

Impact of the COVID-19 on dental consultations in Primary Health Care in Brazil: an ecological study

**Impacto da Pandemia da COVID-19 nas consultas odontológicas da Atenção Primária em Saúde no
Brasil: um estudo ecológico**

**Impacto de la pandemia COVID-19 en las consultas odontológicas de la Atención Primaria de
Salud en Brasil: un estudio ecológico**

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Abstract

The objective of the study was to analyze the impact of the COVID-19 pandemic on dental consultations performed in Primary Health Care (PHC) in Brazil. This was an ecological study, with secondary data collected from the Health Information System for Primary Care of the Ministry of Health. Monthly reports were generated regarding individual care in the 27 federative units in the periods from April to December of: 2018/2019 (before the pandemic) and 2020 (during the pandemic), later divided into quarters. Descriptive data, mean differences, and percentage of variation of dental care in PHC were obtained and compared for each state between periods using the Mann-Whitney U-test ($\alpha < 0.05$), by using SPSS program. A total of 55,687,591 cases were analyzed, 13.1% of which were during the pandemic. The monthly average was 12,456.6 consultations before the pandemic and, during, 3,732.7, with a significant reduction of 70.0% ($p \leq 0.01$). The first quarter (Q2) after recognition of the pandemic (April to June) showed the largest reduction (85,7%) in consultations nationwide, with April being the most affected and all states had a significant reduction when compared with 2018/2019. All states, with the exception of Amapá, showed significant reductions in the 3rd quarter (Q4), despite the gradual increase in consultations throughout 2020. The pandemic had a negative impact on the number of dental consultations performed in PHC in the country. There was a positive evolution in the course of 2020, but the numbers remain well below the levels that were reached before the pandemic.

Keywords: COVID-19; Oral Health; Primary Health Care; Dental care; Access to Health Services.

Resumo

O objetivo do estudo foi analisar o impacto da pandemia da COVID-19 nas consultas odontológicas realizadas na Atenção Primária à Saúde (APS) no Brasil. Metodologia: Trata-se de um estudo ecológico, com dados secundários coletados do Sistema de Informação de Saúde para a Atenção Primária do Ministério da Saúde. Trata-se de um estudo ecológico, com dados secundários do Sistema de Informação em Saúde para a Atenção Básica do Ministério da Saúde. Foram gerados relatórios mensais referentes aos atendimentos individuais nas 27 unidades federativas nos períodos de abril a dezembro de: 2018/2019 (antes da pandemia) e 2020 (durante a pandemia), divididos posteriormente em trimestres. Foram obtidos dados descritivos, diferenças de médias e percentual de variação dos atendimentos odontológicos na APS comparados para cada estado entre períodos, por meio do teste U de Mann-Whitney ($\alpha < 0.05$), utilizando programa SPSS. Resultados: Um total de 55.687.591 casos foram analisados, dos quais 13,1% foram durante a pandemia. A média mensal foi de 12.456,6 consultas antes da pandemia e, durante, 3.732,7, com uma redução significativa de 70,0% ($p \leq 0.01$). O primeiro trimestre (Q2) após o reconhecimento da pandemia (abril a junho) apresentou a maior redução (85,7%) nas consultas em todo o País, sendo abril o mais afetado e todos os estados tiveram

uma redução significativa quando comparado com 2018/2019. Todos os estados, com exceção do Amapá, apresentaram reduções significativas no 3º trimestre (Q4), apesar do aumento gradual das consultas ao longo de 2020. Conclusões: A pandemia teve um impacto negativo sobre o número de consultas odontológicas realizadas em APS no País. Houve uma evolução positiva no decorrer de 2020, mas os números permanecem bem abaixo dos níveis atingidos antes da pandemia.

Palavras-chave: COVID-19; Saúde Bucal; Atenção Primária à Saúde; Assistência Odontológica; Acesso aos Serviços de Saúde.

Resumen

El objetivo del estudio fue analizar el impacto de la pandemia de COVID-19 en las consultas odontológicas realizadas en la Atención Primaria de Salud (APS) de Brasil. Se trató de un estudio ecológico, con datos secundarios recogidos del Sistema de Información Sanitaria para la Atención Primaria del Ministerio de Salud. Se generaron informes mensuales sobre la atención individual en las 27 unidades federativas en los períodos de abril a diciembre de: 2018/2019 (antes de la pandemia) y 2020 (durante la pandemia), posteriormente divididos en trimestres. Se obtuvieron los datos descriptivos, las diferencias de medias y el porcentaje de variación de la atención odontológica en la APS y se compararon para cada entidad federativa entre periodos mediante la prueba U de Mann-Whitney ($\alpha < 0,05$), utilizando el programa SPSS. Se analizó un total de 55.687.591 casos, de los cuales 13,1% fueron durante la pandemia. La media mensual fue de 12.456,6 consultas antes de la pandemia y, durante, de 3.732,7, con una reducción significativa del 70,0% ($p \leq 0,01$). El primer trimestre (Q2) después del reconocimiento de la pandemia (abril a junio) presentó la mayor reducción (85,7%) de las consultas a nivel nacional, siendo abril el más afectado y todos los estados tuvieron una reducción significativa al compararse con el 2018/2019. Todos los estados, con excepción de Amapá, presentaron reducciones significativas en el 3er trimestre (Q4), a pesar del aumento gradual de las consultas a lo largo de 2020. La pandemia tuvo un impacto negativo en el número de consultas odontológicas realizadas en la APS del país. Hubo una evolución positiva en el transcurso de 2020, pero los números se mantienen muy por debajo de los niveles alcanzados antes de la pandemia.

Palabras clave: COVID-19; Salud Bucal; Atención Primaria de Salud; Atención Odontológica; Accesibilidad a los Servicios de Salud.

1. Introduction

In December 2019, an outbreak of pneumonia caused by a new Coronavirus (Sars-CoV-2) started in Wuhan City, Hubei Province - China, and quickly spread to other countries. On March 11, 2020, the World Health Organization (WHO) decreed a pandemic of the disease caused by the new coronavirus, COVID-19 (Zhu et al., 2020). In Brazil, the first case was confirmed on February 25, 2020 and community transmission was recognized 23 days later (Brazil, 2020a).

Brazil being a reference in public health care because of having the largest free health care system in the world, the Brazilian Unified Health System (SUS) (Chisini, Costa, Salvi, et al., 2021) and that has in Primary Health Care (PHC) its model of care. Public services in dentistry in Brazil are almost exclusively centered in PHC, with little expansion in dental care in secondary care (da Silva & Gottems, 2017). PHC is the basis for dealing with emergency health situations and its solid structuring determines the efficient functioning of the entire health system. Ensuring its essence by means of strategies, such as knowledge of the territory, users' access to health care, links between users and the health teams, comprehensive care, monitoring of vulnerable families, and follow-up of suspected and mild cases, are fundamental approaches to containment of the pandemic, the non-worsening of the condition of people with Covid-19, and prevention of the aggravations resulting from the disease (Sousa Néto et al., 2021).

The National Oral Health Policy (Smiling Brazil), implemented in 2004, established guidelines based on SUS fundamentals that reinforce the need to reorganize oral health at all levels of care, which aimed to expand oral health in PHC (de Lucena et al., 2020a).

However, in Brazil, initial governmental efforts have focused on the hospital network, neglecting greater investment and organization in PHC (Guadalupe Medina et al., 2020). Furthermore, the lack of coordination by the federal government, with decentralization of actions and varied decisions among the different states, contributed to the worsening of the pandemic in the country (Rodrigues & Azevedo, 2020).

The pandemic has affected not only the frontline care in the fight against COVID-19, but also several other types of care, including dental care. At the beginning of the pandemic, the dental area, in which close professional-patient contact occurs, was considered to have a high potential for infection with Sars-CoV-2 (Brazil, 2020b). Initial recommendations for dental care in Brazil, in line with other parts of the world, were the suspension of elective care, ensuring care for only those considered urgent and emergency cases (Brazil, 2020b; Centers for Disease Control and Prevention, 2020).

Studies conducted in the first months after outbreak of the pandemic pointed to negative impacts on several sectors of Brazilian basic dental services (Chisini et al., 2022; Chisini, et al., 2021; Chisini et al., 2021; Chisini et al., 2021; de Lucena et al., 2020b; dos Santos et al., 2021). Similar to other elective care in PHC, it is expected that dental services have been reduced. Nevertheless, it is not yet known the size of this impact throughout the year 2020. The importance of a retrospective evaluation to assess the repercussions of the COVID-19 pandemic on dental consultations in PHC is evident since the suspension of elective care could contribute to deterioration in the oral health of Brazilians, with increased unmet demand and the possibility of worsening of interrupted treatments. Thus, this study aimed to analyze the impact of the pandemic on the number of dental consultations performed in PHC in Brazil.

2. Methodology

Delineation

This study with an ecological design, was conducted with data collected from the Health Information System for Primary Care of the Brazilian Ministry of Health, (available publicly and anonymously at <https://sisab.saude.gov.br>) and was established in 2013 and its implementation has been mandatory nationwide since June 2015.

Variables, data source and measurement

All cases of individual dental care provided in primary care services throughout Brazil from April to December 2018, 2019 and 2020 were considered, irrespective of age and gender. The month of March was not considered, as it was the month when the pandemic began, during which there was a transition in the form of dental care in the public health system.

For data extraction, performed in March 2021, monthly production reports were generated referring to the number of services by states of the Federation (Acre – AC, Alagoas – AL, Amapá – AP, Amazonas – AM, Bahia – BA, Ceará – CE, Espírito Santo – ES, Goiás – GO, Maranhão – MA, Mato Grosso – MT, Mato Grosso do Sul – MS, Minas Gerais – MG, Pará – PA, Paraíba – PB, Paraná – PR, Pernambuco – PE, Piauí – PI, Rio de Janeiro – RJ, Rio Grande do Norte – RN, Rio Grande do Sul – RS, Rondônia – RO, Roraima – RR, Santa Catarina – SC, São Paulo – SP, Sergipe – SE, Tocantins – TO) and the Federal District (DF). The researchers (LFM, GSR) were trained in two 90-minute meetings for calibration of the data extraction and use of the protocol. The extraction process was guided by a protocol and included double to rule out the possibility of process failure.

The dependent variable studied was the monthly number of consultations in relation to the type of consultation (were counted in this total the 1st consultation, return consultation or maintenance consultation). Urgent and emergency consultations were not considered. The independent variables were geographic (states and DF) and temporal. For temporal variables, the months from April to December were considered for comparison individually and grouped into three quarters: April to June (Q2); July to September (Q3); and October to December (Q4).

In the study, the number of attendances by months and quarters were compared according to two periods: the first year of the COVID-19 pandemic (2020) and the previous biennium (2018 to 2019). The average number of consultations for each quarter (Q2, Q3 and Q4) was calculated and compared between the two periods, according to the dependent variables.

Statistical Analysis

First, the data were descriptively analyzed. For the number of consultations, the difference of means and the percentage of variation between the two periods were calculated. The Mann-Whitney U test was used to compare the numbers of consultations before (2018/2019) and during the pandemic (2020), considering a statistical significance of 5%. The data were analyzed in the software Statistical Package for Social Sciences (IBM-SPSS, v. 26, IBM, Chicago, IL).

Ethical considerations

The Research Ethics Committee of the Federal University of Minas Gerais (CAAE: 46914221.5.0000.5149) was not required, since this is a study that uses public domain data, of unrestricted access and without identifying individuals.

3. Results

In this study, 55,687,591 individual consultations were analyzed. Performed in the periods studied (April to December 2018, 2019 and 2020), with 13.1% (7,256,273) occurring during the pandemic. The national monthly average was 12,456.6 consultations in 2018/2019 and in 2020 it was 3,732.7, with a significant reduction of 70.03% ($p \leq 0.01$).

The greatest impact on the number of dental visits was in the first quarter after the pandemic (Q2) was recognized (Table 1), with the largest drop in the month of April of 90.74%, with Pernambuco (-95.5%) and Sergipe (-95.4%) being the states with the highest reductions and Minas Gerais with the smallest reduction (-81.72), indicating differences among the Brazilian states.

Table 1. Percentage difference between the average number of consultations before (2018-2019) and during the pandemic of COVID-19 (2020) in Brazil, according to Brazilian states and the Federal District.

Region states		Q2			Q3			Q4		
		Apr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dec
North	Roraima (RR)	-85.12	-87.21	-75.93	-42.27	-28.04	5.39	-23.58	-35.30	-26.76
	Amapá (AP)	-92.86	-91.66	-84.86	-70.57	-63.42	-46.85	-44.55	-37.64	-34.92
	Amazonas (AM)	-82.29	-84.38	-72.85	-61.27	-69.79	-62.68	-52.03	-47.33	-35.70
	Pará (PA)	-83.08	-84.72	-69.96	-57.31	-51.80	-38.43	-51.39	-48.67	-51.33
	Acre (AC)	-82.98	-68.27	-55.02	-55.99	-56.29	-35.81	-38.04	-25.05	-19.99
	Rondônia (RO)	-88.52	-82.06	-78.23	-82.57	-81.05	-67.75	-61.27	-48.56	-39.51
	Tocantins (TO)	-94.44	-94.50	-91.62	-87.66	-79.75	-68.46	-60.40	-52.25	-43.51
Northeast	Maranhão (MA)	-88.28	-88.90	-68.99	-53.36	-42.94	-35.47	-41.54	-42.52	-32.89
	Piauí (PI)	-91.45	-88.95	-81.27	-78.23	-81.29	-67.08	-67.82	-58.97	-37.70
	Ceará (CE)	-94.16	-92.51	-83.96	-84.97	-80.22	-68.34	-61.61	-60.12	-66.73
	Rio Grande do Norte (RN)	-91.80	-90.31	-83.62	-73.23	-63.65	-44.82	-42.82	-40.17	-34.11
	Paraíba (PB)	-92.37	-93.16	-91.44	-86.42	-78.48	-61.46	-54.33	-52.81	-47.84
	Pernambuco (PE)	-95.52	-94.46	-88.28	-83.33	-72.71	-54.76	-53.07	-48.97	-41.19
	Alagoas (AL)	-90.53	-85.97	-79.47	-80.12	-75.73	-60.52	-57.74	-48.31	-46.32
	Sergipe (SE)	-95.40	-92.72	-87.04	-84.29	-78.90	-67.42	-65.74	-62.69	-57.82
	Bahia (BA)	-91.23	-88.45	-81.42	-79.71	-79.97	-69.57	-66.13	-53.45	-50.75
Midwest	Mato Grosso (MT)	-87.56	-75.25	-62.17	-60.33	-61.83	-50.20	-51.39	-43.91	-30.52
	Goiás (GO)	-86.13	-75.38	-68.14	-71.32	-71.76	-60.25	-54.84	-49.79	-53.80
	Federal District (DF)	-91.62	-90.01	-82.95	-80.19	-79.78	-73.90	-67.46	-54.05	-50.85
	Mato Grosso do Sul (MS)	-93.59	-90.50	-86.08	-82.82	-81.99	-74.73	-72.97	-66.14	-62.64

Southeast	Minas Gerais (MG)	-81.72	-81.84	-66.87	-64.57	-56.25	-41.72	-42.52	-47.07	-56.89
	Espirito Santo (ES)	-91.71	-89.77	-83.42	-70.29	-63.76	-47.39	-46.81	-42.93	-50.46
	Rio de Janeiro (RJ)	-92.20	-90.63	-85.77	-81.42	-74.23	-55.84	-47.39	-48.01	-46.03
	São Paulo (SP)	-85.65	-86.14	-84.37	-69.88	-57.13	-52.23	-58.22	-62.36	-42.78
South	Paraná (PR)	-91.74	-87.40	-78.44	-74.87	-74.22	-64.89	-62.76	-53.99	-37.98
	Santa Catarina (SC)	-94.44	-95.15	-94.32	-92.12	-89.65	-78.98	-80.00	-81.61	-75.70
	Rio Grande do Sul (RS)	-92.43	-88.92	-86.05	-77.14	-75.28	-69.01	-67.66	-61.36	-59.38
Brazil	-89,96	-87.38	-79.72	-73,56	-69,26	-56,04	-55,34	-50,89	-45,71	

Note. Numbers in bold indicate statistically significant association (p-values are in supplement 1). The color gradation means that a shade close to red represents a greater reduction in the number of dental visits, and a shade close to green means a lesser reduction in dental visits. Source: Authors.

When observing Table and Figure 1, it is possible to verify that all states showed recovery in the percentage of the number of consultations from the first quarter to the second after recognition of the pandemic, however, 17 states still maintained significant reductions in the number of consultations when compared with the months of previous years. In the Q3, the most significant recovery was observed in Roraima, with a difference of 61.1 percentage points between the two periods, and the state of Santa Catarina continued to be the most affected (86.9% reduction).

Figure 1. Evolution of dental appointments in the quarters during the COVID-19 pandemic when compared with the same period before the pandemic, according to Brazilian states and the Distrito Federal. Note. Numbers in bold indicate statistically significant association.



Source: Authors.

When analyzing Figure 1, significant recovery in the assistance provided in Q4 could be observed after the recognition of the pandemic, However, 11 states maintained a statistically significant reduction when compared with the previous period. The recovery was differentiated along the months among the states after the pandemic, the state with the most impact on this quarter was Santa Catarina (79.1%) and Acre with the smallest reduction (27.7%), highlighting regional differences.

All states, with the exception of Amapá (p=0.079), continued to experience significant reductions in the Q4, despite the gradual increase in consultations throughout 2020 (Figure 1).

4. Discussion

This retrospective evaluation indicated that the pandemic negatively impacted the number of dental consultations in PHC in Brazil, despite a recovery over the months, nevertheless well below the level that was achieved before the pandemic. This result showed a lack of public dental care in the country, with a significative reduction in its use.

Uncertainties surrounding airborne transmission of the Sars-Cov2 virus, the risks of potentially infectious aerosols produced by dental procedures, and even the scarcity of personal protective equipment, have led regulatory authorities around the world and in Brazil to issuing guidelines limiting the performance of dental services, excluding dentistry from being an essential service (Benzian et al., 2021; Brazil, 2020b) that was limited to providing urgent and emergency care (Benzian et al., 2021). One of the factors to explain this significant reduction in the number of individual consultations in the initial months of the pandemic could be attributed to this suspension. In Brazil, initial impacts of the pandemic on PHC have previously been reported relative to the number of health procedures (dos Santos et al., 2021), prosthetic treatments (Chisini et al., 2022), endodontics (Chisini2021), pediatric dentistry (Chisini et al., 2021) and in first programmatic dental consultations (de Lucena et al., 2020b). Similarly, the public dental service has also been impacted in countries like Australia (Hopcraft & Farmer, 2020) and Spain (Chamorro-Petronacci et al., 2020).

This reduction in the number of individual consultations may also be attributable to the fact that oral health teams in Brazil have been shifted to other fronts of working in interprofessional teams, such as FAST-TRACK COVID for rapid screening and diagnostic testing of COVID-19 (Sousa Nétto et al., 2021). Additionally, the uncertainty of security for dental care must also be pointed out, such as the shortage of Personal Protective Equipment (PPE) and/or the need to improve the physical structure of the health establishment (dental office) for adequate biosecurity. Policies were also used to discourage the search for dental care after the onset of the pandemic and to postpone the search for care by patients due to the fear of contamination by the disease, which may have aggravated this scenario (de Lucena et al., 2020b).

The present study pointed out a differentiated reduction in the number of dental consultations during the months of 2020 when compared with the same period in the previous biennium among the states, highlighting regional differences (Celeste et al., 2011). In Brazil, there was no inter-federative coordination at the national level, which would have articulated actions at the federal, state and municipal levels with clear and objective guidelines for fighting the pandemic. This has made it difficult to organize and restructure the health services, generating different strategies and responses to facing the disease in the various regions of Brazil (Rodrigues & Azevedo, 2020). The response was poorly coordinated and with varied effectiveness (Vieira & Servo, 2020). The states assumed a role in coordinating the response to the pandemic, but focused on high complexity services, with little focus on PHC. Municipal decentralization meant that each city planned its own management against the pandemic, causing evident regional differences (Vieira & Servo, 2020). This lack of federal coordination resulted in a drop in the number of dental consultations in the first month after the pandemic, not only elective, but also emergency dental care, which should not happen, since these consultations were maintained (de Lucena et al., 2020b).

Among the lessons that can be drawn from the obtained results, in accord with international experiences, it was evident the need to strengthen PHC (Guadalupe Medina et al., 2020). The impact of the pandemic on primary dental services can bring generate a collapse in the health system due to the increase in unmet demand plus the demand that was already overloaded. Brazil has seen an improvement in the population's oral health indicators after the implementation of the National Oral Health Policy in 2004, but this lack of care may represent a serious setback to the epidemiological scenario of oral health (Sousa Nétto et al., 2021).

This lack of access to public dental services significantly can affect the most vulnerable population. The high cost of health services during a global crisis meant that many people, for financial reasons, could not to go to private practices and had to resort to public services, without have care, which may have contributed to the increase in health inequalities (Sousa Nétto et

al., 2021). Moreover, postponing the treatment of cases, initially elective, of patients who were undergoing treatment before the pandemic or patients with acute complaints could result in worsening of the situation, and eventually require more complex, invasive, time-consuming and costly treatments (Fabris & Kulkamp, 2020).

From the second quarter after the recognition of the pandemic there was a considerable increase in the number of dental consultations performed, even if at a comparatively lower level than that existent before the onset of the disease. This may have happened due to the regularization of teledentistry in the country in June 2020, which allowed the release of teleguidance and telemonitoring for oral health care in the current scenario. The use of digital technologies for these purposes has been seen as an assertive alternative to ensuring access to health care. Triage and orientation about the need for care can be performed, prioritizing care through direct contact only in cases in which this is necessary. In addition, preliminary questionnaires can identify suspected cases of COVID-19 and thus avoid exposing health professionals to the risk of contamination (Carrer et al., 2020). This tool will also be important for the reestablishment of dental care and maintenance of regular care to these patients after the pandemic. Investments in technology and training of professionals will be important in this new scenario.

During the course of the pandemic, more robust information from scientific studies (Ferreira et al., 2022) showed the occupational risk of dentistry with the adoption of safety measures and recommendations on dental care, which allowed a safe and calm return to elective care in Brazil, but as was shown in this study, the return at the end of 2020 still fell short of expectations.

The results of this study were significant; however it is necessary to point out the limitations of using secondary data, obtained from a health system information, which is official information from the Brazilian Ministry of Health. The information is of national origin and guaranteed but does not consider the specific registration characteristics of each service or professional that can generate impacts on the notifications, as well as instabilities on the Internet or on computer equipment, which are difficult to measure (Thum et al., 2019). Another limitation is that the differences between municipalities were not evaluated, only states. Future research should consider a longer period of analysis, which would make it possible to verify the fluctuation of the indicators in the periods before, during, and especially after the pandemic.

The contributions of this study are important to show the impact on Brazilian health system and differences in the states. Thus, they can be used as a scope to strengthen the health services to face the pandemic, to plan actions to restructure dentistry in the PHC in the country, and to guide public policies to promote and protect the oral health of the most vulnerable population. The harmful impact of the pandemic on the health system may last longer than expected, therefore, efforts must be made to reduce the negative impact of the pandemic on the oral health of the population.

5. Conclusion

The COVID-19 pandemic negatively affected the number of dental consultations in PHC in Brazil, impacting access and use of public dental services. There was a positive evolution in the course of 2020, but the numbers remain well below the levels that were reached before the pandemic.

The contributions of this study are important to show the impact on Brazilian health system and differences in the states. Planning and investments must be made to strengthen dental care in primary care and to guide public policies to promote and protect the oral health of the most vulnerable population. The harmful impact of the pandemic on the health system may last longer than expected, therefore, efforts must be made to reduce the negative impact of the pandemic on the oral health of the population, taking into account regional differences.

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