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Effectiveness of Different Health Systems and Governmental Actions on Controlling Spread of the COVID-19

Eficácia de diferentes sistemas de saúde e ações governamentais no controle da propagação da COVID-19

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Autores: **Mariana Esperendi Bastianini** - Doutoranda em Meio Ambiente e Desenvolvimento Regional -UNOESTE. E-mail: marianaesperendi@gmail.com. Orcid: https://orcid.org/0000-0002-0366-852X ; **Nathalia Lopes Manganaro** - Mestre em Odontologia – UNOESTE, e-mail: nathy_manganaro@hotmail.com, Orcid: https://orcid.org/0000-0002-1923-0864 ; **Juliane Avansini Marsicano** - Professora Doutora da Faculdade de Odontologia da UNOESTE, E-mail: juavansini@yahoo.com.br Orcid: https://orcid.org/0000-0002-8213-1754 ; **Rosana Leal do Prado** - Professora Doutora da Faculdade de Odontologia da UFMG, E-mail: rosanahb@yahoo.com.br, Orcid : https://orcid.org/0000-0002-5897-2799.

Abstract

This study analyzed the effectiveness of social development, health access and structure and governmental actions in upper-middle and high-income countries, facing the COVID-19 pandemic. It was collected information about socioeconomic conditions, health system resources, and COVID-19 pandemic of 24 upper-middle and high-income countries. A multiple linear regression model using prevalence and mortality was carried out. The COVID-19 prevalence was reduced by 0.58 times for each unit added to social progress. The countries with the highest health expenditure had the highest COVID-19 prevalence. There was a 0.41 and 0.19 reduction in COVID-19 mortality for every unit increase in hospital beds and COVID-19 tests, respectively. Social progress had an impact on the fall of COVID-19 prevalence ratio. The number of hospital beds and COVID-19 tests influenced the decrease in mortality rate.

Keywords: COVID-19. Health Care Economics and Organizations. Social Conditions. Health Information Systems. Health Impact Assessment.

Resumo

Este estudo analisou a eficácia do desenvolvimento social, acesso e estrutura de saúde e ações governamentais em países de renda média-alta e alta, no enfrentamento da pandemia de COVID-19. Foram coletados dados sobre condições socioeconômicas, recursos do sistema de saúde e pandemia de COVID-19 em 24 países de renda média-alta e alta. Realizou-se um modelo de regressão linear múltipla usando prevalência e mortalidade. A prevalência da COVID-19 foi reduzida em 0,58 a cada unidade somada ao progresso social. Os países com maiores despesas de saúde apresentaram maior prevalência de COVID-19. A mortalidade por COVID-19 reduziu em 0,41 e 0,19 para cada unidade aumentada em leitos hospitalares e testes de COVID-19, respectivamente. O progresso social impactou na redução da prevalência da COVID-19. O número de leitos hospitalares e testes de COVID-19 influenciaram na redução da mortalidade.

Palavras-chave: COVID-19. Economia e Organizações de Cuidados de Saúde. Condições Sociais. Sistemas de Informação em Saúde. Avaliação de Impacto na Saúde.

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Introduction

Access to health services is an important part of determining the health-disease process, directly impacting the socioeconomic development of society, and reducing the iniquities. In order to make this possible, countries tend to organize health systems in different models according to health policies (Reibling; Ariaans; Wendt, 2019). The implementation of the health system in each country is related to the historical, social, and political context (Shakespeare; Officer, 2011) with its own features and challenges (Ziglio; Simpson; Tsouros, 2011).

Among these models, universal health coverage, social insurance, and private insurance stand out. The universal health coverage or National Health Service is a universal system in which the state has a function of financing and managing health access and health promotion for the entire population (Wendt; Frisina; Rothgang, 2009). The social insurance model is related to health insurance for workers, which is a mandatory contribution with payroll deductions involving the worker and employer. Private insurers are a health care service paid for by individuals. Assistance care, such as Medicare and Medicaid, is a model focused on health assistance only for vulnerable populations (Tulchinsky; Varavikova, 2020).

The structure, organization, and attributes of quality, efficiency, and sustainability could define the resilience of health systems (Turenne CP et al., 2019). A health system's resilience is relevant to its development and consolidation, as well as to adapt to disturbances such as public health emergencies (Jarvis T et al., 2020).

In March 2020, the World Health Organization (WHO) declared that the COVID-19 public health emergency could be characterized as a pandemic (WHO[a], 2020). In COVID-19 the main route of infection is human-human transmission, principally affecting the respiratory tract, with mild to critical symptoms related to SARS-CoV-2 that could lead to death. The death rate is higher in patients older than 60 years, and/or with diabetes, hypertension and obesity (Wang Y et al., 2020). The SARS-CoV-2 pandemic affects all countries of the world, with millions of confirmed COVID-19 cases and deaths. In this scenario, without a specific treatment and vaccine for this virus, prevention is the best solution for COVID-19 pandemic control, requiring a collective effort by the population, government, and health services systems (Ali; Alharbi, 2020; Williamson EJ et al., 2020). According to the WHO, guidelines to prevent SARS-CoV-2 infection include washing hands, the use of the masks, and social distancing (WHO[b], 2020). However, some social determinants of health and inequalities could affect these practices and influence the progression of infection rates. These include social distancing which is influenced by the number of rooms in houses, presence of multigenerational households, jobs that are not possible at home office, and the types and quality of public transport among others factors (Burstrom; Tao, 2020).

In addition to biological risk, the world population faced insecurity and instability in employment and income (McKee; Stuckler, 2020), and economic recessions have been shown to have a great impact on the health systems and health of the population (Andrietta LS et al., 2020).

In this situation, the health system must be effective in solving the needs of infected patients in addition to adopting effective measures to reduce the spread of the pandemic (Remuzzi & Remuzzi, 2020). The government should manage the tension between the economy and health conditions (Henne SR, 2020), allow individuals access to care, minimize social conditions that increase the risks of spreading the disease, and applying measures for the prevention and promotion of health (Tulchinsky; Varavikova, 2020).

In times of crisis, health systems provide support in different ways, presenting different forms of financing and management which are influenced by the economic crisis and reduced income (Gostin; Friedman; Wetter, 2020). Consequently, health insurance associated with the pandemic can increase the cost of health and health access challenges as well as the private model (King JS, 2020). In addition, the adoption of positions aimed at necropolitics, that is, to "edit the power and capacity of those who can live and who should die", consider the economy, and not the population's health, to be the central factor, thus influencing the right to health and standard of living of the population (Barp; Mitjavila, 2019; O'Donovan Ó, 2020; Dos Santos et al., 2020). The concept of necropolitics, proposed by the Achille Mbembe a philosopher, theorist, and politician, is related to the biopower of State to decide who is the social enemy dividing the society in useful and worthless groups (O'Donovan Ó, 2020; Dos Santos et al., 2020).

In view of the above, this study analyzed the effectiveness of social development, health access and structure, and governmental actions in upper-middle- and high-income countries facing the COVID-19 pandemic.

Material and methods

To understand the relationship between the health model offered. the number of cases and the mortality rate due to COVID-19, this study was initiated by selecting the countries and identifying the health care model of each one (Universal Model, Private Insurance, Social Insurance and Assistencialist). Information about the country's socioeconomic and health structure, and epidemiological data on COVID-19, was obtained from databases.

Twenty-four upper-middle- and high-income countries were chosen with the main criterion for selection being availability of information on their health models. Countries for which information about health systems was unavailable were excluded from this study. The selected high-income countries were Australia, Austria, Belgium, Canada, Denmark, France, Germany, Greece, Israel, Italy, Japan, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States of America (USA); and the upper-middle income countries were Argentina, Brazil, China, Colombia, Russia, and South Africa.

Data and sources of information

To identify the health system models of countries, the search was performed in the PubMed and Web of Science databases using the keywords 'Health Systems', 'Public Health' and 'Health Insurance', and the articles were selected according to the criterion of the study. Health system was classified into universal system, social insurance, health insurance plans, and assistencialist.

Socioeconomic indicators were obtained for information on the conditions of the countries: The Human Development Index (HDI), Gross National Product (GNP) and the GINI coefficient. HDI characterizes the degree of development in education, health, and income. This indicator ranges from 0 to 1, with closer to 1 meaning greater human development in the country. GNP identifies the level of economic development by measuring the wealth produced in the country.

The GINI coefficient provides information on how wealth is distributed within a nation, state, or municipality, and is the main method for identifying the degree of social inequality. The GINI index ranges from 0 (when there is no inequality) to 100 (with maximum inequality); the lower the index, the lower the social inequality within the territory. Data on population, GNP, and GINI index were obtained from the *World Bank Group* (World Bank Group, 2020) and on HDI from the *Human Development Report Office* website (United Nations Development Programme, 2020).

Social progress is defined as the ability of society to meet the basic needs for survival and to improve the quality of life by creating favorable conditions for the population. The social progress index was calculated based on three areas subdivided into 12 components. The social progress areas evaluated were a) basic human needs (nutrition and basic medical care, water and sanitation, shelter, and personal safety), b) foundations of wellbeing (access to basic knowledge, access to information and communications, health and wellness, and environmental quality) and c) opportunity (personal rights, personal freedom and choice, inclusiveness, and access to advanced education) (The Social Progress Imperative, 2019). The data were collected through the Social Progress Index Executive Summary.

The search for evidence of necropolitics in each country was carried out through official and journalistic websites that evaluated the speeches and attitudes of the government of these nations and explained through reports, the situations that configure it. Thus, the presence or absence of necropolitics was registered along with where and how it was present. It was considered at least one register.

The health system resources were analyzed by the indicators current health expenditure, as a percentage of gross domestic product (CHE%GDP), and hospital beds (per 10,000 population). These data were collected from WHO's Global Health Observatory data repository. The CHE%GDP is the percentage of GDP spent on the health sector. It evaluates the importance of the health sector and gives priority to the economy in the country. The data on it were collected for the year 2017, the last year that most countries presented data for. The number of hospital beds (per 10,000 population) measures the density of hospital beds in relation to the total population (WHO[c], 2020), and is an indicator of the structure of inpatient services of the countries. The data on it were collected for 2016, the last year for which all countries included in this study presented information.

Information on all cases of the disease as well as the number of deaths, were obtained from the *Worldometers* database (Worldometers, 2020) on September 11, 2020, thus completing 6 months since the WHO declared a state of pandemic. The COVID-19

prevalence ratio was calculated obtained using the total number of individuals with COVID-19 divided by the total population (per 1,000 population). The mortality by COVID-19 ratio was obtained through total deaths by COVID-19 divided by the country's total population (per 100,000 population). The crude case fatality rate (CRUDE CFR%) was estimated by dividing total deaths due to COVID-19 by the total number of individuals with COVID-19 (per 100) of each country.

Data on the number of COVID-19 tests by country were obtained from the WHO database (WHO[d], 2020). The COVID-19 test per population was measured considering the total number of tests performed by population (per 100) and the COVID-19 test per case considering the total number of tests performed by total COVID-19 cases.
The Rt1 COVID-19 rate evaluates the estimate effective reproduction number R(t) at day t, which indicates the mean number of people that one patient infected by COVID-19 could infect if the conditions remained the same. This rate was obtained from the database Stochastik-TU-Ilmenau/COVID-19 (Hotz T et al., 2020).

The COVID-19 transmission scenarios in the countries evaluated was obtained through the WHO database and was classified, according to WHO (WHO[d], 2020), into countries with no cases (countries without cases), sporadic cases (one or more causes imported or locally detected), clusters of cases (cases clustered by geographic location and/or common exposure) and community transmission (larger outbreaks of local transmissions).

Data analysis

This study conducted a descriptive analysis of data related to health system models, socioeconomic conditions, health system structures, and rates related to COVID-19. Multiple linear regression models using the prevalence of cases per thousand inhabitants and mortality per hundred thousand inhabitants as outcome variables were built. The independent variables included in the case prevalence model were social progress index, percentage of GDP spent on health, total or partial adoption of containment measures and health model, and the latter dichotomized into universal or not. For the model with the mortality response variable, the following independent variables were considered: number of hospital beds and number of tests per detected case. Collinearity between the model's covariates was evaluated using variance inflation factors (VIF). As there was no evidence of collinearity, all variables included in the model were maintained in the final models. To avoid multicollinearity, variables such as Gini, GNP, HDI, Inclusiveness Index, Necropolitics were not included in the regression analysis. The coefficients of the models (β), determination coefficient (95% confidence intervals), and p value, were calculated using the stepwise procedure. The determination of the best model considered the p value of the F test and the AIC and BIC criteria. Normal residual distribution and homoscedasticity criteria were met. All analyses were performed using R software (R Foundation for Statistical Computing, Vienna, Austria).

Results

Of the 24 countries included in this study, ten have a universal health system (Table 1). As for the economy, 18 countries are high-income and six countries are upper-middle income, with the Human Development Index (HDI) ranging from 0.705 to 0.946. The

GINI Index ranged from 27 to 53.3, corresponding to Norway and Brazil, respectively. Social progress showed values between 66.12 and 92.11, showing a downward trend in some countries between the periods of 2011 and 2020, as shown in Figure 1.

Evidence of necropolitics was identified in Brazil, Spain, the United States, and Italy, and at the same time, it was found that these countries had a higher prevalence of cases of the disease (Table 1). Of the countries analyzed in this study, only ten adopted the universal health system: Brazil, Denmark, Greece, Italy, Norway, Portugal, Russia, Spain, Sweden, and the United Kingdom. Health expenditure in these countries ranged from 5.3% to 11% of GDP. In these countries, the mean prevalence and mortality due to COVID-19 were 7.4±5.7/1,000 and 35.2±27.1/100,000 respectively (Table 1). Regarding the population testing, the percentage ranged from 2.80% to 54.79%. The number of hospital beds ranged from 21.13 to 81.6 per 100,000 inhabitants in 2016.

Argentina, Austria, Belgium, France, Germany, Israel, Japan, and Switzerland adopted the social insurance system (Table 1). The expenditure of these countries on health ranged from 7.4% to 12.3%, with mean prevalence and mortality like the countries who adopted the Universal System. The tests by population and the number of hospital beds ranged from 3.91% to 32.87% and 29.9 to 131.1, respectively.

Table 1. Distribution of countries according to health system models and socioeconomic conditions.

Health System Model					
	Universal System (n=10)	**Social Insurance (n=8)**	**Health Insurance P. (n=2)**	**Private Insurance (n=3)**	**Assistentialist (n=1)**
Socioeconomics conditions					
Income economies					
U. Middle (n=6)	20%	12.5%	0%	66.7%	100%
High (n=18)	80%	87.5%	100%	33.3%	0%
Population (2019) (mean±sd)	57.2Mi ± 69.4Mi	44.9Mi ± 44.1Mi	31.4Mi ± 8.6Mi	145.7Mi±158.1 Mi	1.4 Bi
CHE%GPD (2017)	9.1±1.6	10.4±1.5	9.9±1.0	10.8±.5.5	5.2
GNP (2019)	1.2Tri ± 923.0Bi	1.8Tri ± 2.0Tri	1.5Tri ± 265.0Bi	7.5Tri ± 12.4Tri	14.2Tri
HDI (2019)	0.88±0.06	0.91±0.03	0.93±0.01	0.79±0.11	0.76
Gini index (2017)	34.9±7.8	30.3±2.3	-	49.7	-

Inclusiveness Index (2020)	67.8±16.1	66.0±9.	74.0±7.5	52.8±10.2	27.79
Social Progress Index (2020)	86.1±7.1	88.0±3.8	91.3±0.1	76.7±8.1	66.12
Necro-politics					
Yes*	30%	0%	0%	33.3%	0%
No**	10%	12.5%	0%	0%	0%
N/I	60%	87.5%	100%	66.7%	100%
Covid-19 pandemic situation					
Prevalence Ratio Covid-19***	7.4 ± 5.7	7.1 ± 5.1	2.3 ± 1.8	15.0 ± 4.6	$6.08X10^{-11}$
Mortality by Covid-19 ratio****	35.2 ± 27.1	31.5 ± 30.4	13.8 ± 15.0	43.4 ± 16.9	$3.32X10^{-4}$
Rt1 Covid-19	1.4 ± 0.2	1.4 ± 0.3	1.0 ± 0.7	1.1 ± 0.3	0.80
Crude CFR%	5.2 ± 3.9	4.3 ± 3.6	4.9 ± 2.7	2.9 ± 0.4	5.44
Containment measures					
Masks	70.0%	87.5%	100%	33.3%	100%
Social distance	100%	75.0%	100%	100%	100%
Blocking barriers	40.0%	25.0%	50%	66.7%	100%
Lockdown	60.0%	25.0%	0%	0	100%
Covid-19 Test per case	50.2 ± 40.5	26.6 ± 15.7	158.5 ± 159.1	8.0 ± 5.3	-
Covid-19 Test per population (%)	22.2 ± 14.6	16.0 ± 11.0	23.2 ± 7.9	14.0 ± 13.0	-
Transmission Classification					
Community transmission	60.0%	25.0%‡	50.0%	0%	100%
Clusters of cases	40.0%	62.5%	50.0%	100%	0%
Hospital beds (year 2016)*****	35.2 ± 17.5	66.3 ± 30.6	32.2 ± 8.8	22.3 ± 7.7	40.2

CHE%GDP-Current health expenditure as percentage of gross domestic product;HDI- Human Development Index; GNP- Gross National Product; Health Insurance P.- Health Insurance Plans; U. Middle – Upper Middle income; Mi- millions; Bi – Billion; Tri- Trillion; *Yes - political speeches by authorities on social and television network or statement from authorities; ** No - financial and tax benefits to companies by means of the non-dismissal or reduction of wages; N/I-No information; ***per 1,000 population; ****per 100,000 population; *****per 100,00 population; ‡ No data were found for this variable to Japan

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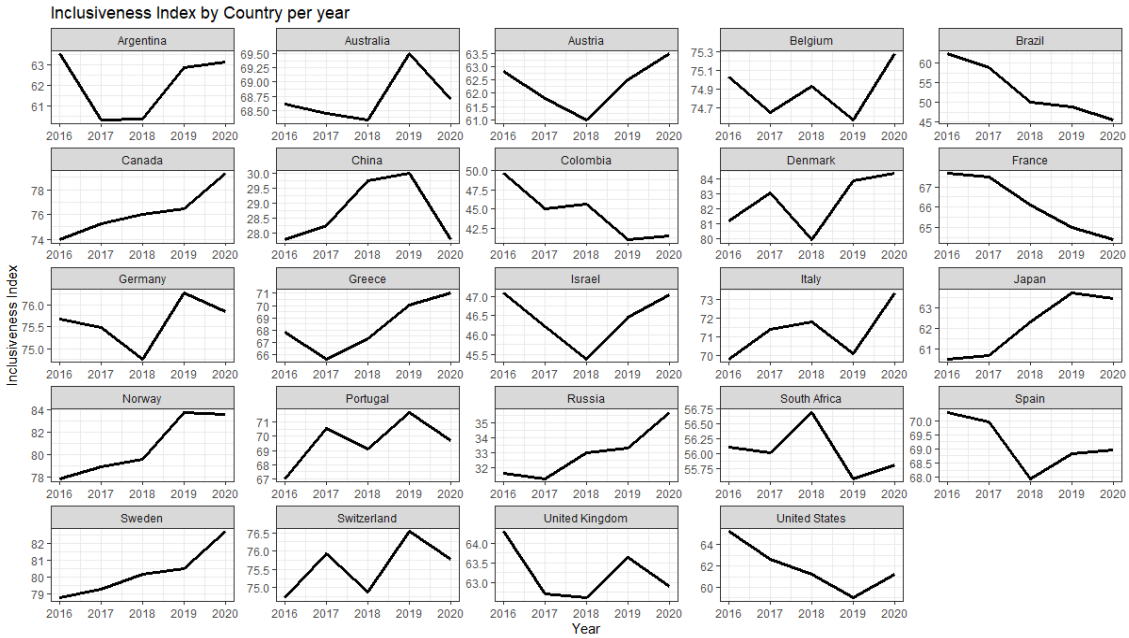

Figure 1. Social progress index by country per year.

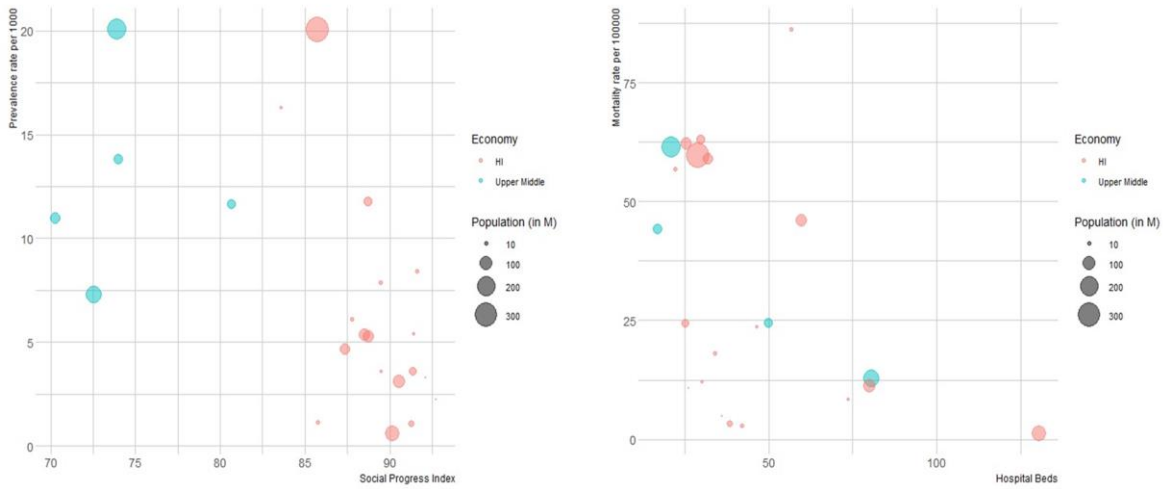

Figure 2. Economy and population according to COVID-19 rate related to social progress index and health structure (hospital beds).

***** China was not included in the bubble chart because its population size was much larger than other countries.

In the analysis of multiple linear regression for mortality by COVID-19, it was observed that for each unit added in the number of hospital beds, there was a reduction of 0.41 times the mortality due to the disease (p=0.03). For the COVID-19 tests per case, for each unit added to the number of tests that were performed, it reduced approximately

0.19 times the mortality due to COVID-19, with a statistically significant association (p=0.03) (Table 2).

Australia and Canada have the health insurance system, and the spending of these countries was 10.6% and 9.2% of their GDP, respectively. In Australia, 28.77% of the COVID-19 tests were performed according to the population and in Canada, 17.61%. Number of hospital beds were 38.4 in Australia and 26.0 in Canada.

Table 2. Multiple linear regression model using prevalence and mortality of COVID-19.

Variables	**β**	**CI95%***	**R²****	**P**	**p-value**
Prevalence of COVID-19 cases per 1,000 inhabitants					
Intercept	41.6285	(17.18 – 66.07)		0.00207	
Social Progress	-0.5844	(-0.93 – 0.23)		0.00251	
Expenditure	1.6469	(0.45 – 2.83)		0.00936	
Containment measures***					
Without measures	Reference		0.4304		0.02425
With measures	-1.9292	(-6.56 – 2.71)		0.39507	
Health System					
Universal	Reference				
Others	2.1647	(-2.32 – 6.65)		0.32588	
Mortality of COVID-19 cases per 100,000 inhabitants					
Intercept	57.81366	(35.02 – 80.60)		5.28e-05	
Hospital Beds	-0.41401	(-0.80 – -0.02)	0.3614	0.0397	0.02211
Covid-19 Tests	-0.19364	(-0.37 – -0.01)		0.0340	

*Confidence Interval of 95%; ** Multiple R-squared; ***Mask use and Social Distance

The private insurance system is adopted by Colombia, South Africa, and the United States, with the spending of these countries ranging from 7.2% to 17.1% of their GDP. Testing ranged from 6.13% to 28.98% and the number of beds from 16.8 to 27.7.

Of all the countries analyzed, only China has the assistentialist system, with the health spending being 5.2% of the GDP (Table 1). The number of tests performed in the country was not found, and the available hospital beds were 40.2/100,000 inhabitants (Table 1).

In the multiple linear regression model for the prevalence ratio of cases of COVID-19, it was demonstrated that for each unit that adds to social progress, it reduces 0.58 times the number of cases of the disease, with a statistically significant difference (p=0.002) (Table 2). On the other hand, the results of the analysis showed that the countries with the highest number of cases of the disease also had the highest health expenditures (p=0.009) (Table 2). The health system type and containment measures did not present a statistically significant difference. However, they were able to adjust the model (Table 2).

The prevalence rate of COVID-19 was lower in high-income countries, although economic status did not appear to be associated with mortality (Figure 2).

Discussion

The COVID-19 pandemic as well as the Ebola epidemic outbreak in West Africa enabled the world to learn some lessons relevant to improving health system resilience (Hanefeld J et al., 2018). This pandemic shine light on the necessity of universal health systems to reduce inequalities in both developing and developed countries. It also highlights the need of health systems to be prepared to stand up to external shocks such as new epidemics and pandemics that are becoming more frequent (Elmahdawy M et al., 2017). The results of this study showed that there were no statistically significant differences in the universal health system compared to other systems in terms of the prevalence of the disease. However, when social progress was analyzed, a significant difference was observed, evidencing the importance of reducing the inequities.

Based on data from the first year of COVID-19 pandemic, it was observed that the situation poses a threat to world development and the Sustainable Development goals of the United Nations (UN) and may delay them by up to a decade (Walker; Vock, 2020) impacting society's quality of life. The social progress index assesses how many countries have been able to meet citizens' social and environmental needs through data on basic human needs, foundations of wellbeing and opportunity (Social Progress Imperative, 2019). Of all the indicators addressed by the index, water and sanitation deserves special mention in relation to communicable diseases such as COVID-19. The precarious conditions created by lack of water and sewage treatment lead to contact with microorganisms and consequent diseases. This is primarily observed in populations with low socioeconomic development and socially vulnerable living conditions. Studies show that SARS-CoV-2, when present in an individual's body, whether symptomatic or not, is secreted by feces and urine, and represents a risk of fecal-oral contamination (Tang A et al., 2020). In addition, human feces can form high concentrations of viral aerosol, spreading contamination through hydraulic sewage systems (Meng X et al., 2020). This is especially true in countries where basic sanitation is precarious, which is now an increasing risk given the fall in the rate of social progress, turning into a cycle difficult to contain. Washing hands with soap and water is an extremely important preventive measure (WHO[b], 2020), if it is carried out with treated running water.

Social distancing and the use of masks were not found to be more effective in reducing the prevalence of the disease. But the WHO recommends that masks be used in public places and where social distancing is not possible. However, it emphasizes that other preventive measures are fundamental, such as frequent handwashing, physical distancing when possible, avoiding agglomeration sites, and adequate environmental cleaning and disinfection (WHO[e], 2020).

It was also observed that countries with higher health expenditures did not obtain an improvement in health conditions of the population and a reduction in cases of COVID-19 during the pandemic. The quality of health services provided to the population and consistency in expenditures must be ensured through the adoption of effective measures and actions that provide access to health for the population. Sufficient financial resources and adequate management allow health expenditures to be converted into quality and effective access to health in the face of complex pandemic scenarios. Thus, the results of this study show that the amount expended in the health system is not a guarantee of an effective health service; the service management, and system structure are important.

The COVID-19 mortality rate points out that of the different health systems, those countries that had more structured health systems related to the number of beds (2016) before the pandemic had a lower number of deaths in the population. Thus, countries that performed more diagnostic tests of COVID-19 in the population had a lower mortality rate. Through the tests carried out in the population, best practices for the prevention and control of transmission were adopted. They allowed for effective control of the spread of pandemic through the early diagnosis of those infected, rigid adoption of social distancing measures such as quarantine, and early access to health care, preventing the worsening of disease (WHO[b], 2020; Ward S at al., 2020).

Some economically developed countries with high health expenditure, social progress, and number of hospital beds presented elevated prevalence and mortality ratios of COVID-19. Sometimes, the health services are under big challenges (King JS, 2020) and it is up to the policy makers to make choices, that depending on how basis lie these decisions, may have implicit spectra of necropolitics (Barp; Mitjavila, 2019). European countries did not present evidence of necropolitics in general. However, Spain and Italy due to the overcrowding of hospitals and the exhaustion of the health system, generated situations that can be characterized as a necropolitics of priority to medical care, since that the Hospital Staff had to prioritize treat people with more chance to survive which resulted in the death of patients with less condition to survive (O'Donovan Ó, 2020). However, countries with greater social progress and even those with high economies have fallen into this position, such as the USA and Brazil, which had a depleted health system in some locations during high medical demands of COVID-19 patients. In Brazil and the USA, the poor and black population were the biggest victims of the pandemic (Dos Santos et al., 2020; Navarro JHN et al., 2020; Corrêa A, 2020).

As this is an ecological study, some limitations inherent to the type of study were observed. A limitation of this survey was the sample size, although all upper-middle and high-income countries were considered for inclusion in the sample, many did not present data for variables included in this study, so many countries were excluded, thus limiting

the sample size. Another limitation was the quality of data collection in the databases; some countries did not provide updated data or present incorrect information.

Conclusion

It can be concluded that the improvement in social progress had an association with the reduction of COVID-19 prevalence ratio. Along with this, the structure of the health system before, as seen by the number of hospital beds, and during the COVID-19 pandemic, as seen by the COVID-19 tests, impacted the reduction of mortality by COVID-19.

In a pandemic moment, it is important that the countries' government be focused on protecting the health of the population through organizing the health structure system to offer adequate care and enhancing adoption of measures for controlling the spread of the novel coronavirus. In addition, it is fundamental to meeting citizens' social, economic, and environmental needs.

References

ALI, I., ALHARBI, O. COVID-19: Disease, management, treatment, and social impact. **Sci Total Environ**, 2020. DOI: 10.1016/j.scitotenv.2020.138861

ANDRIETTA, L.S., et al. The differential impact of economic recessions on health systems in middle-income settings: A comparative case study of unequal states in Brazil. **BMJ Glob Health**,v. 5, p. 1-11. 2020. DOI: 10.1136/bmjgh-2019-002122.

BARP, L.F.G., MITJAVILA, M.R. Necropolitics in contemporary deaths. **INTERthesis**, v. 16, p. 143-147, 2019. DOI: 10.5007/1807-1384.2019v16n1p143.

BURSTROM, B., Tao, W. Social determinants of health and inequalities in COVID-19. **Eur J Public Health,** v. 30, p. 617-618, 2020. DOI:10.1093/eurpub/ckaa095.

CORRÊA, Alessandra. Coronavírus: por que a população negra é desproporcionalmente afetada nos EUA? **BBC News**, Winston-Salem (EUA), 13 abr. 2020. Available: https://www.bbc.com/portuguese/internacional-52267566

DOS SANTOS, H.L.P.C., et al. Necropolitics and the impact of covid-19 on the black community in brazil: A literature review and a document analysis. **Cienc e Saude Coletiva**, v. 25, p. 4211-4224, 2020. DOI: 10.1590/1413-812320202510.2.25482020.

ELMAHDAWY, M., et al. Ebola Virus Epidemic in West Africa: Global Health Economic Challenges, Lessons Learned, and Policy Recommendations. **Value Heal Reg Issues**, v. 13, p. 67-70, 2017. DOI: 10.1016/j.vhri.2017.08.003.

GOSTIN, L.O., FRIEDMAN, E.A., WETTER, S.A. Responding to Covid-19: How to Navigate a Public Health Emergency Legally and Ethically. **Hastings Cent Rep**, v. 50, p. 8-12, 2020. DOI: 10.1002/hast.1090.

HANEFELD, J. et al. Towards an understanding of resilience: Responding to health systems shocks. **Health Policy Plan**, v.33, p. 355-367, 2018. DOI: 10.1093/heapol/czx183.

HENNE SR. Pandemics show us what government is for. **Nat Hum Behav**, v. 4, p. 441-442, 2020. DOI: 10.1038/s41562-020-0871-4.

HOTZ, T. et al. Monitoring the spread of COVID-19 by estimating reproduction numbers over time. **ArXiv e-prints**, 2020, 2004.08557 Availabe at: https://stochastik-tu-ilmenau.github.io/COVID-19/. Accessed: 09 nov. 2020.

JARVIS, T. et al. Defining and classifying public health systems: A critical interpretive synthesis. **Heal Res Policy Syst,** v.18, p. 1-12, 2020. DOI: 10.1186/s12961-020-00583-z.

KING, J.S. Covid-19 and the Need for Health Care Reform. **N Engl J Med**, v. 382, e104-1-e104-3, 2020. DOI: 10.1056/NEJMp2000821

MCKEE, M., Stuckler, D. If the world fails to protect the economy, COVID-19 will damage health not just now but also in the future. **Nat Med**, v. 26, p. 640-642, 2020. DOI: 10.1038/s41591-020-0863-y.

MENG, X. Alert for SARS-CoV-2 infection caused by fecal aerosols in rural areas in China. **Infect Control Hosp Epidemiol,** v. 41, 2020. DOI: 1017/ice.2020.114.

NAVARRO, J.H.N. Pandemic Necropolitics for COVID-19 in Brazil: who can die? Who is dying? Who was born to be let die? **Heal Sci,** v. 4, p. 4-9, 2020. DOI: 10.1590/SciELOPreprints.901.

O'DONOVAN, Ó. The Pandemic, Patient Advocacy, and the Importance of Thinking Comment on "The Rise of the Consucrat". **Int J Heal Policy Manag,** v. 10, n. 8, p. 500-502, 2021. DOI: 10.34172/ijhpm.2020.114.

REIBLING, N., ARIAANS, M., WENDT, C. Worlds of Healthcare: A Healthcare System Typology of OECD Countries. **Health Policy**, v. 123, n. 7, p. 611-620, 2019. DOI: 10.1016/j.healthpol.2019.05.001.

REMUZZI, A., REMUZZI, G. COVID-19 and Italy: what next? **Health Policy**, n. 395, v. 10231, p. 1225-1228, 2020. DOI: 10.1016/S0140-6736(20)30627-9.

SHAKESPEARE, T., OFFICER A. Editorial. **Disability and Rehabilitation**, v. 33, n. 17-18, p. 1491-1492, DOI: 10.3109/09638288.2011.590392.

TANG, A. et al. Detection of novel coronavirus by RT-PCR in stool specimen from asymptomatic child, China. **Emerg Infect Dis**, n. 26, v. 6, p. 1337-1339, 2020. DOI: 10.3201/EID2606.20.0301.

THE SOCIAL PROGRESS IMPERATIVE. 2019 Social Progress Index: executive summary. **Soc Prog Imp,** p. 1-16, 2019. Available at: https://www.socialprogress.org/static/9d3cd3204599ff2cdf87248edc2b1242/2019-social-progress-index-executive-summary-v2.0.pdf

TULCHINSKY, T., VARAVIKOVA, E.A. National Health Systems. **New Publica Heatlh**, v. 21, n. 3, p. 643-728, 2020.

TURENNE, C.P. Et al. Conceptual analysis of health systems resilience: A scoping review. **Soc Sci Med,** v. 232, p. 168-180, 2019; DOI: 10.1016/j.socscimed.2019.04.020.

UNITED NATIONS DEVELOPMENT PROGRAMME. Human Develpment Index Ranking. 2019. Available at: http://hdr.undp.org/en/content/2019-human-development-

index-ranking. Accessed: 6 Set. 2020.

WALKER, B., VOCK, I. New data: the pandemic will set back global development by a decade. **New Statesman**, USA, 11 set. 2020. Available at: https://www.newstatesman.com/politics/2020/09/new-data-the-pandemic-will-set-back-global-development-by-a-decade

WANG, Y. et al. Unique epidemiological and clinical features of the emerging 2019 novel coronavirus pneumonia (COVID-19) implicate special control measures. **J Med Virol**, v. 92, n. 6, p. 568-576, 2020. DOI: 10.1002/jmv.25748.

WARD, S. et al. Clinical testing for COVID-19. **J Allergy Clin Immunol**, v. 146, n. 1, p. 23-24, 2020. DOI: 10.1016/j.jaci.2020.05.012.

WENDT, C., FRISINA, L., ROTHGANG, H. Healthcare system types: A conceptual framework for comparison. **Soc Policy Adm**, v. 43, n. 1, p. 70-90, 2009. DOI: 10.1111/j.1467-9515.2008.00647.x.

WILLIAMSON, E.J. et al. Factors associated with COVID-19-related death using OpenSAFELY. **Nature,** v. 584, n. 7821, p. 430-436, 2020. DOI: 10.1038/s41586-020-2521-4.

WORLD BANK GROUP. World Bank Open Data. Available at: http://hdr.undp.org/en/content/2019-human-development-index-ranking. Accessed 6 Set. 2020.

WORLD HEALTH ORGANIZATION (WHO)[a]. Coronavirus disease 2019 (COVID-19): situation report, 51. World Health Organization. Available at: https://iris.who.int/handle/10665/331475. Acessed 25 mar. 2024.

WORLD HEALTH ORGANIZATION (WHO)[b]. COVID-19 Strategy Update. Switzerland, 2020. Available at: https://www.who.int/publications/i/item/covid-19-strategy-update---14-april-2020. Acessed 09 jun. 2020.

WORLD HEALTH ORGANIZATION (WHO)[c]. The Global Health Observatory, 2020. Available at: https://www.who.int/data/gho/data/indicators. Accessed 6 Set. 2020.

WORLD HEALTH ORGANIZATION (WHO)[d]. COVID-19 Explorer 2020. Available at: https://covid19.who.int/explorer. Acessed 25 nov. 2020

WORLD HEALTH ORGANIZATION (WHO)[e]. Transmission of SARS-CoV-2 : implications for infection prevention precautions, p. 1-10, 2020. Available at: https://www.who.int/news-room/commentaries/detail/transmission-of-sars-cov-2-implications-for-infection-prevention-precautions Acessed 25 Mar. 2024

WORLDOMETERS. Coronavirus n.d. Available at: https://www.worldometers.info/coronavirus/. Accessed 6 Set. 2020.

ZIGLIO, E., SIMPSON, S., TSOUROS, A. Health promotion and health systems: Some unfinished business. **Health Promot Int**, v.26, p. 216-225, 2011. DOI: 10.1093/heapro/dar079.