

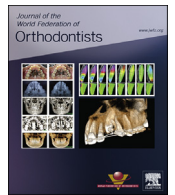


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Journal of the World Federation of Orthodontists

journal homepage: www.jwfo.org

Research Article

Perceived impact of the COVID-19 pandemic on orthodontic practice by orthodontists and orthodontic residents in Nigeria

Ikenna Gerald Isiekwe^{a,*}, Tope Emmanuel Adeyemi^b, Elfleda Angelina Aikins^c, Onyinye Dorothy Umeh^d^a Senior Lecturer/Consultant Orthodontist, Faculty of Dental Sciences, College of Medicine, University of Lagos/Lagos University Teaching Hospital, Idi Araba, Lagos, Nigeria^b Lecturer/Consultant Orthodontist, Faculty of Dentistry, College of Health Sciences, Bayero University Kano/Aminu Kano Teaching Hospital, Kano, Nigeria^c Senior Lecturer/Consultant Orthodontist, Faculty of Dentistry, College of Health Sciences, University of Port Harcourt/University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria^d Lecturer/Consultant Orthodontist, Faculty of Dental Sciences, College of Medicine, University of Lagos/Lagos University Teaching Hospital, Idi Araba, Lagos, Nigeria

ARTICLE INFO

Article history:

Received 13 June 2020

Accepted 6 July 2020

Available online 5 August 2020

Keywords:

COVID-19

Nigeria

Orthodontic practice

Perceived impact

ABSTRACT

Background: The Coronavirus Disease 2019 (COVID-19) pandemic has had far-reaching effects on orthodontic care delivery worldwide. This study aimed to assess the impacts of the pandemic on orthodontists and orthodontic residents in Nigeria.

Methods: This cross-sectional study was conducted among consenting orthodontists and orthodontic residents. The respondents were contacted through the WhatsApp group of the Nigerian Association of Orthodontists to fill the self-administered online questionnaires (Google forms). The questionnaire had two sections: A, Sociodemographics; B, Perceived impact of the COVID-19 pandemic. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 20. Descriptive statistics were used to compute mean and standard deviation and chi-square for association. Level of significance was set at $P < 0.05$.

Results: This study population comprised 98 people; however, only 73 participants responded, which represented a response rate of 74.5%. Approximately 60% (44) of the respondents thought that the COVID-19 pandemic would lead to a reduction in the number of orthodontic patients in the future, whereas almost all the respondents reported that it would affect their future practice of orthodontics. Most of the respondents (63.0%) reported that the pandemic had recorded a moderate to severe negative economic impact on them. Significant gender differences were recorded, in the social life of respondents, in addition to economic and psychosocial effects.

Conclusions: Almost all respondents reported that they would change their future practice of orthodontics, particularly with respect to placing a greater emphasis on infection control. Most of the respondents reported perceived economic, psychosocial, and social impacts due to the pandemic.

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1. Introduction

The Coronavirus Disease 2019 (COVID-19) is a highly infectious disease caused by the most recently discovered coronavirus, which is otherwise known as a “novel coronavirus (nCoV).” This new

virus and disease were unknown before the outbreak of a strange flu-like disease began in Wuhan, China, in December 2019 [1]. COVID-19 is caused by an emerging strain of coronavirus (SARS-Cov-2) that has not been previously identified in humans, belonging to the same family of viruses responsible for severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), for which zoonotic and person-to-person transmission have been confirmed [2].

This disease caught the world completely and as at the time of this study, approximately 4 million people had been infected worldwide, spread across 210 countries, with more than 400,000 fatalities recorded. The World Health Organization declared it a

Funding: This was a self-funded research study.

Competing interest: The authors have no competing interests.

* Corresponding author: Department of Child Dental Health, Faculty of Dental Sciences, College of Medicine, University of Lagos, Idi Araba, Lagos, Nigeria.

E-mail addresses: ikiesiekwe@yahoo.com, iisiekwe@unilag.edu.ng (I.G. Isiekwe).

public health emergency of international concern on January 30, 2020, reflecting the grave seriousness of this pandemic [1].

In Nigeria, the first official case of COVID-19 was reported in late February 2020. Data from the Nigerian Centre for Disease Control revealed that close to 28,000 cases have been reported so far, with approximately 628 deaths till date of this study and these numbers are rising steadily, with the disease spreading rapidly [2,3].

The COVID-19 infection is spread primarily by droplet infection and contact with infected persons and surfaces [1]. Thus, various methods for reducing the spread of the virus, which include hand hygiene involving regular handwashing with soap and water and/or the use of an alcohol-based hand rub, have been recommended. In addition to these, avoidance of touching the face, eyes, and nose, as well as maintaining a social distance of at least 1 m in public or crowded areas have also been reported to be effective. Furthermore, the need to maintain good respiratory hygiene has been advocated [1,2]. Most countries were placed on a total lockdown to prevent cross infection as the number of people infected, as well as casualties, increased.

The nature of spread of this virus puts health care workers among the most vulnerable groups at risk of contracting the infection. Among this group, dentists and other dental care professionals are particularly at great risk because the oral cavity, is a portal of exit and entry of the virus, and being a major route of spread of the virus [4]. Further, it is reported that the saliva of infected persons contains very high viral load [5] and aerosol-generating procedures often carried out in the dental clinic can become a source of its spread as well as cross-infection.

Thus, due to the characteristics of dental practice settings, there is a risk of cross infection between patients and dental health practitioners [6]. As a result of this, many national dental associations all over the world, including the Nigerian, American, and British Dental Associations [7–10], have recommended to close down dental clinics during this period or significantly scale down the level of dental care provided, to strictly emergency dental care, while all elective dental procedures are suspended. In addition to these, a greater emphasis now being placed on infection control practices and the need to maintain standard precautions in the care of dental patients. This is of particular importance, during and even beyond the period of this pandemic [6].

Orthodontics is a dental specialty that is catered for primarily by specialist orthodontists. Orthodontic treatment often takes longer period of time ranging from 12 to 18 months or even longer. In this country, we currently have fewer than 100 orthodontists and orthodontic residents catering to a population of close to 200 million people. Orthodontic care is provided in both public and private dental facilities, although most of these facilities are located in urban city centers. There are currently nine post-graduate training centers for orthodontics, with close to fifty residents in training [11,12]. Indeed, the shutdown of most of the dental clinics in the country has significantly affected orthodontic care, with most orthodontists and orthodontic residents in training providing only emergency orthodontic care during the lockdown period.

As we reopen orthodontic clinics and continue to provide orthodontic care during this period and beyond, it is important to understand the impact of the pandemic on orthodontists and orthodontic residents and how this may affect their future practice of orthodontics, particularly with respect to infection control. In addition, the lockdown has also had significant economic and social impacts on the lives of orthodontists, as well as their practices. Thus, based on these, the aim of this study was to assess the impact of the COVID-19 pandemic on orthodontists and orthodontic residents in the country, particularly with respect to their current and future

practice of orthodontics, as well as their economic, psychosocial, and social well-being.

2. Methodology

Ethical approval for this study was obtained from the Institutional Review Board of the Lagos University Teaching Hospital, Idi-araba, Lagos, Nigeria, with approval number LUTHHREC/EREV/0420/09. The study population was made up of all orthodontists and orthodontic residents in the country. Informed consent was obtained from all respondents and only those who consented to participate in the study were allowed to participate. Self-administered questionnaires were distributed to consenting participants through an online data collection platform (Google forms) between April and May, 2020. A purposive sampling technique was used. The respondents were also reached using the WhatsApp platform of the Nigerian Association of Orthodontists and via direct WhatsApp messages to orthodontists and orthodontic residents in the country. The questionnaire contained two sections. Section A covered participants' sociodemographics, and section B documented participants' perceived impact of the COVID-19 pandemic on their practice of orthodontics, particularly with respect to patients' seen during the pandemic, infection control training, and their perceptions on the future viability of orthodontics as a specialty following the pandemic. Respondents were also asked if the pandemic would change the way they currently practiced orthodontics and what changes they would be making, if any. In addition, the questionnaire also assessed the perceived economic, psychosocial, and social impacts of the pandemic on the lives of respondents. A pilot study was done. The questionnaire was distributed to five orthodontists and two orthodontic residents to assess the validity of the instrument. These were not included in the overall samples used for the study. The ideal sample size computed for the study was 73, based on a confidence interval of 90%, a margin of error of 5%, and a study population of 99. There are currently approximately 99 orthodontists and orthodontic residents practicing in Nigeria.

Data analysis was carried out with the Statistical Package for Social Sciences (SPSS) version 20 (IBM Corp, Armonk, NY). Descriptive statistics was used to compute mean and age distribution and chi-square test was used to test for association, with the level of significance set at 0.05. The internal consistency of the scale used was measured with Cronbach's alpha and a minimum value of 0.7 was set as an acceptable level of reliability.

3. Results

A total of 73 orthodontists and orthodontic residents in the country participated in the survey, made up of 25 (34.2%) men and 48 (65.8%) women, with a mean age of 43.41 ± 9.21 years. Most of them, 38 (52.1%), were specialists/consultant orthodontists, while 35 (47.9%) of them were orthodontic residents (Table 1). The Cronbach's alpha score recorded for the study instrument was 0.722, which showed an acceptable level of reliability of the study questionnaire.

A greater majority of the respondents 62 (84.9%) had received training on infection control in dentistry, compared with only 27 (37.0%) respondents who had received specific infection control training for COVID-19. Most, 44 (60.3%), of the respondents thought that COVID-19 would lead to a reduction in the number of orthodontic patients in the future. With regards to the viability of the future practice of orthodontics following the outbreak of the COVID-19 pandemic, most of the respondents (46 [63.0%]) felt that it would not affect the viability of the future practice of the specialty, while a fewer number (27 [37.0%]) felt it was going to affect it.

Table 1
Demographics of respondents

Demographic characteristics	Gender		Total: n (%)
	Female: n (%)	Male: n (%)	
Age groups, y			
21–30	3 (6.3)	2 (8.0)	5 (6.8)
31–40	19 (39.6)	7 (28.0)	26 (35.6)
41–50	15 (31.3)	12 (48.0)	27 (37.0)
51–60	10 (20.8)	2 (8.0)	12 (16.4)
61–70	1 (2.1)	2 (8.0)	3 (4.1)
Total	48 (100.0)	25 (100.0)	73 (100.0)
No. of years post-BDS graduation			
1–10	12 (25.0)	3 (12.0)	15 (20.5)
11–20	20 (41.7)	13 (52.0)	33 (45.2)
21–30	8 (16.7)	7 (28.0)	15 (20.5)
31–40	8 (16.7)	1 (4.0)	9 (12.3)
41–50	0 (0.0)	1 (4.0)	1 (1.4)
Total	48 (100.0)	25 (100.0)	73 (100.0)
Current status of practice			
1st year Junior resident	4 (8.3)	2 (8.0)	6 (8.2)
2nd year Junior resident	4 (8.3)	2 (8.0)	6 (8.2)
3rd year Junior resident and above	2 (4.2)	1 (4.0)	3 (4.1)
1st year Senior resident	2 (4.2)	3 (12.0)	5 (6.8)
2nd year Senior resident	1 (2.1)	0 (0.0)	1 (1.4)
3rd year Senior resident and above	11 (22.9)	3 (12.0)	14 (19.2)
Specialist/Consultant Orthodontist	24 (50.0)	14 (56.0)	38 (52.1)
Total	48 (100.0)	25 (100.0)	73 (100.0)
No. of years as specialist			
Zero	24 (50.0)	11 (44.0)	35 (47.9)
1–10	12 (25.0)	11 (44.0)	23 (31.5)
11–20	8 (16.7)	1 (4.0)	9 (12.3)
21–30	4 (8.3)	2 (8.0)	6 (8.2)
Total	48 (100.0)	25 (100.0)	73 (100.0)

BDS, bachelor of dental surgery.

This study also showed that 58 (78.1%) of the respondents felt that COVID-19 would permanently change the way they practiced orthodontics (Table 2).

Ninety-four percent of those who thought COVID-19 was going to permanently change the way they practiced orthodontics indicated that they would improve on their infection control measures, whereas 3 (4%) of them indicated that they would use more aligners. Only 2 (2%) of them were not exactly sure of what they would do going forward.

Table 3 shows that most of the respondents (47 [63.0%]) reported COVID-19 to have a moderate to severe negative economic impact on their income. Significant gender differences were recorded concerning the impact of the pandemic on the social life of respondents. This is because although majority (25 [52.1%]) of the female respondents reported that the period of the pandemic had enriched their relationships with their families, more men (12 [48%]) than women (7 [14.6%]) reported that it had affected their

relationships with friends negatively ($P < 0.05$). Only a few of the respondents felt depressed by the whole situation (2 [2.7%]) when their psychosocial well-being was assessed.

Figure 1 shows that most (56 [75.7%]) of the total respondents reported that their practice only saw emergency patients during the COVID-19 pandemic. Although 29 (39.2%) reported lower patient turnout, 35.1% reported that their practice was closed and not seeing patients. Every respondent reported that it had some form of impact on their practice.

Figure 2 shows the different emergency treatments provided by orthodontists during the lockdown period. The management of protruding arch wires (33 [44.6%]) constituted the most frequent emergency treatment provided to patients during the period. This was followed by no emergency treatment provided (32 [43.3%]); loose bracket, wire, or bands (18 [24.4%]); acute infection from appliance (10 [13.5%]); and swallowed piece of appliance (2 [2.7%]), respectively.

4. Discussion

The coronavirus pandemic has significantly affected health care delivery all over the world. This is particularly so in the area of dental care because of the high level of exposure of dentists and patients in the course of providing care in the dental clinic setting [10,13–15]. Thus, there have been significant disruptions to dental care all over the world as the profession grapples with establishing standard protocols for care during this period. Likewise, orthodontic care has also been affected by the pandemic [13,15]. Thus, assessing the impact on orthodontists and orthodontic care in particular, with a view to mitigating these effects is important at this time for the specialty. To achieve this, it is important to get the perspectives of orthodontists and orthodontic residents, as they are in the best position to highlight the impact of the pandemic, first on themselves as individuals and secondly on the care and treatment they provide as specialists and specialists in training, respectively.

The findings from this study are quite instructive. Most of the respondents had undergone previous training in infection control, which is quite understandable, as infection control training forms a bedrock of the training in undergraduate, postgraduate, and continuous education training in dentistry [16–18]. However, at the time of this study, only approximately 40% had undergone specific training focused on infection control in the dental clinic for COVID-19. The importance of continuous education courses for orthodontists that are focused on infection control for COVID-19, cannot be overemphasized. The importance of such training is further reinforced by the fact that standard protective measures in daily clinical work are not effective enough for the prevention of the spread of COVID-19 in the dental clinic, particularly when patients are in the incubation period, are unaware they are infected, or intentionally conceal their infection [6]. Thus, it is also very likely that in the near future, most dental regulatory bodies may require

Table 2
Infection control training and perceived impacts on orthodontic practice

S/N	Concerning infection control and COVID-19	Total: 73 (100.0)	
		No (%)	Yes (%)
1.	Do you have any training on infection control in dentistry?	11 (15.1)	62 (84.9)
2.	Have you attended any training regarding control for COVID-19?	46 (63.0)	27 (37.0)
Impact of the pandemic on orthodontic practice			
1.	Do you think COVID-19 will lead to reduction in the number of orthodontic patients in the future?	29 (39.7)	44 (60.3)
2.	Do you think it will affect the viability of Orthodontics as a profession?	46 (63.0)	27 (37.0)
3.	Do you think COVID-19 will permanently change the way you practice orthodontics?	16 (21.9)	57 (78.1)

COVID-19, Coronavirus Disease 2019.

Table 3

Effects of the pandemic on economics, psychosocial well-being, and social life of orthodontists and orthodontic residents

Effect of COVID-19 pandemic	Gender		Total: N (%)	P
	Female: n (%)	Male: n (%)		
Negative economic impact of COVID-19 on income				
No effect	7 (14.6)	1 (4.0)	8 (11.0)	0.482
Mild	13 (27.1)	6 (24.0)	19 (26.0)	
Moderate	12 (25.0)	9 (36.0)	21 (28.8)	
Severe	16 (33.3)	9 (36.0)	25 (34.2)	
	48 (100.0)	25 (100.0)	73 (100.0)	
Effect of COVID-19 on psychosocial well-being				
No effect	6 (12.5)	0 (0.0)	6 (8.2)	0.409
I feel depressed	1 (2.1)	1 (4.0)	2 (2.7)	
I am happy, it has given me time to rest	11 (23.0)	5 (20.0)	16 (21.9)	
I feel unhappy, not being able to work or earn an income	11 (22.9)	10 (40.0)	21 (28.8)	
I cannot immediately tell	19 (39.6)	9 (36.0)	28 (38.4)	
	48 (100.0)	25 (100.0)	73 (100.0)	
Effect of COVID-19 on social life				
It has had no effect on my social life	7 (14.6)	4 (16.0)	11 (15.1)	0.029 ^a
Has affected my relationship with my friends negatively	7 (14.6)	12 (48.0)	19 (26.0)	
Has enriched my relationship with my friends	7 (14.6)	3 (12.0)	10 (13.7)	
Has affected my relationship with my family negatively	2 (4.2)	1 (4.0)	3 (4.1)	
Has enriched my relationship with my family	25 (52.1)	5 (20.0)	30 (41.1)	
Others	1 (2.1)	0 (0.0)	1 (1.4)	
	48 (100.0)	25 (100.0)	73 (100.0)	

COVID-19, Coronavirus Disease 2019.

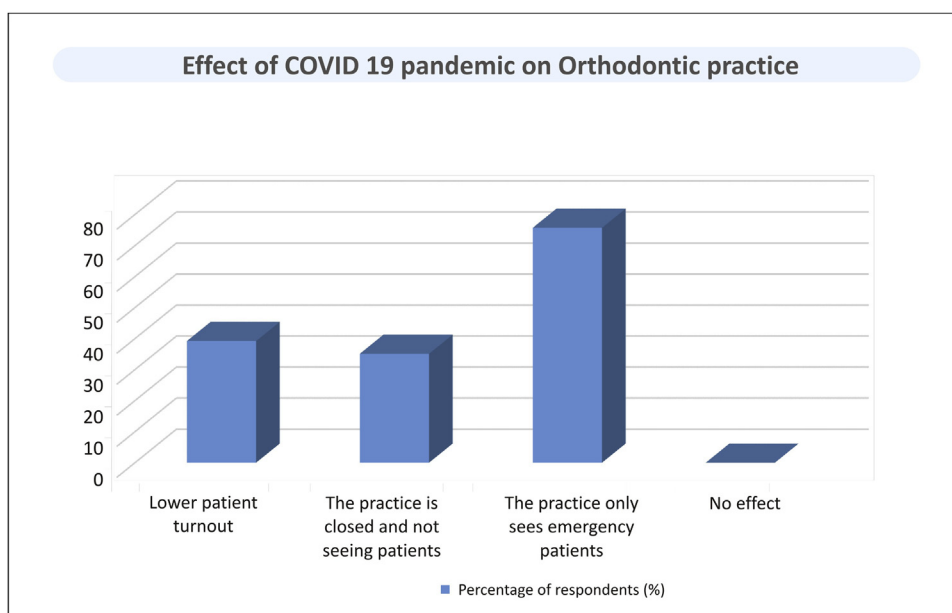
^a $P < 0.05$.

this training or continuous education in this area, as being mandatory, to ensure that all dentists and dental specialists, particularly orthodontists, receive the required training in this regard, based on the huge risks involved in providing dental or orthodontic care at this period without having adequate knowledge of the proper precautions to take.

Furthermore, it is interesting to note that approximately 80% of the respondents reported that the pandemic would permanently change the way they practice orthodontics in the future and the changes they proposed to make are quite revealing. The major change highlighted by almost all the respondents was increased infection control and the increased use of personal protective equipment, as previously highlighted, and the importance of this

cannot be overemphasized. In addition to these, respondents also proposed to make other changes that include “longer patient appointments,” the use of social distancing in the clinic, and facemasks for all patients and minimal accompanying persons with patients in the clinics. Many of these have previously been recommended in other reports [13–15,19]. The increased use of aligners was also proposed by some respondents. Aligner therapy in particular is likely to gain greater acceptance among orthodontists in the post-lockdown period because of the reduced dependence on clinic visits and the overall less invasive nature of this form of treatment.

The most commonly carried out emergency treatment during the lockdown period occasioned by the pandemic, was cutting of protruding arch wires, followed by replacement of loose brackets

**Fig. 1.** Effect of COVID-19 on orthodontic practice.

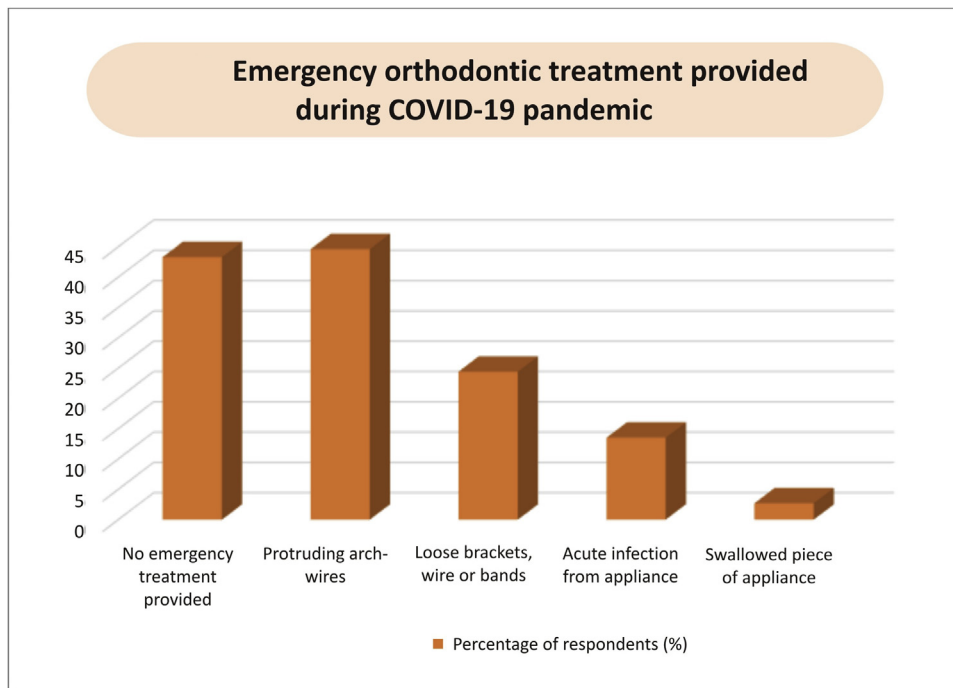


Fig. 2. Emergency orthodontic treatment provide during COVID-19 pandemic.

and bands. Similar emergencies have also been highlighted in other reports [15,19–21]. From an orthodontic perspective, orthodontic emergencies may include the embedment of an orthodontic appliance into the gingiva or oral mucosa leading to severe pain and or infection, circumstances related to dental trauma, or conditions in which a lack of management would be harmful to the patient [15,19]. However, in the literature, there appears no standard definition for what constitutes “emergency orthodontic treatment.” The absence of this has been highlighted in recent reports [19–21]. Thus, as it stands, the professional judgment of the practitioner should determine what defines urgent treatment need and all of the guidance indicates that urgent need incorporates the concept of preventing harm to the patient [21]. However, the importance of addressing this gap in definition is very important for our specialty, as this pandemic has produced scenarios that were never before envisaged to affect the practice of orthodontics in particular and dentistry as a whole. This standardization in definition will go a long way in guiding orthodontists and also help in developing appropriate guidelines and legislation for care during periods like this. Other authors have also made similar recommendations [15,19–21]. Furthermore, recent studies have also recommended the use of tele dentistry or virtual-based consultation in maintaining communication with patients during periods like this, which has been reported to be quite effective [15,19,21]. It provides an alternative means of addressing minor orthodontic emergencies, while also making it possible to remotely monitor the progress made by patients. It also creates an opportunity to advise them on patient-dependent treatment procedures, such as elastic changes. However, much still needs to be done in this regard, with respect to standardization of the care provided in this manner and patient informed consent for any counseling received via this means [15,21].

The lockdown that occurred in different parts of the world has obviously had significant negative economic impacts. This is coupled with the fact that most dental and orthodontic clinics were also shut during this period. Thus, it is not surprising, that most of

the respondents reported that the pandemic had some negative impact on their economic income, with only 11% recording that it had no impact on their income. Bearing in mind that approximately half of the respondents were orthodontic residents and most likely not engaged in active private orthodontic practice, it is obvious that the economic impact cut across all strata of orthodontic professionals. The severity of this impact is underscored by the fact that more than two-thirds of the respondents recorded a moderate to severe economic impact on their resources. The recorded severity over the economic impact emphasized the need for dental and orthodontic practices to benefit from stimulus packages and very low interest loans from their respective governments. This will help to ensure that these practices, most of which are small businesses, are better able to survive and cope with the harsh economic climate in which they now must operate.

The huge negative economic impact is also likely to have affected the psychosocial well-being of respondents, with at least one-third of the respondents reporting that they were unhappy and unable to work. This is not surprising, because reduced work time for most orthodontists is most likely to have resulted in reduced incomes. Conversely, the fact that a large percentage of respondents reported that it had a positive impact on their families is also noteworthy and highly positive. Indeed, a significantly greater percentage of women than men recorded that it had enriched their family lives and this is not surprising, as the lockdown would have afforded them an opportunity to spend more time with their families. A previous study had reported that female orthodontists may have a difficult time achieving work life balance, because of the professional and time demands of the job [22]. The findings from that study further reinforce the findings from this study and explain why most of the women reported enriched family relationships from the greater time spent at home. Conversely, more male orthodontists recorded that it had affected their relationships with friends negatively and this may be because of reduced opportunity to spend time with their friends in other social settings, as occasioned by the restriction of movement in place in the country.

Approximately 60% of respondents felt that the pandemic would reduce the number of patients seeking orthodontic treatment. This perception may have been driven from the thought that the pandemic may result in a high level of fear among general public. Further studies are required to validate this. However, orthodontic associations all over the world have a great role to play in terms of advocacy to members of the public, that they can safely receive orthodontic and dental treatment at this time.

Furthermore, the fact that about 40% of the respondents were worried about the viability of orthodontics as a practice, can also be linked to the perception of reduced number of patients presenting for treatment. This may also be linked to the widespread recession that may accompany this pandemic, thus reducing the purchasing power of potential orthodontic patients worldwide, especially in countries like ours where most patients pay out of pocket for health care. The worldwide economic climate will hopefully improve as the pandemic gradually recedes worldwide.

This study has a number of limitations, one of which is that environmental differences may affect the perceptions of impact, thus it may not be able to directly extrapolate some of the results of this study to orthodontists practicing in other countries. Furthermore, because of the unusual nature of the pandemic and the unknown length of time of the lockdown in different parts of the world, the impact may vary from one region to the other, based on the duration of the lockdown experienced. In addition, the perceptions as recorded are quite subjective and may also be confounded by individual circumstances of each respondent that may affect their perception of some of the situations assessed in the study. Indeed, the disparity in age and experience of respondents could also have affected the results recorded. The use of validated scales to assess the psychosocial and social impacts would also have been of great benefit, and these should be used in future research in this regard, as the scales used for this study had not previously been validated. However, the results from this study provide a baseline for future studies.

Findings from this study highlight the need for further studies to look at how knowledgeable orthodontists are about infection control, particularly with respect to COVID-19 and the various modifications they intend to make to their current infection control practices. Furthermore, because orthodontic treatment is long and continuous and because for several patients all over the world, treatment was abruptly suspended as a result of the pandemic, there is also a need for studies to assess the impact of the pandemic on patients vis-à-vis their knowledge of the pandemic and how this may affect their perception of orthodontic treatment in the future.

5. Conclusion

A large percentage of the respondents reported that the pandemic would change the way they practice orthodontics in the future, particularly with respect to improved infection control practices. In addition, a large majority of the study participants also reported that the pandemic had affected their economic, psychosocial, and social lives, with the female orthodontists and

orthodontic residents recording a significantly more positive social impact than their male counterparts. There were no significant gender differences recorded for both the economic and psychosocial impacts.

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