



# Perceived Economic Impact of COVID-19 on Dental Practitioners: A Bi-Country Survey

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## Abstract

**Objective** COVID-19 resulted in dentistry being declared high-risk occupation due to the mode of the spread of the virus. This resulted in partial and complete closure of dental practices around the world, reducing revenue of practitioners. Hence, study aims to evaluate financial impact on dental practitioners in Pakistan and UAE.

**Materials and Methods** A questionnaire-based cross-sectional study was conducted from July 2020 to January 2021. It involved questions relating to demographics and financial challenges faced, associated with change in standard operating procedures due to pandemic. The descriptive statistics were expressed as frequency and percentage. Statistical analysis was performed by Chi-square test or Fischer's exact test.

**Results** In total, 427 respondents participated in the study. Approximately half (55.7%) of the respondents had their practices shut down, while 89.9% observed decrease in patient flow. The majority (82.2%) of respondents had to buy personal protective equipment (PPE), whereas 66.7% had to pay a high cost for that. Almost 87.3% of respondents reported having experienced financial constraints because of the pandemic related changes to the practice. Moreover, 27.8% reported staff being laid off, which were mostly due to monetary constrictions.

**Conclusion** Dental professionals faced a considerable impact on their practice and financial situation due to pandemic. Policies must be made to support such professionals in times of emergency who are at higher risk of being most affected with respect to health and finances.

## Keywords

- ▶ COVID-19
- ▶ dentistry
- ▶ dental clinics
- ▶ dental practice
- ▶ economic evaluation

## Introduction

The outbreak of COVID-19 affected more than 210 countries worldwide, which was declared a public health emergency shortly after. It is a serious respiratory syndrome, caused by

the novel SARS-CoV-2 virus that is transmitted either indirectly via the inhalation of infected respiratory droplets or directly via direct inoculation. The symptoms usually present 2 to 14 days after being exposed in the form of fever, sore

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throat, cough, shortness of breath, loss of taste, and/or smell.<sup>1</sup> The real concern arises from the chances of virus transmission from asymptomatic individuals and the ability of virus to survive in aerosols/droplets for several hours and on objects for many days.<sup>2</sup> Hence, dental professionals are deemed at a very high risk of exposure, primarily due to aerosol-generating procedures (AGPs) and the close doctor-patient proximity.<sup>1-3</sup> Therefore, dental associations and regulatory bodies issued guidelines to minimize the risk of cross-infection amongst patients and dental healthcare professionals. These guidelines mainly involved patient triage, elimination of AGPs and focusing on urgent and emergency dental treatments.<sup>4-6</sup>

In April 2020, the National Health Service (NHS) guidelines allowed only for emergency dental procedures to be performed at urgent dental care centers.<sup>4</sup> In the same time frame, the American Dental Association (ADA) allowed for reduced routine check-ups and follow-up appointments alongside emergency dental care.<sup>6</sup> Consequently, in August 2020, the World Health Organization (WHO) advised all routine check-ups, preventive treatments, and dental cleaning to be put on hold until COVID-19 transmission rates subsided.<sup>5</sup> As a consequence, many dental professionals in Pakistan and UAE had to close practices and only a few offered emergency services. These procedures mainly included treating acute oral infections, swelling, severe pain uncontrollable by analgesics, broken orthodontic appliances, extensive dental decay, and dental/facial trauma.<sup>7</sup> Moreover, the Dubai Health Authority (DHA) started the disinfection program from March 2020 and guidelines put forth by the ADA were followed.<sup>8</sup> Thus, dental practices globally had to postpone elective treatments, screen patients for contact history, increase PPE, improve aerosol control by either using HEPA filters or extra-oral suction, maintain recommended ventilation rates at 10/l/s/person, and focus on post-treatment disinfection protocols.<sup>5,7,9</sup>

The dental world had to face the direct impact of such changes financially. The effect of such changes has been profound all over; however, in countries such as Pakistan where inflation is at a constant rise and most of the population is under poverty line, this effect has been 10-fold. Interestingly, UAE, a high-income country, also did not have any plan in place to support the dental professionals in such trying times, which possibly also had an impact on financial outcomes for such professionals. This impact of COVID-19 on dentistry has reinforced permanent changes in patient scheduling with decreased procedure volumes, reduced patient flow, and limited dental staff hiring, leading to increased cost of dental treatment and decreased practice revenues.

In these trying times, clinicians had to face challenges and it is worth exploring the impact of COVID-19 as we navigate toward the "new norm of dental world." Hence, the current study aimed to evaluate the financial and clinical impact of COVID-19 on dental professionals practicing in UAE and Pakistan.

## Materials and Methods

A questionnaire-based cross-sectional study was performed amongst the dental practitioners practicing in Pakistan and UAE, from July 2020 to January 2021. Non-probability sampling was employed to select respondents for the study. Sample size was calculated by considering the number of registered dentists in Pakistan and UAE (29, 135) with 70% response distribution, 95% level of confidence, 80% study power, and 20% attrition. The minimum required sample size was estimated to be 384. Ethical approval (UCD/ERCA/20/06h) was obtained from the review board of the University College of Dentistry, University of Lahore. The questionnaire was validated by one researcher and one subject specialist to ascertain the relevance of questions. It was then piloted amongst 40 participants to ensure its validity and reliability. The Google questionnaire link was then randomly shared online through social media groups and applications to the targeted population. The aim and purpose of the study was conveyed to the respondents and a valid consent was obtained from participating dental practitioners before completing the questionnaire. Confidentiality of the participants was assured by omitting gathering any personal information, for example, name, email address, or social media handle. The self-formulated questionnaire included general questions on participant demographics, employment status, pay grade, general patient influx in dental practice, and more focused questions relating to financial constraints, if any brought on by COVID-19-related restrictions. Exclusion criteria entailed dentists who were not practicing and those only practicing in dental teaching hospitals. Data were entered and analyzed using the IBM SPSS (version 23.0) software. The descriptive statistics of categorical variables are expressed as frequency and percentage, while continuous variables such as age are presented as mean and standard deviation. Categorical group comparisons were made by Chi-square test or Fischer exact test as applicable. A  $p$ -value of  $\leq 0.05$  was considered to be statistically significant.

## Results

A total of 427 dental professionals, aged 23 years and above participated in the current study. In total, 305 (71.4%) practitioners were from Pakistan, while 122 (28.6%) were from the UAE. The majority of the participants were male (227 [53.2%]) with an overall mean age of  $34.68 \pm 9.4$  years (age range: 23–61). More than half of the respondents had basic dental qualification of BDS/DDS (257 [60.2%]), and around 111 (26%) respondents were practicing as dental professionals for more than 10 years. Most (309 [72.4%]) of them were currently working as general dental practitioners. **Table 1** gives a country-wise summary of demographic characteristics of the study population.

Data analysis indicated that most of the participating dentists were employed as general dental practitioners, as opposed to being the practice owners and were earning moderately.

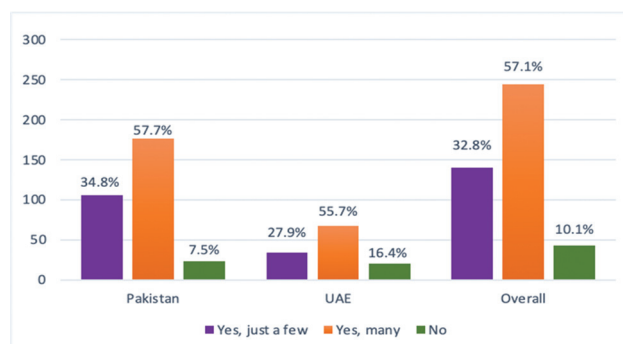
**Table 1** Country-wise summary of demographic characteristics

Sr. No.	Characteristics	Population sample	
		Pakistan (n = 305)	UAE (n = 122)
1.	Age in years (mean $\pm$ SD)	35.94 $\pm$ 9.9	
2.	Age range	23 - 60	
3.	Gender		
	• Male	180 (59.0%)	47 (38.5%)
	• Female	125 (41.0%)	75 (61.5%)
4.	Qualification*		
	• BDS/DDS/DMD	150 (49.2%)	107 (87.7%)
	• FCPS/MCPS	99 (32.4%)	0 (0%)
	• MSc	37 (12.1%)	13 (10.7%)
	• MDS	16 (5.2%)	0 (0%)
	• PhD	3 (1.0%)	2 (1.6%)
5.	Years in practice		
	• <1–3 years	75 (24.6%)	44 (36.1%)
	• 4–10 years	143 (46.9%)	54 (44.3%)
	• >10 years	87 (28.5%)	24 (19.7%)
6.	Job description		
	• General dental practitioner	198 (64.9%)	111 (91.0%)
	• Specialist	107 (35.1%)	11 (9.0%)
7.	Monthly income		
	• Low	75 (24.6%)	52 (42.6%)
	• Middle	140 (45.9%)	68 (55.7%)
	• High	90 (29.5%)	2 (1.6%)
8.	Sole earner in family	89 (29.2%)	38 (31.3%)
9.	Owns private practice		
	• Yes	129(42.3%)	13 (10.7%)
	• No	176(57.7%)	109 (89.3%)
10.	High volume practice (>35 new patients per month)		
	• Yes	132 (43.3%)	42 (34.4%)
	• No	173 (56.7%)	80 (65.6%)

\*Fellowship of College of Physicians and Surgeons/ Member of College of Physicians and Surgeons Master of Dental Surgery.

Following the government-imposed lockdown, 55.7% of the practitioners had to shut down their dental practices for any major dental procedures or treatments.

Similarly, 82.5% of the operating dental practices reported a drastic increase in number of appointments cancelled by the patients (**► Fig. 1**). Generally, a low patient influx was observed by 90% of the dental practitioners. In contrast, 79.8% of the practitioners refused to examine or treat patients during this time. It was also found that the financial situation of the majority of the respondents (374 [87.6%]) was considerably affected during the pandemic-driven health regulation changes. Country-wise responses are depicted in **► Table 2**.



**Fig. 1** Responses pertaining to patients cancelling appointments due to pandemic.

**Table 2** Country-wise effect of COVID-19 pandemic on dental practices

Sr. No.	Parameters	Overall (n = 427)	Location	UAE (n = 122)	p-Value
			Pakistan (n = 305)		
1.	Practice closed after government-imposed lockdown (except emergency services)				
	• Yes	238(55.7%)	177 (58%)	61 (50%)	0.13
	• No	189 (4.3%)	128 (42%)	61 (50%)	
	If not, did you reduce the number of patients? (n = 189)				
	• Yes	156 (82.5%)	117 (65.4%)	39 (34.6%)	<0.01
• No	33 (17.4%)	11 (84.8%)	22 (15.2%)		
2.	Procedures performed during lockdown				
	• Only medication	146 (34.2%)	109 (35.7%)	37 (30.3%)	<0.01
	• Only Emergency services	228 (53.4%)	177 (58%)	51 (41.8%)	
	• All Procedures with precautions	53 (12.4%)	19 (6.2%)	34 (27.9%)	
3.	Refused patients due to suspected infection				
	• Yes, just a few	195 (45.7%)	148 (48.5%)	47 (38.5%)	<0.01
	• Yes, many	146 (34.2%)	117 (38.4%)	29 (23.8%)	
	• No	86 (20.1%)	40 (13.1%)	46 (37.7%)	
4.	Patients refused to show up for appointment due to the pandemic				
	• Yes, just a few	140 (32.8%)	106 (34.8%)	34 (27.9%)	0.01
	• Yes, many	244 (57.1%)	176 (57.7%)	68 (55.7%)	
	• No	43 (10.1%)	23 (7.5%)	20 (16.4%)	
5.	Reduced practice timings in view of the pandemic				
	• Yes	260 (73.0%)	187 (61.3%)	73 (59.8%)	0.82
	• No	167 (26.9%)	118 (38.7%)	49 (40.2%)	
6.	Purchased special equipment e.g PPE etc				
	• Yes	351 (82.2%)	260 (85.2%)	91 (74.6%)	0.01
	• No	76 (17.8%)	45 (14.8%)	31 (25.4%)	
7.	Incurred high cost for the purchase of special equipment				
	• Yes	285 (66.7%)	218 (71.5%)	67 (54.9%)	<0.01
	• No	142 (33.3%)	87 (28.5%)	55 (45.1%)	
8.	Experienced interruption in availability of dental supplies				
	• Yes	275 (64.4%)	198 (64.9%)	77 (63.1%)	0.73
	• No	152 (35.6%)	107 (35.1%)	45 (36.9%)	
9.	Difficult for owners to manage payment of dental supplies due to hike in price (n = 142)				
	• Yes	86 (60.6%)	76 (53.5%)	10 (70.4%)	0.31
	• No	56 (39.4%)	53 (37.3%)	3 (2.1%)	
10.	Staff laid-off due to pandemic				
	• Yes	119 (27.8%)	112 (36.7%)	7 (5.8%)	<0.01
	• No	308 (72.2%)	193 (63.3%)	115(94.2%)	
	Reasons for laying-off staff				
	• Monetary issues	67 (56.4%)	64 (57.1%)	3 (42.8%)	<0.01
	• Maintaining SOPs	27 (22.6%)	25 (22.3%)	2 (28.6%)	
	• Members who weren't essential part of the team	25 (21%)	23 (20.5%)	2 (28.6%)	
11.	Financial constraint experienced				
	• Not much	53 (12.4%)	34 (11.1%)	19 (15.6%)	0.43

(Continued)

**Table 2** (Continued)

Sr. No.	Parameters	Overall (n = 427)	Location	UAE (n = 122)	p-Value
			Pakistan (n = 305)		
	• Somewhat	172 (40.3%)	126 (41.3%)	46 (37.7%)	
	• Very much	202 (47.3%)	145 (47.5%)	57 (46.7%)	
12.	Aware of monetary relief/compensation declared by the government				
	• Yes	62 (14.5%)	42 (13.8%)	20(16.4%)	0.54
	• No	365 (85.5%)	263 (86.2%)	102(83.6%)	
13.	Started offering routine services to all patients				
	• Yes	326 (76.3%)	240 (78.7%)	86 (70.5%)	0.07
	• No	101 (23.7%)	65 (21.3%)	36 (29.5%)	
14.	Accommodating lesser appointments than before				
	• Yes	283 (66.3%)	197 (64.6%)	86 (70.5%)	0.25
	• No	144 (33.7%)	108 (35.4%)	36 (29.5%)	

It was found that the “years of practice” and “owning a private clinic” were significantly associated with some indicators of economic crisis during the COVID-19 epidemic. More experienced dentists were able to afford expensive special equipment ( $p < 0.001$ ) to provide patient care during the pandemic. ► **Table 3** depicts overall and country-wise association of monthly income with economic crisis indicators. Similarly, owners of private clinics were more likely to have bought specialized equipment ( $p < 0.001$ ), and had paid more money for special equipment ( $p < 0.001$ ). At the same time, dental practitioners with more monthly income were more likely to buy special equipment ( $p < 0.001$ ), paid more for specialized equipment ( $p < 0.001$ ), and were less likely to encounter difficulty in payment ( $p < 0.001$ ).

Overall and country-wise association of owning private clinics with economic crisis indicators is given in ► **Table 4**. Interestingly, all subgroups were found to be equally affected financially owing to the COVID-19 pandemic.

## Discussion

In the critical times of COVID-19, effective sustainability of dental practice under certain restrictions and pandemic conditions was put under question. Hence, the current study was performed to highlight potential financial impact on practicing dentists during the peak of COVID-19 under changed health policies.

Most of the participating dentists were mid-career general practitioners. Consequently, due to pandemic and government-imposed lockdown, 55.7% had to shut down practice for major procedures. Similarly, a study performed in Pakistan reported that 52.7% of dental practitioners who owned their practices were open for clinical services.<sup>10</sup> While it was important for dentists to provide relief to their patients, a lot of practices were fully functional possibly to retain their patients as well, as they would have changed

their preference toward a practice that was offering services which they required at that moment. Conversely, a Polish study reported that 71.2% of dentists suspended their dental practice and subsequently observed an evident decrease in the number of patients after the COVID-19 outbreak.<sup>11</sup> Their main reason for closure was to contain the infection and lack of protective equipment.

The majority (53%) of the regular dental procedures were limited to emergency treatments aiming to relieve pain, which was an appreciative step toward limiting transmission of COVID-19. A survey by the Irish Dental Association (IDA) reported a similar finding in which 52% of practices were confined to emergency treatments only.<sup>12</sup> However, dental practices around the world had to endure financial constraints due to it.

According to a survey conducted by Tada et al, 46.7% of participants reported a decrease in the number of patients.<sup>13</sup> Most respondents in our study also corroborated that many patients refused to show up for the appointment owing to the situation of pandemic. Also, timings of most practices were reduced instead of complete closure. This could be so that the dentists could manage the finances associated with payment of bills and maintenance of equipment, etc.

To ensure safe practice and continue to sustain financial positions, many dental practices employed safety and necessary measures, where the majority of respondents had to purchase thermal guns and protective personal equipment (PPE) such as full body suits, face shield, and N95 masks. Many practitioners who were employees and did not own the practices reported purchasing PPE. It is worth exploring why the PPE was not provided by the employers which in turn resulted in financial burden on dental employees, although two reasons can be postulated for this. First, dental practitioners were faced with difficulty in providing PPE because of the high cost as dental owners had to manage expenses associated with buying specialized equipment and managing

**Table 3** Country-wise associations of monthly income and economic crisis indicators

Country	Economic indicators	Monthly income status			p-Value
		Low (n = 127)	Middle (n = 208)	High (n = 92)	
Overall	Bought special equipment				
	• Yes	86 (67.7%)	175(84.1%)	90 (97.8%)	<0.01
	• No	41 (32.3%)	33 (15.9%)	2 (2.2%)	
	Paid more for special equipment				
	• Yes	67 (52.8%)	135(64.9%)	83 (90.2%)	<0.01
	• No	60 (47.2%)	73 (35.1%)	9 (9.8%)	
	Faced difficulty in payment management (n = 142)				
	• Yes	10 (83.3%)	42 (73.7%)	33 (45.2%)	<0.01
	• No	2 (16.7%)	15 (26.3%)	40 (54.8%)	
	Financial situation got affected				
	• Not much	18 (14.2%)	24 (11.5%)	11 (12%)	0.72
	• Somewhat	47 (37.0%)	83 (39.9%)	44 (45.7%)	
	• Very much	62 (48.8%)	101(48.7%)	39 (42.4%)	
		Low (n = 75)	Middle (n = 140)	High (n = 90)	p-Value
Pakistan	Bought special equipment				
	• Yes	53 (70.7%)	119 (85.0%)	88 (97.8%)	<0.01
	• No	22 (29.3%)	21 (15.0%)	2 (2.2%)	
	Paid more for special equipment				
	• Yes	44 (58.7%)	92 (65.7%)	82 (91.1%)	<0.01
	• No	31 (41.3%)	48 (34.3%)	8 (8.9%)	
	Faced difficulty in payment management (n = 129)				
	• Yes	7 (77.8%)	37 (75.5%)	31 (43.7%)	<0.01
	• No	2 (22.2%)	12 (24.5%)	40 (56.3%)	
	Financial situation got affected				
	• Not much	8 (10.7%)	15 (10.7%)	11 (12.2%)	0.80
	• Somewhat	31 (41.3%)	54 (38.6%)	41 (45.6%)	
	• Very much	36 (48.0%)	71 (50.7%)	38 (42.2%)	
		Low (n = 52)	Middle (n = 68)	High (n = 02)	p-Value
UAE	Bought special equipment				
	• Yes	33 (63.5%)	56 (82.4%)	2 (100%)	0.04
	• No	19 (36.5%)	12 (17.6%)	0 (0%)	
	Paid more for special equipment				
	• Yes	23 (44.2%)	43 (63.2%)	1 (50.0%)	0.11
	• No	29 (55.8%)	25 (36.8%)	1 (50.0%)	
	Faced difficulty in payment management (n = 13)				
	• Yes	3 (100%)	5 (62.5%)	2 (100%)	0.29
	• No	0 (0%)	3 (37.5%)	0 (0%)	
	Financial situation got affected				
	• Not much	10 (19.2%)	9 (13.2%)	0 (0%)	0.66
	• Somewhat	16 (30.8%)	29 (42.6%)	1 (50.0%)	
	• Very much	26 (50.0%)	30 (44.1%)	1 (50.0%)	

**Table 4** Associations between being the private dental practice owner and economic crisis indicators

Country	Economic indicators	Owning private clinic		p-Value
		Yes (n = 142)	No (n = 285)	
Overall Both	Bought special equipment			
	• Yes	130 (91.5%)	221 (77.5%)	<0.01
	• No	12 (8.5%)	64 (22.5%)	
	Paid more for special equipment			
	• Yes	114 (80.3%)	171 (60.0%)	<0.01
	• No	28 (19.7%)	114 (40.0%)	
	Faced difficulty in payment management			
	• Yes	86 (60.6%)	0 (0%)	-
	• No	56 (39.4%)	0 (0%)	
	Financial situation got affected			
	• Not much	14 (9.9%)	39 (13.7%)	0.36
	• Somewhat	55 (38.7%)	117 (41.1%)	
• Very much	73 (51.4%)	129 (45.3%)		
		Yes (n = 129)	No (n = 176)	p-Value
Pakistan	Bought special equipment			
	• Yes	120 (93%)	140 (79.5%)	<0.01
	• No	9 (7.0%)	36 (20.5%)	
	Paid more for special equipment			
	• Yes	109 (84.5%)	109 (61.9%)	<0.01
	• No	20 (15.5%)	67 (38.1%)	
	Faced difficulty in payment management			
	• Yes	76 (58.9%)	0 (0%)	-
	• No	53 (41.1%)	0 (0%)	
	Financial situation got affected			
	• Not much	11 (8.5%)	23 (13.1%)	0.22
	• Somewhat	50 (38.8%)	76 (43.2%)	
• Very much	68 (52.7%)	77 (43.2%)		
		Yes (n = 13)	No (n = 109)	p-Value
UAE	Bought special equipment			
	• Yes	10 (76.9%)	81 (74.3%)	0.83
	• No	3 (23.1%)	28 (25.7%)	
	Paid more for special equipment			
	• Yes	5 (38.5%)	62 (56.9%)	0.20
	• No	8 (61.5%)	47 (43.1%)	
	Faced difficulty in payment management			
	• Yes	10 (76.9%)	0 (0%)	-
	• No	3 (23.1%)	0 (0%)	
	Financial situation got affected			
	• Not much	3 (23.1%)	16 (14.7%)	0.69
	• Somewhat	5 (38.5%)	41 (37.6%)	
• Very much	5 (38.5%)	52 (47.7%)		

payment of their rent and dental materials. A report estimated 1000% increase in the price of PPE during the peak COVID-19 period compared with the pre-pandemic period.<sup>14</sup> This was validated by results of an Iranian study.<sup>15</sup> Second, due to the increase in the demand of PPEs and disinfectants for the healthcare providers, bearing the apparent utilization, these become scant as well further adding to the dismay of practitioners.

Interestingly, results from UAE depicted that 45.1% of respondents did not have to pay high costs for the PPE, whereas only 28.5% in Pakistan reported the same. Although most practitioners in both countries were faced with interruption in the delivery of dental supplies as most materials are imported from Europe and the US in this part of the world.

According to this study, the financial situation of the majority of dentists in Pakistan as well as UAE was equally affected. Likewise, Moraes et al revealed that 94% of the Brazilian dentists were financially affected due to the pandemic.<sup>16</sup> Although where 36.7% of the staff was laid off in the Pakistani sample, only 5.8% of dentists from UAE reported being let go from practices. Reasons for most layoffs were associated with financial issues. A US-based survey also reflected that only 27% paid the full salary to staff, whereas, 45% paid half the salary, and 28% did not pay at all.<sup>17</sup>

Unfortunately, in Pakistan, ~86.2% were not aware of any monetary relief declared by the government. It was indeed testing times, especially for low- and middle-income countries with limited resources but there was a visible need for relief policies for health workers of private practice. With social distancing requirements, no pay cheque protection program loans, and employee furloughs, running dental offices had to face economic hardships. Only monetary relief which a few of private dental practitioners could find was bill payment in term of instalments, yet not initiated by the government at a national platform.<sup>18</sup>

In March 2020, the Canadian government announced an Economic Response Plan with proposed \$27 billion to assist various businesses affected due to the pandemic.<sup>19</sup> Moreover, NHS-managed dental practices in the UK were also provided funds as compensation.<sup>20</sup> Unfortunately, such measures were lacking not only Pakistan but also in high-income countries such as UAE. It is imperative that dental associations of both countries should advocate for such policies to be incorporated in national programs so that if such an emergency were to occur again, an existing healthcare insurance or support plan will provide some relief to healthcare workers.

Pakistan Ministry of National Health Services, Regulations & Coordination provided return to working guidelines for dental care services during the COVID-19 pandemic on July 16, 2020, but no substantial platform has been established to ponder over the clinical financial constraints faced by dental community including the cost of preventive measure equipment of triaging zone to aerosol-minimizing measures.<sup>10</sup>

## Conclusion

It is evident from the results that most respondents in both countries experienced financial constraints due to the pan-

demic. It can help in understanding how dental practices were affected due to COVID-19 and enable the authorities to formulate future strategies to overcome these problems in further emergency situations.

## Limitations

More respondents from UAE could have been approached if not for the pandemic to make accurate assessment and comparison with Pakistan, enabling to understand the precise difference between low- and high-resource settings.

### Funding

None.

### Conflict of Interest

None declared.

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