REVISTA CIÊNCIAS EM SAÚDE
HEALTH SCIENCES JOURNAL e-ISSN 2236-3785

ORIGINAL ARTICLE

Impact of the COVID-19 pandemic on the performance of pediatricians and pediatric dentists in the Brazilian Unified Health System

Impacto da pandemia de COVID-19 na atuação do pediatra e do odontopediatra no Sistema Único de Saúde do Brasil

Davi Moreira Santana[1,*], **Ricardo Barbosa-Lima**[2], **Alexandre Machado de Andrade**[2]
[1]*Federal University of Sergipe (UFS), Department of Medicine of Lagarto (DMEL). Lagarto, SE, Brazil.*
[2]*Federal University of Sergipe (UFS), Department of Dentistry of Lagarto (DOL). Lagarto, SE, Brazil.*

Submitted 31 Mar 2023, accepted 29 May 2023, published 22 Jun 2023.

KEYWORDS

Child health
COVID-19
Epidemiology
Unified Health System

ABSTRACT

Objective: To evaluate the impact of the COVID-19 pandemic on the outpatient production of pediatricians and pediatric dentists in the Brazilian Unified Health System (SUS).
Methods: An ecological study was conducted with an analytical and quantitative approach using public domain data from the SUS Department of Informatics. The monthly number of professionals who worked in the SUS, the number of outpatient procedures in each category, and the projection of residents from zero to thirteen years old to normalize it were retrieved. Data were compared by pre-pandemic (2018-2020) and pandemic (2020-2022) periods with a significance level of 5%.
Results: There was a significant reduction in the monthly number of outpatient procedures performed in the SUS by pediatricians in the first and second pandemic years of COVID-19 compared to the pre-pandemic period ($p < 0.001$ and 0.002, respectively). This reduction represents a median percentage reduction of -57.1% (95%CI -51.3%, -71.7%) in the first and -22.3% (95%CI -0.55%, -31.5%) in the second pandemic year. Regarding pediatric dentists, a significant reduction was observed only between the pre-pandemic period and the first pandemic year ($p < 0.001$), representing -82.0% (95%CI -73.4%, -93.6%). Moreover, a significant positive and moderate correlation was observed between the productivity of both professional categories in the SUS throughout the investigated period ($p < 0.001$, $\rho = 0.744$).
Conclusion: The COVID-19 pandemic negatively affected the provision of specialized medical and dental outpatient care for children in the SUS.

*Corresponding author:
Departamento de Medicina de Lagarto, Universidade Federal de Sergipe.
Addr.: Avenida Governador Marcelo Déda, 13, São José. Lagarto, SE, Brasil | CEP: 49.400-000.
E-mail: davi.moreira00@gmail.com (Santana DM)

This study was carried out at the Federal University of Sergipe.

The study is part of the course completion work (type: monograph) by the author Davi Moreira Santana.

https://doi.org/10.21876/rcshci.v13i2.1419

How to cite this article: Santana DM, Barbosa-Lima R, Andrade AM. Impact of the COVID-19 pandemic on the performance of pediatricians and pediatric dentists in the Brazilian Unified Health System. Rev Cienc Saude. 2023;13(2):52-58. https://doi.org/10.21876/rcshci.v13i2.1419

PALAVRAS-CHAVE

COVID-19
Epidemiologia
Saúde da Criança
Sistema Único de Saúde

RESUMO

Objetivo: Avaliar o impacto da pandemia de COVID-19 na produção ambulatorial de pediatras e odontopediatras no Sistema Único de Saúde do Brasil (SUS).
Métodos: Foi realizado um estudo ecológico com abordagem analítica e quantitativa, usando dados de domínio público do Departamento de Informática do SUS. Foram recuperadas as quantidades mensais de profissionais que atuaram no SUS, a quantidade de procedimentos ambulatoriais de cada categoria profissional e a projeção de residentes de zero a 13 anos para normalizá-la. Os dados foram comparados entre os períodos pré-pandemia (2018-2020) e pandêmicos (2020-2022), com nível de significância de 5%.
Resultados: Houve uma redução significativa na quantidade mensal de procedimentos ambulatoriais realizados no SUS pelos pediatras no primeiro e no segundo ano pandêmico de COVID-19 quando comparados ao período pré-pandemia ($p < 0,001$ e $< 0,002$, respectivamente). Tal redução representa uma redução mediana percentual de -57,1% (IC95% -51,3%; -71,7%) no primeiro e -22,3% (IC95% -0,55%; -31,5%) no segundo ano pandêmico. Em relação aos odontopediatras, redução significativa foi observada somente entre o período pré-pandemia e o primeiro ano pandêmico ($p < 0,001$), representando -82.0% (IC95% -73,4%; -93,6%). Além disso, observou-se uma correlação significativa, positiva e moderada entre a produtividade de ambas as categorias profissionais no SUS durante todo o período investigado ($p < 0,001$; $\rho = 0,744$).
Conclusão: A pandemia de COVID-19 afetou negativamente a oferta de cuidado ambulatorial médico-odontológico especializado para crianças no SUS.

INTRODUCTION

At the end of 2019, the world experienced the discovery of a new coronavirus in the city of Wuhan, China. The infection and global transmission of SARS-CoV-2 triggered the emergence of a new disease, COVID-19, which directly impacted health systems and services worldwide, whose pandemic was declared in March 2020. In Brazil, the Unified Health System (SUS) was drastically affected by the COVID-19 outbreak, imposing the need to reorganize the care model to deal with the demand for health actions aimed at controlling SARS-CoV-2 and COVID-19 at the care level (outpatient and hospital care for those infected) and management (implementation of sanitary measures to contain the transmission of the virus) throughout Brazil[1-3].

Public Health strategies to deal with the COVID-19 pandemic in the SUS, often endorsed by the World Health Organization (WHO), sought to prioritize actions and use health services in emergencies. Therefore, elective services have been drastically reduced in Brazil[1,4]. On the one hand, it is understandable that the care model focused on urgent and emergency situations has been predominant in dealing with an abrupt and intense load of an unknown disease without defined treatment or competent immunization. However, postponing elective procedures is a critical factor for global health in the post-pandemic period of COVID-19, raising concerns about underreporting, late diagnosis, and increased health expenditures for several diseases[4,5].

In parallel with the global scenario, the scientific community has addressed concerns about the impact of the COVID-19 pandemic on children's health. Initially, the course of the disease in this age group was questioned seeking to understand mechanisms that could justify greater or lesser vulnerability to the disease and its treatment during childhood[6]. However, the permanence of the unfavorable epidemiological scenario raised concerns related to educational, social, economic, and emotional aspects as well as the health care offered to children[7,8]. To deal with the COVID-19 pandemic, elective childcare and child follow-up services were reduced in the primary care of the SUS, which may have repressed demand and neglected health needs[9,10].

However, to the best of our knowledge, the impact of the COVID-19 pandemic on the performance of professionals who provide such specialized care, such as pediatricians and pediatric dentists, has not been measured in the SUS. Consequently, the question arises: was there a significant impact on the performance of pediatricians and dentists in the SUS during the COVID-19 pandemic? Furthermore, given that urgent and emergency care was prioritized, it is reasonable to question the impact on outpatient care, considering the predominantly elective nature of this modality. Therefore, the objective of this study was to evaluate the impact of the COVID-19 pandemic on the outpatient production of pediatricians and pediatric dentists in the SUS.

METHODS

An observational ecological study was carried out[11]. The data used were in the public domain and open access provided by the Ministry of Health through the SUS Department of Informatics (DATASUS) and collected by the Outpatient Information System (SIA/SUS). Concerning the ethical aspect, the national resolution 510/2016 from the National Health Council does not require submission and appreciation by the Research Ethics Committee for the described approach, considering that there is no reference to any individual, configuring it as a population-level approach[12].

The principal investigator conducted qualitative training using the TabNet tool to collect the data provided by DATASUS. Data collection occurred in November 2022. The population was delimited at the national level, recording variables according to information related to Brazil. The survey period was

established in three different intervals, based on the beginning of the COVID-19 pandemic: pre-pandemic or control interval (two previous years, from April 2018 to March 2020), first pandemic year (from April 2020 to March 2021), and second pandemic year (April 2021 to March 2022). Additionally, the outcomes from April 2022 to August 2022 (most recent published data) were collected to be qualitatively analyzed with the other intervals. To generate an effective control interval, the 24 pre-pandemic months were neatly divided by two after the sum (e.g., April 2018 and April 2019), generating a balanced data set between periods to act more consistently. Each interval consisted of twelve months (n = 12).

The main dependent variable was the monthly number of outpatient procedures performed by pediatricians and pediatric dentists in the SUS, characterized as discrete quantitative. To present it properly, it was necessary to normalize it annually by population size (correcting for the effect of annual population growth). The estimated projection of Brazilian residents between zero and thirteen years of age from the Brazilian Institute of Geography and Statistics (IBGE) was used as a proxy measure. Normalization was projected to a ratio of outpatient procedures per 100,000 Brazilian residents in the described age group. In addition, to estimate productivity (number of outpatient procedures to the number of professionals working in the SUS), the approximate average value of the number of professionals who worked annually was obtained for both professional categories.

The same researcher performed the procedure to collect data using the TabNet tool in SIA/SUS after qualitative training based on previous evidence[13,14]. Data collection began by accessing the DATASUS website (https://datasus.saude.gov.br/) and selecting "TabNet - health information". To recover the monthly number of outpatient procedures, the options "health care", "outpatient production" and "by place of care" were consecutively selected. The geographic scope was delimited nationally (Brazil). Outpatient production of pediatricians and pediatric dentists was recorded using codes #225124 and #223236, respectively. The available filters were used to delimit the time interval. The number of pediatricians and pediatric dentists was retrieved by returning to the TabNet tool and sequentially selecting the options "care network", "CNES - human resources" and "professionals". The "serves at SUS" filter was set to the "yes" option. Finally, the IBGE projection of Brazilian residents aged zero to 13 years was retrieved by selecting the options "demographic and socioeconomic", "resident population" and "projection by sex and simple age".

The PAST software (version 4.3, Oslo, Norway) was used to perform statistical operations. The significance level was set at 5% ($\alpha = 0.05$) for all inferences. The variables in their crude, relative (%) and normalized form were presented by the median as a measure of central tendency, followed by the 95% confidence interval (95%CI) obtained by the bootstrap technique (number of repetitions equal to 9,999). The dispersion of the variables was presented by the first (Q1) and third (Q3) quartiles, followed by the interquartile range (IQR). The Lilliefors test (*L*) was used to examine the hypothesis of normality of the residuals together with the distribution graphs (QQ *plot)*, indicating the need for a nonparametric approach.

Durbin-Watson test showed a first-order serial autocorrelation for the number of outpatient procedures performed by pediatricians (statistics DW = 0.223 with $p < 0.001$) per 100,000 residents between zero and thirteen years of age. Thus, the ranked Wilcoxon test (*W*) was used to compare intervals, while the temporal trend was examined by regression analysis using the Prais-Winsten method after the logarithmic transformation (log 10) of the dependent variable. There was no influence of first-order serial autocorrelation for pediatric dentists, but the same statistical procedure was adopted to standardize the approach15. The Mann-Whitney test (U) was used for unranked comparisons, while the Spearman coefficient (ρ) estimated the significance, direction, and intensity of correlations.

RESULTS

Table 1 presents the projection of Brazilian residents estimated by the IBGE in the age group from zero to 13 years, the approximate monthly average, and the ratio between pediatricians and pediatric dentists (P/PD) who provided care in the SUS (including the number normalized per 100,000 residents). Regarding the projection of residents between 2018 and 2022, it was observed that there was a reduction between the years evaluated, representing a gross decrease of 2,158,229 and a relative decrease of approximately 5.1%. On the other hand, there was an increase in the number of pediatricians and pediatric dentists who attended SUS in the same period. For the first professional category, the gross increase was 1,743 professionals, representing a relative growth of 6.0%. For the second category, the gross increase was 43 professionals, translating to 5.7% growth. However, it is necessary to recognize that the ratio between the categories demonstrates a significant disparity since the number of pediatric dentists working in the SUS was much lower compared to pediatricians, whose minimum ratio was approximately one pediatric dentist for every 38 pediatricians observed in 2021.

Regarding the gross number of outpatient procedures performed by pediatricians, an annual number of 45,937,578 was observed between 2018 and 2019 (mean of the control interval). In the first year of the COVID-19 pandemic, 19,786,019 were notified, translating to a gross and relative reduction of 26,151,559 and 56.9%, respectively. In the second year, 31,433,467 were notified, translating into a gross and relative reduction of 14,504,111 and 31.6%, respectively. Between April and August 2022, on a preliminary basis, 17,026,585 outpatient procedures performed by pediatricians were reported. Table 2 presents a descriptive overview of the number of outpatient procedures performed monthly by pediatricians per 100,000 residents aged zero to 13 years in the SUS, considering the control intervals, first and second year after the COVID-19 pandemic, and the five months available in 2022. It was observed that the monthly medians in the pandemic period were lower than the control interval, which may indicate

statistically significant differences between them.

Table 3 presents the analytical panorama when comparing the number of outpatient procedures performed by pediatricians per 100,000 residents aged zero to 13 years in the SUS, considering the control interval and pandemic years of COVID-19. The Wilcoxon test revealed a significant reduction between the control interval and the first and second pandemic years. However, the temporal trend of this variable was established as stationary between April 2018 and August 2022 after regression analysis using the Prais-Winsten method (p = 0.354).

Table 1 — Population panorama from zero to 13 years old and professional number of pediatricians and pediatric dentists who worked in the Unified Health System (SUS).

Year	Projection of residents (0 to 13 years old)	Monthly average (P)	Number of pediatricians /100,000 residents	Average monthly (PD)	Number of pediatric dentists /100,000 residents	Ratio (P/PD)
2018	42,183,894	29,100	69.0	750	1.78	38.8
2019	41,620,364	29,767	71.5	756	1.81	39.5
2020	41,072,040	30,248	73.6	766	1.86	39.6
2021	40,540,300	29,983	73.9	788	1.94	38.1
2022	40,025,665	30,843	77.0	793	1.98	38.9

P, pediatricians; PD, pediatric dentists.

Table 2 — Descriptive overview of the number of outpatient procedures performed by pediatricians per 100,000 residents from zero to 13 years of age in the Unified Health System (SUS).

Variable	Median (monthly) [95%CI]	Q1 - Q3	IQR
Pre-pandemic period	8,932 [7,711; 9,531]	8,238 - 10,159	1,921
First pandemic year	4,170 [3,691; 4,863]	3,443 - 4,658	1,215
Second pandemic year	6,570 [5,575; 7,988]	5,106 - 7,674	2,568
2022 (April - August)	9,226 [9,059; 11,287]	7,321 - 9,335	2,014

Table 3 — Analytical overview of the number of outpatient procedures performed by pediatricians per 100,000 residents aged zero to 13 years in the Unified Health System (SUS).

Variable	Difference (median/monthly) [95%CI]	% (median/monthly) [95%CI]	p-value
Pre-pandemic period *versus* first pandemic year	-5,239 [-4,128, -6,944]	-57.1% [-51.3%, -71.7%]	< 0.001
Pre-pandemic period *versus* second pandemic year	-2,030 [-291, -3,060]	-22.3% [-0.55%, -31.5%]	0.002

Considering the pediatric dentists about the gross number of outpatient procedures performed, the presence of an outlier was observed in August 2019 (1,273,282) and another in November 2021 (1,472,488), making it impossible to assess the gross and relative reduction assertively. Between April and August 2022, 512,521 outpatient procedures performed by pediatric dentists were reported on a preliminary basis. Table 4 presents a descriptive overview of the monthly outpatient procedures performed by pediatric dentists per 100,000 residents aged zero to thirteen years in the SUS, considering the control intervals, first and second year after the COVID-19 pandemic, and the five months available in 2022. In addition to the outcome of pediatricians, it was observed that the monthly medians in the pandemic period were lower than the control interval, suggesting that there may also be statistically significant differences between them.

Table 5 compares the number of outpatient procedures performed by pediatricians per 100,000 residents aged zero to 13 years in the SUS, considering the pre-pandemic interval and the pandemic years of COVID-19. A significant reduction was observed between the pre-pandemic interval and the first pandemic year but not between the pre-pandemic interval and the second. The temporal trend of this variable was established as stationary between April 2018 and August 2022 after regression analysis using the Prais-Winsten method (p = 0.553). When comparing the relative reduction (%) in the number of outpatient procedures

performed by pediatricians and pediatric dentists per 100,000 residents between zero and 13 years of age, it was observed that the impact of the COVID-19 pandemic significantly affected more pediatric dentists in the first pandemic year ($p < 0.001$), with no statistically significant differences in the second ($p = 0.885$).

Finally, Table 6 presents a descriptive overview of the monthly productivity of each professional category (the number of monthly outpatient procedures divided by the average number of professionals). It was observed that there was no statistically significant difference after the Mann–Whitney test between the period from April 2018 to August 2022 ($p = 0.078$). Furthermore, after Spearman's test, a significant positive and moderate correlation was observed between the productivity of both professional categories in the SUS throughout the investigated period ($p < 0.001$; $\rho = 0.744$). Considering each interval, it was observed that the productivity of pediatric dentists was significantly higher in the pre-pandemic period. After the COVID-19 outbreak, the production of this class dropped significantly and became inferior to that of pediatricians. In the second pandemic year, there was no statistically significant difference.

Table 4 — Descriptive overview of the number of outpatient procedures performed by pediatric dentists per 100,000 residents from zero to 13 years of age in the Unified Health System (SUS).

Variable	Median (monthly) [95%CI]	Q1 - Q3	IQR
Pre-pandemic period	319 [209, 383]	253 - 467	214
First pandemic year	72 [54, 105]	36 - 91	55
Second pandemic year	169 [62, 187]	145 - 788	643
2022 (April - August)	226 [42, 259]	204 - 322	118

Table 5 — Analytical overview of the number of outpatient procedures performed by pediatric dentists per 100,000 residents from zero to 13 years of age in the Unified Health System (SUS).

Variable	Difference (median/monthly) [95%CI]	% (median/monthly) [95%CI]	p-value
Pre-pandemic period *versus* first pandemic year	-280 [-207, -376]	-82.0% [-73.4%, -93.6%]	< 0.001
Pre-pandemic period *versus* second pandemic year	-94 [8, -557]	-34.7% [12.9%, -88.3%]	0.850

Table 6 — Monthly productivity of pediatricians and pediatric dentists who worked at the Unified Health System (SUS) in each investigated interval. Median values (monthly) [95%CI].

Period	Professional category		p-value
	Pediatrician	Pediatric Dentist	
Pre-pandemic	130 [120, 143]	178 [169, 208]	< 0.001
First pandemic year	56 [50, 66]	38 [29, 55]	0.002
Second pandemic year	88 [74, 106]	86 [74, 94]	0.470

DISCUSSION

This investigation sought to evaluate the impact of the COVID-19 pandemic on the outpatient production of pediatricians and pediatric dentists in the SUS. There was a significant reduction in the outpatient production of pediatricians in the SUS, both in the first and second years after the onset of the COVID-19 pandemic. In addition, a significant reduction in the outpatient production of pediatric dentists was also demonstrated, which occurred only in the first year. In the pre-pandemic period, it was observed that the monthly productivity of pediatric dentists was higher than that of pediatricians in the SUS, showing a significant reversal in the first year of the COVID-19 pandemic and leveling off in the second. There was a correlation in monthly productivity between both professional categories. Finally, it was observed that the number of professionals working in the SUS grew for both specialists, although the number of pediatricians was higher than that of pediatric dentists.

It is reasonable to say that the significant performance of pediatricians in the first year of the COVID-19 pandemic is an expected outcome, given that such professionals could provide frontline medical care, especially for pediatric patients with COVID-19[16]. Concerning the pediatric dentist, the reality was different. For dental practice, a series of regulations systematically guided the postponement of elective care in oral health in all age groups, suggesting that only

urgent and emergency procedures should be managed without restrictions. Such regulations considered the risk of transmission of SARS-CoV-2 between professionals and patients, especially through contact with saliva and the generation of aerosols (characteristic in some dental procedures)[17,18]. The postponement of consultations and procedures by pediatric dentists during the COVID-19 pandemic was a frequent and significant problem for children's oral health[19].

In the second year, the productivity of both professional classes grew compared with the first year of the COVID-19 pandemic. However, the number of procedures performed by pediatric dentists was already equal to the control interval, which did not occur for pediatricians. Among possible causes for this outcome, it is possible to hypothesize that the pandemic context negatively influenced oral hygiene habits and dietary patterns, contributing to a higher incidence of caries disease and other oral conditions in children[19,20]. In addition, it is possible that the suppressed dental demands in the first pandemic year led to the search for assistance in the second year, increasing the demand for pediatric dentists in the SUS[20,21].

When applying such outcomes, it is crucial to consider that the impact of the COVID-19 pandemic on children has different interfaces. This investigation demonstrated the negative effect of the pandemic context on the performance of pediatricians and dentists in the SUS. However, evidence indicates that the COVID-19 pandemic may have affected the pediatric population in basic living and health conditions, such as food insecurity, neglect of personal care, abuse, violence, lack of socialization, and mental illness. Such factors may have contributed to negative outcomes in children's health and quality of life after the onset of the COVID-19 pandemic, especially in children with socioeconomic and geographic vulnerability, with difficulties in accessing basic resources and services, such as health services[22,23].

Furthermore, evidence has already highlighted the need to mitigate the effects of COVID-19 on children's health. Regarding this investigation, the offering of telemedicine and teledentistry were proposed strategies to make these professionals accessible to pediatric patients, allowing their productivity to continue in the pandemic context. However, the availability of technological resources and management systems is necessary to implement care at a distance, especially assisted by videos and other communication technologies, which the SUS may not have achieved equitably[24,25]. In addition, several children may have complex medical and dental conditions, characterizing them as patients with special needs, making such a strategy unfeasible due to the need for face-to-face care. This perspective corroborates the already mentioned impact of the COVID-19 pandemic on more vulnerable children[26,27].

Ultimately, it is essential to point out that the emergence of SARS-CoV-2 and the COVID-19 pandemic were abrupt situations that triggered severe consequences for health systems and services, including the SUS. The effort made to deal with the disease was not foreseen, and it was necessary to learn how to manage the health crisis during its course, both through scientific advances regarding treatment and immunization and the management of financial, material and human resources, allowing the control and improvement of the health condition in Brazil over time[28,29]. Therefore, it is reasonable to hypothesize that the outcomes of this investigation fit into the scenario experienced by the various public sectors, including health, as a direct reflection of the need to prioritize emergency actions that would produce more impacts in managing the health crisis at first.

Future investigations may appropriately verify the impact of such a reduction on this population's health and quality of life, seeking to identify gaps in care and direct health promotion and prevention actions. In addition, it is necessary to consider the limitations of the method, especially the possibility of underreporting the monthly number of outpatient procedures and the lack of registration of professionals in the National Register of Health Establishments. Finally, it is also essential to consider that the ecological approach does not allow adjusting the outcomes to the characteristics of individuals, as well as regional disparities that corroborate or contrast the national scenario examined here.

CONCLUSION

It is possible to conclude that the COVID-19 pandemic significantly reduced the number of outpatient procedures performed by pediatricians and pediatric dentists in the SUS, negatively impacting the provision of medical and dental care for children.

REFERENCES

1. Croda J, Oliveira WK, Frutuoso RL, Mandetta LH, Baia-da-Silva DC, Brito-Sousa JD, et al. COVID-19 in Brazil: advantages of a socialized unified health system and preparation to contain cases. Rev Soc Bras Med Trop. 2020;53:e20200167. https://doi.org/10.1590/0037-8682-0167-2020
2. Rosa MFF, da Silva EN, Pacheco C, Diógenes MVP, Millett C, Gadelha CAG, et al. Direct from the COVID-19 crisis: research and innovation sparks in Brazil. Health Res Policy Syst. 2021;19(1):10. https://doi.org/10.1186/s12961-020-00674-x
3. Zimmermann IR, Sanchez MN, Alves LC, Frio GS, Cavalcante FV, Cortez-Escalante JJ, et al. COVID-19 as the leading cause of hospital deaths in the Brazilian public health system in 2020. Int J Infect Dis. 2021;113:162-165. https://doi.org/10.1016/j.ijid.2021.09.077
4. Frio GS, Russo LX, de Albuquerque CP, da Mota LMH, Barros-Areal AF, Oliveira APRA, et al. The disruption of elective procedures due to COVID-19 in Brazil in 2020. Sci Rep. 2022;12(1):10942. https://doi.org/10.1038/s41598-022-13746-5
5. Martin BI, Brodke DS, Wilson FA, Chaiyakunapruk N, Nelson RE. The impact of halting elective admissions in anticipation of a demand surge due to the coronavirus pandemic (COVID-19). Med Care. 2021;59(3):213-19. https://doi.org/10.1097/MLR.0000000000001496
6. Balasubramanian S, Rao NM, Goenka A, Roderick M, Ramanan AV. Coronavirus disease 2019 (COVID-19) in children - what

we know so far and what we do not. Indian Pediatr. 2020;57(5):435-42. https://doi.org/10.1007/s13312-020-1819-5
7. Phillips DE, Bhutta ZA, Binagwaho A, Boerma T, Freeman MC, Hirschhorn LR, et al. Learning from exemplars in Global Health: a road map for mitigating indirect effects of COVID-19 on maternal and child health. BMJ Glob Health. 2020;5(7):e003430. https://doi.org/10.1136/bmjgh-2020-003430
8. Sharfstein JM. Child Health Policy and the COVID-19 pandemic. JAMA Health Forum. 2021;2(8):e212921. https://doi.org/10.1001/jamahealthforum.2021.2921
9. Cabral IE, Pestana-Santos M, Ciuffo LL, Nunes YDR, Lomba MLLF. Child health vulnerabilities during the COVID-19 pandemic in Brazil and Portugal. Rev Lat Am Enfermagem. 2021;29:e3422. https://doi.org/10.1590/1518-8345.4805.3422
10. Gur-Arie R, Johnson S, Collins M. Advancing child health and educational equity during the COVID-19 pandemic through science and advocacy. Isr J Health Policy Res. 2022;11(1):3. https://doi.org/10.1186/s13584-021-00512-7
11. Merchán-Hamann E, Tauil PL. Proposal for classifying the different types of descriptive epidemiological studies. Epidemiol Serv Saude. 2021;30(1):e2018126. https://doi.org/10.1590/s1679-49742021000100026
12. Brasil. Resolução n. 510 de 7 de abril de 2016 [Internet]. Dispõe sobre as normas aplicáveis a pesquisas em ciências humanas e sociais. Diário Oficial da União; Brasília: 24 May 2016. Available from: https://conselho.saude.gov.br/resolucoes/2016/Reso510.pdf
13. Barros SG, Chaves SCL. Use of the outpatient information system (SIA-SUS) to assess oral health activities. Epidemiol Serv Saude. 2003;12(1):41-51. https://doi.org/10.5123/S1679-49742003000100005
14. dos Santos MBF, Pires ALC, Saporiti JM, Kinalski MA, Marchini L. Impact of COVID-19 pandemic on oral health procedures provided by the Brazilian public health system: COVID-19 and oral health in Brazil. Health Policy Technol. 2021;10(1):135-42. https://doi.org/10.1016/j.hlpt.2021.02.001
15. Antunes JLF, Cardoso MRA. Using time series analysis in epidemiological studies. Epidemiol Serv Saude. 2015;24(3):565-76. https://doi.org/10.5123/S1679-49742015000300024
16. Daltro MR, Guerra-Júnior P, Alves PCL. Experience of a pediatrician in combating COVID-19: an autobiographical narrative. Res Soc Dev. 2021;10(16):e09101622940. https://doi.org/10.33448/rsd-v10i16.22940
17. Carvalho LIM, da Silva TVS, Castanha DM, Galdino LMB, Silva ADCM, Costa GB, et al. Pediatric dentistry and COVID-19: the reflection of the pandemic on care in Paraíba. Braz J Develop. 2021;7(11):109033-4. https://doi.org/10.34117/bjdv7n11-501
18. Braga BR, Amorim-Júnior LA, Castro CG, Corrêa-Farias P. Mudanças no atendimento odontopediátrico e uso de procedimentos de mínima intervenção durante a pandemia de COVID-19. Rev Odontol Bras Central. 2022;31(90):105-20. https://doi.org/10.36065/robrac.v31i90.1557
19. Asociación Latinoamericana de Odontopediatría. Equipo Interdisciplinario COVID-. Pediatric dentistry management guidelines during the confinement or quarantine stage of the COVID-19 pandemic. Rev Odotopediatr Latinoam. 2020;10(2):131-82.
20. Santos ACS, Santos EM, Bussadori SK, Imparato JCP, Rezende KM. Food in the pandemic - how this issue affected children's oral health: a narrative review of the literature. Res Soc Dev. 2021;10(12):e461101220679. https://doi.org/10.33448/rsd-v10i12.20679
21. Felipe LP, Silva MJN, Vasconcelos PF, Leite ACRM, Melo ESJ, Nogueira MRN. Impacts of the COVID-19 pandemic on child care and oral health from parents' perspective. Rev Enferm Atual In Derme. 2022;96(38):e-021247. https://doi.org/10.31011/reaid-2022-v.96-n.38-art.1375
22. Cardoso PC, Sousa TM, Rocha DS, Menezes LRD, Santos LC. Maternal and child health in the context of COVID-19 pandemic: evidence, recommendations and challenges. Rev Bras Saúde Matern Infant. 2021;21(Supl. 1):S213-20. https://doi.org/10.1590/1806-9304202100s100011
23. Morais AC, Miranda JOF. Repercussions of the pandemic on the health of Brazilian children beyond COVID-19. Physis. 2021;31(1):e310102. https://doi.org/10.1590/s0103-73312021310102
24. Santos IC, Oliveira LMF, Salas MMS, Soares MRPS, Dias AM. Dental education, teledentistry and the COVID-19 pandemic: a narrative review. Res Soc Dev. 2022;11(12):e436111234619. https://doi.org/10.33448/rsd-v11i12.34619
25. Bolognese D, Dianin AH, Cavazana WC. Telemedicine platform for outpatient and emergency care during the COVID-19 pandemic. Res Soc Dev. 2022;11(11):e290111133024. https://doi.org/10.33448/rsd-v11i11.33024
26. Naseri A, Hosseini MS. Do not neglect the children: considerations for COVID-19 pandemic. Indian Pediatr. 2020;57(6):583-4. https://doi.org/10.1007/s13312-020-1868-9
27. Wong CA, Ming D, Maslow G, Gifford EJ. Mitigating the impacts of the COVID-19 pandemic response on at-risk children. Pediatrics. 2020;146(1):e20200973. https://doi.org/10.1542/peds.2020-0973
28. Campos MR, Schramm JMA, Emmerick ICM, Rodrigues JM, Avelar FG, Pimentel TG. Burden of disease from COVID-19 and its acute and chronic complications: reflections on measurement (DALYs) and prospects for the Brazilian Unified National Health System. Cad Saude Publica. 2020;36(11):e00148920. https://doi.org/10.1590/0102-311x00148920
29. Gleriano JS, Fabro GCR, Tomaz WB, Goulart BF, Chaves LDP. Reflections on the management of Brazilian Unified Health System for the coordination in facing COVID-19. Esc Anna Nery Rev Enferm. 2020;24:e20200188. https://doi.org/10.1590/2177-9465-ean-2020-0188

Conflicts of interest: The authors declare no conflicts of interest related to this article.

Individual contribution of the authors:
Conception and design of the study: DMS, RBL, AMA
Data analysis and interpretation: DMS, RBL, AMA
Data collection: DMS
Writing of the manuscript: DMS
Critical revision of the text: DMS, RBL, AMA
Final approval of the manuscript*: DMS, RBL, AMA
Statistical analysis: RBL
General responsibility for the study: AMA
*All authors read and approved the final version of the manuscript submitted for publication by Rev Cienc Saude.

Financing information: Not applicable.