

Patient Perspective on Dental Care Amidst COVID-19 Pandemic: A Survey During Omicron Stage

Journal of Patient Experience
Volume 12: 1-9
© The Author(s) 2025
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/23743735251342125
journals.sagepub.com/home/jpx



Paratcha Pingsuthiwong, DDS, MSc^{1,2} ,
Paswach Wiriyakijja, DDS, MSc, PhD^{3,4} ,
Pagaporn Pantuwadee Pisarnurakit, DDS, PhD⁵ , and Keskanya Subbalekha, DDS, PhD^{1,2}

Abstract

The COVID-19 pandemic influenced dental care behaviors, with increased concern over virus transmission. This study provides insights into Thai patient behaviors and attitudes about dental care during the Omicron wave. A cross-sectional survey was conducted via Google Forms in June 2022, collecting sociodemographic data, attitudes, and behaviors related to dental care during the pandemic. Nine hundred and seventy-eight responses were analyzed using descriptive statistics, the Mann-Whitney *U*-test, and multiple linear regression. Nearly half of the respondents expressed high to extreme concerns about delayed dental care affecting oral health (49.3%) and the risk of contracting COVID-19 in dental settings (45.7%). Individuals who avoided dental visits increased from 8.1% before the pandemic to 36.3% during the pandemic. However, 59.4% of respondents reported confidence in avoiding COVID-19 when dental workers strictly followed preventive measures. The study highlights concern over delayed dental care and COVID-19 risks, leading to increased avoidance of visits. However, strict preventive measures by dental workers boosted confidence, emphasizing the need for effective infection control to ensure continued access to dental care.

Keywords

attitude, behavior, COVID-19, dental treatment, pandemic

Introduction

The COVID-19 pandemic, caused by severe acute respiratory syndrome-coronavirus 2 (SARS-CoV-2), has significantly impacted global healthcare,¹⁻³ with dental practices facing unique challenges due to the high risk of aerosol transmission.⁴⁻⁶ Dental clinics had to defer many elective treatments while implementing stringent preventive measures like patient screening, enhanced personal protective equipment (PPE), and ventilation improvements. These changes were essential in minimizing transmission risks, particularly in environments where aerosol-generating procedures are common.⁷⁻⁹ Despite the adoption of robust safety protocols, many patients were reluctant to visit dental clinics, leading to deferred treatments.¹⁰⁻¹⁹ This avoidance of dental care raised concerns over the long-term effects of delayed oral health.¹¹

Two years into the COVID-19 pandemic, the emergence of the highly transmissible Omicron variant was associated with milder symptoms.²⁰ By this stage, widespread vaccination, enhanced infection control protocols, and improved

understanding of COVID-19 transmission allowed dental clinics to resume more normal operations in Thailand.²¹⁻²³ In contrast to the early pandemic phase, when healthcare facilities were closed or restricted to nonaerosol-generating treatments, these measures may have impacted oral health

¹ Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

² Oral and Maxillofacial Surgery and Digital Implant Surgery Research Unit, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

³ Department of Oral Medicine, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

⁴ Avatar Biotechnologies for Oral Health and Healthy Longevity Research Unit, Chulalongkorn University, Bangkok, Thailand

⁵ Department of Community Dentistry, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

Corresponding Author:

Keskanya Subbalekha, Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University, 34 Henri-Dunant Road, Wangmai, Patumwan, Bangkok 10330, Thailand.

Email: skeskanya@gmail.com



Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and Open Access page (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

outcomes.²⁴ The key challenges during the Omicron stage included managing backlogs of postponed treatments and restoring patient confidence in routine dental visits. However, studies specifically examining the impact of this phase on dental care remain limited, highlighting the need for further research.

Understanding patient perspectives on dental care during the outbreak is crucial for maintaining oral healthcare in future pandemics. This study aims to fill this gap by assessing the attitudes and behaviors of dental patients in Thailand during the Omicron wave, which seems to be a transition period from the epidemic to normal, providing key insights into how patient confidence and dental service utilization were affected.

Methods

Study Design

This cross-sectional study assessed the attitudes and behaviors of dental patients in Thailand during the COVID-19 pandemic. Data were collected via a web-based survey conducted using Google Forms in June 2022, during the Omicron wave. The questionnaire consisted of 3 sections: sociodemographic information, attitudes, and behaviors toward dental treatments during the pandemic. The study adhered to the Declaration of Helsinki and was approved by the Human Research Ethical Committee of the Faculty of Dentistry, Chulalongkorn University. Participants were fully informed about the study's purpose and voluntarily provided their consent before participating. To protect privacy, all collected data were anonymized, ensuring no personally identifiable information was recorded or used in the analysis.

Participants

The study targeted Thai residents aged 18 years and older who were able to read and understand Thai. Dentists were excluded from the study to avoid bias in patient perspectives. The sample size was calculated using Slovin's formula ($n = N/(1 + Ne^2)$), with N representing the Thai adult population (aged 18 and over) from the 2019 National Statistical Office of Thailand, resulting in a minimum required sample of 400 participants. Considering a 20% anticipated drop-out rate, the final target was 480 participants.

Data Collection

Participants were recruited through social media platforms (Facebook, Messenger, and Line) and handbills were distributed at private and public dental clinics by convenient sampling. As an incentive, participants were entered into a drawing for a chance to win one of 100 fuel gift cards, each worth 500 Thai Baht.

The self-administered online survey took ~15 min to complete. Respondents were limited to a single submission

by enabling unique response tracking. The questionnaire was pilot-tested with 10 dental patients from the Faculty of Dentistry at Chulalongkorn University in early 2022. Based on feedback from the pilot, minor adjustments were made to improve question clarity. However, pilot data were not included in the final analysis.

Outcome Measures

The survey instrument was developed based on a review of previous studies^{10–19} and qualitative interviews with 10 dental patients receiving dental care services at the Faculty of Dentistry, Chulalongkorn University during January and February 2022. The questionnaire consisted of 3 sections: (1) sociodemographic data, (2) attitudes toward COVID-19-related dental treatments, rated on a 5-point Likert scale (1 = not at all, 2 = slight, 3 = moderate, 4 = high, and 5 = extreme), and (3) dental service utilization during the pandemic. Each question was set to be required so that could proceed to the next question, preventing nonresponse errors or missing data. Four dentists specializing in different areas of dentistry evaluated the questionnaire's content validity. The English version of the questionnaire is available as Supplemental File 1.

Statistical Analysis

Data analysis was conducted using IBM SPSS Statistics (Version 22). Descriptive statistics were used to summarize sociodemographic characteristics and responses. Categorical variables were expressed as frequencies and percentages. Multiple linear regressions were employed to explore associations between sociodemographic variables and patients' attitudes toward dental treatments during the pandemic. A significance level of 0.05 was used. Additionally, a Mann-Whitney U -test was applied to compare levels of concern between participants who visited the dentist during the pandemic and those who did not.

Results

Participant Characteristics

A total of 1093 responses were received, of which 978 met the inclusion criteria and were analyzed. Due to the distribution method of the questionnaire, the response rate could not be determined. The sample consisted of 65% female participants, with nearly equal representation of individuals aged 18 to 40 (42.8%) and 41 to 60 years (38.0%). Most participants (87.4%) lived with their families, and 45.1% had at-risk family members, such as young children, the elderly, or those with chronic health conditions. Approximately 20% of respondents reported a history of COVID-19 infection, with the vast majority (88.4%) experiencing only mild symptoms. Nearly all participants (98.8%) had received

Table 1. Characteristics of the Surveyed Participants.

Characteristics	Number of participants (%)
Gender	
Male	337 (34.5)
Female	636 (65.0)
Not specified	5 (0.5)
Age (year)	
18-40	418 (42.7)
41-60	372 (38.1)
≥ 61	188 (19.2)
Medical status	
Healthy	706 (72.2)
Underlying disease	272 (27.8)
Region	
Capital city (Bangkok)	422 (43.1)
Provincial city	556 (56.9)
Monthly income (Thai Baht)	
< 15 000	220 (22.5)
15 001–25 000	205 (21.0)
25 001–50 000	313 (32.0)
> 50 000	240 (24.5)
Education level	
Not higher than secondary school	100 (10.2)
Bachelor's degree or diploma	569 (58.2)
Master's degree or higher	309 (31.6)
Living with family	
Yes	855 (87.4)
Having family in the risk group	
Yes	441 (45.1)
No	414 (54.9)
No	123 (12.6)
COVID-19 vaccination	
Yes	966 (98.8)
No	12 (1.2)
History of COVID-19 infection	
Yes	198 (20.3)
No	780 (79.7)

COVID-19 vaccinations. Detailed participant characteristics are provided in Table 1.

Attitudes Toward COVID-19 and Dental Treatments (Figure 1)

A higher percentage of participants expressed high to extreme concern about contracting COVID-19 during dental visits (45.7%) compared to the general risk of infection in daily life (34.3%). Additionally, 49.3% were highly concerned about the negative impact of postponed dental visits on their oral health.

While 11.9% and 14.8% of participants perceived a high to extreme risk of COVID-19 transmission in the dental waiting area and from dental professionals, respectively, this concern increased to 38.3% when their masks had to be removed during treatment.

Trust in protective measures varied among participants: 29.8% relied on vaccination for protection, while 50.7%

felt assured when dental staff underwent COVID-19 testing. Additionally, 46.5% reported confidence when patients were tested before appointments, and 59.4% felt secure when dental professionals strictly adhered to preventive measures.

Perception of Preventive Measures in Dental Clinics (Figure 2)

Although infection control measures in dentistry existed before the COVID-19 outbreak, their strictness notably increased during the pandemic. More than 75% of participants reported the preventive protocols they noticed when having dental visits during the Omicron stage were body temperature check (81.5%), patient triage and COVID-19 screening (78.2%), the use of disposable gloves (76.4%), and pre-operative mouth rinse (75.6%). However, proper ventilation and air purification systems (54%), cleaning dental chair surfaces after each patient (49.3%), and regular surface disinfection (48.4%) were less frequently noted.

Factors Associated With the Level of Concern

Multivariate analyses revealed that gender, living with family, and education level were significantly associated with participants' levels of concern about contracting COVID-19 during dental visits ($P < .001$). Female participants, those living with family, and those with higher education levels exhibited greater concern about infection risks. Additionally, concern about oral health issues due to delayed dental visits was higher among female participants and those living with family ($P < .001$). The Mann-Whitney U -test revealed that participants who avoided dental visits during the pandemic (37%) exhibited significantly higher concern levels about contracting COVID-19 during dental appointments (median = 4) compared to those who attended dental visits (63%, median = 3), $P < .001$.

Behavioral Changes in Dental Service Utilization During the Pandemic

The proportion of patients who postponed dental treatments increased during the pandemic. Before the pandemic, 8.1% of participants had never visited a dentist, however, this number increased to 36.3% during the pandemic (Figure 3A). The primary reasons for dental visits before the pandemic were routine check-ups (54.6%), symptoms requiring treatment (34.4%), and orthodontic adjustments (9.8%). During the pandemic, these shifted to 43.2%, 41.7%, and 12.2%, respectively, reflecting a higher proportion of symptom-driven care (Figure 3B).

Among the 623 participants who received dental services during COVID-19, 62.1% (387) sought treatment during the

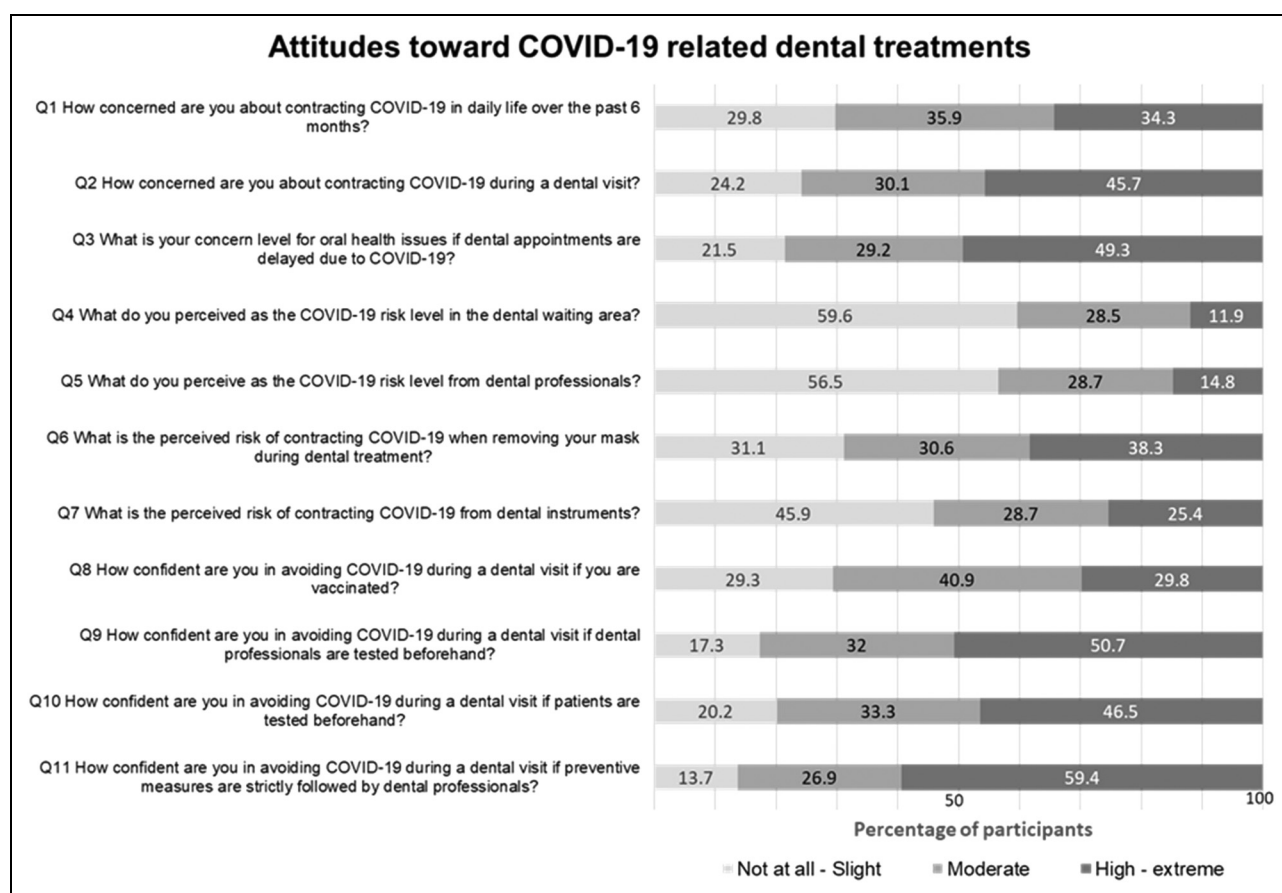


Figure 1. Attitudes toward COVID-19-related dental treatments. The levels of concern (Q1-Q3), perceived risks (Q4-Q7), and confidence (Q8-Q11) regarding COVID-19 were varied among participants.

Omicron stage. Of these, 90.9% (352) received dental care as usual. Among those who did not receive any dental services, 4.3% (16) cited the lack of urgency, 3.3% (13) were concerned about the risk of virus transmission, and 1.5% (6) had other reasons.

The most common reasons for avoiding dental care during the pandemic included the absence of symptoms (39.8%), concerns about COVID-19 (26.9%), clinic closures (21.7%), fear of undergoing dental procedures (5.8%), and financial constraints (3.6%).

Participants' Opinions on Dental Services During and After the Pandemic

If strict preventive protocols were in place, ~58.5% of participants believed that individuals diagnosed with COVID-19 should be able to receive dental treatment. Moreover, 88.7% of participants supported using antigen test kits (ATKs) for pretreatment screening, although some raised concerns about the affordability and accuracy of testing methods. Most participants (90.3%) endorsed continuing comprehensive COVID-19 preventive strategies in dental clinics.

Discussion

This study highlights the impact of the COVID-19 pandemic on dental care utilization and patient attitudes in Thailand during the Omicron wave. A key finding was that nearly half of the participants expressed highly concern about contracting COVID-19 during dental visits. Notably, patients perceived a higher risk of infection in dental settings compared to daily activities, likely due to the close contact and aerosol-generating procedures involved in dental treatments.⁴⁻⁶ It was consistent with the study by Sun et al,¹⁶ which showed that most parents of children aged 0 to 14 years agreed that dental clinics were a place at high risk of viral infection (92%) and more dangerous than other public locations (66%).

This study also revealed a notable shift in dental service utilization, as many patients delayed or avoided treatment due to concerns about virus transmission. Similarly, Moffat et al reported that patients were more concerned about infection risk than missing necessary dental treatment during the COVID-19 pandemic.¹³ In contrast, Peloso et al¹¹ found that 49% of patients feared worsening oral health due to delayed care, which could lead to increased treatment complexity and costs.

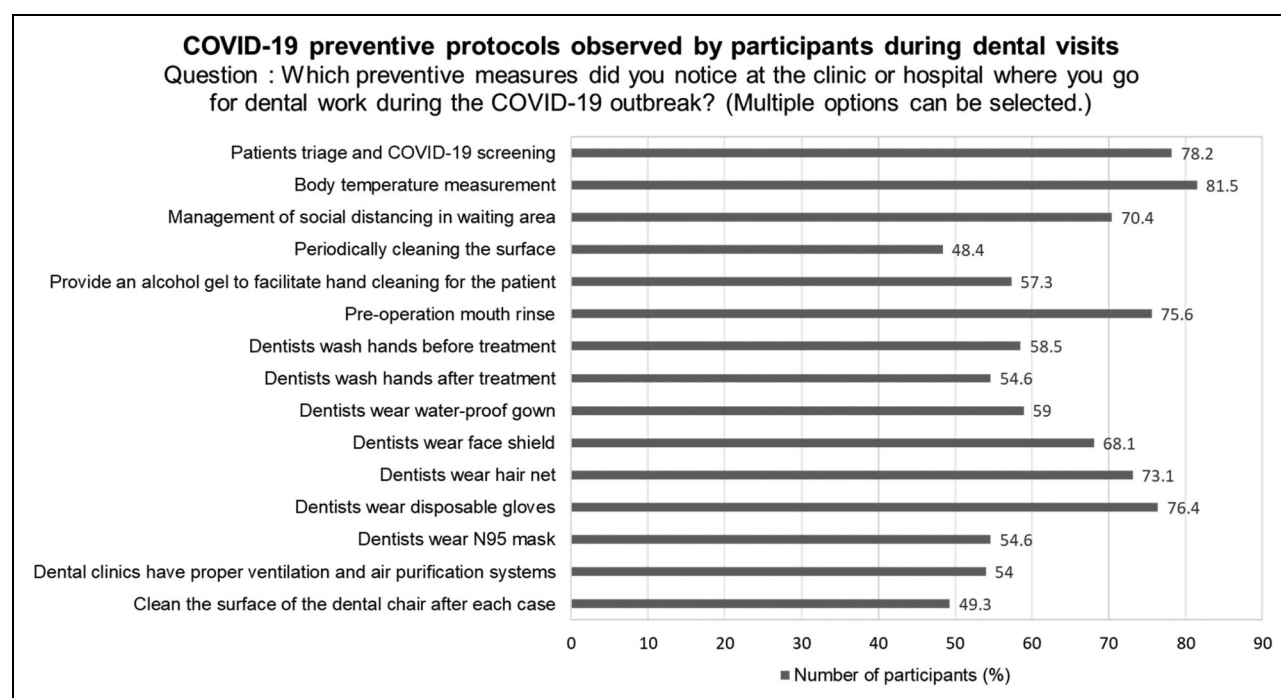


Figure 2. COVID-19 preventive protocols observed by participants during dental visits. The 5 most common protocols noticed by participants were body temperature measurement, COVID-19 triage, disposable gloves, and pre-operative mouth rinsing.

The issue with which the patients were most concerned about being infected with COVID-19 from dental treatment was removing the mask while receiving treatment. Our findings indicate that participants infrequently noted the presence of effective ventilation or air purification systems in dental clinics as a COVID-19 preventive measure. This underscores the necessity for dental clinics to enhance their focus on improving ventilation systems. The Thai Ministry of Public Health established a minimum of 12 air changes per hour (ACH) as the recommended standard for the environment in the dental clinic.²¹ Air purifiers are highly recommended in dental healthcare facilities to help prevent the spread of infection, not only of COVID-19 but also other respiratory diseases.²⁵

Certain demographic factors significantly influenced levels of concern. Female participants, those living with family, and those with higher education levels exhibited greater anxiety about contracting COVID-19 during dental visits. These findings are consistent with prior research that shows women and individuals with higher health literacy tend to be more cautious about health risks during the pandemic.^{26–29} The previous studies, which were systematic reviews or questionnaire surveys in China²⁷ and Spain,²⁸ found that females were the risk factor for anxiety during COVID-19. Those with education up to secondary school expressed the least concern about oral health issues, consistent with a study in Japan. They discovered that a higher level of education correlated with preventive dental care use, and participants with a high level of health literacy were more likely to use preventive dental care than those with low health literacy.²⁹

Additionally, participants who abstained from dental visits exhibited significantly higher levels of concern than those who continued their dental care, highlighting the strong correlation between anxiety and avoidance behavior.¹⁵

Despite these concerns, the majority of respondents expressed high confidence in their safety from COVID-19 when preventive measures were implemented by dental clinics. Confidence was highest when dental professionals strictly adhered to safety protocols. These findings suggest that while fear of infection is a significant barrier to care, clear communication and visible preventive measures can play a critical role in restoring patient trust. This is supported by studies from other regions, such as Poland, where similar measures were associated with higher levels of patient confidence in dental care safety.¹⁴

The pandemic also prompted behavioral changes in dental service utilization. A notable shift was observed from routine check-ups to symptom-driven visits, reflecting patients' prioritization of urgent care over preventive services during the pandemic. Consistent with prior research, we observed increased symptom-led and orthodontic visits during the pandemic, but fewer preventative appointments.^{11,12,16,19} These findings echo global reports on the disruption of routine healthcare services due to the pandemic, highlighting the need for strategies to ensure the continuity of both preventive and emergency dental care.

However, more than half of the participants who obtained dental services during COVID-19 received treatments during the Omicron stage which demonstrates that this is the period when patients are starting to return to acquire dental services.

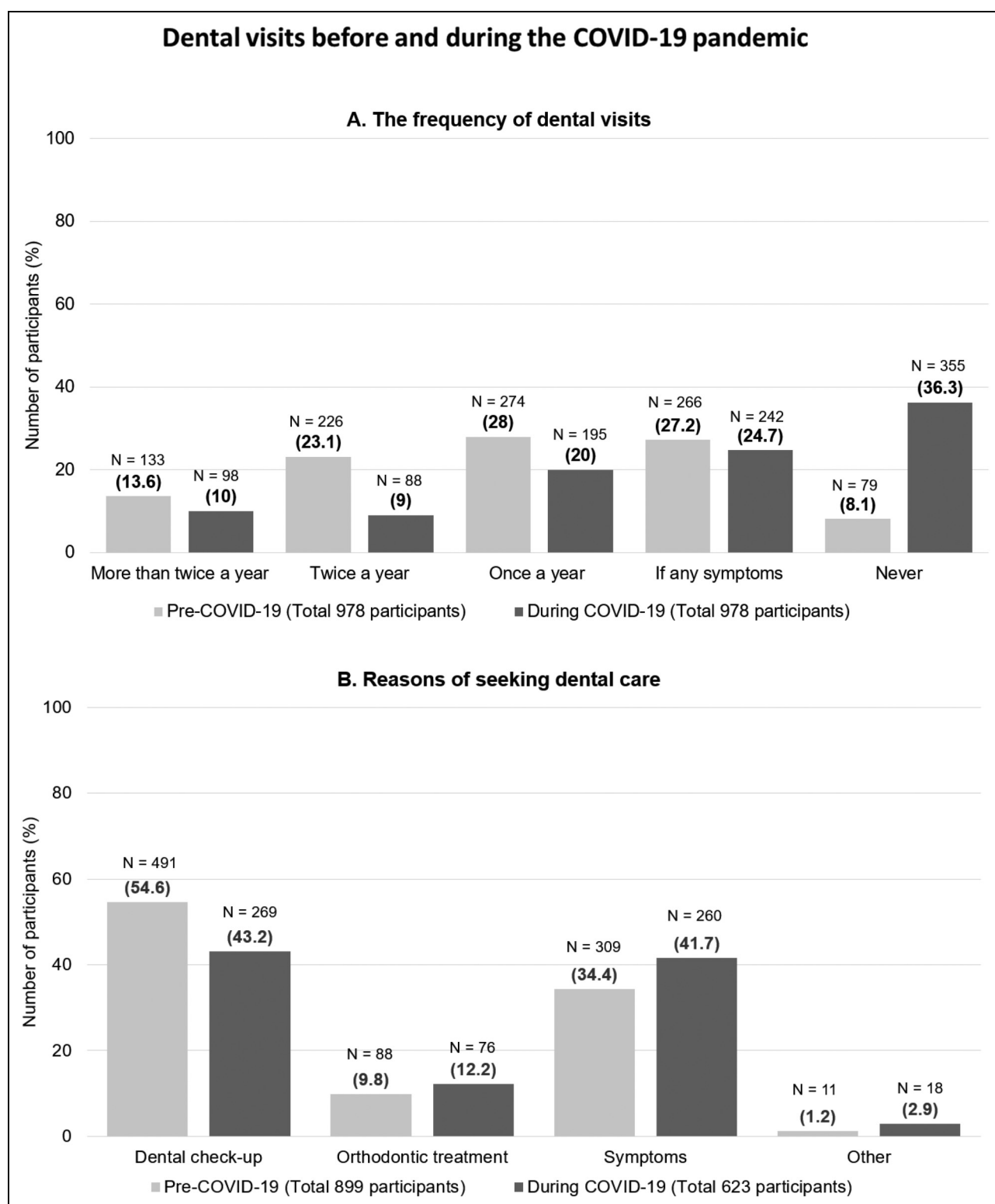


Figure 3. Dental visits before and during the COVID-19 pandemic (A) frequency of dental visits, and (B) reasons for seeking dental care.

This may be because the Omicron strain was less virulent or there were vaccines and preventive measures in place, including a better ability of the population to adapt to the new normal after the several initial outbreaks.^{20–23}

Interestingly, despite these disruptions, a proportion of participants supported the idea of allowing COVID-19-positive patients to receive dental treatment, provided that stringent preventive measures were in place. This suggests

that while patients are concerned about infection risks, they are also open to maintaining dental care access, even under challenging circumstances, if safety is guaranteed. The widespread support for the continued use of ATKs and other preventive strategies further emphasizes the importance of visible, actionable safety protocols in reassuring patients.

This study has several limitations. The reliance on an online survey may have introduced selection bias by excluding individuals without internet access or those less familiar with digital platforms. Conversely, even among those with access, some may have opted not to participate or discontinued the questionnaire due to time constraints. Furthermore, providing incentives for participation may have influenced respondents' decisions, potentially introducing bias into the sample.

Another limitation of this study is that 98.8% of respondents had received a COVID-19 vaccine, which may have influenced their perceptions of dental visit safety and risk assessment. The results might be even more pronounced in settings or countries with significant vaccine hesitancy, where concerns about infection risk and avoidance of dental care could be higher. Future research should consider diverse populations with varying vaccination rates to better understand the broader impact of vaccine status on dental care behaviors and perceptions.

Additionally, the cross-sectional design limits the ability to establish causal relationships between patient concerns and behaviors. Future research should incorporate longitudinal studies to capture changes in attitudes and behaviors over time, providing a more comprehensive understanding of these dynamics.

Moreover, future research should explore the mid- to long-term health effects of individuals who avoided or limited dental care during the pandemic. A key question is whether we will observe increased rates of tooth decay, periodontal disease, or other oral health complications as a result of this avoidance behavior. Longitudinal studies tracking oral health outcomes in populations with deferred care could provide valuable insights into the actual impact of missed routine visits.

Interestingly, research should investigate whether the current twice-a-year dental visit recommendation remains essential or if modifications are warranted based on evidence. If no significant long-term health effects emerge from reduced dental visits, this could prompt a reevaluation of traditional preventive care guidelines and raise questions about the value of frequent routine check-ups. Future studies should assess not only clinical but also patient-reported outcomes, treatment needs, and healthcare costs associated with delayed care, helping to determine whether existing recommendations provide optimal value or if a more personalized approach is needed.

Eventually, this study contributes to the growing body of knowledge on the pandemic's impact on dental healthcare, providing valuable insights for dental practitioners and

public health officials. By understanding the factors that influence patient behavior, dental practices can develop targeted strategies to address patient concerns, enhance preventive measures, and improve communication. The findings also underscore the importance of preparing for future pandemics by ensuring dental care systems are resilient and adaptable to crisis conditions. As pandemics are expected to occur periodically, this study offers a framework for dental professionals to maintain patient confidence and continuity of care in the face of similar health crises.

Conclusion

This study highlights the impact of the COVID-19 pandemic on patients' attitudes and behaviors toward dental care, emphasizing concerns over infection risks and the postponement of treatment. While in the Omicron stage, strict infection control measures enhanced patient confidence, vaccine coverage, and public relations about preventive protocols played a crucial role in shaping perceptions of safety. For future respiratory tract infection crises, dental care settings must adopt a proactive approach by strengthening infection control protocols, ensuring clear communication of safety measures, and integrating flexible care models such as tele dentistry and prioritized scheduling for high-risk patients. Additionally, long-term research on the effects of deferred dental care is essential to refine preventive guidelines and optimize patient management strategies. Maintaining patient trust and accessibility in dental services during health crises will be key to mitigating the impact of future outbreaks on oral health.

Acknowledgments

We would like to express our sincere thanks to Associate Professor Dr João Ferreira and Professor Lakshman Perera Samaranayake for their suggestions on manuscript writing techniques and to Associate Professor Dr Neeracha Sanchavanakij for participating in content validation.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the Faculty Research Grant, Faculty of Dentistry, Chulalongkorn University (grant number DRF64036).

Ethical Approval

It adhered to the Declaration of Helsinki and received approval from the Ethics Committee at the Faculty of Dentistry, Chulalongkorn University (approval number: 105/2021, dated: January 14, 2022).





Informed Consent

All participants gave consent before starting the questionnaires

Data Availability Statement

The dataset generated and analyzed during this study is available from the corresponding author upon reasonable request. Due to privacy and ethical considerations, access will be granted only for academic and research purposes.

ORCID iDs

Paratcha Pingsuthiwong  <https://orcid.org/0009-0006-3655-1113>
 Paswach Wiriyakijja  <https://orcid.org/0000-0002-2340-517X>
 Pagaporn Pantuwadee  <https://orcid.org/0000-0002-3092-7988>
 Keskanya Subbalekha  <https://orcid.org/0000-0002-1570-2289>

Supplemental Material

Supplemental material for this article is available online.

References

- Forchette L, Sebastian W, Liu T. A comprehensive review of COVID-19 virology, vaccines, variants, and therapeutics. *Curr Med Sci*. 2021;41(6):1037-1051.
- Hossain MM, Tasnim S, Sultana A, et al. Epidemiology of mental health problems in COVID-19: a review. *F1000Res*. 2020;9:636.
- Kolahchi Z, De Domenico M, Uddin LQ, et al. COVID-19 and its global economic impact. *Adv Exp Med Biol*. 2021;1318:825-837. doi:10.1007/978-3-030-63761-3_46
- Zhou L, Ayeh SK, Chidambaram V, Karakousis PC. Modes of transmission of SARS-CoV-2 and evidence for preventive behavioral interventions. *BMC Infect Dis*. 2021;21(1):496.
- Rahman HS, Aziz MS, Hussein RH, et al. The transmission modes and sources of COVID-19: a systematic review. *Int J Surg Open*. 2020;26:125-136.
- Ge ZY, Yang LM, Xia JJ, Fu XH, Zhang YZ. Possible aerosol transmission of COVID-19 and special precautions in dentistry. *J Zhejiang Univ Sci B*. 2020;21(5):361-368.
- Cirincione L, Plescia F, Ledda C, et al. COVID-19 pandemic: prevention and protection measures to be adopted at the workplace. *Sustainability*. 2020;12(9):3603.
- Guo J, Xie H, Wu H. Preventive measures for COVID-19 in dental treatments. *Disaster Med Public Health Prep*. 2022;16(3):866-870.
- Silva OMD, Cabral DB, Marin SM, Bitencourt J, Vargas MAO, Meschial WC. Biosafety measures to prevent COVID-19 in healthcare professionals: an integrative review. *Rev Bras Enferm*. 2021;75(1):e20201191. doi:10.1590/0034-7167-2020-1191
- Daltaban Ö, Aytekin Z. Fear and anxiety of COVID-19 in dental patients during the COVID-19 pandemic: a cross-sectional survey in Turkey. *Dent Med Probl*. 2022;59(3):343-350.
- Peloso RM, Pini NIP, Sundfeld Neto D, et al. How does the quarantine resulting from COVID-19 impact dental appointments and patient anxiety levels? *Braz Oral Res*. 2020;34:e84.
- Aquilanti L, Gallegati S, Temperini V, et al. Italian response to coronavirus pandemic in dental care access: the DeCADE study. *Int J Environ Res Public Health*. 2020;17(19):6977.
- Moffat RC, Yentes CT, Crookston BT, West JH. Patient perceptions about professional dental services during the COVID-19 pandemic. *JDR Clin Trans Res*. 2021;6(1):15-23.
- Pylińska-Dąbrowska D, Starzyńska A, Cuda WJ, Ragin K, Alterio D, Jereczek-Fossa BA. Psychological functioning of patients undergoing oral surgery procedures during the regime related with SARS-CoV-2 pandemic. *J Clin Med*. 2020;9(10):3344.
- Promchinnawong W, Jansawang S, Deeraksa S, Jitpreeda W, Thanakanjanaphakdee W. Perspectives on dental services of the patients in the pandemic of coronavirus (COVID-19) Thakhantho District, Kalasin Province. *TDNJ*. 2021;32(1):80-88.
- Sun J, Xu Y, Qu Q, Luo W. Knowledge of and attitudes toward COVID-19 among parents of child dental patients during the outbreak. *Braz Oral Res*. 2020;34:e066.
- Bains R, Tikku A, Bains V, Verma P. Knowledge, attitudes, and practices of dental patients toward cross-infection and economic implications in view of COVID-19: an online survey. *J Adv Oral Res*. 2021;12(1):95-102.
- Ahmed MA, Jouhar R, Adnan S, Ahmed N, Ghazal T, Adanir N. Evaluation of patient's knowledge, attitude, and practice of cross-infection control in dentistry during COVID-19 pandemic. *Eur J Dent*. 2020;14(S 01):S1-S6.
- Farsi D, Farsi N. Mothers' knowledge, attitudes, and fears about dental visits during the COVID-19 pandemic: a cross-sectional study. *J Int Soc Prev Community Dent*. 2021;11(1):83-91.
- Meo SA, Meo AS, Al-Jassir FF, Klonoff DC. Omicron SARS-CoV-2 new variant: global prevalence and biological and clinical characteristics. *Eur Rev Med Pharmacol Sci*. 2021;25(24):8012-8018.
- Amnuaiphanit P, Thumbuntu T, Gaewkhiew P, Ampomaramveth RS. Paradigm shift in infection control practices in dental clinics in response to COVID-19 among dental professionals in Thailand. *Front Oral Health*. 2022;3:979600.
- Ngamchaliew P, Kaewkuea N, Nonthasom N, et al. Acceptance of COVID-19 vaccination and vaccine confidence levels in Thailand: a cross-sectional study. *Vaccine*. 2023;41(44):6589-6598.
- Maude RR, Jongdeepaisai M, Skuntaniyom S, et al. Improving knowledge, attitudes and practice to prevent COVID-19 transmission in healthcare workers and the public in Thailand. *BMC Public Health*. 2021;21(1):749.
- Doceda MV, Gavriiloglou M, Petit C, Huck O. Oral health implications of SARS-CoV-2/COVID-19: a systematic review. *Oral Health Prev Dent*. 2022;20:207-218.
- Tzoutzas I, Karoussis I, Maltezou HC. Air quality in dental care facilities: update to current management and control strategies implementing new technologies: a comprehensive review. *Vaccines (Basel)*. 2022;10(6):847.
- Saeed H, Eslami A, Nassif NT, Simpson AM, Lal S. Anxiety linked to COVID-19: a systematic review comparing anxiety rates in different populations. *Int J Environ Res Public Health*. 2022;19(4):2189.

27. Fu W, Wang C, Zou L, et al. Psychological health, sleep quality, and coping styles to stress facing the COVID-19 in Wuhan, China. *Transl Psychiatry*. 2020;10(1):225.
28. Rodríguez-Rey R, Garrido-Hernansaiz H, Collado S. Psychological impact and associated factors during the initial stage of the coronavirus (COVID-19) pandemic among the general population in Spain. *Front Psychol*. 2020;11:1540.
29. Murakami K, Aida J, Kuriyama S, Hashimoto H. Associations of health literacy with dental care use and oral health status in Japan. *BMC Public Health*. 2023;23(1):1074.