Background

Edentulism (partial or total) is an indicator of the oral health of a population [1]. It may also be a reflection of the success or otherwise of various preventive and treatment modalities put in place by the health care delivery system [2]. Many patients also regard edentulism as self-mutilating and may be a strong incentive to seek dental treatment [3].
While the rate of total edentulism is decreasing in developed countries, the reverse is the case with developing countries and this had been attributed mainly to the high prevalence of periodontal diseases and caries [5-7].

Previous studies have also shown that several non-disease factors such as attitude, behavior, dental attendance, characteristics of health care system and socio-demographic factors play important roles in the aetiopathogenesis of edentulism [3].

Some studies reported that the incidence of edentulism correlated with educational levels and income status, with those in the lower levels exhibiting higher risks of becoming totally edentulous [8,9]. In addition, a study done in a rural area of Eastern Guatemala showed that social and environmental influence such as poverty, lack of proper education and inadequate diet contributed to widespread premature and heavy losses of permanent teeth [10].

Although, Hoover and McDermount [11] reported a higher prevalence of edentulism in males than females, Marcus et al observed that the prevalence of edentulism had no relationship with gender [12]. They also observed that there was an inverse relationship between the level of education, income and edentulism.

Studies among Nigerians have linked some of these socio-demographic factors with the prevalence, pattern and rate of dental diseases [13,14] but there has been no report on the influence of these on edentulism.

The aim of this study therefore was to assess the relationship between socio-demographic variables with types of edentulism.

Methods
All patients that attended and were treated in the removable prosthetic units of Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife (a rural area located in the south west of Nigeria) between the months of March and May year 2002 and Lagos University Teaching Hospitals (LUTH), Lagos (an urban area also located in south west Nigeria) between December 2002 and March 2003 were included in the study. Information such as age, gender, occupation and level of education attained were documented. The types of partial denture received following treatment at the clinics were also documented.

There has not been a consensus on various socio-economic classifications in Nigeria because of the unstructured nature of the society. Therefore, for the purpose of this study, a standard occupational classification system designed by Office of population Census and Surveys, London (OPCS 1991) [15] modified based on local reality was used and patients were classified into three socio-economic groups:

Class 1 = Skilled worker e.g professionals and managerial officers and retirees of this cadre.
Class 2 = Unskilled workers e.g. Artisans and traders
Class 3 = Dependants. e.g. Retirees of class 2, those not on pensions, house wives of class 2 cadre, students whose parents are unskilled workers

Data was analysed using SPSS for Windows version 10.0, (SPSS Inc Chicago Illinois, USA). Analysis included frequency, cross tabulations, calculation of means. Association between discrete variables was tested by Chi-Square and the level of significance was set at 5%.

Results
One hundred and fifty two patients attended the prosthetic clinics during the study period. Eighty (52.6%) were males while 72 (47.4%) were females (Table 1). Their ages ranged from 8 to 84 years. The median age was 22.00 years, while the mean age was 41.8 (±19.5) years. The mean age for Ile-Ife study population was 41.3 (±20.46) years, while that of Lagos was 39.9 (±17.56) years.

Table 1: Distribution by gender.

| Gender | Ile-Ife | Lagos | Total |
|--------|--------|-------|-------|
| Male   | 48     | 32    | 80    |
| Female | 52     | 20    | 72    |
| Total  | 100    | 52    | 152   |

χ^2 = 2.515, df = 1, P = 0.113.

Table 2: Denture demand by age and center/clinic

| Age group | Ile-Ife | Lagos | Total |
|-----------|--------|-------|-------|
| ≤20       | 18     | 5     | 23    |
| 21-40     | 35     | 22    | 57    |
| 41-60     | 25     | 17    | 42    |
| ≥61       | 22     | 8     | 30    |
| Total     | 100    | 52    | 152   |

χ^2 = 3.568, df = 3, P = 0.312
There were no statistically significant age (p = 0.312) and
gender (p = 0.113) differences between the populations
from the two centers. (Tables 1 and 2).

There was a highly significant difference in the educa-
tional status of patients seen at LUTH and OAUTHC with
patients seen at LUTH being of higher educational levels
than patients seen at OAUTHC. ($\chi^2 = 7.50$ df = 3, P < 0.001) (Figure 1).

In terms of socioeconomic status, 28 (18.42%) patients
belonged to class I; 43(28.29%) patients belonged to class
II while 81(53.29%) belonged to class III. There was no

statistically significant difference in the socio-economic
status of patients from the two centers ($\chi^2 = 5.70$, df = 2,
p = 0.057). (Figure 2)

In both centers, 134 patients (88.2%) received removable
partial dentures, 13 patients (8.6%) received complete
dentures while 5 patients (3.3%) received either upper or
lower complete dentures. There was no significant differ-
ence in the demand for different types of dentures
between the study locations. (P = 0.315). (Table 3).

However, there was a significantly higher demand for
removable partial dentures than any other type of pro-
theses. ($P < 0.01$). (Table 3)

It was observed that as the age increased, the proportions
demanding for complete dentures also increased. In addi-
tion, those in age group 21–40 years demanded more for
removable partial denture than any other age groups.
While those above 61 years asked more for removable
complete dentures than removable partial dentures.
(Table 4).
No significant relationship between gender and pattern of denture demand (p = 0.812) was noted and no statistically significant difference was noted in the pattern of denture demand between the two centers (p = 0.277). (Table 5 and Figure 3).

The lower educational groups demanded more for complete dentures among those asking for complete denture, while those with higher level of education asked more for removable partial denture. (p < 0.001). (Table 6). More over, those with tertiary level of education constituted the majority of the study population. (Table 6)

Table 5: Demand for various prostheses in relation to gender.

| Type of Denture | male | Female | Total |
|-----------------|------|--------|-------|
| Complete denture | 6    | 7      | 13    |
| Complete upper or Lower denture | 3    | 2      | 5     |
| Partial denture  | 71   | 63     | 134   |
| Total            | 80   | 72     | 152   |

χ² = 0.57, df = 1, p = 0.812
For the purpose of analysis, complete and lower/upper complete denture columns were merged.

Table 6: Demand for dentures according to educational level

| Educational Level | Complete Denture | Partial Denture | Total |
|------------------|-----------------|----------------|-------|
|                  | No   | %   | No   | %   | No   | %   |
| Nil              | 11   | 61.1| 12   | 8.9 | 23   | 15.1|
| Primary          | 3    | 16.7| 8    | 5.9 | 11   | 7.2 |
| Secondary        | 0    | 0.0 | 51   | 38.1| 51   | 33.6|
| Tertiary         | 4    | 22.2| 63   | 47.0| 67   | 44.1|
| TOTAL            | 18   | 100.0| 134  | 100.0| 152  | 100.0|

Fishers exact test P < 0.001
For the purpose of analysis, secondary and tertiary educational levels’ rows were merged. Also complete denture and either upper or lower complete denture column were merged

Table 7: Relationship between age group, educational level and completely edentulous state

| Age group | Educational Level |
|-----------|------------------|
| ≤20       | Nil | Primary | Secondary/Tertiary |
|           | 1(9.1%) | - | - |
| 21–40     | 2(18.2%) | - | - |
| 41–60     | 4(33.3%) | 1(33.3%) | - |
| >60       | 4(33.3%) | 2(66.7%) | 4(100%) |

Likelihood-ratio χ² = 7.515, df = 6 P = 0.276

Discussion

Tooth loss could occur as a result of caries, periodontal diseases, trauma, tooth impaction, orthodontic reasons, hypoplasia, over eruption, supernumerary teeth, attrition, neoplastic and cystic lesions [5-7].

Many studies have consistently shown the role of specific diseases like dental caries and periodontal disease as a major cause of tooth loss [7,13,14]. This same picture was noted in similar Nigerian studies [5,6].

Okoisor further established that the disease factors responsible for tooth loss was age related; with caries and periodontal diseases being the major causes of tooth mortality in children and adult respectively [5].

However, none of the studies done in Nigeria evaluated the role of other factors such as education, socio-economic status, gender, location of patients, dental attitude and behavior in the etiology of edentulism.
The older age groups in this study required more of removable complete dentures than the younger age groups while the younger age groups required more of removable partial dentures. This is in agreement with the study done by Marcus et al [12]. Although there was an over representation of age groups >61 and 21–40 in our study population, the percentages of these age groups in Nigerian population are 4% and 30% respectively in both urban and rural areas [16]. Hence, these age groups have risk factors that might be responsible for their needing dentures.

This age related changes may not be unconnected with the deteriorative physiological changes noticed after adolescence and which gets worse with increase in age, a situation which is changing rapidly in the developed countries due to improved social infrastructure and functional health system [17,18].

Most studies have also shown significant gender difference in edentulism with more males becoming edentulous than females [11,19]. This has been attributed to the fact that males are more active than females and do not pay much attention to oral care. A significant gender difference was not seen in this study although variation in site presentation was observed. In Lagos, an urban area, more males actually demanded for prostheses. However, in Ile-Ife, a rural area more females demanded for prostheses. This is in agreement with the studies done by Eklund and Burt [8] and Marcus et al [12]. Although no statistically significant difference was noted in the rural-urban gender presentation, a larger qualitative study alongside a quantitative study may be able to adduce possible reasons for this interesting observation.

Majority of our study population belonged to the higher education status. This is because those with higher level of education are more informed about their health needs and may seek dental treatments earlier and more often than those of lower educational status who may only seek dental treatment when there is apparent morbidity. In addition, those of higher educational status are likely to be richer than those of lower educational status. Hence, they are able to afford the cost of dental treatments from time to time.

Our study showed that the need for complete dentures decreased with increasing level of education (p < 0.001), hence the likelihood of retaining teeth in the mouth becomes higher as the educational level increases. Although the educational status of the patients from the two centers differ, independent analysis of these centers still showed the same significant effect of educational status on the pattern of denture demand. This is in agreement with the findings of Brodeur et al, where the proportion of completely edentulous adults decreased from 26% in 1980 to 20 % in 1993 due to improved income and educational status [1].

The association between edentulism and educational status may be as a result of improved dental health awareness, increased utilization of oral health facilities, proper oral hygiene habits acquired during learning process and peer group influence.

Interestingly, about 23.3 % of those in class II who need dentures asked for complete dentures as opposed to 3.6% in class I and 8.6% in class III. The reason for this may be as a result of the fact that they may not be able to afford the exorbitant cost of restorative procedures hence they wait until they have lost their set of teeth to have a complete removable denture which is cheaper.

The present study showed that people with low socio-economic status demanded for more dentures than the high socio-economic group. Studies have long established a gradient relationship between socio-economic status and health [20]. In so many intricate ways, socio-economic status tends to affect health behaviors, the environment and social influences an individual is exposed to. Hunter

| Socio-economic status | Edentulous state | Total |
|-----------------------|-----------------|-------|
|                       | Partial | Complete |
|                       | No  | %    | No  | %    | No  | %    |
| Class I               | 27  | 96.4| 1   | 3.6  | 28  | 18.4 |
| Class II              | 33  | 76.7| 10  | 23.3 | 43  | 28.3 |
| Class III             | 74  | 91.4| 7   | 8.6  | 81  | 53.3 |
| Total                 | 134 | 88.2| 18  | 11.8 | 152 | 100  |

$\chi^2 = 7.992, df = 2, P = 0.018$

| Socio-economic Class | Lagos center | Ile center | TOTAL |
|----------------------|--------------|------------|-------|
|                      | No | %  | No | %  | No | %  |
| Class I              | 8  | 15.4| 20 | 20.0| 28 | 18.4|
| Class II             | 21 | 40.4| 22 | 22.0| 43 | 28.3|
| Class III            | 23 | 44.2| 58 | 58.0| 81 | 53.3|
| TOTAL                | 52 | 100.0| 100| 100.0| 152| 100.0|

$\chi^2 = 5.70, df = 2, p = 0.057$
and Arbona found that environmental influences such as land hunger, family poverty, and inadequate diet are of paramount importance in the cause of tooth loss [10]. They concluded, "Periodontal disease drives the poorest of the poor to spend disproportionately large sums on pain killers and destructive traditional medicine”.

The importance of socio-economic status is further reflected in the urban-rural variance noted in this study population’s demand for denture. The Ile-Ife study group, a rural population with a lower socio-economic status, demanded for more dentures than the Lagos study group.

However, this study population was an all-inclusive hospital based sample; the result may not be representative of the population at large. Hence, its use can only be limited to the study population. A randomized population based survey may be able to present a better picture among Nigerians.

This study observed that edentulism is due to a combination of various factors. Poor education, a risk factor for poverty, has been identified as a major factor in edentulism. So also is the socio-economic status of the patient. These two factors, which are non-disease factors, affect the mortality of teeth arising from disease factors. There is therefore a need for oral health policy formulators to focus on improving the educational and socio-economic status of its citizens (a down stream approach) rather than the present emphasis on disease control (an up stream approach) in oral health care delivery.

On the other hand, with increasing level of literacy, and positive social changes in Nigeria, Prosthodontists should brace up to face the challenges that may arise from increased removable partial denture demand and decreased demand for complete dentures. This is because, with increase in level of education and socio-economic status of patients, the demand for removable partial dentures is likely to increase while dentists may be confronted with a significant increase in the number of difficult edentulous mouths requiring treatment.

In addition to addressing the non-disease factors, dental education should be targeted at the uneducated populace, the rural dwellers and low-income groups to reduce the rate of total edentulism.

**Conclusion**

No gender relationship with denture demand was noted this study. In addition, the demand for complete dentures increased with age. There was a statistically significant inverse relationship between educational levels and demand for dentures. There was more demand for prostheses among the lower socio economic groups.

**References**

1. Brodeur JM, Benigeri M, Naccache H, Olivier M, Payette M: Trends in the level of Edentulism in Quebec between 1980 and 1993. J Can Dent Assoc 1996, 62(2):159-160. 162–166.
2. Okeyemi OD, Ndubwe KCE: Pattern of Tooth loss among paediatric patients in Ile-Ife. Niger Med J 1997, 32(1):10-13.
3. Bouma J: On becoming edentulous. An investigation into the dental and behavior reason for full mouth extraction. Thesis Ryksuniversteit te Grmingh 1984.
4. Zarb GA, Bolender CL, Hickey JC, Carlson GE: Bouchers prosthodontic treatment for edentulous mouth. 10th edition. St Louis: The C.V. Mosby Co; 1990:3-27.
5. Okoisor FE: Tooth Mortality: A clinical study of causes of loss. Ng Med Journal 1977, 7:77-81.
6. Odusanya SA: Tooth loss among Nigerians: causes and pattern of mortality. Int J Oral maxillofac Surg 1987, 16:184-189.
7. Kaimenyi JT, Sachdrea P, Patel S: Causes of tooth mortality at the Dental Hospital Unit of Kenyatta National Hospital of Nairobi, Kenya. J odonto-stomatologie tropicole 1988, 1:17-20.
8. Eklund SA, Burt BA: Risk factor for total tooth loss in the United States: Longitudinal analysis of national data. J public health dent 1994, 51(1):5-14.
9. Caplan Dj, Weintraub JA: The oral health burden in the United States: a summary of recent epidemiologic studies. J Dent Educ 1993, 57(12):853-862.
10. Hunter JM, Arbona ST: The tooth as a marker of developing world quality of life: a field study in Guatemala. Soc Sci Med 1995, 41(9):1217-1240.
11. Hoover JR, McDermott RE: Edentulosityness in patients attending a university dental clinic. J Can Dent Assoc 1989, 55(2):139-140.
12. Marcus PA, Joshi JA, Morgano SM: Complete edentulism and denture use for elders in New England. J Prosthet Dent 1996, 76(3):260-266.
13. Brekhus PJ: Dental disease and its relation to the loss of human teeth. JADA 1929:2237-2247.
14. MacGregor IDM: Pattern of tooth loss in a selected population of Nigerians. Arch Oral Biol 1972, 17:1573-1582.
15. Office of Population Census and Surveys (OPCS 1991): Standard occupational Classification. Volume 3. London: HMSO .
16. Population Census of the Federal republic of Nigeria: Analytical report at the national level. National population Commission 1998.
17. Weintraub JA, Burt BA: Tooth loss in the United States. Presented at the 62nd annual session of the American association of dental Schools Las Vegas New 1995.
18. Weintraub JA, Burt B: Oral health status in the United States: Tooth loss and edentulism. J Dent Educ 1985, 49:368-376.
19. Suominen-Taipale AL, Alalen P, Helenius H, Nordblad A, Uutla A: Edentulism among Finish adults of working age. Community Dent Oral Epidemiol 1999, 27(5):353-365.
20. Adler N, Boyce T, Chesney MA, et al.: Socio-economic status and health: The challenge of gradient. Health and human rights 1999, 3:181-201.

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