

DOI: <https://doi.org/10.36489/saudecoletiva.2020v10i59p4126-4139>

Potential years of life lost by COVID-19 in São Paulo, Rio De Janeiro end Ceará

Años de vida potenciales perdidos por COVID-19 en São Paulo, Rio de Janeiro y Ceará

Anos potenciais de vida perdidos por COVID-19 em São Paulo, Rio De Janeiro e Ceará

ABSTRACT

Objective: To estimate the Potential Years of Life Lost (APVP) by Covid 19 in Ceará, Rio de Janeiro and São Paulo, according to sex and age, from March to August 2020. **Methods:** This is an epidemiological study of the type descriptive, comparative. Data analysis occurred through the calculation of APVP, proposed by Romeder and McWhinnie (1977), and the method was adapted for this research. **Results:** The most significant results of APVP by Covid-19 come from the states of São Paulo and Rio de Janeiro. In these same locations, the age group with the highest APVP was 55 to 59 years. In Ceará, in contrast, APVPs were concentrated in greater numbers in the 50-54 age group, with the male gender standing out in relation to the female. **Conclusion:** The quantification of APVP is essential to guide public health priorities.

DESCRIPTORS: Covid-19; Potential Years of Life Lost; Deaths; Pandemic.

RESUMEN

Objetivo: Estimar los Años Potenciales de Vida Perdidos (APVP) por Covid 19 en Ceará, Rio de Janeiro y São Paulo, según sexo y edad, de marzo a agosto de 2020. **Métodos:** Se trata de un estudio epidemiológico del tipo descriptivo, comparativo. El análisis de datos se realizó mediante el cálculo de APVP, propuesto por Romeder y McWhinnie (1977), y el método fue adaptado para esta investigación. **Resultados:** Los resultados más significativos de APVP por Covid-19 provienen de los estados de São Paulo y Río de Janeiro. En estos mismos lugares, el grupo de edad con mayor APVP fue de 55 a 59 años. En Ceará, en cambio, las APVP se concentraron en mayor número en el grupo de 50 a 54 años, destacando el género masculino en relación al femenino. **Conclusión:** La cuantificación de APVP es fundamental para orientar las prioridades de salud pública.

DESCRIPTORES: Covid-19; Años Potenciales de Vida Perdidos; Fallecidos; Pandemia.

RESUMO

Objetivo: Estimar os Anos Potenciais de Vida Perdidos (APVP) pela Covid 19 no Ceará, Rio de Janeiro e São Paulo, segundo sexo e idade, no período de março a agosto de 2020. **Métodos:** Trata-se de um estudo epidemiológico do tipo descritivo, comparativo. A análise dos dados ocorreu por meio do cálculo de APVP, proposto por Romeder e McWhinnie (1977), sendo o método adaptado para esta pesquisa. **Resultados:** Os resultados mais significativos de APVP por Covid-19 são advindos dos estados de São Paulo e Rio de Janeiro. Nestas mesmas localidades, a faixa etária com maior APVP foi a de 55 a 59 anos. Diferentemente, no Ceará, os APVP concentraram-se em maior número na faixa etária 50-54 anos, com o sexo masculino destacando-se em relação ao feminino. **Conclusão:** A quantificação dos APVP é essencial para nortear as prioridades em saúde pública.

DESCRIPTORIOS: Covid-19; Anos Potenciais de Vida Perdidos; Óbitos; Pandemia.

RECEIVED ON: 09/30/2020 APPROVED ON: 10/21/2020

Victor Hugo Santos de Castro

Teaching degree in Physical Education by the State University of Ceará (UECE). Specialist in Health Management and Pedagogical Management (UECE) and Mental Health by the School of Public Health of Ceará (ESPCE), in the multiprofessional residency modality. Master's student in the Graduate Program in Public Health (PPSAC) at UECE.

ORCID: 0000-0001-7465-9092.

Lucélia Rodrigues Afonso

Nurse by the University Center of Greater Fortaleza (UNIGRANDE). Specialist in Neonatal Nursing from the Federal University of Ceará (UFC). Federal Public Employee (Hospital Universitário Walter Cantídio-CE). Master's student of the Postgraduate Program in Public Health (PPSAC) at the State University of Ceará (UECE).

ORCID: 0000-0002-8370-4008

Bruna Araújo Rodrigues

Teaching degree in Physical Education by the University Center of Greater Fortaleza (UNIGRANDE). Specialist in Exercise Physiology at Faculdade Lourenço Filho and Instituto Movimento-se. Master's student in the Graduate Program in Collective Health (PPSAC) at UECE.

ORCID: 0000-0001-9436-5542

Delane Giffoni Soares

Teaching degree in Physical Education by the University Center of Greater Fortaleza (UNIGRANDE). Specialist in Exercise Physiology at Faculdade Lourenço Filho and Instituto Movimento-se. Master's student in the Graduate Program in Collective Health (PPSAC) at UECE.

ORCID: 0000-0002-1215-5291

Cláudia Patrícia da Silva Ribeiro Menezes

Graduated in Nursing from the University Center of Grande Fortaleza (UNIGRANDE). Graduated in Pedagogy from the Vale do Acaraú University (UVA). Specialist in Public Health and Scientific Research from the State University of Ceará (UECE). Specialist in Stomatherapy by the Faculty of Quixeramobim (UNIQU). Master in Child and Adolescent Health from the State University of Ceará (UECE). Active participation in the research group - Chronic diseases in children and adolescents, family, public health and nursing (DOCAFS). Manager of Preventive Internal Control and Innovation at the Municipal Education Secretariat (SME). Pedagogical Coordinator of the company Eukah Consultoria e Serviços Educacionais LTDA.

ORCID: 0000-0002-0559-9302

Marcelo Gurgel Carlos da Silva

Post-doctorate in Health Economics from the University of Barcelona. PhD in Public Health from the University of São Paulo (USP). Master in Public Health from USP. Graduated in Medicine and Economic Sciences from the Federal University of Ceará (UFC). He is currently a full professor at the State University of Ceará and a physician-epidemiologist at the Cancer Institute of Ceará (ICC).

ORCID: 0000-0003-4030-1206

INTRODUCTION

Brazil was the first country in Latin America to register a case of Covid-19, confirmed by the Ministry of Health on February 26, 2020. He was a 61-year-old man, recently arrived from Italy, where was already occurring an epidemic of the disease. ⁽¹⁾ Since then, the number of cases and deaths has been increasing in all states, especially in São Paulo, Rio de Janeiro and Ceará, which recorded the highest number of cases and deaths.

Covid-19's survey of deaths provides an analysis of the Potential Years of Life Lost (Anos Potenciais de Vida Perdidos - APVP), understood as an indicator of the average years that a person could have lived, had he not died prematurely ⁽²⁾, proving efficient in redefining public

health priorities. ⁽³⁾ The technique was introduced in Brazil through Silva ⁽⁴⁾, using the indicator to analyze the main causes of deaths in Fortaleza, between 1978 and 1980.

It is emphasized that mortality rates make it possible to analyze the risk of death in different regions of the world, however, they do not indicate the impact of these deaths on society, as they do not consider the age of death (early or not). Thus, the indicator in question involves premature mortality, the magnitude of the causes and the social impact of diseases, especially when considering that Covid-19 has had significant impacts on international health and the economy.

This research is justified because this indicator emphasizes premature mortality, that is, death occurred at a stage when

life was eventually productive, causing a direct impact on society that was deprived of the economic and intellectual potential of individuals. These data can also foster measures and public policies to address possible social and economic vulnerabilities at the individual and collective level caused by the Covid-19 pandemic, since the instrument guides the allocation of resources in the face of specific health problems.

Considering the above, the following guiding question of this study was elaborated: what is the estimated number of years that, theoretically, the populations of the states of São Paulo, Rio de Janeiro and Ceará stopped living due to the premature deaths caused by Covid-19 in the period of March to August 2020? Thus, the objective was to estimate the potential

years of life lost by Covid-19 in the three States with the highest number of cases and deaths, according to sex and age, in that period.

METHODS

This is an epidemiological study of the descriptive, comparative type, based on data obtained through information recorded in a public domain database. The deaths caused by Covid-19 were collected in three databases: INTEGRASUS (Ceará) (5); São Paulo Contra o Novo Coronavírus (São Paulo) (6) and Painel Coronavírus COVID-19 (Rio de Janeiro). (7) All are transparency platforms of the Health Secretariats of each State.

Data extraction was performed on August 25th, 2020, considering the time interval from March to August 24th of the same year. As there were still deaths under analysis, the data presented in this study may differ from future information, since the referred platforms are constantly updated.

The population estimate for the year 2020 was obtained by the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística -IBGE). (8) Data analysis occurred through the calculation of APVP, proposed by Romeder and McWhinnie (9), the method

The estimated population, for the range of 0 to 69 years, in the State of São Paulo is the largest among the states analyzed in this study, with the equivalent of 43.063.753 individuals

being adapted for this research. The formula is expressed by: $APVP = \sum aidi = \sum (L - ((LS - LI) \times 0,5)) \times di$.

Where, ai = the average between the upper age of death (LS) and the lower age of death (LI) in the age group, subtracted from the limit age (L), considered in this study to be 70 years old, and di = number of deaths between the upper and lower age groups.

Deaths of individuals younger than

one year were included and deaths in those older than 69 years were excluded to estimate the midpoint of the age groups. Thus, the midpoint of each age group was subtracted from 70 years (age proposed in the aforementioned method), this was multiplied by the number of deaths in the fourteen age groups, segmented every five years. These totals were added up to obtain the absolute value.

APVP rates (TAPVP) were calculated using the following mathematical expression: $TAPVP = \sum aidi \cdot 1000/N$, where N is the number of people between 0 and 70 years of age in the real population. The information was tabulated and also represented by descriptive statistics by frequency distributions.

RESULTS

The estimated population, for the range of 0 to 69 years, in the State of São Paulo is the largest among the states analyzed in this study, with the equivalent of 43.063.753 individuals, while in the State of Rio de Janeiro it comprises 16.018.530 and in Ceará, 8,625,142 individuals. (8) The age group with the largest number of people in Ceará corresponds to the age of 20 to 24 years, whereas in São Paulo and Rio de Janeiro it is equivalent to 35 to 40 years (see table 1).

Table 1 - Estimated population from 0 to 69 years, by sex and age, in the states of Ceará, São Paulo and Rio de Janeiro from March to August 2020.

Faixa Etária	Ceará			São Paulo			Rio de Janeiro		
	Masculina	Feminina	Total	Masculina	Feminina	Total	Masculina	Feminina	Total
0-4	336.102	320.761	656.863	1.554.575	1.483.786	3.038.361	575.123	548.521	1.123.644
5-9	328.916	314.427	643.343	1.555.741	1.486.357	3.042.098	563.335	537.734	1.101.069
10-14	346.029	331.805	677.834	1.511.593	1.446.086	2.957.679	539.267	515.868	1.055.135
15-19	366.157	354.661	720.818	1.595.401	1.531.720	3.127.121	580.133	558.014	1.138.147
20-24	415.584	408.930	824.514	1.746.584	1.701.929	3.448.513	671.202	659.464	1.330.666
25-29	396.263	407.259	803.522	1.772.220	1.738.870	3.511.090	651.764	656.296	1.308.060
30-34	380.147	404.712	784.859	1.921.154	1.888.809	3.809.963	653.001	674.666	1.327.667
35-39	347.668	373.083	720.751	1.907.817	1.946.363	3.854.180	659.063	705.901	1.364.964
40-44	307.151	335.363	642.514	1.726.673	1.822.081	3.548.754	624.327	684.994	1.309.321
45-49	264.473	294.939	559.412	1.513.550	1.628.117	3.141.667	549.745	617.789	1.167.534

50-54	243.054	275.345	518.399	1.387.535	1.517.168	2.904.703	517.428	587.438	1.104.866
55-59	210.653	241.247	451.900	1.225.083	1.407.141	2.632.224	477.135	564.885	1.042.020
60-64	155.310	189.020	344.330	1.038.561	1.228.204	2.266.765	409.952	506.991	916.943
65-69	122.283	153.800	276.083	801.226	979.409	1.780.635	314.834	413.660	728.494
0-69	4.219.790	4.405.352	8.625.142	21.257.713	21.806.040	43.063.753	7.786.309	8.232.221	16.018.530

Source: IBGE, 2020.

The first deaths by Covid-19 in Brazil occurred in the states of São Paulo and Rio de Janeiro, both on March 17th, while in Ceará the first victims of the new coronavirus occurred on the 24th of the same month. The number of deaths confirmed by Covid-19 in the federal states elected for analysis in this study, from the first death in Brazil to August 24th, 2020 corresponds to 24.087 deaths in the population aged 0-69 years.

It appears that in São Paulo in total there were 13.633 deaths, of which 8.503 (62,37%) were male and 5.130 (37,63%) were female. In Rio de Janeiro these values correspond, respectively, to 7.196 in total, 4.344 (60,37%) and 2.852 (39,63%), while Ceará presents the values of 3.258

deaths in total, 2.015 (61,85%) male and 1.243 (38,15%) female.

As for the age group, it was observed that most deaths occurred in the group of 65-69 years (6.317 deaths), both for males (3.827 deaths) and for females (2.490 deaths). The age range with the lowest frequency of deaths was 5-9 years, with 23 deaths in all (16 deaths in males and 7 deaths in females) (see table 2).

Regarding the potential years of life that were lost, in the triad there are a total of 326.522,5 APVP, of which 200.505 APVP are attributed to males, corresponding to 61,41% of the loss, and 126.017,5 to females, that is, 38,59% of the years lost. The most significant results of APVP come from the states of São Paulo and

Rio de Janeiro, with 180.127,5 APVP (111.982,5 APVP in men and 68.145 APVP in women) and 99.025 APVP (59.460 APVP in males and 39.565 in females, respectively) by Covid-19. Ceará presented a total of 4.062,5 APVP in men and 18.307,5 APVP in women).

In these same locations, the age group with the highest APVP was 55 to 59 years old (15,78%; 28.250 APVP, in São Paulo and 15,68%; 15.100 APVP, in Rio de Janeiro). Differently, in Ceará, the APVP were concentrated in greater number in the age group 50-54 years (13,89%; 6.580 APVP), with the male sex (8,64%; 4.095 APVP) standing out compared to the female (5,25%; 2.485 APVP).

Table 2 - Deaths by Covid-19, according to sex and age, in the states of Ceará, São Paulo and Rio de Janeiro from March to August 2020.

Faixa Etária	Ceará			São Paulo			Rio de Janeiro		
	Masculino	Feminino	Total	Masculino	Feminino	Total	Masculino	Feminino	Total
0-4	11	13	24	17	20	37	11	11	22
5-9	4	1	5	3	2	5	9	4	13
10-14	4	2	6	9	5	14	6	5	11
15-19	13	11	24	12	24	36	6	11	17
20-24	15	18	33	39	35	74	27	27	54
25-29	34	21	55	85	72	157	61	42	103
30-34	44	36	80	194	117	311	89	79	168
35-39	97	60	157	331	206	537	166	113	279
40-44	141	63	204	521	291	812	300	193	493
45-49	169	99	268	712	387	1.099	381	225	606
50-54	234	142	376	1.027	567	1.594	517	305	822
55-59	326	194	520	1.415	845	2.260	751	457	1.208
60-64	408	260	668	1.930	1.145	3.075	916	627	1.543
65-69	515	323	838	2.208	1.414	3.622	1.104	753	1.857
0-69	2.015	1.243	3.258	8.503	5.130	13.633	4.344	2.852	7.196

Source: INTEGRASUS, 2020; SÃO PAULO CONTRA O NOVO CORONAVÍRUS, 2020; PAINEL CORONAVÍRUS COVID-19, 2020.

The age group of 5-9 years showed less accumulation of APVP in Ceará (312,5 APVP; 0,66%), of these, 250 APVP (0,53%) of the male children of Ceará were lost and 62,5 APVP (0,13%) were female. This same age was also the least affected in São Paulo with 312,5 APVP (0,17%) of the total, 187,5 APVP (0,10%) for men and 125 APVP (0,07%) for women. In Rio de Janeiro, the age with the least APVP was 10 to 14 years, with 632,5 APVP (0,35%), with 345 APVP (0,29) in men and 287,5

APVP (0,64%) in women.

In population terms, considering all the deaths analyzed in this study, Covid-19 was the cause of 4,82 APVP per thousand people, 6,03 APVP per thousand men and 3,66 per thousand women. Still considering the three states, TAPVP was higher in the 55-59 age group (12,08 APVP per thousand people, 16,28 APVP per thousand men and 8,45 per thousand women) and less than 5-9 years (0,30 APVP per thousand people, 0,41 APVP per thousand men and

0,19 APVP per thousand women).

It was identified that there is a greater TAPVP in Rio de Janeiro with 6,18 APVP per thousand people (7,64 per thousand men and 4,81 per thousand women); and the lowest TAPVP in the state of São Paulo with 4,18 APVP per thousand people (5,27 APVP per thousand men and 3,13 per thousand women). Ceará was in an intermediate position with 5,49 TAPVP per thousand people (6,89 TAPVP in males and 4,16 TAPVP in females).

Table 3 – APVP of deaths by Covid-19, according to sex and age, in the states of CE, SP and RJ from March to August 2020.

Faixa Etária	Ceará			São Paulo			Rio de Janeiro		
	Masculino	Feminino	Total	Masculino	Feminino	Total	Masculino	Feminino	Total
0-4	742,5	877,5	1.620	1.147,5	1.350	2.497,5	742,5	742,5	1.485
5-9	250	62,5	312,5	187,5	125	312,5	562,5	250	812,5
10-14	230	115	345	517,5	287,5	805	345	287,5	632,5
15-19	682,5	577,5	1.260	630	1.260	1.890	315	577,5	892,5
20-24	712,5	855	1.567,5	1.852,5	1.662,5	3.515	1.282,5	1.282,5	2.565
25-29	1.445	892,5	2.337,5	3.612,5	3.060	6.672,5	2.592,5	1.785	4.377,5
30-34	1.650	1.350	3.000	7.275	4.387,5	11.662,5	3.337,5	2.962,5	6.300
35-39	3.152,5	1.950	5.102,5	10.757,5	6.695	17.452,5	5.395	3.672,5	9.067,5
40-44	3.877,5	1.732,5	5.610	14.327,5	8.002,5	22.330	8.250	5.307,5	13.557,5
45-49	3.802,5	2.227,5	6.030	16.020	8.707,5	24.727,5	8.572,5	5.062,5	13.635
50-54	4.095	2.485	6.580	17.972,5	9.922,5	27.895	9.047,5	5.337,5	14.385
55-59	4.075	2.425	6.500	17.687,5	10.562,5	28.250	9.387,5	5.712,5	15.100
60-64	3.060	1.950	5.010	14.475	8.587,5	23.062,5	6.870	4.702,5	11.572,5
65-69	1.287,5	807,5	2.095	5.520	3.535	9.055	2.760	1.882,5	4.642,5
0-69	29.062,5	18.307,5	47.370	111.982,5	68.145	180.127,5	59.460	39.565	99.025

APVP: Anos Potenciais de Vidas Perdidas (Potential Years of Lives Lost); CE: Ceará; SP: São Paulo; RJ: Rio de Janeiro.
Source: authors, 2020.

Table 4 – TAPVP * of deaths by Covid-19, according to sex and age, in the states of CE, SP and RJ from March to August 2020.

Faixa Etária	Ceará			São Paulo			Rio de Janeiro		
	Masculino	Feminino	Total	Masculino	Feminino	Total	Masculino	Feminino	Total
0-4	2,21	2,74	2,47	0,74	0,91	0,82	1,29	1,35	1,32
5-9	0,76	0,20	0,49	0,12	0,08	0,10	1,00	0,46	0,74
10-14	0,66	0,35	0,51	0,34	0,20	0,27	0,64	0,56	0,60
15-19	1,86	1,63	1,75	0,39	0,82	0,60	0,54	1,03	0,78
20-24	1,71	2,09	1,90	1,06	0,98	1,02	1,91	1,94	1,93
25-29	3,65	2,19	2,91	2,04	1,76	1,90	3,98	2,72	3,35
30-34	4,34	3,34	3,82	3,79	2,32	3,06	5,11	4,39	4,75

35-39	9,07	5,23	7,08	5,64	3,44	4,53	8,19	5,20	6,64
40-44	12,62	5,17	8,73	8,30	4,39	6,29	13,21	7,75	10,35
45-49	14,38	7,55	10,78	10,58	5,35	7,87	15,59	8,19	11,68
50-54	16,85	9,03	12,69	12,95	6,54	9,60	17,49	9,09	13,02
55-59	19,34	10,05	14,38	14,44	7,51	10,73	19,67	10,11	14,49
60-64	19,70	10,32	14,55	13,94	6,99	10,17	16,76	9,28	12,62
65-69	10,53	5,25	7,59	6,89	3,61	5,09	8,77	4,55	6,37
0-69	6,89	4,16	5,49	5,27	3,13	4,18	7,64	4,81	6,18

* per thousand. TAPVP: Rate of Potential Years of Life Lost; CE: Ceará; SP: São Paulo; RJ: Rio de Janeiro.
Source: authors, 2020.

DISCUSSION

The first deaths by Covid-19 in Brazil occurred in the states of São Paulo and Rio de Janeiro, both on March 17, while in Ceará the first victims of the new coronavirus occurred on the 24th of the same month. Due to the originality of Covid-19, it became unviable to hold discussions of the APVP that occurred in other states in Brazil. Only one study was identified, considering the indicator in question, that research analyzes deaths in the state of Minas Gerais, however the period was not equivalent. ⁽¹⁰⁾

However, it is worth mentioning the high loss generated by Covid-19 in Minas Gerais, since, until the period of June this year, it had caused a loss of 4.284,5 APVP. 83,37% of these coming from deaths occurring at an economically active age, directly affecting society. ⁽¹⁰⁾

The peak of the disease in Ceará occurred in the first half of May, reaching 154 deaths/day, the highest number of deaths recorded in one day in the state. From the beginning of the second fortnight, the death and transmission curves gradually decreased, with a few days of oscillation ⁽⁵⁾, which stimulated the resumption of social activities.

While in Rio de Janeiro, in May, there was an increase in the number of deaths, with a minimum of 46 daily deaths at the beginning of the

However, it is worth mentioning the high loss generated by Covid-19 in Minas Gerais, since, until the period of June this year, it had caused a loss of 4.284,5 APVP. 83,37% of these coming from deaths occurring at an economically active age, directly affecting society.

month, reaching a maximum of 256 deaths in a single day during the same month and rising to 324 daily deaths in early June, oscillating between falls and significant increases during the months mentioned, including still, with notable data during the month of July. ⁽¹¹⁾

The number of cases of the new coronavirus in the state of São Paulo had a considerable increase around the end of April, showing a slowdown in the first week of May, resuming again with high values of deaths at the end of the same month. ⁽¹²⁾ It is worth mentioning that the advances of alarming cases in the municipalities of the interior and coast of São Paulo did not follow the same period as that of the Greater São Paulo region. ⁽¹³⁾

The consequences of the Covid-19 pandemic are not yet measurable, as it is a situation that is still under development. It is public knowledge, however, that there will be a negative impact on the world economy. The current crisis differs from others already faced, since it is not happening due to the very functioning of economic structures, but as a consequence of a global health crisis. ⁽¹⁴⁾

Thus, it is pointed out that estimates of the number of APVP are relevant subsidies for the discussion of economic losses caused by deaths, as well as for the planning of policies to combat the diseases

that cause these deaths. Therefore, the quantification of APVP is an important indicator to guide public health priorities. ⁽²⁾

CONCLUSION

Thus, it is pointed out that estimates of the number of APVP are relevant subsidies for the discussion of economic losses caused by deaths, as well as for the planning of policies to combat the diseases that cause these deaths. Therefore,

...it is pointed out that estimates of the number of APVP...

the quantification of APVP is an important indicator to guide public health priorities.

Further studies on the subject are recommended, since this research only brings evidence from March to August 2020 and new cases and deaths are confirmed day after day, despite being in a smaller proportion. Post-pandemic analysis will be essential for understanding the impact on private society of the economic and intellectual potential of individuals who died early. ■

REFERENCES

- Rodriguez-Morales A et al. COVID-19 in Latin America: The implications of the first confirmed case in Brazil. *Travel Medicine and Infectious Disease* 2020 May-June; 35:101613.
- Silva LS, Menezes MLN, Lopes CLA, Corrêa MSM. Anos potenciais de vida perdidos por mulheres vítimas de homicídio na cidade do Recife, Pernambuco, Brasil. *Cad Saúde Pública* 2011; 27(9): 1721-1730.
- Arnold MW, Silva MA, Falbo Neto GH, Haimenis RP. Anos potenciais de vida perdidos por mulheres em idade fértil na cidade do Recife, Pernambuco, vítimas de morte por homicídio nos anos de 2001 e 2002. *Rev Bras Saúde Matern Infant* 2007; 7 (Supl. 1): S23-S27.
- Silva MGC. Anos potenciais de vida perdidos segundo causas, em Fortaleza (Brasil), 1978-80. *Revista de Saúde Pública* 1984; 18 (2):108-121.
- Governo do Estado do Ceará (CE). IntegraSUS. Indicadores sobre o novo Coronavírus (Covid-19). Secretaria de Saúde. 2020. [acesso em 25 de agosto 2020]. Disponível em: <<https://indicadores.integrasus.saude.ce.gov.br/indicadores/indicadores-coronavirus/obitos-covid>>.
- Governo do Estado São Paulo (SP). SP contra o novo coronavírus. Boletim Completo. Fundação Sistema Estadual de Análise de Dados Estatísticos. 2020. [acesso em 25 de agosto 2020]. Disponível em: <http://www.seade.gov.br/wp-content/uploads/2020/08/casos_obitos_doencas_preexistentes.csv>.
- Governo do Estado Rio de Janeiro (RJ). Painel Coronavírus Covid-19. Secretaria de Saúde. 2020. [acesso em 25 de agosto 2020]. Disponível em: <<http://painel.saude.rj.gov.br/monitoramento/covid19.html#>>.
- Instituto Brasileiro de Geografia e Estatística (IBGE). Projeções da População do Brasil e Unidades da Federação por sexo e idade: 2010-2060. 2020. [acesso em 25 de agosto 2020]. Disponível em: <<https://www.ibge.gov.br/estatisticas/sociais/populacao/9109-projecao-da-populacao.html?=&t=resultados>>.
- Romedor JM, McWhinnie JR. Potential years of life lost between ages 1 and 70: an indicator of premature mortality for health planning. *Int J Epidemiol* 1977 Jun; 6(2): 143-51.
- Andrade JV, Moraes RCC. O que o Coronavírus tem nos tirado? Anos potenciais de vida perdidos em Minas Gerais. *J Nurs Health* 2020; 10(n.esp.): e20104014.
- Governo do Estado Rio de Janeiro (RJ). Secretaria de Saúde. Painel Coronavírus Covid-19- Evolução dos Óbitos confirmados- por dia de divulgação. 2020. [acesso em 28 de setembro 2020]. Disponível em: <<http://painel.saude.rj.gov.br/monitoramento/covid19.html#>>.
- Folha de São Paulo (SP). Cidade de São Paulo pode ter atingido ápice de mortes por Covid-19, mostra indicador para sete dias. 2020. [acesso em 28 de set 2020]. Disponível em: <<https://www1.folha.uol.com.br/equilibrioesaude/2020/06/cidade-de-sao-paulo-pode-ter-atingido-apice-de-mortes-por-covid-19-mostra-indicador-para-sete-dias.shtml#:~:text=No%20in%C3%ADcio%20de%20maio%2C%20a,recome%C3%A7ou%20o%20crescimento%20da%20taxa>>.
- Governo do Estado São Paulo (SP). Interior e litoral veem avanço alarmante de casos e mortes por Covid-19 em maio. 2020. [acesso em 28 de setembro 2020]. Disponível em: <<https://www.saopaulo.sp.gov.br/ultimas-noticias/interior-e-litoral-veem-avanco-alarante-de-casos-e-mortes-por-covid-19-em-maio/>>.
- Mattei L. A crise econômica decorrente do COVID-19 e as ações da equipe econômica do atual governo. 2020. [acesso em 27 de setembro 2020]. Disponível em: <<https://necat.ufsc.br/td-035-2020-a-crise-economica-decorrente-do-covid-19-e-as-aco-es-da-equipe-economica-do-governo-atual/>>.