



# COVID-19 Pandemic Impact on Dental Practice

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## Abstract

**Edited by:** Aleksandar Iliev

**Citation:** Bozhkova T, Musurlieva N. COVID-19 Pandemic Impact on Dental Practice. Open-Access Maced J Med Sci. 2022 Mar 09; 10(D):148-152. https://doi.org/10.3889/oamjms.2022.8504

**Keywords:** COVID-19; Dental practice; Pandemic; Dentists

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**Received:** 27-Jan-2022

**Revised:** 15-Feb-2022

**Accepted:** 27-Feb-2022

**Copyright:** © 2022 Tanya Bozhkova, Nina Musurlieva

**Funding:** This research did not receive any financial support

**Competing Interest:** The authors have declared that no competing interest exists

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**BACKGROUND:** The COVID-19 pandemic has a huge impact on the dental industry in Bulgaria since the initial lockdown in March 2020 to the present day. Even after 1 year of lockdown, dentists are still unable to continue practice that has negatively affected their revenue.

**AIM:** The study aims to examine the impact of COVID-19 on dental practices during the pandemic in Bulgaria.

**METHODS:** A specially developed questionnaire was distributed electronically among 138 dentists to all regions of Bulgaria. The collected primary statistical information was entered and processed with the statistical package SPSS Statistics version 19.0.

**RESULTS:** Statistical analysis of the questionnaire showed that  $62.32\% \pm 4.12$  of dentists said that COVID-19 made no impact on their decision to retire or continue practicing; 43% of respondents predicted that revenue or costs will be the biggest challenge faced by their practice in 2021. Some of the dentists ( $34.78\% \pm 4.05$ ) believed that COVID-19 allowed them to learn more regarding the infection control. Most of the respondents ( $87.68\% \pm 2.79$ ) agreed that their income was lower in April–September 2020 as compared to 2019. More than half of dentists ( $61.59\% \pm 4.14$ ) believed that COVID-19 has not impacted the products or services they offer. The majority of the participants ( $84.78\% \pm 3.05$ ) did not perform non-emergency procedures during the pandemic.

**CONCLUSION:** Despite the numerous disadvantages caused by the COVID-19 pandemic, our survey showed dentists found ways to adapt and succeed.

## Introduction

In December 2019, a new coronavirus called SARS-CoV-2/human/Wuhan/X1/2019 was identified in Wuhan, China. The disease caused by this virus was named COVID-19 by the World Health Organization (WHO), short for CO-rona VI-rus D-isease and year of identification-19 [1], [2].

The routes of transmission of COVID-19 are by sneezing, coughing, and inhaling small particles of air and contact transmission (contact with the lips, eyes, and nasal mucosa) [3], [4]. Transmission of the virus from patients with mild or no symptoms is also possible [5]. Eye exposure is another potential way for the virus to penetrate. COVID-19 can also be transmitted through saliva directly or indirectly [6], [7]. Dental procedures generate aerosols and droplets that can be heavily contaminated with SARS-CoV-2 and explain the need for additional preventive measures during the COVID-19 pandemic [8], [9].

Studies have shown that 2019-nCoV can be carried in the air by aerosols released during dental procedures, which endanger not only the staff and the patient but also the virus in aerosols can remain viable and infectious for about 3 h [10], [11]. It has been shown

that SARS-CoV-2 can remain viable and contaminated on various types of environmental surfaces for several hours or up to several days [12].

Dentists are at the forefront of the possibility of encountering the virus, as they work in close contact with patients. They are particularly at high risk of SARS-CoV-2 infection due to the inability to maintain an interpersonal distance of more than 1 m and due to exposure to saliva, blood, and other body fluids during treatment procedures [13], [14].

The New York Times publication titled "The Workers Who Face the Greatest Coronavirus Risk" showed that dentists are the workers at risk of being affected by COVID-19, much more than general practitioners and nurses [9].

To limit the spread of COVID-19, many dental offices and clinics drastically reduce patient access by limiting clinical activity for emergency and immediate care. A clinical evaluation conducted by the Researcher of the Li Ka Shing, Faculty of Medicine of the University of Hong Kong reported a consistent detection of SARS-CoV-2 in the saliva of 92% of analyzed patients [15].

Due to the distinctiveness of dental treatment procedures, the risk of SARS-CoV-2 transmission between dentists and patients is quite high [16]. For this

reason, all routine dental practices were discontinued after the outbreak of COVID-19 in many parts of the world and only emergency services were provided [17].

A number of studies have proven the possibility of cross-contamination between dental clinics and dental laboratories [18], [19]. To prevent this, it is recommended to disinfect all items that leave the clinic and that come from the dental laboratory [20], [21]. Various recommendations have been made for safe dental care and control of the sale of the infection [14], [21], [22].

Although many measures are in place to prevent and control SARS-CoV-2 transmission during dental practice, there is still concern among dentists as it significantly reduced the number of patients. In 2020, a study was conducted by Guo *et al.* on 2537 dental patients. This study found that at the beginning of the COVID-19 outbreak, 38% fewer patients visited the dental offices [23].

The COVID-19 pandemic has had a huge impact on the dental industry since the initial lockdown in March 2020 to the present day. For a year now, dentists have not been able to practice normally, which greatly affects their income [10]. However, as we approach nearly a full year of living with the pandemic, it has been proven that dentistry is an essential service and practices have been able to remain open despite additional lockdowns across the country.

The pandemic affected the work of dentists, which put them under great psychological stress. This connection has been proven in a number of studies [24], [25].

The study aims to examine the impact of COVID-19 on dental practices during the pandemic in Bulgaria.

## Methods

### Sociological method

A specially developed questionnaire containing 10 questions was sent through e-mail to 600 dentists from all regions of Bulgaria with active registration in the Bulgarian dental union who has email addresses cataloged in their data base. To certify a good reliability and validity of the questionnaire, we conducted a pilot tested version in a sample of 18 volunteer dentists who were not involved with the study. The relevant sections of questionnaire were as follows: Sociodemographic characteristics of participants and section related to the opinion of dentist about types of procedures performed during the pandemic, level of incomes, types of infection control, etc. The minimum sample size of respondents was established based on power analysis for sample size calculation. The response rate was 23%. All of

the dentists were informed about the purpose of the research and gave their agreement to participate.

### Statistical assessment

The collected primary statistical information was entered and processed with the statistical package SPSS Statistics 19.0, and the graphs were prepared using Microsoft Office 2019. Descriptive statistics for quantitatively measurable quantities and non-parametric (Pearson criterion) test were used to test hypotheses. For a significance level at which the null hypothesis was rejected,  $p < 0.05$  was chosen.

## Results

A total of 600 dentists participated in the online survey, in which the response rate was 23% (138 questionnaires returned).

Tables 1 and 2 present the distribution of respondents by age and years of service.

**Table 1: Distribution of the contingent by age**

Age distribution	n	%	Sp
25–35 years	72	52.17	4.25
36–45 years	45	32.60	3.99
46–65 years	19	13.77	2.93
> 65 years	2	1.45	1.01
Total	138	100.0	-

The distribution of respondents according to the type of practice in which they operate is presented in Table 3.

**Table 2: Years of service of the participants**

Years of service distribution	n	%	Sp
<5 years	11	7.97	2.30
6–15 years	65	47.10	4.25
16–30 years	43	31.16	3.94
>30 years	19	13.77	2.93
Total	138	100.0	-

The opinion of the dentists on whether COVID-19 influences their decision to work is presented in Figure 1.

Table 4 presents the answers to the other questions.

## Discussion

Of the respondents who participated in the online survey, 98 were women, which correspond to  $71.01\% \pm 3.86$  of the total share, and 40 were men –  $28.98\% \pm 3.86$ . This result confirms the global trends of feminization in this profession [26]. In recent years, women have increasingly embarked on occupations that were considered specifically for male.

**Table 3: Distributions of participants according to the type of practice**

	n	%	Sp
Medical center			
Own outpatient clinic	89	64.49	4.07
Group practice	25	18.11	3.28
Employed in an outpatient clinic	19	13.77	2.93
Dental center	5	3.62	1.59
Total	138	100.0	-

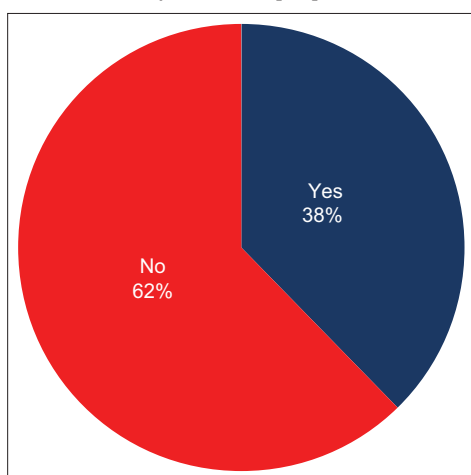
The reasons can be explained by the fact that women are more ambitious, organized, and patient, which help them in the profession.

The largest share of the participants was in the age group of 25–35 years ( $52.17\% \pm 4.25$ ) and had work experience of 6–15 years ( $47.10\% \pm 4.25$ ). Various authors explain the demographic characteristics of participants in online surveys. In general, people with higher education are more likely to participate than those with lower education [27]. Younger people are more likely to participate in such online surveys. In addition, women are the ones who would participate more often than men. Similar parameters concerning gender and age were also observed in the sample.

**Table 4: Dentists' viewpoints regarding the effects of COVID-19 on dental practice**

Question	Yes	No
Are your incomes lower from April to September of 2020 compared to 2019?	$87.68\% \pm 2.79$	$12.31\% \pm 2.79$
Did COVID-19 affect the products of the services?	$61.59\% \pm 4.14$	$38.40\% \pm 4.14$
Have you performed non-emergency procedures during the pandemic?	$84.78\% \pm 3.05$	$15.21\% \pm 3.05$
COVID-19 affected infection control?	$35.50\% \pm 4.07$	$64.49\% \pm 4.07$

The study found that a large proportion of dentists ( $64.48\% \pm 4.07$ ) work in their outpatient clinics for individual practice. This result differs from the global trend for consolidation of practices, which would lead to better opportunities for equipment and cooperation between individual specialists [28].

**Figure 1: COVID-19 impact the decision to work or retire?**

During the state of emergency, many dental practices drastically reduced patients' access to emergency care. Such measures have been taken in many meeting [15]. The risk of transmitting the virus is very high between dentists and patients, as well as dentists and dental technicians [10], [16]. The majority of participants ( $84.3\% \pm 2.86$ ) did not perform

emergency procedures during the pandemic. This can be explained to some extent by the awareness of the risk of spreading COVID-19.

Health care workers have been found to face much more emotional stress than the general population during the COVID-19 pandemic [29], [30]. Studies have been conducted on the impact of the pandemic on the psychological state of dentists and it has been proven that some people have symptoms of mental health problems [24]. The results show that more than half of dentists ( $60.86\% \pm 4.15$ ) believed that COVID-19 did not affect the products of the services they offer. Despite the psychological stress, the dentists involved in the present study, despite the problems during a pandemic, managed to maintain the quality of dental treatment. Rokaya and Koontongkaew link TMD to COVID-19, as one of the main causes of TMD is stress and psychosocial impairment [25].

Some dentists ( $35.50\% \pm 4.07$ ) believed that COVID-19 allowed them to learn more about the infection control. It has been proven that the aerosol created when working with turbines and ultrasonic instruments can remain in the air and surfaces for hours [10], [11]. Numerous work and disinfection protocols have been established for the dissemination of COVID-19 [21], [22].

Restrictions on dental procedures and reduced working hours affected the dentists' incomes. Most of the respondents ( $87\% \pm 2.86$ ) agreed that their incomes were lower from April to September 2020 as compared to 2019. Studies conducted in other countries showed that the COVID-19 pandemic caused financial disaster of dental offices [31]. If normal operation is not restored, financial problems will increase [32]. Variables such as gender, clinical experience, and types of clinical practice did not influence income reduction ( $p > 0.05$ ). In Bulgaria, 43% of respondents predicted that revenues or expenditures will be the biggest challenge for their practice in 2021. Despite the difficulties, they face ( $62.32\% \pm 4.12$ ) of dentists say that COVID is not influenced their decision to retire or continue practicing. Dentists continue to work, although there has been a reduction in the number of patients who visit dental offices [23].

It is important to recognize some limitations of the present study, such as the convenience sample, which included dentists who had access to their emails and social media in the period that the questionnaire was released and the short period of data collection.

## Conclusion

Despite the numerous disadvantages caused by the COVID-19 pandemic, our survey shows that dentists have found ways to adapt and succeed. The

majority of dentists have felt prepared to go into the next wave, continuing the protocols that have been learned over the last year. It is commendable that despite the financial losses, the quality of services has not been affected.

## Acknowledgments

We thank all of the respondents to our survey who took the time to share their opinions and preferences with us.

## References

- Chan J, Yuan S, Kok K, To KK, Chu H, Yang J, *et al.* A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: A study of a family cluster. *Lancet.* 2020;395(10223):514-23. [https://doi.org/10.1016/S0140-6736\(20\)30154-9](https://doi.org/10.1016/S0140-6736(20)30154-9)  
PMid:31986261
- Groot Raoul J, Christian D, Chris L, Dmitry P, Stanley P, LM P. The species severe acute respiratory syndrome-related coronavirus: Classifying 2019-nCoV and naming it SARS-CoV-2. *Nat Microbiol.* 2020;5(4):536-44.
- Li P, Fu JB, Li KF, Liu JN, Wang HL, Liu LJ, *et al.* Transmission of COVID-19 in the terminal stages of incubation period: A familial cluster. *Int J Infect Dis.* 2020;96:452-3. <https://doi.org/10.1016/j.ijid.2020.03.027>  
PMid:32194239
- Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, *et al.* Clinical features of patients infected with 2019 novel Coronavirus in Wuhan, China. *Lancet.* 2020;395(10223):497-506. [https://doi.org/10.1016/S0140-6736\(20\)30183-5](https://doi.org/10.1016/S0140-6736(20)30183-5)  
PMid:31986264
- Li C, Ji F, Wang L, Wang L, Hao J, Dai M, *et al.* Asymptomatic and human-to-human transmission of SARS-CoV-2 in a 2-Family Cluster, Xuzhou, China. *Emerg Infect Dis.* 2020;26(7):1626-8. <https://doi.org/10.3201/eid2607.200718>  
PMid:32228809
- Lu CW, Liu XF, Jia ZF. 2019-nCoV transmission through the ocular surface must not be ignored. *Lancet.* 2020;395(10224):e39. [https://doi.org/10.1016/S0140-6736\(20\)30313-5](https://doi.org/10.1016/S0140-6736(20)30313-5)  
PMid:32035510
- Belser J, Rota P, Tumpey T. Ocular tropism of respiratory viruses. *Microbiol Mol Biol Rev.* 2013;77(1):144-56. <https://doi.org/10.1128/MMBR.00058-12>  
PMid:23471620
- Afef A, Dorsaf T, Eya M, Lamia O, Nabih D. Routes of transmission and control protocols of COVID-19 in dental clinics: An overview. *Int J Drug Res Dent Sci.* 2000;2(4):73-83.
- Gamio L. The Workers Who Face the Greatest Coronavirus Risk; 2020. Available from: <https://www.nytimes.com/interactive/2020/03/15/business/economy/coronavirus-worker-risk.html?action=click&module=top+stories&pgtype=homepage> [Last accessed on 2020 Jul 27].
- Wax R, Christian M. Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients. *Can J Anesth.* 2020;67(5):568-76. <https://doi.org/10.1007/s12630-020-01591-x>  
PMid:32052373
- Ge ZY, Yang LM, Xia J, Fu X, Zhang Y. Possible aerosol transmission of COVID-19 and special precautions in dentistry. *J Zhejiang Univ Sci B.* 2020;21(5):361-8. <https://doi.org/10.1631/jzus.B2010010>  
PMid:32425001
- vanDoremalen N, Bushmaker T, Morris D, Holbrook M, Gamble A, Williamson B, *et al.* Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *N Engl J Med.* 2020;382(16):1564-7. <https://doi.org/10.1056/NEJMc2004973>  
PMid:32182409
- Spagnuolo G, de Vito D, Rengo S, Tatullo M. COVID-19 outbreak: An overview on dentistry. *Int J Environ Res Public Health.* 2020;17(6):2094. <https://doi.org/10.3390/ijerph17062094>  
PMid:32235685
- Deana NF, Seiffert A, Aravena-Rivas Y, Alonso-Coello P, Muñoz-Millán P, Espinoza-Espinoza G, *et al.* Recommendations for safe dental care: A systematic review of clinical practice guidelines in the first year of the COVID-19 pandemic. *Int J Environ Res Public Health.* 2021;18(19):10059. <https://doi.org/10.3390/ijerph181910059>  
PMid:34639363
- Lo Giudice R. The severe acute respiratory syndrome Coronavirus-2 (SARS CoV-2) in dentistry. Management of biological risk in dental practice. *Int J Environ Res Public Health.* 2020;17(9):3067. <https://doi.org/10.3390/ijerph17093067>  
PMid:32354081
- Meng L, Hua F, Bian Z. Coronavirus disease 2019 (COVID-19): Emerging and future challenges for dental and oral medicine. *J Dent Res.* 2020;99(5):481-7. <https://doi.org/10.1177/0022034520914246>  
PMid:32162995
- Yang Y, Zhou Y, Liu X, Tan J. Health services provision of 48 public tertiary dental hospitals during the COVID-19 epidemic in China. *Clin Oral Investig.* 2020;24(5):1861-4. <https://doi.org/10.1007/s00784-020-03267-8>  
PMid:32246280
- Shetty M, Thulasidas N, John N, Hegde C. Microbial analysis and determination of antibiotic susceptibility of dental laboratory equipments and laboratory attire. *Contemp Clin Dent.* 2018;9(4):607-12. [https://doi.org/10.4103/ccd.ccd\\_569\\_18](https://doi.org/10.4103/ccd.ccd_569_18)  
PMid:31772472
- Vazquez-Rodriguez I, Estany-Gestal A, Seoane-Romero J, Mora MJ, Varela-Centelles P, Santana-Mora U. Quality of cross-infection control in dental laboratories. A critical systematic review. *Int J Qual Health Care.* 2018;30(7):496-507. <https://doi.org/10.1093/intqhc/mzy058>  
PMid:29635417
- Meghashri K, Kumar P, Prasad DK, Hegde R. Evaluation and comparison of high-level microwave oven disinfection with chemical disinfection of dental gypsum casts. *J Int Oral Health.* 2014;6(3):56-60.  
PMid:25083033
- Rokaya D. COVID-19: Prosthodontic challenges and opportunities in dental practice. *J Adv Oral Res.* 2020;11(2):113-6.
- Al Shikh A, Milosevic A. Effectiveness of alcohol and aldehyde spray disinfectants on dental impressions. *Clin Cosmet Investig Dent.* 2020;12:25-30. <https://doi.org/10.2147/CCIDE.S233336>  
PMid:32104101
- Guo H, Zhou Y, Liu X, Tan J. The impact of the COVID-19 epidemic on the utilization of emergency dental services. *J Dent*

- Sci. 2020;15(4):564-7. <https://doi.org/10.1016/j.jds.2020.02.002>  
PMid:32296495
24. Mekhemar M, Attia S, Dörfer C, Conrad J. The psychological impact of the COVID-19 pandemic on dentists in Germany. *J Clin Med.* 2021;10(5):1008. <https://doi.org/10.3390/jcm10051008>  
PMid:33801333
25. Rokaya D, Koontongkaew S. Can Coronavirus disease-19 lead to temporomandibular joint disease? *Open Access Maced J Med Sci.* 2020;8(T1):142-3.
26. McKay J, Quinonez C. The feminization of dentistry: Implications for the profession. *J Can Dent Assoc.* 2012;78(1):C1.  
PMid:22322017
27. Maslovskaya O, Durrant G, Smith P, Hanson T, Villar A. What are the characteristics of respondents using different devices in mixed device online surveys? *Int Stat Rev.* 2019;87(2):326-46. <https://doi.org/10.1111/insr.12311>
28. Nasseh K, Bowblis JR, Vujcic M, Huang SS. Consolidation in the dental industry: A closer look at dental payers and providers. *Int J Health Econ Manag.* 2020;20(2):145-62. <https://doi.org/10.1007/s10754-019-09274-x>  
PMid:31583512
29. Tan BY, Chew NW, Lee GK, Jing M, Goh Y, Yeo LL, *et al.* Psychological impact of the COVID-19 pandemic on health care workers in Singapore. *Ann Intern Med.* 2020;173(4):317-20. <https://doi.org/10.7326/M20-1083>  
PMid:32251513
30. Greenberg A, Greenberg H. UK's response to covid-19: Crude, unadjusted mortality figures are not the whole story. *BMJ.* 2020;369:m2453. <https://doi.org/10.1136/bmj.m2453>  
PMid:32561514
31. Schwendicke F, Krois J, Gomez J. Impact of SARS-CoV2 (COVID-19) on dental practices: Economic analysis. *J Dent.* 2020;99:103387. <https://doi.org/10.1016/j.jdent.2020.103387>  
PMid:32473182
32. Barabari P, Moharamzadeh K. Novel Coronavirus (COVID-19) and dentistry-A comprehensive review of literature. *Dent J (Basel).* 2020;8(2):53. <https://doi.org/10.3390/dj8020053>  
PMid:32455612