

Adult Dental Caries Experience: A Rural-Urban Comparison in Southwestern Nigeria

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ABSTRACT

Objective: Dental caries as a public health concern affects people's productivity and quality of life. A number of studies exist on caries status of children in Nigeria but same cannot be said for adults. In addition, majority of the few available studies on caries experience of adults in Nigeria have been conducted in urban locations. If scarce resources are to be appropriated efficiently, a broader picture of the rural and urban caries trend is crucial. The objective of this study was to assess and compare the caries prevalence and experience of the adult population in a rural and urban local government area of Lagos State as well as determine factors affecting the caries experience of adults in two contrasting populations.

Methods: A descriptive, comparative cross-sectional study was conducted among 474 consenting adults aged 18-64 years in one rural and one urban local government area of Lagos State, in southwestern Nigeria. Ethical approval was obtained from the Institutional Ethics Committee, Lagos University Teaching Hospital. Data was obtained using an interviewer administered questionnaire. Descriptive statistics was used in data analysis, whilst p values of <0.05 were considered statistically significant.

Results: The majority of the respondents in this study were within the age brackets of 20-39 years, with a mean age of 36.4 ± 36.1 . Dental Caries prevalence was 15.4% and 19.5%, with a mean DMFT of 0.72 and 0.62 in the rural and urban populations respectively. Also, the index of treatment need was 50.4% and 61.1% and index of treatment failure was 60.6% and 48.1% for the rural and urban populations respectively.

Conclusion: There was no statistically significant difference in the dental caries experience between urban and rural populations. Notwithstanding the low caries experience, a lot of carious lesions remained untreated among rural and urban adult resident in Lagos. There is need for improved oral health promotion measures and preventive programs in rural and urban communities in Lagos State

Keywords: Adult, dental caries, rural, urban,

INTRODUCTION

Dental caries which constitutes a public health concern worldwide has shown distinctive patterns that have become more evident over time particularly in developing countries. It has been reported to be the single most prevalent chronic condition globally, affecting slightly over a third of

the world's population. (Irigoyen et al., 2000; Bernabé & Sheiham, 2014; Mercenes et al., 2013).

Citation: Ekowmenhenhen UI, Wright KO, Uti GO, Makanjuola JO, Olagundoye OO, Alade OT (2019). Adult dental caries experience: a rural-urban comparison in southwestern Nigeria. *Nig J Med Dent Educ*; 1(1&2):28-35.

Dental caries results in discomfort and if left untreated leads to dental pain which ultimately affects daily activities and quality of life (Filstrup et al., 2003; Sheiham, 2001). The multifactorial origin of caries makes it challenging to accurately ascertain the relative contribution of specific factors to varying levels of the disease in specific subgroups within population (Sheiham, 2001).

The risk factors of oral diseases are influenced by oral health determinants such as age, gender, race, ethnicity, socioeconomic status, geographical location, and cultural beliefs and practices (Sofola & Jeboda 2003; Shah & Sundaram, 2004). With respect to age, it is a well-established finding that dental caries increases as individuals advance in age. Observational population-based studies have reported that caries incidence is higher among adults compared to children (Irigoyen et al., 2000). Variations in caries prevalence have been discovered between rural and urban populations in the same country (Varenne et al., 2004). Higher caries prevalence has been reported in several African urban populations compared to rural areas. (V El Nadeef et al., 1998; Okullo et al., 2003; Varenne et al., 2004). The low caries prevalence seen in rural African settlements was associated with a traditional diet among these subpopulations which are low in fermentable carbohydrates. This epidemiological picture is less straightforward in settings where development and industrialization co-exist with relatively simpler social lifestyle within the same country. The adoption of western dietary habits has led to an increase in prevalence of dental caries which is largely untreated (Akpata, 2004).

Variations also exist in oral health practices and prevalence of oral disease worldwide. In the developed countries, rural dwellers are more likely to have untreated dental caries than urban dwellers. Generally, rural dwellers in developed countries have lower prevalence of dental caries than rural dwellers in developing countries (Azodo & Amenaghawon, 2013; Ogunbodede et al., 2015). In developing countries, there is a vast difference in oral health status between urban rural populations with enormous and widening disparities in access to quality care predominantly in rural areas (Gambhir & Gupta, 2016).

Oral health care is generally neglected in developing countries. A lot of people with caries are still unattended to in Nigeria and it has been reported that the country's restorative index is extremely low (Akpata, 2004; Soroye, 2016). There is a dearth of oral health care facilities in Nigeria

and the few ones available are located in urban cities. The Nigerian dentist to population ratio is also alarmingly low with one dentist to cater for a population of over 40,000 people (Akpata 2004; Soroye, 2016). Unfortunately too, a greater proportion of these dental practitioners reside in the cities and this further worsens the already existing health disparity between rural and urban areas in the country as obtains in most other developing countries (Jamieson & Thomas, 2006; Oredugba & Dacosta, 2006). Restorative dental care is extremely expensive and only 5-10% of health expenditure goes into the provision of oral health in most countries (Widstrom & Eaton, 2004).

There is a paucity of Nigerian studies assessing and comparing the dental caries trend among adult populations in rural and urban areas. Assessing the caries status, understanding trends and variation between different populations will be instrumental to establishing efficient health policies and preventive programs to tackle the existing disparities of caries prevalence in rural and urban population.

This study objective was to assess and compare the caries prevalence and experience of the adult population in a rural and urban local government area of Lagos State as well as determine factors affecting the caries experience of adults in two contrasting populations.

MATERIALS AND METHODS

Study Location

This study was undertaken in two randomly selected local government areas, –Badagry (rural) and Ikeja (urban) both in Lagos State, southwestern Nigeria. Lagos State is a historical state located in south western Nigeria, it is cosmopolitan in nature and often acclaimed the commercial capital of the country.

Study design, sample size and sampling technique

This was a descriptive, comparative cross-sectional study consisting of participants from two randomly selected local government areas of Lagos State, Nigeria. A total of 474 adults within the ages of 18 to 64 years who consented to participate in the study were included after a calculated minimum sample size of 442 was arrived at.

Approval for this study was obtained from the Health Research and Ethics Committee of the Lagos University Teaching Hospital, LUTH.

A multistage sampling technique involving both Probability and non probability methods was utilized. Stratification of Nigeria into the six

geopolitical zones was done, namely: South South, South West, South East, North East, North Central and North West. South West is made up of 6 states namely Lagos, Ogun, Oyo, Ondo, Osun and Ekiti. A purposive selection of Lagos State from a total of six states comprising the South West was done. Lagos was chosen deliberately because of its cosmopolitan nature and high national representative demographic characteristics. Stratification of Lagos State into urban and rural local government areas was done. Thereafter, a simple random sampling technique was used to select five wards each from both LGAs by balloting. A standard estimate of number of households in a ward (120) was divided by the expected number of households (40) to get an interval of 3. Thus, every third household was included and adults that met the inclusion criteria were interviewed. A simple random sampling technique was utilized to select the entry point while a day code was used to determine the starting point.

Study protocol

A pretested interviewer administered questionnaire was used to collect information from each respondent with the following main sections: Section A: Social demographic information. Section B: The dental caries status using the Decayed Missing Filled Teeth (DMFT). The DMFT index was developed by Klein, Knutson and Palmer in 1938. It entails the visual measurement of the crown of the tooth after drying to record the amount of carious, missing and filled teeth due to dental caries. Its unit is the tooth. For the population, individual DMFT scores are added up and divided by the number of individuals assessed to get a mean DMFT score for that population. Two trained examiners carried out oral examination using separate sterile gloves, mouth mirrors and probes/caries explorer for each respondent under natural light with strict observance of principles of standard precaution. The intra- and inter-examiner agreement as well as Cohen's kappa coefficients were calculated to determine examiner reliability. The intra-examiner agreements were 94% and 95%. Inter-examiner agreement was 93%. Kappa coefficient was 0.87, which indicates very good agreement between examiners. The DMFT index was estimated for permanent teeth and caries experience was calculated.

Data analysis

The information collected was entered in a database and analyzed using Statistical Package for Social Sciences (SPSS) for windows (Version

16.0 Chicago, USA). Central tendency measures and standard deviations (sd) were obtained. Appropriate statistical test ie One-way ANOVA and t test were employed. For all statistical tests, probability values less than 5% inferred the criterion for statistical significance.

RESULTS

Four hundred and seventy four (474) respondents adequately supplied complete information in this study, of which more than half (52.1%) of the respondents were from the urban settlement while 47.9% were from the rural settlements. Majority of the respondents sampled in the urban location belonged to 20-39 years age group and 30-39 years group in the rural location respectively. The males were 71.7% and 47.6% in the urban and rural settlements respectively. The respondents were predominantly from the Yoruba tribe (58.3% and 73.1%) in the urban and rural locations respectively. (Table 1)

In terms of association between socio-demographic variables and the caries experience, there was a statistically significant association between age distribution, education, income and DMFT scores of the respondents ($p < 0.05$) as shown in Table 2. The prevalence of dental caries was highest in the urban community (19.5%) with a mean DMFT of 0.72 ± 0.63 than the rural community (15.4%) with a mean DMFT of 0.62 ± 0.46 . However, the index of treatment need for the rural and urban population was 50.4% and 61.1% respectively. Also, the index of treatment failure was 60.6% and 48.1% for the rural and urban populations respectively (Table 3). Table 4 revealed that there was no significant difference in the dental caries experience between the urban and rural residents

DISCUSSION

Health disparities are the differences in health between different cohorts with respect to prevalence of diseases, outcomes and access to health care which is regarded as unfair and remediable (Lee & Divaris, 2014). This variation in the distribution of health states exists globally and the greatest health burden is usually among the vulnerable and poor populations. These poor group of people are usually more distributed among the rural dwellers (Zematiene et al., 2016). Disparities also exists when comparing the distribution of oral health services, accessibility, utilization and outcomes between urban and rural areas of developing and developed countries (Beaglehole et al., 2009; Bayne et al., 2013)

Table 1: Demographic characteristics of the respondents by location

Characteristics	Urban (N= 247) n (%)	Rural (N = 227) n (%)	Total n (%)
Age (years)			
18-19	19(7.7)	31(13.7)	50(10.5)
20 – 29	89(36.0)	56(24.7)	145(30.6)
30 – 39	76(30.8)	62(27.3)	138(29.1)
40 – 49	37(15.0)	45(19.8)	82(17.3)
50+	26(10.5)	33(14.5)	59(12.4)
Gender			
Male	177(71.7)	108(47.6)	285(60.1)
Female	70(28.3)	119(52.4)	189(39.9)
Religion			
Christianity	165(66.8)	154(67.8)	319(67.3)
Islam	80(32.4)	72(31.7)	152(32.1)
Others	2(0.8)	1(0.4)	3(0.6)
Tribe			
Yoruba	144(58.3)	166(73.1)	310(65.4)
Igbo	48(19.4)	28(12.3)	76(16.0)
Hausa	32(13.0)	6(2.6)	38(8.0)
Others	23(9.3)	27(11.9)	50(10.5)
Income (Naira=#)			
Daily	211,000	146,000	357,000
Weekly	376,000	214,000	590,000
Monthly	1,051,000	689,000	1,740,000

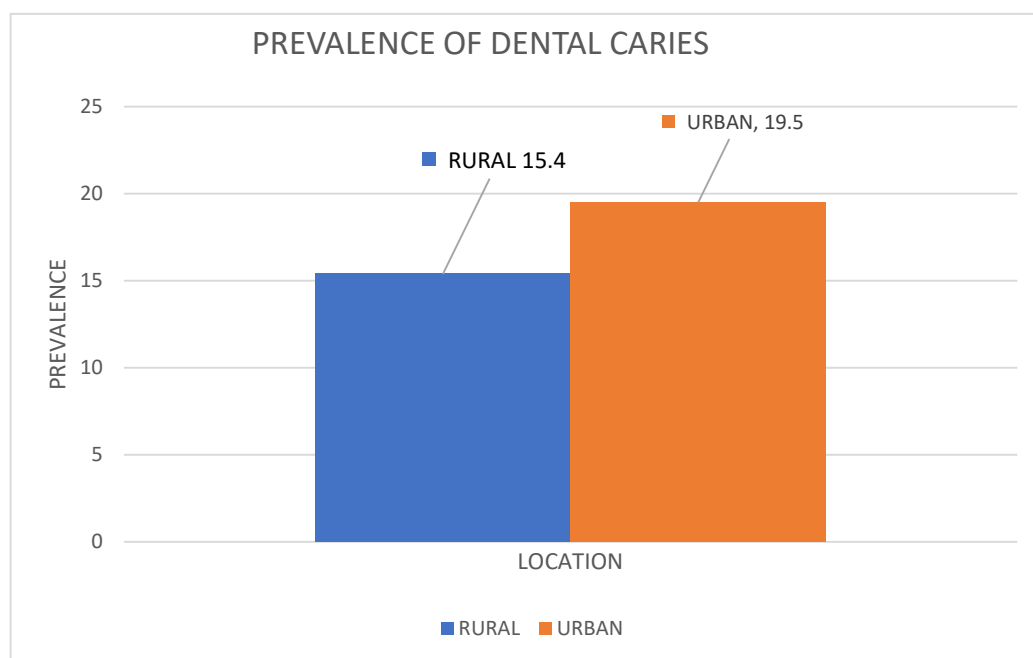


Figure 1: Prevalence of dental caries

Table 2: Association between Socio-demographic characteristics and dental caries (DMFT)

Characteristics	Mean DMFT (SD)	f/t value	P-value
Location			
Rural	0.62 (1.46)	11.52	0.319
Urban	0.72 (1.62)		
Age (years)			
Less than 20	0.40 (1.12)	1073.69	0.001*
20 – 29	0.50 (1.24)		
30 – 39	0.57 (1.19)		
40 – 49	0.82 (1.60)		
50+	1.37 (2.66)		
Sex			
Male	0.62 (1.50)	16.20	0.704
Female	0.81 (1.72)		
Tribe			
Yoruba	0.66 (1.60)	49.88	0.136
Igbo	0.60 (1.41)		
Hausa	0.90 (1.35)		
Others	0.66 (1.60)		
Income			
Daily	0.71 (1.68)	693.487	0.040*
Weekly	0.59 (1.22)		
Monthly	0.62 (1.42)		

Table 3: DMFT Derivatives

Indices	Percent (%)
Treatment Need Index	
Rural	50.4
Urban	61.1
Index of Treatment Failure	
Rural	60.6
Urban	48.1

Table 4: Comparison of mean DMFT scores (Dental caries experience) between locations

Dental health parameters	Location	N	Mean	STD	t-value	P-value
DMFT	Urban	247	0.7287	1.64888	0.725	0.469
	Rural	247	6256	1.45001		

Dental caries is a chronic, bacteria-based infectious disease with great impact on individuals and communities with different levels of social and economic development. Its distribution varies among different populations and it is greatly influenced by lifestyle and habits like dietary and tooth brushing practices (Konig & Navia, 1995). Dental caries has been reported to be one of the most prevalent chronic conditions in different population groups worldwide (Casamassimo et al., 2009). It is the leading cause of orofacial pain and

infection which can be detrimental to the quality of life of the affected individual (Sheiham, 2001; Casamassimo et al., 2009).

In this study, prevalence of dental caries was higher in the urban population with a prevalence of 19.5%(mean DMFT=0.72) compared to the rural population which had a prevalence of 15.4%(mean DMFT=0.62). This result is similar to studies carried out in other parts of Africa and Asia and falls within reported rates in Nigeria of 4-30% (Bajomo et al., 2004; Varenne et al., 2006; Kida et al., 2006; Okoye

& Ekwueme 2011; Omitola & Arigbede 2011; Gathecha et al., 2012; Braimoh et al., 2014). It is however lower than reported rates of over 70% and DMFT of 2.6 obtained in some European studies (Marthelar, 2004; Petersen et al., 2005). The high caries prevalence in the West may be attributable to their dietary practices which is still largely composed of refined sugar. Though Blerin et al (2016) found a slight difference in caries status between urban and rural populations with a slightly higher rate for rural (75.9%) compared with urban, (71.5%), the difference was not statistically significant. Similar result was obtained in another study by Vargas et al. (2003). In the Asian study by Sahil et al. (2016), the mean DMFT of the urban and rural populations were 2.27 and 1.78 respectively. Thus, more urban respondents had dental caries compared to their rural counterparts as reported in this study. However, studies by Hessari et al. (2008) and Wang et al (2002) reported a greater prevalence of caries in the rural population compared to the urban. A result attributable to the predominantly cariogenic diet and poor oral hygiene practices seen in the rural locations compared to the urban. Also, an absence of modern amenities such as pipe borne water and the absence of fluoride in their drinking water may have contributed to an increase in caries status in the rural population compared to the urban. Furthermore, differences in the prevalence of caries between urban and rural areas appear to be reducing globally due to socioeconomic development in rural areas leading to an increasing prevalence of dental caries in rural areas as seen in these studies. In the present study, there was no statistically significant difference between the caries status of the rural and urban population and this result is in tandem with other findings in Europe and America (Matheler, 2004; Petersen et al., 2005).

Though population averages have been known to underscore the severity of health states, they still provide a quantitative means of describing these states amongst population. The mean DMFT (caries experience) of both urban (0.72) and rural population (0.6) was very low according to the WHO criteria as they were below 1.2 and within the WHO global mean of three for the year 2000 for all countries. This result is similar with several studies in other developing countries of Asia and Africa. (Wang et al., 2002; Okeigbemen, 2004; Hessari et al., 2008; Okoye, 2010; Udoye et al., 2009). Notwithstanding the very low caries status, the treatment need index was high (55.5%) and restorative index low and this compares favourably with similar studies carried out in Nigeria (Akpata,

2004; Denloye et al., 2005; Omitola & Arigbede, 2011). Thus, a lot of the carious lesions remain unrestored and the consequence of this could be far reaching as far as oral health is concerned.

The association between socio-behavioural and environmental characteristics and oral health is well established (Matheler, 2004; Petersen et al., 2005). Dental caries occurrence and distribution varies between location, ages, gender, cultures and religion. However in this study, there was no statistically significant association between caries occurrence and gender, religion, ethnicity and location. Rather, there was a significant association between amount of income and dental caries as high income earners were more affected by dental caries. It may appear that as a result of their higher financial status, people living in urban areas have more income to spend on sugary snacks and have adopted western dietary practices of constant consumption of refined carbohydrate. They are also exposed to a constant barrage of enticing advertisement from chocolate and beverage making companies and many adults in urban centers view consumption of these snacks as a sign of affluence and modernity thus promoting it amongst themselves and their households. This has led to an increase in the prevalence of dental caries in urban compared to rural areas in these countries. Since more affluent people are likely to be found in urban than rural areas, the prevalence of dental caries is expected to be higher in the urban than rural communities as seen in this study. In this study, though the prevalence of dental caries and mean DMFT (caries experience) of the urban (0.72) and rural population (0.6) were very low according to the WHO criteria, the real burden still lies in the fact that the treatment need index was high as reported in other studies (Bajomo et al., 2004, Varenne et al., 2006; Okoye & Ekwueme, 2011; Omitola & Arigbede, 2011; Gathecha et al., 2012; Braimoh et al., 2014). This means a lot of the carious lesions remain untreated and the consequence of this could be far reaching. Lesions which go untreated eventually cause greater morbidity and can even lead to death from complications like Ludwig angina. The economic losses arising from treatment cost and lost productive man hours for the individual and the nation is huge. The psychological toll that can result from the loss of a tooth or teeth and eventual loss of a loved one to complications arising from unattended dental caries is better imagined than experienced. The adoption and practice of the basic package of oral health care (BPOC) in primary oral health care facilities across the state is one major step that can reverse this ugly trend of

needless losses to unattended dental caries. The use of ART when well performed has a great potential to reduce morbidity and mortality from dental caries especially in rural communities.

The following recommendations have been put forward as a result of our findings:

Health authorities like the Lagos state ministry of health should strengthen the implementation of community based oral disease prevention and health promotion programs rather than traditional curative care.

The government at all levels, and other corporate organizations should support researches to further generate relevant and reliable data for planning oral health prevention programs to bridge existing oral health disparities across the nation.

There should be an increase in overall access to dental health services (both private and public). Relevant health authorities at the local, state and federal levels should make conscious efforts to bring oral health care closer to the people by integrating oral health care into general health care. Special preventive/rehabilitative treatment measures should be identified and introduced for groups at higher than-average risk of dental decay.

CONCLUSION

In this study, the dental caries experience was not statistically significantly higher among urban than rural respondents. However, a lot of carious lesions remain untreated in both locations. An increase in oral health awareness among all adults in Lagos is essential to improve the oral health practices of the populace.

Financial support and sponsorship

This work received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Conflict of interest

The authors declare that they have no conflicts of interest.

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