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Research Article

Covid-19 and its Correlation with Chronic Diseases: Exposed Elderly -

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ABSTRACT

The world has witnessed the accelerated expansion of Covid-19, impacting health systems. The effects of Covid-19 contamination are potentially devastating, especially in poor countries. It is in this context that the core of the research is inserted. The objective is to characterize the social, economic conditions and aspects related to the health of the elderly predisposing them to infection by SARS-CoV-2. It is a study with primary data collection, prospective, cross-sectional population-based, exploratory, of quantitative character. The research universe is composed of elderly people of both sexes, with some chronic non-transmissible disease, during the period of 2017-18, living in the city of Barra do Garças, state of Mato Grosso, Brazil. As results, it was found that elderly were at risk for developing unfavorable outcomes due to their physiological characteristics as well as their baseline status, an example of which are chronic non-communicable diseases, social conditions and low literacy. New studies and discoveries will provide a foundation on the theme discussed here.

Keywords: Elderly health; Primary health care; Chronic diseases; SARS-cov-2; Coronavirus disease

INTRODUCTION

The world has witnessed the accelerated expansion of Covid-19 contamination, impacting health and funeral systems. The effects are potentially devastating, especially in emerging countries. In these regions, people are more exposed for obvious reasons: they live in small houses with many persons, difficulties in social mobility, accessibility to health services are precarious. In this context, the social isolation is difficult and when it occurs, it leads to loss of income or unemployment. Social inequalities are determinant for the rate of transmission [1].

The etiological agent of Covid-19 is the coronavirus called SARS-CoV-2 because it is an RNA virus, it has a greater tendency to mutations and a high dissemination power. Covid-19 is a notifiable disease in Brazil [2-4]. It has been observed that the virus incubation period varies from 4 to 14 days, with the majority of cases occurring in the first four to five days after exposure [5-8]. Respiratory distress, also known as “respiratory distress syndrome” is a serious symptom that requires medical intervention at a specialized centre. Elderly people with diabetes and hypertension were more associated with this syndrome [9].

Laboratory confirmed cases must be notified immediately. The current professional consensus is that clinically suspect cases should also be reported [2]. On January 30 2020, the World Health Organization declared this epidemic as a public health emergency of global interest [10]. It is a pandemic. A pandemic is understood to be an infectious disease that spread throughout all regions of the planet, this form of contagion occurs worldwide and not just in a specific territory. The spread of the disease occurs quickly because there are facilities for international travel [11,12]. It is a virus that causes severe infection in the lungs. At first, it can be confused with the flu; the person has a fever and respiratory symptoms with the potential to develop into pneumonia. The mode of transmission is person to person through droplets [13,14]. The confirmed cases in Brazil, on July 6, 2020, were 1.604.683 diagnosed, of which 906.286 were considered recovered, 631.902 remain in follow-up, there were 64.909 deaths, lethality of 4.0%, the mortality rate of, 30.9, the incidence rate of, 762.8, new cases, 26.652 [15]. Health authorities claim that community transmission is present in all Brazilian states. This type of transmission occurs when it is no longer possible to know the source of the infection because it has spread randomly. It is different from the local transmission when it is known who passed the virus to whom [16].

The city of Barra do Garças, where this research was carried out, registered on July 6, 2020: 251 confirmed cases, 115 recovered patients,

88 monitored residents in social isolation, 22 hospitalized patients, 37 deaths. The underlying diseases and comorbidities identified were: diabetes, systemic arterial hypertension, heart disease, kidney disease, obesity [17]. The mean age of patients who died was 72 years old, treated at basic health units and in public hospitals. Ordinance No. 356 of March 11, 2020, asserts that the person who presents signs and symptoms of the disease must remain in residential isolation, together with all the people residing in the same house, for 14 days under medical prescription that guarantees the legal rights of that person [18].

To cope with the epidemic, the government of Brazil determined social isolation, “aiming at the separation of symptomatic or asymptomatic people, in clinical and laboratory investigation, so that to prevent the spread of infection and local transmission”. The isolation measure prescribed by the medical act should preferably be carried out at home. The quarantine measure aims to ensure the maintenance of health services in the right and determined location [19]. The Ministry of Health seeks to reduce viral transmissibility in the population and delay the progression of the epidemic by adopting a non-pharmacological action plan [16]. Among the measures used, the following stand out: use of a sanitary cord, suspension of public transport, taxi by apps, restriction of air traffic, the prohibition of travel within the country, closure of public spaces, cancellation of events, mandatory use of masks in public and home isolation for the population. Similar measures have been adopted in China successfully to decrease the incidence of new cases [20].

The reason for so many deaths at the global level is the evidence of the high virulence of the pathogen. The spectrum of this disease is still under investigation. It is known to date that the patient’s immune response is decisive in determining the disease phenotype. There is evidence that a subgroup of patients with severe cases of the disease has a cytokine storm syndrome (hypercytokinaemia) triggering a hyperinflammatory response, responsible for the severe organic dysfunction observed. The condition behind this appears to be Haemophagocytic Lymphohistiocytosis (LHH), characterized by the immune hyperactivation that occurs when NK cells and cytotoxic T lymphocytes do not eliminate activated macrophages, leading to excessive production of proinflammatory cytokines. Cytokines, a type of protein that targets infections and inflammations, so that activate, mediate or regulate the total immune response [21,22]. It is observed that less educated people are more exposed to contamination, being much higher among Brazilians who only attended elementary school than in the other groups: 42%, compared to 33% in the population mean. A possible explanation for this higher incidence is associated with low income and a higher incidence of chronic diseases. There is

evidence that the pandemic could unevenly affect more vulnerable people [23,24].

Risk factors for SARS-CoV-2 are frailty, diabetes, chronic kidney or liver disease, pregnancy, chemotherapy, use of corticosteroids or other immunosuppressants, smoking, cardiovascular disease, asthma, or Chronic Obstructive Pulmonary Disease (COPD) [25]. Concerning risk factors, advanced age is the main risk factor due to the fragility of the body, followed by the male gender accompanied by preexisting morbidity conditions: heart disease. One of the most important systems that must be ahead in infection is the immune system, and this presents itself in immunosenescence in individuals aged 60 years or more. Immunosenescence is characterized by the decrease in the functions of the immune system, these changes trigger the increased incidence and the severity of infectious diseases, factors that can explain how COVID-19 becomes severe in these individuals [26].

The signs and symptoms are indicators of the onset of the disease and do not differ clinically from seasonal flu. Pneumonia is the most frequent and most serious clinical manifestation [27,28]. The elderly are more exposed to SARS CoV-2, the hospitalization rate among them were double in the total population studied, even among those without reported clinical conditions [28]. The rate of hospitalization in people who do not have a precondition, in a study carried out in the United States with 7,162 inpatients, was 7% (501), of which 2% (10) needed an Intensive Care Unit. In that study, the clinical preconditions were: diabetes, cardiovascular diseases, chronic pulmonary diseases, hypertension, chronic kidney diseases, immunodeficiency and neurological diseases. These numbers increase to 30% for people with preconditions [29]. The elderly population in Brazil is 28 million people representing 14% of the population. This percentage will be doubled in the coming decades, this is the projection of the population released by the Brazilian Institute of Geography and Statistics – IBGE [30].

The elderly in outpatient care in primary health care are assisted by the Unified Health System-UHS. The UHS is one of the largest and complex public health systems in the world, covers several levels of care, thus ensuring full, universal and free access for the entire population, naturalized or not in Brazil. One of the components highlighted in this system is comprehensive health care, covering not only health care but also health promotion and provision of health and disease prevention services to meet the demands of the population and improve quality of life at the individual and collective level [31]. It is in this context that the core of the research is inserted. We seek to investigate how the elderly population is exposed to Covid-19. The objective is to characterize the social, economic conditions and aspects related to the health of the elderly predisposing to infection by SARS-CoV-2.

METHODOLOGY

It is a study with primary data collection, prospective, cross-sectional population-based, exploratory, of quantitative character. The research universe is composed of elderly people of both sexes, with some chronic non-transmissible disease, from April to September 2017-18 up to date do 2019 living in the city of Barra do Garças, state of Mato Grosso, Brazil. The city of Barra do Garças has 5,452 elderly people (research universe) [30]. The sample ($N = 235$) consisted of elderly followed up in fifteen (15) family health units. The identification of these people occurred through the medical records of the families enrolled in the health units. Once identified and in

possession of their addresses, they were visited by the researcher and auxiliaries, accompanied by the community health agent of the area attached to the health unit. The selection for home visits was randomized (randomization) that ensure the representativeness of the sample (N), thus it was ensured that each element of the population had the same probability (p) of being selected [32]. At least one home visit was performed so that the elderly could respond to (1) Free and Informed Consent Term; (2) - Identification of the Elderly in the Family Health Unit; (3) - Social and demographic assessment instrument; (4) - Economic profile; (5) Characterization of the general health aspects of the elderly. The present investigation included all the elderly resident who was monitored in the family health units that allowed the home visit and answered all the data collection instruments. All those who expressed an interest in not participating, those with difficulties in communication, and those who did not fill out the application form were not eligible for the present study. All were informed about the research objectives and confidentiality of the data, invited to sign the participation consent evaluated by the Research Ethics Committee. Approved by the Ethics Committee of the Federal University of Mato Grosso, CAAE number: 51585115.1.000.5587, and opinion no. 1387492.

Statistical analyses

Data were analyzed with the aid of the statistical package SPSS version 23, adopting a level of significance of 5% ($p < 0.05$). The characterization of demographic, economic, social, and health-related aspects was performed employing absolute (n) and relative (%) frequency. Qualitative variables were used for descriptive statistics. For the quantitative variables the median, average, standard deviation, minimum and maximum were calculated. The normality of the data was verified using the Shapiro-Wilk test.

RESULTS AND DISCUSSION

The elderly were economically responsible for the household with an average income of R \$1,039 real (the USA 195.07) for retirement, lived in the city, had assistance from their children or stepchildren. The elderly population under analysis, users of the health system, lived in an area where income was considered low. The houses in which they live were densely inhabited. In these conditions, they were more likely to be exposed to viral contamination. One similar reality was evidenced in the work of Deziel, et al [33] (Table 1).

There were specific and clear risk underlying health conditions which predict adverse outcomes for Covid-19 in old adults, among them stood out the health conditions and the age. The pandemic disproportionately affects the rich and the poor. In this sense, the Brazilian parliament has proposed social and economic protection measures to the needy, it worth to cite: income tax exemption for those over 65 and retirees who receive up to 10 minimum wages in the event of a pandemic or state of public calamity. Exemption from the payment of the Contribution for the Cost of Public Lighting for the elderly aged 65 and over who have only one property in their name and whose monthly income does not exceed three minimum wages. Temporary suspension of credit agreements signed between financial institutions and retirees and pensioners during the entire public health emergency period of the coronavirus. The objective is to minimally guarantee the purchasing power of the elderly who earn up to three minimum wages. The proposals intend is to ensure the livelihood of families in difficult times without interrupting the purchase of medicines necessary to cope with chronic disease [34]. Education was a variable that influenced knowledge/understanding and attitudes towards diseases. Studies show that the higher the level

of education, the greater the understanding and adoption of self-care practices [35].

The quality of life and well-being involves other aspects in addition to health as it is influenced by education and related factors. Self-care is related to the years of study and influences the understanding of the disease, as well as the comorbidity related to it. There is a direct relationship between education and socioeconomic level. Studies show that the higher the level of education the greater the understanding and adoption of self-care practices [35]. During the information-gathering phase and home visits, it was found that many elderly people, family members and caregivers had difficulties regarding the underlying pathology and its comorbidity. They also did not understand the reason for multiple drugs, nor did they feel enlightened when visiting family health units.

Education stands out as a relevant factor for therapeutic follow-

up since people with more advanced education tend to assimilate information better. It was observed that many respondents never studied or did not complete elementary school. There was a decrease in the quality of life in the elderly and family members with low educational levels.

In the assessment of the profession of the elderly those who did not work (77.4%) were highlighted because they were already retired (81.7%), consequently the main income came from retirement (79.1%). The elderly which income came from a minimum wage (53.2%) and, therefore, resorted to the help of some family member was 70.2% when considered the spouse/aggregates the percentage was 24.2%, another 5.5% turned to neighbours and friends (Table 2).

In the year 2019 the minimum wage in Brazil was R\$ 999 reais (USA 178.59), in the present year (2020) it was changed to R\$ 1,039 real which is equivalent to USA 185.74, an increase of 40 real or 7.33 US\$ dollar. Today, 13.5 million people survive on an income of just R\$ 145 (USA 30) per month, the lowest level in the past seven years [36].

There was a high prevalence of diseases (77.4%) with systemic arterial hypertension being the most prevalent (36.2%) followed by diabetes (15.7%). The two diseases combined accounted for 25.1% of all elderly people. It should be emphasized that 2.6% have heart problems. The elderly made use of multiple drugs (Table 3).

The high prevalence of chronic diseases in the elderly who looked for primary health care draws attention. It was evidenced that 79.6% either had diabetes or high blood pressure or the association of the two diseases, added to that cardiac problems. These elderly people were likely to have complications and die from Covid-19.

In a recent study was found that hypertension is one of the comorbidities most associated with deaths from Covid-19. Diabetes comes in the second place concerning comorbidity associated with deaths from this disease, followed by people with heart disease. The average age of those who died was 68 years [9,28,29].

FINAL CONSIDERATIONS

In Brazil, the in, almost all the 5,570 municipalities, community transmission occurs. To contain the pandemic, social isolation was determined. It was clear those persons who were less educated and had less purchasing power had difficulties in meeting and understanding sanitary measures and were, therefore, more exposed to SARS COV-2 contamination. Concerning risk factors, low education, advanced age, male gender, and preexisting morbidity conditions were evident.

In reality, in the context of the city of Barra do Garças, “locus” of the investigation, it was found that the elderly were more exposed to COVID-19, had a higher hospitalization rate. From the above, the various ways in which the elderly were more vulnerable to viral infection were found:

- Great dependence on the public health system;
- Residents in small and poorly structured dwellings;
- Densely inhabited house;
- High prevalence of chronic diseases;
- Intensive use of multiple drugs;

In short, the pandemic requires a broad social understanding of potential risks, an individual and collective imperative sense.

Table 1: Social and demographic assessment instrument (N = 235).

	n	%
Age group		
60 a 69	121	51,5
70 a 98	114	48,5
Gender		
Female	150	63,8
Male	85	36,2
Schooling		
Literate	160	68,1
Elementary School	40	17,0
High school	31	13,2
Higher education	4	1,7
Marital status		
Married / Gathered	123	52,3
Divorced	27	11,5
Not married	19	8,1
Widower	66	28,1
Family Composition		
Aggregates	7	3,0
Spouse	70	29,8
Spouse / Aggregates	146	62,1
Lives alone	12	5,1
Practice physical activity		
Not	135	57,4
Yes	100	42,6
Religion		
Not	17	7,2
Yes	218	92,8
Participate in some group		
Not	88	37,4
Yes	147	62,6
Leisure Activity		
Not	38	16,2
Yes	197	83,8

The scenario in Brazil in months is uncertain, complex, and uncomfortable. The health system is not prepared and is undergoing extensive restructuring to adapt to the new reality.

Based on the analyzed literature and the investigated reality, it could be seen that the elderly were at risk for developing unfavourable outcomes due to their physiological characteristics as well as their baseline status, an example of which were chronic non-communicable diseases, social conditions and low literacy. New studies and discoveries will provide a foundation on the theme discussed here.

Study difficulties and limitations

Some addresses were out of date in the medical records of family health units, so in some cases, it was impossible to find the elderly person at the registered address, due to change.

There were several reasons why the elderly or family members did not want to participate in the research, among them: the elderly was not at home at the time of the visit, cognitive, and motor difficulties, hospitalizations and deaths.

It was evident the fear of being approached by criminals trying to impersonate health professionals even though the researchers were properly identified with uniforms from the Federal University of Mato Grosso, Institute of Health Science.

It is noteworthy that the results obtained must be interpreted taking into account that the population studied was restricted to those attended in primary health care units.

Table 2: Characterization of the economic profile of the elderly (N = 235).

	n	%
Profession		
Agriculture	5	2,1
Does not work	182	77,4
Others	4	1,7
Trade professional	19	8,1
General Services	25	10,6
Is retired		
No	43	18,3
Yes	192	81,7
Income origin		
Retirement	186	79,1
Retirement of the spouse	4	1,7
Pension / family allowance	11	4,7
Job	26	11,1
No income	8	3,4
Family income		
1 minimum wage (US\$ 185.74)	125	53,2
From 1 to 2 s wages (185.74-371,48)	95	40,4
From 2 to 5 minimum wages (371,48-928,7)	15	6,4
To whom do you turn to for help?		
Aggregates	165	70,2
Spouse	25	10,6
Spouse and Aggregates	32	13,6
Others	13	5,5

Table 3: Characterization of health-related aspects of the elderly in general (N = 235).

	n	%
Have any disease		
Not	53	22,6
Yes	182	77,4
Your health is		
Poor	41	17,4
Regular	116	49,4
Good	68	28,9
Excellent	10	4,3
Baseline disease		
Diabetes	37	15,7
Systemic arterial hypertension	85	36,2
Systemic arterial hypertension and Diabetes	59	25,1
Heart disease	6	2,6
Undiagnosed	8	3,4
Others	40	17,0
Use of medication		
Not	7	3,0
Yes	228	97,0
What medications (N = 228)		
Hydrochlorothiazide (HCTZ or HCT) 25 mg*	44	19,3
Propranolol 40 mg*	33	14,5
Captopril 25 mg*	37	16,2
Glibenclamide 5 mg*	61	26,8
Metformin 850 mg*	59	25,9
Others *	111	48,7
Negative responses have been omitted		

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Contribution of Each Author: We certify that all authors participated sufficiently in the work to make public their responsibility for the content as specified herein: Marcílio, S. Santos, Advisor and Research Supervisor. Marcilio, S. Santos and Mercia, G. Leite. Participated with the data analysis, in the writing and critical review of the content and final version of the manuscript.

REFERENCES

- Bengtsson T, Dribe M, Eriksson B. Social class and excess mortality in Sweden during the 1918 influenza pandemic. *American Journal of Epidemiology*. 2018; 187: 2568-2576. DOI: 10.1093/aje/kwy151
- Brazil. Health Ministry. What is coronavirus? (COVID-19). <https://coronavirus.saude.gov.br/>
- Phelan A, Katz R, Gostin LO. The novel coronavirus originating in Wuhan, china: challenges for global health governance. *JAMA*. 2020; 323: 709-710. DOI: 10.1001/jama.2020.1097
- Lu R, Zhao X, Li J, Niu P, Yang B. Genomic characterization and epidemiology

- of 2019 novel coronavirus: Implications for virus origins and receptor binding. *The Lancet*. 2020; 565-574. <https://tinyurl.com/y9gv4y5u>
5. Chan JFW, Yuan S, Kok KH, To KKW, Chu H. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *The Lancet*. 2020; 395: 514-523. <https://tinyurl.com/wu4hod6>
 6. Liu K, Fang YY, Deng Y, Liu W, Wang MF. Clinical characteristics of novel coronavirus cases in tertiary hospitals in Hubei Province. *Chinese Medical Journal*. 2020. DOI: 10.1097/CM9.0000000000000744
 7. Lauer SA, Grantz KH, Bi Q, Jones FK, Zheng Q. The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: estimation and application. *Annals of internal medicine*. 2020. DOI: 10.7326/M20-0504
 8. Zhu N, Zhang D, Wang W, Li X, Yang B. A novel coronavirus from patients with pneumonia in China, 2019. *New England Journal of Medicine*. 2020. DOI: 10.1056/NEJMoa2001017
 9. Wu C, Chen X, Cai Y, Zhou X, Xu S. Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. *JAMA Internal Medicine*. 2020. DOI: 10.1001/jamainternmed.2020.0994
 10. WHO. Novel Coronavirus (2019-nCoV) Situation Report 15.
 11. Mendes C. Pandemics and international trade. *Pontes*. 2018; 5: 8.
 12. WHO. Coronavirus. <https://tinyurl.com/y6uzpdt7>
 13. Zhu N, Zhang D, Wang W, Li X, Yang B. A Novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med*. 2020; 382: 727-33. DOI: 10.1056/NEJMoa2001017
 14. Phan T. Novel coronavirus: From discovery to clinical diagnostics. *Infect Genet Evol*. 2020; 79. DOI: 10.1016/j.meegid.2020.104211
 15. BRAZIL, Ministry of Health. Updated epidemiological report. <https://covid.saude.gov.br/>
 16. Brazil. Civil House of the Presidency of the Republic. National Press. Federal Official Gazette (DOU). Ordinance No. 356, of March 11, 2020. Provides for the regulation and operationalization of the provisions of Law No. 13,979, of February 6, 2020, which establishes measures to deal with the public health emergency of international importance resulting from the coronavirus (COVID-19). 2020. <https://tinyurl.com/ycrs2bpn>
 17. City Hall of Barra do Garças. Municipal Health Secretariat. Epidemiological Surveillance Sector. <https://tinyurl.com/ycrs2bpn>
 18. BRAZIL, Federal Official Gazette. Ministry of Health. Ordinance no. 356. Edition no. 49, section 1, p. 185, March 11, 2020. <https://tinyurl.com/ycwbrj9z>
 19. Brazil ministry of health. Health surveillance secretariat. Center for emergency public health operations for human infection with the new coronavirus. *Epidemiological Bulletin* 07. 2020. <https://tinyurl.com/y8dvn7sz>
 20. Wang C, Liu L, Hao X, Guo H, Wang Q, Huang J, et al. Evolving epidemiology and impact of non-pharmaceutical interventions on the outbreak of coronavirus disease 2019 in Wuhan, China. *Medrxiv*. 2020. DOI: 10.1101/2020.03.03.20030593
 21. *The Lancet*. www.thelancet.com/infection published online April 20, 2020. <https://tinyurl.com/ya7zwwdg>
 22. *The Lancet*. www.thelancet.com. 395 March 28, 2020. <https://tinyurl.com/yb3tog85>
 23. Mamelund SE. Social inequality—a forgotten factor in pandemic influenza preparedness. *Tidsskrift for praktisk medicin, ny raekke*. 2017; 137: 911-913. <https://tinyurl.com/ychpvlca>
 24. Rabi FA, Zoubi AI, Kasasbeli GA, Salameh DM, Al Nasser AD. Sars-cov-2 and coronavirus disease 2019: what we know so far. *Pathogens*. 2020; 9: 231. DOI: 10.3390/pathogens9030231
 25. Greenhalgh T, Koh GCH, Car J. Covid-19: Remote assessment in primary health care. *Rev Bras Med Fam Comunidade*. 2020; 15: 2461. <https://tinyurl.com/y7czvxaz>
 26. Liu K, Chen Y, Lin R, Haiv K. Clinical features of COVID-19 in elderly patients: A comparison with young and middle-aged patients. *Journal of Infection*. 2020. <https://tinyurl.com/ybkwvqsc>
 27. Huang C, Wang Y, Li X, Ren L, Zhao J. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*, 2020; 395: 497-506. <https://tinyurl.com/wczxotr>
 28. Zhou F, Yu T, Du R, Fan G, Liu Y. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: A retrospective cohort study. *The Lancet*. 2020; 395. <https://tinyurl.com/r9eepu7>
 29. Centers for disease control and prevention: preliminary estimates of the prevalence of selected underlying health conditions among patients with coronavirus disease 2019 United States. 2020. <https://tinyurl.com/sowj9zs>
 30. IBGE - Brazilian institute of geography and statistics. 2020; 4. <https://tinyurl.com/y7ghs6mw>
 31. Brazil. Federal official gazette, Brasília, df. September 19. 1990a. Section 1. Law 8.080, of September 19, 1990. Provides for the conditions for the promotion, protection and recovery of health, the organization and functioning of the corresponding services and provides other measures. 2020. <https://tinyurl.com/y9pypn58>
 32. Kara Junior N. Teaching standardization in ophthalmology. *Rev Bras Oftalmol*. 2014; 73: 67-68. DOI: 10.5935/0034-7280.20140042
 33. Deziel NC, Allen JG, Scheepers PT, Levy JI. The COVID-19 pandemic: A moment for exposure science. *Journal of Exposure Science & Environmental Epidemiology*. 2020; 1-3. <https://tinyurl.com/y845ahtn>
 34. Brazil. Chamber of Deputies. Human rights. 2020. <https://tinyurl.com/y73r5jr8>
 35. Chehuen Neto JA, Costa LA, Estevanin GM, Bignoto TC, Vieira CIR. Functional health literacy in chronic cardiovascular patients. *Ciencia & saude coletiva*. 2019; 24: 1121-1132. <https://tinyurl.com/y8ka8ml7>
 36. IBGE - Brazilian Institute of Geography and Statistics. 2020. <https://tinyurl.com/y7jj9a9l>