10.18605/2175-7275/cereus.v16n4p2-14

ARTIGO ORIGINAL

<< Recebido em: 07/07/2024 Aceito em: 17/11/2024. >>

REVISTA CEREUS ISSN: 2175-7275

Difference of gender and lethality due to covid-19: between the biomedical and the behavioural models.

Diferença de gênero e letalidade por covid-19: Entre o modelo biomédico e o modelo comportamental

Neemias Costa Duarte Neto[1], Marcos Antônio Barbosa Pacheco[2], Débora Adriane Pinheiro Trindade[3], Denise Alves Santos[4], Marcela Lobão de Oliveira[5], Flor de Maria Araújo Mendonça Silva[6], Cláudia Regina Silva dos Santos Cunha[7], Cristina Maria Douat Loyola[8].

RESUMO

No Brasil, durante a pandemia de Covid-19, adoeceram, segundo análise comparativa, mais mulheres que homens. No entanto, paradoxalmente, morreram muito mais homens do que mulheres. Portanto, objetivou-se discutir a dinâmica de incidência e desfecho fatal da Covid-19 desagregando a variável de gênero (diferenças de casos e óbitos por sexo). Trata-se de um estudo misto, o qual aborda métodos qualitativos e quantitativos, transversal e descritivo. Os dados foram obtidos através do Sistema de Informação e Mortalidade e Sistema de Informação de Vigilância Epidemiológica da Gripe. A amostra foi composta por 38 entrevistados de diferentes cidades, a saber: São Luís, Imperatriz, Caxias e Barra do Corda. As entrevistas foram gravadas e transcritas e analisadas a partir das representações sociais de Moscovici e analise de discurso por Minayo. Além disso, utilizou-se de gráficos e tabelas para representar os dados quantitativos. Portanto, é possível afirmar que os padrões de comportamento explicam como uma determinada doença atinge fatalmente determinados públicos, e não apenas o modelo biomédico. Ressalta-se que a Covid-19 trouxe à tona a desigualdade de gênero que acomete a sociedade, pois ainda há maior prevalência de comportamentos socialmente construídos referentes ao masculino e ao feminino.

Palavras-chave: Covid-19. Gênero. Mortalidade.

ABSTRACT

In Brazil, more women than men have fallen ill during the Covid-19 pandemic, according to a comparative analysis. However, paradoxically, many more men have died than women. The aim was therefore to discuss the dynamics of the incidence and fatal outcome of Covid-19 by disaggregating the gender variable (differences in cases and deaths by sex). This is a mixed study using qualitative and quantitative, cross-sectional and descriptive methods. Data was obtained from the Mortality Information System and the Influenza Epidemiological Surveillance Information System. The sample consisted of 38 interviewees from different cities, namely: São Luís, Imperatriz, Caxias and Barra do Corda. The interviews were recorded and transcribed and analyzed using Moscovici's social representations and Minayo's discourse analysis. Graphs and tables were also used to represent the quantitative data. It is therefore possible to state that behavioral patterns explain how a certain disease fatally affects certain audiences, and not just the biomedical model. It should be noted that Covid-19 has brought to light the gender inequality that affects society, as there is still a greater prevalence of socially constructed behaviors referring to males and females.

Keywords: Covid-19. Gender. Mortality

[1] Mestrando em Saúde do Adulto pela Universidade Federal do Maranhão – UFMA.

E-mail: neemias.duarte@hotmail.com.

ORCID: https://orcid.org/0000-0003-2513-0947

[2] Doutor em Políticas Públicas pela Universidade Federal do Maranhão - UFMA. ORCID: https://orcid.org/0000-0002-3566-5462

[3] Mestra em Gestão em Programa e Serviços de Saúde pela Universidade Ceuma - UNICEUMA. ORCID: https://orcid.org/0000-0002-5718-7617

[4] Mestranda em Entomologia pela Faculdade de Saúde Pública – USP. ORCID: https://orcid.org/0000-0003-2959-0246

[5] Doutoranda em Saúde Coletiva pela Universidade Federal do Maranhão - UFMA. ORCID: https://orcid.org/0000-0002-0508-7980

[6] Doutora em Saúde Coletiva pela Universidade Federal do Maranhão – UFMA. ORCID: https://orcid.org/0000-0002-2796-0939

[7] Doutora em Ciências da Saúde pela Universidade Federal do Maranhão - UFMA. ORCID: https://orcid.org/0000-0002-2859-3587

[8] Doutora em Saúde Coletiva pela Universidade Estadual do Rio de Janeiro - UERJ. ORCID: https://orcid.org/0000-0003-2824-6531

1. INTRODUCTION

The differences of gender in the distribution of grievances about health vary according to biological and social factors. In addition, factors related to the disease are considered (OPAS, 2021). In Brazil, during the epidemic of COVID-19, got sick, according to comparative analysis, more women than men. However, paradoxically, many more men died than women (BRASIL, 2022). It is necessary to find explanatory models that determine the causes of such an occurrence based on the epidemic context.

Literature has abundant sources that recognize that proportionally and paired to a same age or social class extract, women die less than men (OPAS, 2021). The explanatory models that seek to justify this difference report to two possibilities: a) a biomedical bias that seeks to associate this apparent “fortress” of the women to their genetics and immune response capacity to the diseases (EYNDE, 2020; DANIELSEN et cols., 2022); b) a behavioural bias, when admitting that women take better care of themselves and seek more health services earlier than the male gender (BRASIL, 2018).

In addition, may occur that the two possibilities add up, further justifying the thesis of lower mortality between women. In any way, the discussion about differences in morbidity and mortality, taking into consideration gender distinctions, is a fundamental theme to the planning, scheduling and development of health public policies; it is based on the obtained data that it is possible to make decisions regarding the offer of actions and services that could guarantee, in an equitable way, the access and the sequence of the assistance according to the demand profile.

Within the theme of difference of gender and morbimortality, the focus given in the present article is the one related to Covid. The research sought to do a data survey about the cases and deaths in the period that comprehends the beginning of the epidemy, in the state of Maranhão, until the present moment – August of 2022 –, segmenting by gender, age, race/colour and comorbidity. At the same time, interviews with patients that presented some complication or aggravation and family members of patients with fatal outcome (death), were carried out. That is, people that had a significant experience with the disease.

The state of Maranhão has presented, until the moment, the lowest mortality rates for Covid in the country (BRASIL, 2022). The explanations for this, according to local managers, are divided into three dimensions: 1) Social distancing rules, having in sight

the first lockdown in the country happened in the metropolitan region of the capital, São Luís; 2) Rapid expansion of infirmary and ICU beds, with a strict flow from risk stratification of all the patients who sought the state network; 3) Implantation of a specific call centre to guide the patients with suspect conditions, and to monitor the clinical conditions of treated patients.

In that regard, Maranhão could be constituted as a very fruitful territory for an investigation that can offer data or inferences about the illness and mortality dynamics of this respiratory infection with systemic clinical repercussions, as is the case of Covid-19. This article was produced within the context of a wider research, called “Clinical-epidemiological profile and care itinerary of patients who fell ill, and patients who died from COVID-19 in the State of Maranhão”.

In this article, the emphasis is given to the difference in gender and lethality due to COVID-19. Nevertheless, in the investigation and analysis process, articulated with each other, both quantitative and qualitative data, it is possible to glimpse explanations drawn from each other. i.e. a single dimension does not explain, by itself, such a complex phenomenon as the mortality by a certain disease. In that regard, it is appropriate that the following question be analyzed: is it possible to propose a specific explanatory model to this context, or does COVID-19 fit the common profile of other infectious diseases?

The importance of this discussion falls on the different conceptions that underlie the institution of a health policy. Indeed, in any process of constitution, implantation or implementation of an action or a health program, its impact on society and on the different identities and diversities that make it up, must be considered.

This work intends to discuss the incidence and fatal outcome dynamics of Covid-19, dissociating the gender variable (differences in cases and deaths by gender).

2. MATERIAL AND METHODS

This is a research with quantitative and qualitative approaches, transversal, and drawn with the scope of analyzing senses and meanings of morbimortality by Covid, considering the differences of gender. The approach is quantitative as long as it seeks to do a clinic-epidemiological description of the cases and deaths; and qualitative as long as it seeks to identify the perceptions of the patients and their family members (i.e. the family members of the patients that outcome to death) about the disease and its outcomes. Reaffirming here

the premise that the diversity of approach methods is due to the need to expand the capacity to analyze data and its articulation with the reality that is intended to be investigated. Indeed, complex problems require complementary and diversified approaches (MINAYO and DESLANDES, 2016). In this case, it was a question of deepening one dimension of the object of investigation: the interpretation of the social perception of the disease from patients and family members.

It was used, as a data source, for the first approach (quantitative), the information systems based on the State Secretary of Health (SIM – Sistema de Informação de Mortalidade, or Mortality Information System, in English, and Sivep Gripe – Sistema de Informação de Vigilância Epidemiológica da Gripe, or Influenza Epidemiological Surveillance Information System, in English). And, in this specific case, it was made a temporal cut (March 2020 to August 2022) that was transformed into the unit of study to the gathering, tabulate, description and data analysis, which included reported cases and its outcomes, as its geographical attribution.

Quantitative data regarding the patients' sociodemographic profile, morbidity and mortality were tabulated and consolidated in the form of tables and graphs. The consolidated was analyzed through absolute and relative values, averages, proportions and crossing of the variables gender, age, race/color and comorbidities. Considering the objectives of the research, the approach was merely descriptive; there is not, therefore, on the consolidation of the data, the use of inferential or inductive statistics that extrapolate the emphasis that was intended to give to the object of the investigation.

In the second approach (qualitative), data refers to the results of the interviews with patients and patients' – who outcome to death – family members, distributed in four regions of the state, contemplating (1) the metropolitan region of São Luís, the capital of the state, to the North; (2) Imperatriz's region, second biggest city of the state, to the South-west; (3) the region of Caxias, to the East; and (5) the region of Barra do Corda, located on the center of the state and adjoining to two big indigenous territories (Canabrava – Guajajaras and Porquinhos – Kanelas).

There were, at all, 38 interviews, an average of eight to ten by city, whose number was defined by the criteria of saturation, which occurs when the answers begin to be repeated and generate equivalence on the perception of the interviewed. The questions presented were about the personal understanding and different perceptions of the disease, adhesion

to distancing rules, use of masks, home measures and treatment, assistance seeking and utilization of health services because of the disease, as well as its outcome.

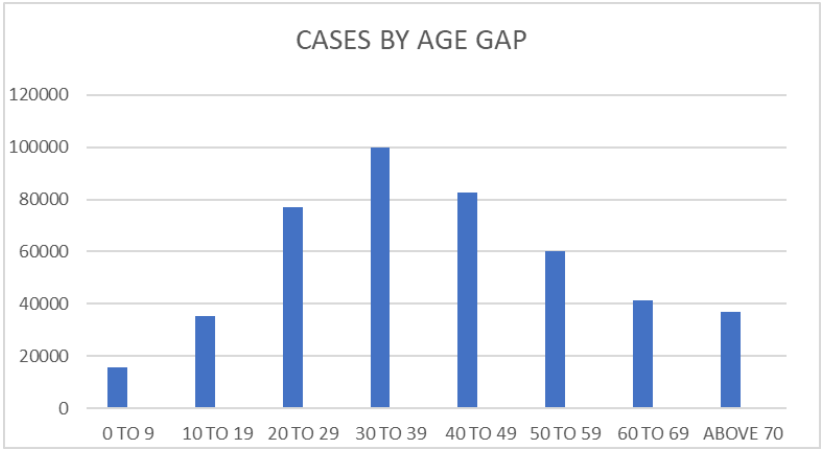
The interviews were recorded and transcribed, and then they passed through a process of pre-analysis for initial exploration, aiming to identify and classify the themes cited by the interviewed; right after this first stage, an analysis of the sense of the lines and their meaning in the context of the epidemy was carried out, always considering the potential “social representations” (MOSCOVICI, 2006) about the disease, its treatments and “therapeutic alternatives”, as well as the potential complications arising from non-conventional treatments. Starting from the previous concepts, it was possible to extract the main categories of analysis aggregated by homogeneous and homogenic senses on the interviewed speeches.

This study is based on National Health Council Resolution No. 466, of December 12, 2012, the project is affiliated with the research: "Clinical-Epidemiological Profile and Care Itinerary of Deaths by COVID-19 in Maranhão" forwarded to the Ethics Committee on Research with Human Beings (CEP) of the Ceuma University for appreciation in accordance with the guidelines and regulatory standards of Resolution No. 466/2012 and obtained approval on September 28, 2020, under CEP Circumstantial Opinion No. 4.305.629.

3. RESULTS AND DISCUSSION

In the state of Maranhão, in the period defined by the research, 463,197 COVID-19 cases were confirmed, being 263,603 in women and 199,594 in men. In this case, the data corresponds to 57% of the female gender and 43% of the male gender. The most affected age gap was among 30 and 39 years old to a cut of 10 years. The less affected age gap was among 0 and 9 years old. Yet, it was reported 5,494 confirmed cases between health professionals (SES, 2022).

Figure 1. Distribution of Covid cases by age gap



Source: Covid Epidemiological Report Card 05/08/22. State Secretary of Health (MA), 2022

Considering the number of involvement, the data analysis of the sociodemographic characteristics reveals the clear predominance of women affected by the infection (57 to 43%) in relation to men. The predominance of women can be explained by the greater seeking for healthcare services, on this one or another general clinic condition. Women sought more health services; thus, they were more diagnosed and made more tests. Bibiano (2019), referring to the factors associated with the utilization of services by men, brings attention to the big difficulty the health services must attract this portion of the population.

The pandemic demand was not so much different from the usual healthcare service demand, increasing just the “cause” of the search. In this case, a flu condition that wisely could have been Covid-19. Men were, as almost always, more resistant on the seek to health services; and when they did, it was because of women’s recurring incentive. This was clear in some interviews carried out; as well as the expression “it is just the flu, it will pass”, as referring to the clinical condition in which they were, as in the lines that follow, a report from a family member of a patient who died:

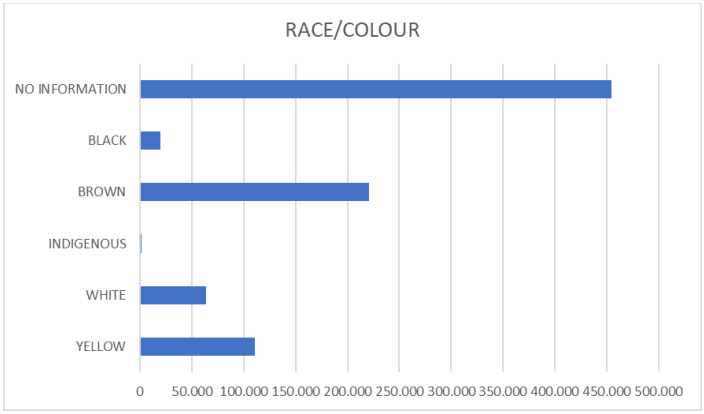
> *“After five days, we called the nurse to do the [COVID-19] test, because he did not want to go to the hospital […] on the same day, we took him for a CT Scan and he already was with 50% of the lung compromised, they already ordered he had to be hospitalized” (I10)*

> *“Let’s not go now, it is just a flu” (I22)*

Regarding the criteria Race/Colour, the percentage of people affected and confirmed cases are expressed in Figure 2, with a greater predominance of the Race/Colour “brown”, with 220,936 cases, and the one with lower predominance being the color/race “indigenous”, with 1,646 confirmed cases. It is highlighted that the proportion of women affected reflects

itself equally when associated with the criteria of Race/Colour. i.e. independently of the criteria, women have had more confirmed cases than men. And this difference was pretty much increased when dealing with health professionals, in which women were the vast majority.

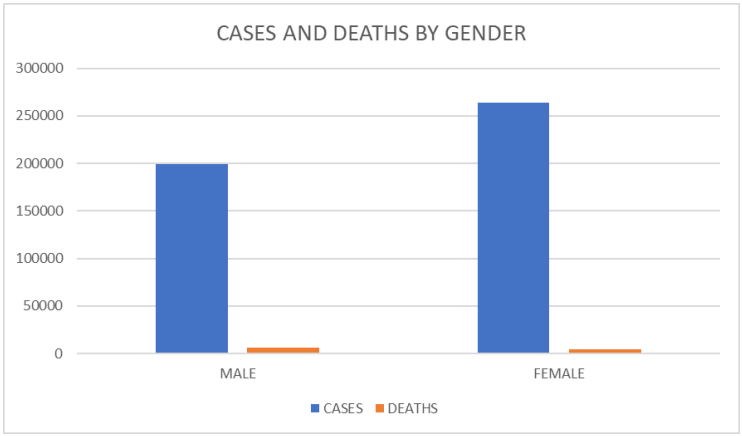
Figure 2. Confirmed cases according to race/color



Source: Covid Epidemiological Report Card 05/08/22. State Secretary of Health (MA), 2022.

Regarding the deaths, it occurred, in the state of Maranhão, on the researched period, 10,953 deaths, thus distributed: 4,470 in women, corresponding to 41% of the deaths; 6,483 in men, corresponding to 59% of the total deaths. As can be seen, men are almost two-thirds of the number of deaths and just 43% of the number of cases. It is a huge difference, creating an alleged disproportionality between the cases and the deaths. Figure 3 below shows this difference.

Figure 3 – Percentage of cases and deaths caused by Covid between men and women in Maranhão.



Source: Covid Epidemiological Report Card 05/08/22. State Secretary of Health (MA), 2022.

Socioeconomic inequalities can have major impacts in the scenario of a pandemic like

Covid-19 (DEMENECH et al., 2020). Nevertheless, considering the same social class extracts and Race/Colour criteria, the disproportion between cases and deaths between men and women remains. The lethality is increased the more vulnerable the population is, as Batista et al. (2020) demonstrate. Nonetheless, the (disproportional) relation between men and women remains.

When we analyze the interviews, especially those obtained with the family members of patients who have died, the lines show clearly some resistance of the male gender patient to submit to the evaluation, doing it only when the general state was already significantly compromised – when the shortness of breath was already installed; the expression "shortness of breath" is used by family members to refer to respiratory discomfort or dyspnea. Indeed, according to the reports, when these patients were evaluated by the emergency service, they were not saturating satisfactorily.

The family member's line below shows clearly how the patients resisted seeking health services when the condition was classified as "light", i.e. flu condition with some relative smell and taste loss. Thus, until these patients presented some most significant alarm signal (decline in the general condition associated with persistent fever, shortness of breath, recurrent cough, etc.), they would not seek a medical evaluation, aggravating the initial condition.

"He has the flu […] started to get worse and I asked […] to take him to the hospital […] only flu and weakness […] he was feeling stomachache" (I23)

"He would not sleep; he was shaking a lot […] he went straight to the hospital" (I11)

"It was on Sunday to Monday, he was feeling tired at night, had a crisis at night, then […] took him to the emergency care unit" (I16)

In general, fatality rates vary depending on the variable you want to use. In the following table, you can see the different mortality rates between health professionals and people who declare themselves mixed race, indigenous and white. Nevertheless, inside each one of these groups, maintaining the variable, the disproportionality between men and women remained, i.e. always women getting sicker and men dying more, in any populational group observed. The exception was the health professionals' group, in which the number of affected women was larger when compared to the number of affected men.

The lethality between health professionals was, by far, the smaller between the

presented groups. This is due to several factors. Some of them are punctuated here: 1) knowledge of the warning signs of the disease; 2) early intervention and monitoring of the clinical condition; 3) faster access to health services. Thus, between health professionals, the factors that can be pointed out as determinants of lower lethality are not related to gender conditions, but to behavioural factors; it is known, however, that the same principle can not be applied, generically, to the other populational groups.

Table 1. Differences of lethality by Covid between specific groups of the state of Maranhão's population (until August/2022).

Populational group	Number of cases	Number of deaths	Lethality rate
Health professionals	5,494	89	1.61 %
White	63,784	2,092	3.27 %
Brown	220,936	6,833	3.09 %
Indigenous	1,646	65	3.94 %
Black	19,917	878	4.40 %

Source: Covid Epidemiological Report Card 05/08/22. State Secretary of Health (MA), 2022.

As pointed out by Werneck and Carvalho (2020), the impacts of the pandemic, in Brazil's case, were somewhat known in advance: as they highlight, an "announced tragedy". Some consequences occurred to the populations in a worse socioeconomic situation: indeed, the disease was more impactful on the most vulnerable populations. In the case shown in the table, we can see that lethality was higher among blacks (4.40%) and indigenous people (3.94), compared to 3.09% for browns and 3.27% for whites.

This difference of 0.18% between whites and browns, favourable to the last group and not to the first, as would be expected, probably is due to the quality of the information provided by health services that attended predominantly to that group (private and bigger cities' hospitals, therefore, with a better quality of information). However, this is just a hypothesis that we still need to study further at another opportunity.

During the pandemic, even with the social mobility restriction measures, many men and women, indistinctly, continued with their work routines with the intent of guaranteeing the feeding to their respective families. In that regard, it is not possible to establish affirmations relating to the fact that women or men exposed themselves more or less during the pandemic. Therefore, the argument of greater or lesser public exposure, that is, outside

the home, cannot explain the greater incidence of women and less in men, nor does it explain the greater mortality in men and lower in women. This is an invalid argument because, among other factors, it is not possible to accurately monitor the routine of everyone studied in this article.

Many authors have been emphatic about the aspects to be analyzed in the context of the pandemic. Mendes (2019) highlights that we should analyze the pandemic beyond its biomedical aspects, also valuing the social dimension of the process; both the illness process and the different perceptions socially built about health, as a clinical condition, but also health as an attention service to the patients. The author points out that the precarious conditions could have contributed to the faster dispersion of the disease over us.

And, in that sense, it can be affirmed that men and women are submitted to the same precarious scenario. And, that an explanatory model that can comprehend the reality of lower mortality among women is, definitely or preponderantly, in the behaviour when facing the disease. Recent research, community-based, has demonstrated how the press and social media were important to the information disclosure about the pandemic, despite the fake news. In the background, it is important to highlight how women, in a general way, searched for more information about the disease than men (TARGINO, 2022).

The following interviewee's speech describes how women were, in a certain way, more watchful than men to the hardships and grievances brought by the pandemic.

> *"When the greater difficulty to breathe came […] then I perceived that her tiredness was not coming from a normal flu. Then we strongly suspected of Covid, and we thought it was not mild due to factors such as her age" (I24).*

From the exposure and analysis until here, women had, in general, a different behaviour facing COVID-19 when compared to the male gender. In general, they respected the prevention measures, so-called non-pharmacological (use of masks, hand sanitation and social distancing). As well as in the elderly care in the home environment, which to some extent is already a cultural pattern in our midst – it is common, in the present study environment, that women be responsible by the elderly people when they need care. This leads us to think that women's lower mortality when compared to men's rate, is indeed related to a behaviour pattern and not to the characteristics specific to female biology and physiology.

The pandemic scenario was a challenge to everyone, both in the private (home) and public (work and health services) scope. In this context, it is possible that women may have worked and exposed themselves even more than men, due to the characteristic of double and triple working hours that is characteristic of the female gender in the context in which we live, continually crossing the public and private spheres, to guarantee the support of their children, often financed exclusively by them.

It is established here, therefore, a fundamental data. The behaviour pattern of a population when facing a disease or a grievance or an epidemic, is so or more important than the measures taken based on an exclusive biomedical dimension, without taking into consideration factors and social determinants in the health-disease process. This analysis can be applied to epidemics, pandemics, and endemics because all of them start from the same assumption of populational contact – the variants regarding the contexts external to the biomedical dimension should be taken more into account when studying the causes and consequences

4. CONCLUSION

There was a higher rate of confirmed cases in women compared to the male public. In this way, greater testing for that public was possible due to greater health care compared to the latter, so that their demand for health service was possible thanks to female interventions for health care. Therefore, it is possible to affirm that behavioural patterns explain how a certain disease fatally affects certain audiences and not just the biomedical model. A double analysis is necessary, that is, considering both factors presented here.

It is also stated here that the lethality of the disease is proportional to the social inequality. The public with bigger social prestige obtained more material resources to seek medical attendance in private hospitals. Moreover, there was a bigger resistance to the seeking of health services in less favoured social classes, due to the generalized fear that was installed during the pandemic – mainly the fear of going to the hospital, because a collapse was being experienced. In some cases, the shortness of breath was the main motivation to seeking treatment or medical monitoring.

Otherwise, it is highlighted that the COVID-19 brought to the scene the gender inequality that affects society because there is yet a bigger prevalence of socially

constructed behaviours referring to the masculine and feminine. This study has some limitations due to the use of data available in public domain data bases because this data does not provide reliability to the real numbers – it is known that there is a large portion of sub-notified numbers.

REFERENCES

BATISTA, A. et al. Análise socioeconômica da taxa de letalidade da COVID-19 no Brasil - Nota Técnica 11. **Núcleo de Operações e Inteligência em Saúde** 2020.

BIBIANO, Alana Maiara Brito et al. Fatores associados à utiliação dos serviços de saúde por homens idosos: uma revisão sistemática da literatura. **Ciênc. Saúde Colet**., v. 24, n. 6, p. 2263-2278, jun. 2019. Disponível em: https://doi.org/10.1590/1413-81232018246.19552017. Acesso em: 8 ago. 2022.

BRASIL. Ministério da Saúde. SVE. Boletim Epidemiológico Covid n.º 118, agosto 2022.
EYNDE, Jef Van den; VOS, Karen De ; DAALEN, Kim R. Van; OOSTERLINCK, Wouter Oosterlinck. Women and COVID-19: A One-Man Show?. Front. **Cardiovasc. Med**., volume 7, n. 596583, p. 1-4, dez. 2020. Disponível em: https://www.frontiersin.org/articles/10.3389/fcvm.2020.596583/full#h4. Acesso em: 8 ago. 2022.

DANIELSEN, Ann Caroline et al. Sex disparities in COVID-19 outcomes in the United States: Quantifying and contextualizing variation. **Social Science & Medicine**, volume 294, n. 114716, p. 1-12, fev. 2022. Disponível em: https://www.sciencedirect.com/science/article/pii/S0277953622000193. Acesso em: 8 ago. 2022.

DEMENECH, Lauro Miranda et al. Desiguadade econômica e risco de infecção e morte por COVID-19 no Brasil. **Revista Brasileira de Epidemiologia** [on-line]. 2020, v. 23 [Acessado 13 julho 2022], e200095. Disponível em: <https://doi.org/10.1590/1980-549720200095> . Epud 05 Out 2020. ISSN 1980-5497.

DESLANDES, Suely Ferreira; GOMES, Romeu; MINAYO, Maria Cecília de Souza. Pesquisa Social: teoria, método e criatividade. 1 ed. Petrópolis, RJ: **Vozes**, 2016. 96 p. 978-85-326-5202-7.

FERREIRA, Maria Mary. **Os bastidores da Tribuna: mulher, política e poder no Maranhão**. 2006. 235 f. Tese (Doutorado em Sociologia) – Universidade Estadual Paulista, Faculdade de Ciências e Letras de Araraquara, Araraquara, 2006. Disponível em: http://hdl.handle.net/11449/106267. Acesso em: 24 ago. 2016.

MARANHÃO. **Boletim Epidemiológico COVID-19.** Maranhão: Secretaria de Estado da Saúde, 2022. Disponível em: https://www.saude.ma.gov.br/wp-content/uploads/2022/08/BOLETIM-05.08.pdf. Acesso em 06 ago 2022.

MENDES, R. Vigilância em saúde do trabalhador na pandemia. In: FREITAS, C. M.; BARCELLOS, C.; VILLELA, D. A. M., eds. Covid=19 no Brasil: cenários epidemiológicos e vigilância em saúde [on-line]. Rio de Janeiro: Observatório Covid-19 Fiocruz; **Editora Fiocruz**, 2021, p. 345-355. Inofrmação para ação na Covid-19 series. ISBN: 98-65-5708-049-8. https://doi.org/10.7476/9786557081211.0022.

MOSCOVICI, Serge. Representações sociais: investigações em psicologia social. 11. ed. Petrópoles, RJ: **Vozes**, 2015. p. ISBN 978-85-326-2896-1

OPAS, Organização Panamericana de Saúde. **Desfecho de Saúde e Covid nas Américas: diferenças de sexo**. Janeiro de 2020 a janeiro de 2021. Washington DC, 2021.

TARGINO, Rafaela Soares. **Prevenção e controle do COVID-19: Estudo sobre a percepção e práticas no cotidiano das orientações médico-científicas pela população dos territórios de abrangência da Atenção Primária à Saúde em uma Unidade de Saúde em Imperatriz – MA**. 2021. 88f. Dissertação (Mestrado) – Universidade Federal do Maranhão, Imperatriz, 2021.

WERNECK, G. L.; CARVALHO, M. S. A pandemia de Covid-19 no Brasil: crônica de uma crise sanitária anunciada. **Cadernos de Saúde Pública**, 36(5): e00068820, 2020. Disponível em: Acesso em 12 nov. 2020.