structural barriers to accessing healthcare systems would be related to the increased mortality for COVID-19 in this population[50]. Furthermore, minority ethnic groups are usually employed in essential industries, which do not provide opportunities for working from home, leading to closer proximity with other individuals and higher exposure to the virus[51,52].

Similarly, COVID-19 also impacted the health of approximately 900000 indigenous people (IP) in Brazil. Even if part of this population lives in native lands, theoretically more isolated from society in general, the interaction is inevitable. The first reported case in IP occurred on April 9, 2020 in the Kokama tribe after contact with an infected doctor. As of June 5, there were already 70 deaths in patients aged between 0 and 88 years. Among the victims were the so-called Caciques, a title bestowed on the oldest and leader of the tribe. These deaths can mean an irreparable loss for the maintenance of the culture and traditions of these people[53]. The invasion of protected lands by illegal activities such as mining, drug trafficking, and logging, as well as tourists, missionaries, and traders, are other means of contact between IP and infected people[54].

An ecological study, using spatial analysis techniques and government databases, carried out between March 24 and October 26, 2020, revealed the occurrence of 32024 cases and 472 deaths from COVID-19 in IP, with approximately 85% of the fatal cases occurring in individuals over 50 years old, mainly in the north and midwest regions of Brazil. This study also calculated the mortality rate of COVID-19 in IP at 265.37 deaths per 100000 inhabitants, against 41.1 deaths per 100000 inhabitants in the general population[55]. There are some possible explanations for this higher rate in IP, among which are the high prevalence of comorbidities such as obesity, hypertension, diabetes mellitus, and malnutrition, in addition to the low access to health services, potable drinking water, and good sanitary conditions of housing or even soap and alcohol gel[53,54].

To reinforce the vulnerability of IP, another retrospective study identified that the excess of deaths in the general Brazilian population in 2020 showed an increase of 18.1% in relation to the expected value, while in IP this growth was substantially higher, at 34.8%. It is worth noting that this excess of deaths is directly related to the fatal cases of COVID-19[56]. This scenario can be even more serious as studies also raise the possibility of under-reported cases of COVID-19, leading to the belief that these rates may have been higher[57,58], and even leading to the possibility of risk of the decimation of the entire indigenous villages in the southern region of the country[59].

The world perspective on the COVID-19 pandemic and IP is not very different from what happens in Brazil. The difficulties in dealing with COVID-19 are closely related to limited state and federal assistance and this is a reality for IP in different parts of the world[60]. A recent study looked at differences in stress, anxiety, and depression experienced by different ethnic groups during the COVID-19 pandemic. Their results demonstrated that indigenous ethnicity is a specific risk factor for the psychiatric disorders studied and suggested that greater attention to the mental health of this population is needed[61]. In addition, the socioeconomic marginalization and the social inequalities that affect with more severity the indigenous communities and potentiate the pandemic effects in these populations around the world[62] also can hinder these populations' access to vaccination[63].

COVID-19 PANDEMIC AND WAR STRESS

Syria and Lebanon are Middle Eastern countries that have been living with internal armed conflict for

about 11 years since the Arab uprising in 2011. This reality of combat and altercation generated, in addition to an undeniable and expressive number of deaths and injuries, the population displacement and collapse of health systems[64]. With the emergence of the COVID-19 pandemic, the situation of poor health in these places has become even more evident, given that if even countries with health systems and more advanced resources struggled with difficulties to fight COVID-19, those affected by conflicts ended up facing even more devastating outbreaks of the disease[65]. Yet, statements from several international public entities, such as the International Crisis Group, warned of concerns about these locations, where the already challenge of global health was met with wars and political conditions that generate an extremely weak health system, mass displacement, and lack of basic infrastructure, resulting in more impacts of the COVID-19 pandemic[65].

There are several factors that put the Syrian population, of about 3.5 million people, at greater risk than the others in the face of the current global health condition. In addition to the presence of more than 2.8 million internally displaced people, this could be a potential route for the spread of the virus and an increase in the number of cases of the disease, as well as overcrowding of urban centers and rural areas, and the existence of more than 500 concentration camps arbitrarily built in the region[65]. Finally, the high rate of extreme poverty – estimated to be that about 83% of Syrians live below the poverty line – added to the inability of the Syrian health system, shaken and weakened by the 9 years of armed conflict, end up contributing to a lack of adequate and sufficient resources and supplies[66].

Thereby, unequal distribution of wealth, sociopolitical instability, and underreporting result in several COVID-19 incidences[67]. The first case of SARS-CoV-2 infection in Lebanon was confirmed in February 2020; since then, the case numbers have increased. However, it remains limited due to national confinement, closed borders, and care measures. Nevertheless, since August 2020, with the explosion of the Beirut Port, there was a decline in socioeconomic status, reaching 534968 positive cases and 7569 deaths by May 2021[68]. Yet, the COVID-19 dissemination coincided with a period of political instability [69].

Focus on public health sectors preparing to meet the infected patients threatens the continuity of some basic services, besides the fear of getting the infection and obligatory reclusion, which has stopped many individuals from visiting the psychological support. Yet, the lockdown measures negatively affect the maintenance of millions of people and about 30% of young people in Lebanon are unemployed in this context[70]. Moreover, one of the most important psychological impacts of the infected or suspected patients was the prejudice and stigma of having the disease, among the front line professionals. Those in quarantine were more likely to be stigmatized and rejected[71].

However, when comparing mortality rates in Middle Eastern countries, including Syria and Lebanon, there are lower figures than, for example, those in Europe and the Americas[72]. Such an estimate could lead to the erroneous conclusion that the pandemic has hit countries in conflict less strongly, as their estimates are less alarming than global ones. However, the conclusion must be precisely inverse: Given an overloaded health system, unequal distribution of wealth, and lack of sociopolitical stability, there is a high number of undetected and unreported cases in this region, making official data not reflect reality [67,72].

Therefore, although politics and health are subjects sometimes seen as unrelated, the index of political stability can and should be used as a predictor of the management capacity of a pandemic[73]. Thus, in countries in a constant war situation, such as Syria and Lebanon, the position in the face of a global health problem is complex, since its inhabitants and political leaders must deal with the pandemic and the ongoing war, two serious obstacles, which add up to the death and invalidity numbers[74].

RESTRICTION TO HEALTH SERVICES ACCESSIBILITY

The primary objective of the health system in Brazil is to provide health services to the population, regardless of gender, age, race, ethnicity, religion, nationality, social class, sexual orientation, or political position, promote treatment, monitor diseases, minimize pain, whether physical or psychological and, when possible, promote the cure[75]. However, COVID-19 generated a growing additional demand in the public health system, mainly in the increase of ICU beds and mechanical ventilation devices, necessary measures for the treatment of contaminated people in moderate and severe states[76]. As elective operations resume, operating room (OR) access has become increasingly challenging because of the large backlog of cases. Before the pandemic, many hospitals were running their ORs at near capacity, leaving little room to accommodate additional surgeries and forcing scheduling delays as long as 20 mo. As a result, patients are facing mounting challenges to the receipt of timely surgical treatment as outpatients and inpatients[77].

The pandemic represents a barrier to access to health services since these are organized for priority care for potentially infected patients and with professionals away from care for various reasons, with an overload of the remaining. In addition, people avoid going to services, due to social distancing recommendations and fear of contamination[78-80]. Thus, Brazil faces some challenges in the battle against the COVID-19 pandemic, including the risks of cross-infection (community infection) increase in densely populated areas, and low access to health services in areas where the number of beds in ICUs is scarce and poorly distributed, mainly in states with a low population density[76,81].

Experience from past outbreaks indicates the need to pay attention to the potential effects of the COVID-19 pandemic on sexual health outcomes, both in the immediate and long term[80]. The greater risk of sexually transmitted infections during the pandemic for women in situations of domestic violence or other conditions of psychosocial risks, such as the use of alcohol or drugs, poverty, among other situations of vulnerability, also needs to be recognized and should be a priority for health services [81]. Attendance at family planning services has also dropped dramatically in different countries. The consequences can involve an increase in the number of unwanted pregnancies and unsafe abortions, as well as maternal and neonatal deaths, and an impact on sexually transmitted infections. The effects could linger during the recovery phase of the pandemic, hitting disadvantaged and neglected groups again and reversing gains made in recent decades[76,82,83].

The treatment and follow-up of chronic diseases also suffer the impact of the pandemic. A study showed that diabetes (38%) was the disease most affected by resource reallocation and prioritization to COVID-19, followed by chronic obstructive pulmonary disease (COPD, 9%), hypertension (8%), heart disease (7%), asthma (7%), cancer (6%), and depression (6%)[84]. Non-infectious chronic respiratory diseases such as obstructive sleep apnea, asthma, and COPD were also negatively impacted. Both diagnosis/treatment and follow-up have been compromised by a reduction of resources, lack of adherence to face-to-face care, and interruption of clinical trials with possible innovative therapies, and these events can have negative consequences in the medium and long term for patient survival[85]. Recently, another study demonstrated a reduction in hospital admission for cardiovascular disease at the beginning of the pandemic and another study reported a lower overall hospital mortality and higher out-of-hospital mortality for patients with cardiovascular disease during rigid periods of isolation compared to other times of the pandemic[86,87]. These studies raised the hypothesis that the changes and interference of the conditions generated by the pandemic in the treatment and monitoring of diseases may negatively affect patients with cardiovascular diseases not infected by SARS-CoV-2[88]. Furthermore, the pandemic has also significantly affected cancer patients. The allocation of resources to deal with patients positive for SARS-CoV-2 has led to a shortage of essential drugs for the care of cancer patients, given that the replacement of therapy is a complex condition and not always possible since the limitation in the treatment of cancer can be fatal[89]. In addition, the diagnosis of some types of cancer such as gastrointestinal cancer was compromised by the risk of infection of patients[90].

In addition to the aforementioned, the inequalities present in the immunization process have contributed to the harm to human health and postponed the pandemic end[91]. Research demonstrated that the cost of vaccines against the COVID-19 impeded the access and the immunization process of some countries which suffered from the economic impact of the pandemic, and the adaptation of their health systems to attend to the population with the disease[92]. Furthermore, the discrepancy between the high stimuli to the creation of vaccination strategies in developed countries like the United States of America (USA) which vaccinated over half of its the population until September 2021 and detriment to countries like India which vaccinated about 13% of the population in the same period, made possible that new infection waves formed in these last countries, increasing the infection and death rates and also propitiating the emergence of new virus variants[93].

Vaccine access also is affected by the way that the communities are structured, since the necessity to work during the vaccination periods, the mistrust of the health system, documents pending related to immigration, religious negativism, and political opposition are individual factors that have contributed to decreasing the vaccine access by Latin and Hispanic people in the USA[94]. Similarly, studies have demonstrated a greater hesitation to vaccination by the people belonging to minority groups, mainly the Black population in the United Kingdoms and the USA, which could be related to possible historic disbelief of these people about the health system due to events like the Tuskegee Experiment[95,96]. Furthermore, immigrant people can present a reduction in the seeking of immunization due to spatial barriers that restrict the mobility to the locals of vaccination and language barriers since not speaking the language of the countries where they live can reduce the access to information about the process of vaccination[97].

LABOR VULNERABILITY AND IMPACT ON THE FAMILY NUCLEUS

Exposure to infection caused by SARS-CoV-2 is directly related to the nature of people's profession. In this context, frontline work can be mentioned, such as the health area and certain essential industries, in which there is greater interaction with other individuals[52]. This scenario becomes more serious in places with a high population density, households with shared sanitation facilities, and ineffective health systems, as is common in poorer regions of developing countries[98]. Furthermore, the COVID-19 pandemic has not only affected infection and mortality rates. With the adoption of restrictive measures to control transmission in several countries in 2020, such as the closing of establishments considered non-essential and rules of social isolation, economic and social aspects were also influenced. Thus, several changes were noticed in work relationships that had consequences on income and family management[98,99].

Social isolation involves exceptions such as essential workers (EWs), which include healthcare professionals (HCP), individuals working in the food production and distribution, emergency and protection services, communications, information technology, logistics, and delivery services. These EWs vary according to regulations and local economy[100] and their contacts, which increase the contagion risk itself and to other people, need to be retained [101]. The recommendations include support work from home, face shield, and individual protection equipment (IPE) for functions where social distancing is not possible, workplace layout changes, and improved cleaning and disinfection. However, working from home is often not feasible[102]. Besides that, achieving a balance between the provision of essential health care and protection of the HCP against infection, mainly due to the deficiency of the IPE, is challenging for the frontline team[103]. Furthermore, the COVID-19 pandemic affects the mental health of work-people. Anxiety, depression, post-traumatic stress disorder (PTSD), and sleep disturbances are more often present in HCP on the frontline, migrant workers, and those in contact with the public, where job insecurity, long-term isolation, and uncertain future worsen the psychological condition[104]. A systematic review showed that a high proportion of the HCP experience elevated levels of anxiety, depression, and insomnia, being more prevalent in the nurse team when compared with physicians [105]. Yet, rates of suicide are reported in this population, due to the psychological pressure, loneliness, financial crisis, and fear of dying[106,107]. Another study that evaluated Spanish health professionals described that about 56.6% of workers presented with PTSD, 59.6% had anxiety, and 41.1% had emotional exhaustion[108]. Among Chinese physicians, 50.4% and 71.5% of the study participants reported depression and anguish, respectively[109].

On the other hand, the economical and productive consequences of the pandemic can also affect labor sectors, while some individuals were forced to stop their work activities due to lockdown policies or effective job loss[104]. A study reported that almost two-thirds of the participants had their family income reduced during the pandemic and approximately half of them had reduced work hours or lost their job due to COVID-19[110]. Yet, the Spanish population estimates an increase in the unemployment rate of 27.88%, mainly in service sectors[111]. A search performed in Hawaii showed that the interviewees reported having difficulties spending for essential items and expected problems to increase in the next 3 mo, such as paying for alimentation, rent, and car expenses, as well as utility bills, and mobile/internet costs[112]. Other data obtained in the USA showed that about 28% of respondents declared that school closures were a factor that affected the finances of low-income families, as children no longer received free or reduced-cost meals in schools[113]. Moreover, domestic work gains importance in pandemic scenarios due to the great demand for care for both children and the elderly, but their employment situation, exposure, and vulnerability affect most of these workers. Therefore, they are at serious risk of losing their jobs, beyond the contagion danger, family estrangement, and violence in the house[114].

Generally, families belonging to marginalized or low-income populations tend to suffer the most severe effects. In this way, existing inequities were further aggravated by COVID-19[99,113]. In Liberia, Africa, it was identified in a study that about 67% of participating families had reduced income due to the pandemic. This situation contributed to the fact that 68% of respondents only had food in stock for a week or less, and 35% reported that they had skipped a meal in the last 7 d[98]. A study in Indiana, USA found that 55% of participants were worried about their family finances because they had lost their jobs. Another factor involved in greater economic precariousness was education, with people who did not have a university degree having twice the risk of food insecurity compared to those who had any college degree, while those without complete high school were 4 times more likely[99].

Another relevant issue is that the COVID-19 pandemic accelerated the process of transitioning from face-to-face work to remote work at home, and this affected the health of individuals[115,116]. A survey carried out in Japan with company workers showed that the average number of days of working from home per week went from 0.2 in 2019 to 1.0 during the pandemic in 2020. In this context, there was an increase in sedentary lifestyle, with more time dedicated to activities such as sitting, watching TV, and using the PC. A sedentary lifestyle is a problem that increases the risk of chronic diseases and fatigue and reduces workers' productivity[115]. In Pittsburgh, USA, a survey was carried out to assess the consequences for desk workers, most of whom had to migrate to remote work. The results show that these people also had an increase in sedentary time on rest days, and worse sleep quality, in addition to a reduction in work-related health, such as loss of productivity, concentration, and personal satisfaction [116]. A study highlighted that in Italy, the number of people working from home rose from 4.6% in 2019 to 19.4% in the second quarter of 2020. The findings point to an increase in physical inactivity and a reduction in outdoor physical exercise, indicating that this increase may have been greater in people who lost their jobs compared to those who could keep them. Such a scenario, which, added to an increase in hours of working and the adoption of less healthy diets, can contribute to an increased risk of cardiovascular events, such as obesity and hypertension[117]. Thus, several studies reported that unemployment also contributes to mental health commitment, especially among young people[118, 119]. It is important to note that even with the end or loosening of restrictions on social isolation, it is very likely that most companies will opt for remote work, either by popularizing available technologies or by saving costs. Thus, the health problems related to a sedentary lifestyle caused by COVID-19 may persist beyond the pandemic, requiring a joint effort among families, companies, and governments to reduce these effects[116,117].

INCREASE IN DOMESTIC VIOLENCE IN THE FACE OF SOCIAL ISOLATION

Domestic violence is defined in The Protection of Women from Domestic Violence Act as “any act of commission or omission or conduct resulting in physical, verbal, emotional, sexual, and economic abuse” [82,120]. Especially during the first 6 mo of the pandemic, support mechanisms for victims of domestic violence such as specialized centers in Spain, Cyprus, Brazil, and the United Kingdom reported an increase of 20%, 30%, 40%-50%, and 25%, respectively, in complaints. Furthermore, Google's search engine detected an elevation of about 75% in searches related to supporting domestic violence [121-123]. It is possible to observe a trend already experienced in other moments of the crisis, in which, as in the current pandemic, there were mainly economic and social problems, linked to the loss of jobs, reduction of family income, food insecurity, stress, reduced interactions and social support, and increase in the consumption of alcoholic beverages and drugs, which corroborate the increase in violence rates [124,125].

The measures of confinement and social isolation restricted contact with external family members, neighbors, and co-workers, which makes it difficult to search for help or the opportunity to talk about the violence faced at home [126,127]. Isolation has made it more complicated for the victim to denounce her aggressor since she is confined with him [128,129], as well as made access to social services and health services and assistance to the population more difficult [129]. Therefore, in a situation of aggression, in addition to the violence suffered, the victim still needs to deal with a series of barriers to defend themselves. This is in agreement with studies that reported how victims of domestic violence felt that social support was weakened during confinement measures, especially in the first 6 wk, associated with lower trust in social and health services [130,131].

The rise in domestic violence and other stressors generated during the pandemic, contribute to aggravating the victims' lack of mental health, bringing physical and psychological consequences to the female population throughout their lives. In this way, the health impact can be translated through higher levels of stress, anxiety, depression, post-traumatic stress symptoms, and chronic environmental stress [132]. A study in the United Kingdom proved this by stating that women and people living with young children experience greater mental distress during the pandemic [133]. In addition, other studies around the world also confirmed that, in relation to men, women were at greater risk of acquiring mental health problems in this period [134-136].

CONCLUSION

In conclusion, the complex interaction between the biological and the social inequalities continually assists the development of the infection. The social inequalities contribute to the illness process, increasing the risk of contamination and morbimortality of the disease. On the other hand, the pandemic context favored the increase of the gaps and structural barriers pre-existing against the more vulnerable groups, leading to distress, social change in daily life, and greater illness of this population. Therefore, understanding the nuances that permeate the infection can assist both in the evaluation of the disease impacts and formulation of targeted measures able to encompass the individual necessities of the population, potentiating the prevention and recovery process of the health.

FOOTNOTES

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Country/Territory of origin: Brazil

ORCID number: Jonathan Santos Apolonio 0000-0002-9463-8114; Ronaldo Teixeira da Silva Júnior 0000-0003-0835-4092; Beatriz Rocha Cuzzuol 0000-0002-1456-2982; Glauber Rocha Lima Araújo 0000-0002-5195-3632; Hanna Santos Marques 0000-0001-5741-1570; Isadora de Souza Barcelos 0000-0002-6868-2840; Luana Kauany de Sá Santos 0000-0003-4618-1129; Luciano Hasimoto Malheiro 0000-0001-7767-2874; Vinicius Lima de Souza Gonçalves 0000-0002-6445-9318; Fabrício Freire de Melo 0000-0002-5680-2753.

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