

# An Update on Demand and Pattern of Root Canal Treatments in a Clinical Setting in Lagos, Nigeria

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## Abstract

There have been a growing number of patients demanding root canal treatment to save their teeth. This study aimed to determine the pattern of demand and treatment need for root canal treatments at a tertiary healthcare facility in Lagos, Nigeria and update the dental literature with the demand and pattern of root canal treatments as seen in Nigeria. This was a retrospective study. Data from 8239 patients treated at restorative dental clinic, Lagos State University Teaching Hospital from 2011 through 2014, were reviewed. Data were analyzed using IBM SPSS Version 26. Association between categorical variables was assessed using Chi square test. Significance level was set at  $p < 0.05$ . Nine hundred (900) patients age 18 to 79 years (Mean  $\pm$  SD 38.95 $\pm$ 9.4) of which 542 (60.2%) were male and 358 (39.8%) female received root canal treatment involving 1256 teeth. More male patients demanded for root canal treatment but treatment need was greater in female patients and increased with age. Demand for root canal treatment was more prevalent in those  $< 40$  years of age. Central incisors were the most frequently root filled teeth in the maxilla and this was statistically significant ( $p=0.002$ ). In the mandible, first molars were the most frequently root filled teeth however, this was not statistically significant ( $p=0.093$ ). Findings in this study corroborate those of several other studies in Nigeria. However, unlike other Nigerian studies, this study noted a greater need for root canal treatment in female patients compared to male patients.

**Keywords:** Root canal treatment, demand, pattern, clinical setting, Nigeria.

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## INTRODUCTION

The main goal of endodontic treatment is to save a tooth suffering from pulp diseases and their sequelae, from being extracted (Wigsten E *et al.*, 2020; Osadolor O *et al.*, 2019). Endodontic services include: pulpotomy, pulp capping, conventional root canal treatment, apicectomy, repair of root perforation, implantation, re-implantation, hemisection, root amputation and endodontic endo-osseous implant.

The frequency of demand for endodontic services is influenced by several factors such as availability of dental facilities, cost of production of endodontic services, clinical fees for endodontic procedures, skill of dental practitioners, level of awareness of dental patients and other related factors (Agholor C *et al.*, 2018).

In the past, the frequency of demand for root canal treatment had been low, but in recent years there

has been steady increase in the number of patients who demanded to save their teeth utilizing root canal treatment (Agholor C *et al.* 2018; Enabulele J *et al.* 2021). This increase has been attributed to various reasons such as dental care awareness and education, better instrumentation, improved expertise of the dentists and endodontists through further advanced training and updates, improved dental facilities as well as cost effectiveness as opposed to extraction of a tooth and subsequent replacement with implant or a fixed partial denture (Enabulele J *et al.*, 2021). The demand pattern for endodontic services has always been a subject of local and international studies (Osadolor O *et al.*, 2019; Enabulele J *et al.*, 2021; Oglah F *et al.*, 2011; Scavo R *et al.*, 2011). Some studies have shown that anterior teeth are the most frequently root-filled teeth compared to posterior teeth (Enabulele J *et al.*, 2021; Oginni A *et al.*, 1999). However, there were studies which reported that posterior teeth were the most frequently endodontically treated teeth (Umesi D *et al.*,

2016; Ibhawoh L *et al.*, 2019). Furthermore, some of these studies also reported higher root canal treatment in maxilla than in mandible; maxillary anterior teeth were the most frequently root filled teeth (Oglah F *et al.*, 2011; Scavo R *et al.*, 2011; Umesi D *et al.*, 2016; Khan S *et al.*, 2017). Here in Lagos, a metropolitan city in Nigeria there was a study on the frequency and demand pattern for endodontic services (Umesi D *et al.*, 2016). That study found that the most frequently root filled teeth were the molars while the least frequently root filled tooth was the canines (Umesi D *et al.*, 2016). In that same study, there were more root filled teeth on the maxilla than on the mandible and more on the left than on the right side of the arch (Umesi D *et al.*, 2016).

A similar study was also conducted in Port-Harcourt – a Metropolitan city in South-South Nigeria and reported that posterior teeth were more frequently treated endodontically than anterior teeth (Umanah A *et al.*, 2012). However, yet another study conducted in Ile-Ife – a semi-urban city in South-Western part of Nigeria reported a higher prevalence of root canal treatment in posterior teeth than in anterior when aggregated although from their study, the maxillary central incisors were the most commonly root filled teeth (Oginni A *et al.*, 1999).

The main objective of this study was to determine the pattern of demand and treatment need for root canal treatments at a tertiary healthcare facility in Lagos, Nigeria and thereby update the dental literature with the demand and pattern of root canal treatments as seen in Nigeria.

## MATERIALS AND METHOD

This was a retrospective study. Ethics approval was obtained from Health Research and Ethics

Committee of Lagos State University Teaching Hospital, Ikeja. The case files of 8,239 patients who attended the adult restorative dental clinic of Lagos State University Teaching Hospital (LASUTH) from 2011 through 2014 were reviewed for the following information: age of patients, gender, teeth involved in endodontic procedures according to arch. Nine hundred patients met the inclusion criteria which were: age, sex and completion of endodontic treatment.

Endodontic services such as pulpotomy and pulp capping were excluded from this study. Reasons for demand for root canal treatment by patients were not included in this study; and case files with insufficient clinical data and incomplete bio data were also excluded. In this study, central and lateral incisors and canines were referred to as anterior teeth while premolars and molars were referred to as posterior teeth. Data were analyzed using IBM SPSS Version 26. Frequency and percentages were presented for categorical data while numeric variables were presented using mean and standard deviation. Association between categorical variables was assessed using Chi square test. Significance level was set at  $p < 0.05$ .

## RESULTS

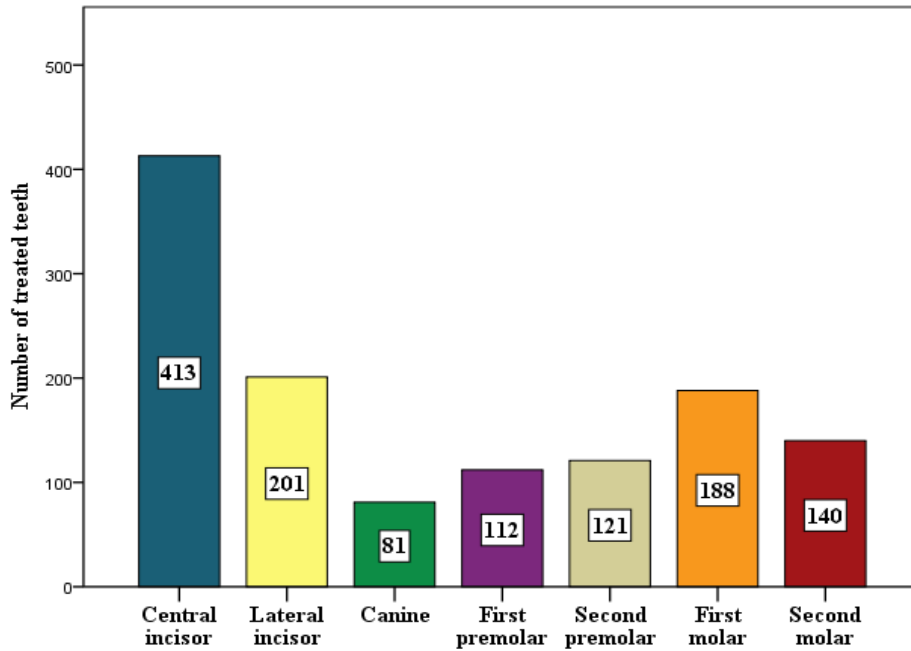
A total of 900 out of 8,239 patients (10.9%) who attended adult dental Restorative Clinic, Lagos State University Teaching Hospital (LASUTH) demanded for root canal treatment during the period under review. These involved 1256 teeth in the 900 patients with more male patients 542 (60.2%) than female patients 358 (39.8%). Their ages ranged from 18 to 79 years (Mean  $\pm$  SD 38.95 $\pm$ 9.4). The age group with the most number of patients was the 30-39 years group with 340 (37.8%) patients while only 5 (0.6%) patients were seen in the 70-79 years age group (Table 1).

**Table 1: Age and gender distribution of patients**

Variable	Frequency (n=900)	Percentage (%)
<b>Gender</b>		
Male	542	60.2
Female	358	39.8
<b>Age group (Years)</b>		
18-29	321	35.7
30-39	340	37.8
40-49	164	18.2
50-59	46	5.1
60-69	24	2.7
70-79	5	0.6
Mean $\pm$ SD	38.95 $\pm$ 9.4	

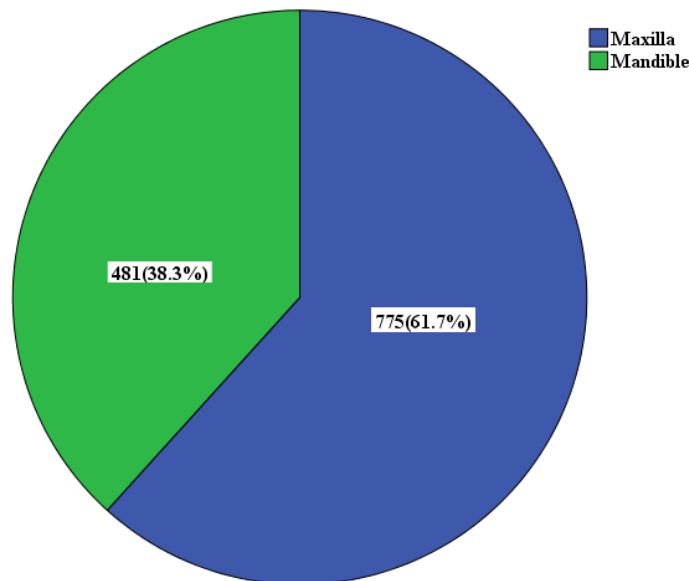
The most frequently root filled teeth were the central incisors- 413 (32.9%). This was followed by the lateral incisors -201 (16.0%) and then the first molar -

188 (14.9%). The least root filled teeth is the canine - 81 (6.4%) (Figure 1).



**Figure 1: Distribution of root filled teeth**

There were more root filled teeth in the maxilla 775(61.7%) than in the mandible 481 (38.3%) (Figure 2).



**Figure 2: Distribution of root canal treatment according to the arch**

A comparison of the distribution of root filled maxillary or mandibular teeth and gender of the patients showed that for the maxilla, both genders (males 46.1%, females 33.0%) had their central incisors more frequently root filled than any other teeth and this was statistically significant ( $p=0.002$ ). However for the mandible, while the most frequently filled teeth in the

females were the central incisors (24.4%), in the males it was the first molar teeth (23.7%). Furthermore, when the numbers of root filled teeth were combined for both genders according to tooth type the first molar became the most frequently root filled teeth in the mandible. This was however not statistically significant ( $p=0.093$ ) (Table 2).

**Table 2: Distribution and percentage of root canal treated teeth according to arch and gender**

	Maxilla			Mandible		
	Male	Female	Total	Male	Female	Total
CI	216(46.1)	101(33.0)	317(40.9)	32(14.6)	64(24.4)	96(39.0)
LI	83(17.7)	48(15.7)	131(16.9)	39(17.8)	31(11.8)	70(29.6)
C	29(6.2)	23(7.5)	52(6.7)	12(5.5)	17(6.5)	29(12.0)
P <sub>1</sub>	39(8.3)	31(9.8)	70(9.0)	22(10.0)	20(7.6)	42(17.6)
P <sub>2</sub>	41(8.7)	32(10.1)	73(9.4)	25(11.4)	23(8.8)	48(20.2)
M <sub>1</sub>	36(7.7)	42(13.7)	78(10.1)	52(23.7)	58(22.1)	110(45.8)
M <sub>2</sub>	25(5.3)	29(9.5)	54(7.0)	37(16.9)	49(18.7)	86(35.6)
Total	469	306	775	219	262	481
p-value	0.002*			0.093		

Key- CI- Central Incisor, LI- Lateral incisor, C- Canine, P1- First Premolar, P2- Second Premolar, M1- First Molar, M2- Second Molar

There was an increase of treatment need with increase in age; in other words with increase in age of patients in this study, the more the teeth they need to root fill. This however did not apply in the 70-79 years

age group because of the limited number of patients and teeth treated in that group. There was also a greater root canal treatment need in the female patients than their male counterpart (Table 3).

**Table 3: Treatment need according to age and gender distribution**

	Number of patients	Number of teeth treated	Teeth: patient ratio
<b>Age group (Years)</b>			
18-29	321	420	1.31
30-39	340	449	1.32
40-49	164	246	1.50
50-59	46	81	1.76
60-69	24	61	2.54
70-79	5	6	1.20
<b>Gender</b>			
Male	542	668	1.23
Female	358	568	1.59

## DISCUSSION

This retrospective study was conducted in patients who had root canal treatment in an urban tertiary referral centre. The prevalence of root canal treatment is increasing because more patients are choosing root canal treatment over extraction (Agholor C *et al.*, 2018; Enabulele J *et al.*, 2021).

In this present study, there were more males (60.2%) than females (39.8%) patients and this corroborates the findings from other similar studies (Enabulele J *et al.*, 2021; Oginni A *et al.*, 1999; Khan S *et al.*, 2017; Abuzenada B *et al.*, 2021; Oginni A *et al.*, 2015). This could be a pointer to an increasing demand for better oral health care by the male patients (Enabulele J *et al.*, 2021) indicating that the male patients are now more enlightened and would rather demand root canal treatment than extraction (Umesi D *et al.*, 2016). However, other studies had demonstrated a preponderance of female patients (Osadolor O *et al.*, 2019; Agholor C *et al.*, 2018; Oglah F *et al.*, 2011; Scavo R *et al.*, 2011; Umesi D *et al.*, 2016; Abuzenada B *et al.*, 2021). Some reasons that can be adduced for more female patients seeking root canal treatment might be because females are more meticulous about their health and appearance, so they undergo regular dental

check-up and maintain good oral health (Abuzenada B *et al.*, 2021).

Although the 30-39 years age group in this present study had the highest prevalence (35.7%) of root canal treatment done, the 70-79 years age group (0.6%) recorded the least prevalence of root canal treatment. However, it was noted in this present study that for patients aged 39 and below, the prevalence for root canal treatment was 73.5%. Similar findings were noted in other studies (Agholor C *et al.*, 2018; Umesi D *et al.*, 2016; Ibhawoh L *et al.*, 2019; Oginni A *et al.*, 2015). This can be attributed to the high prevalence of dental caries and its sequelae in young adults (Agholor C *et al.*, 2018).

The maxillary central incisors were the most frequently root filled teeth in this present study. This observation corroborates findings in other studies (Enabulele J *et al.*, 2021; Oginni A *et al.*, 1999; Oginni A *et al.*, 2015). This could be attributed to the fact that although the maxillary central incisors are one of the first teeth to erupt, they have a high risk for rampant caries and are more prone to trauma, and because of their location in the mouth, the patients would therefore prefer to retain their central incisors for aesthetic

purposes rather than extract them (Enabulele J *et al.*, 2021; Oglah F *et al.*, 2011; Scavo R *et al.*, 2011; Umanah A *et al.*, 2012). The maxillary central incisor teeth appear prominent during a smile; this is another reason why the patient may be more interested in preserving the central incisors (Umanah A *et al.*, 2012). In some other studies (Agholor C *et al.*, 2018; Oglah F *et al.*, 2011; Scavo R *et al.*, 2011; Umesi D *et al.*, 2016; Khan S *et al.*, 2017) the lower molars were the most frequently root filled teeth. This could be because of the pit and fissure present on its occlusal surfaces which makes them more prone to dental caries and when the dental caries remains untreated, its sequelae (Boushell L *et al.*, 2019; Avelino de Paiva M *et al.*, 2018).

In the present study, the least frequently root filled tooth was the mandibular canine. This is also supported by findings in other studies (Osadolor O *et al.*, 2019; Umesi D *et al.*, 2016, Ibhawoh L *et al.*, 2019; Al-Nazhan S *et al.*, 2017). However, the mandibular incisors were found to be the least frequently root filled teeth in some other studies (Oglah F *et al.*, 2011; Al-Nazhan S *et al.*, 2017; Hollanda A *et al.*, 2008). Nevertheless, these studies including this present study have all demonstrated that the lower anteriors (mandibular incisors and canines) are the least frequently root filled teeth. This could be because they are constantly bathed in saliva thus benefitting from its buffering effects making it less prone to dental caries and its sequelae (Oglah F *et al.*, 2011; Boushell L *et al.*, 2019). Moreover, they are also less susceptible to trauma (Umanah A *et al.*, 2012).

This present study demonstrated that there were more root filled teeth in the maxilla than in the mandible, this was also seen in other studies (Osadolor O *et al.*, 2019; Agholor C *et al.*, 2018; Enabulele J *et al.*, 2021; Oglah F *et al.*, 2011; Scavo R *et al.*, 2011; Umesi D *et al.*, 2016; Ibhawoh L *et al.*, 2019; Khan S *et al.*, 2017; Umanah A *et al.*, 2012; Oginni A *et al.*, 2015). This finding could be due to a culmination of factors such as the maxillary anteriors being more prone to fracture and rampant caries when compared to the mandibular anteriors (Boushell L *et al.*, 2019; Avelino de Paiva M *et al.*, 2018). Even some studies that reported highest prevalence of root filled teeth in the mandible molars also noted that next most frequently root filled teeth occurred in the maxilla (Agholor C *et al.*, 2018; Umanah A *et al.*, 2012).

This present study demonstrated a statistically significant association between root filled tooth type and gender in the maxilla. However the reason for this is unclear.

According to this present study, the treatment need increased with increase in age and was more in the female than in the male patients even though the male patients in this study were more than the females. Another study also noted a lower treatment need among

the male patients in their study (Dolci M *et al.*, 2016). This could be because more females seek treatment on issues related to pain and aesthetics (Abuzenada B *et al.*, 2021).

## CONCLUSION

This study showed that male patients had more demand for root canal treatment (RCT) but treatment need was greater in female patients and increased with age. Furthermore the demand for RCT was more prevalent in younger adults and maxillary central incisors were the most frequently root filled teeth. Findings in this study corroborate those of several other studies in Nigeria. However, unlike other Nigerian studies, this study noted a greater need for RCT in female patients compared to male patients.

The authors declare no conflict of interest.

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