Received: 20th May 2015 Accepted: 15th August 2015 Conflicts of Interest: None

Source of Support: Nil

Original Research

Analysis of Tooth Loss in Young Adults and Associated Factors in the Amazon Region

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How to cite the article:

Silva PR, Lopes MC, Paiato A, Rabelo MA, Michel-Crosato E. Analysis of tooth loss in young adults and associated factors in the Amazon region. J Int Oral Health 2015;7(10):1-5

Abstract:

Background: Tooth loss causes serious problems for the individual, both for general health and for social interaction. The aim of this study was to estimate the prevalence of tooth loss of adolescents in Manaus associating it to individual, socioeconomic, and self-perception of oral health factors.

Materials and Methods: A cross-sectional study was conducted in schools in the urban area of the city of Manaus with the participation of 889 adolescents between 15 and 19 years old. A single examiner conducted all oral examinations. For the data analysis the dependent variable was dichotomized resulting in Categories: Presence and absence of tooth loss per individual. The independent variables were collected through a questionnaire held before the oral examination.

Results: Show that the dental loss of adolescents in Manaus is higher than average in Brazil and the perception of adolescents who feel the need for dental treatment seemed to be associated with the tooth loss in the bivariate analysis. Adolescents with one or more missing teeth due to the caries represent 40% of the sample.

Conclusion: Tooth loss of the adolescents in Manaus-Brazil was high and associated with some worse oral health self-perception.

Key Words: adolescent, epidemiology, socioeconomic factors, tooth loss.

Introduction

Tooth loss causes serious problems for the affected individual, with respect to both general health and social interaction. Studies have shown that the main cause of these losses is dental caries.[1,2] However, besides the biological factors involved, socioeconomic conditions can also contribute to this process.[3]

In Brazil, epidemiological surveys conducted using the decay-missing-filled (DMF) index (i.e. the sum of the DMF teeth per individual) on young adults indicate a decrease in the number of teeth affected by caries. This scenario is strongly illustrated by epidemiological studies conducted and which demonstrated that young adults aged between 15 and 19 years in the 16 Brazilian capitals presented an approximate average of 13 teeth affected by caries.[4] Comprehensive study conducted in all the capitals and in the small and big cities of the five Brazilian regions, indicated a decrease in the DMF average within the same age group to 6.2, evidencing a decrease in the prevalence of caries disease of almost 50%.[5] Recently, results of a 2010 survey[6] conducted with a methodology similar to the previous counting, indicated that the average DMF among Brazilians aged between 15 and 19 years was 4.25. Therefore, it ratifies an approximate decrease of 31% in the development of dental caries over 10 years of monitoring.

Despite the decrease in the DMF index indicating a favorable result in relation to the control and decrease of the disease, the prevalence of missing components has not followed the same expected pace of decline.[3] In the above-mentioned 1986, 2000, and 2010 surveys, the rate of missing components in the specified age group was 15.2%, 14.4%, and 8.9%, respectively, of the constitution of the DMF. This indicates that in 24 years of monitoring, the missing component continued to be significant when compared with the percentage of the other components of the index.

Considering the regional diversity, the importance of investigations regarding dental losses in Brazilian adolescents and the scarceness of previous studies, the objective of this study was to estimate the prevalence of tooth loss in adolescents in Manaus, Brazil, and to study its associations with individual, socioeconomic, and self-perception of oral health factors.

Materials and Methods

This project was approved by the Research Ethics Committee of the Federal University of Amazonas (Protocol Number: 031/2006).

It was conducted as a cross-sectional study, with the participation of 889 adolescents aged between 15 and 19 years, enrolled in schools in the urban area of the city of Manaus, Brazil in 2007. This sample was calculated based on the sample calculation conducted considering a 20% non-response rate (increase estimated of the possible losses of the individual randomly selected), multiplied by 2 as an effect of the study (considering that in the sampling plan conglomerates represented by the school were used), 10% of maximum permitted error (stipulated by the researchers) and a 95% confidence interval.[6]

The 889 adolescents were proportionally divided into the areas of the city (north, south, east, and west) according to the number of general enrollments offered by the Department of Planning and Research/Statistics Management of the State of Amazonas Education Department.

The examination was conducted by a single examiner and properly calibrated, achieving a general concordance rate of 94% and a kappa coefficient equal to 0.91. The students were individually examined in the school itself, with the use of a headlight, a plane intraoral mirror, a modified ballpoint probe, and sterile gauze pads for drying the teeth. The data was collected as a DMF index as proposed by the World Health Organization.[7] The codes were recorded by an auxiliary. Adolescents who were undergoing orthodontic treatment with the use of a fixed dental appliance, and those with third molars were excluded from this research.

For the data analysis, the dental elements classified with the code 4 were used,[7] representing the loss of the element caused by caries. This dependent variable was dichotomized into the following categories: presence and absence of dental loss per individual.

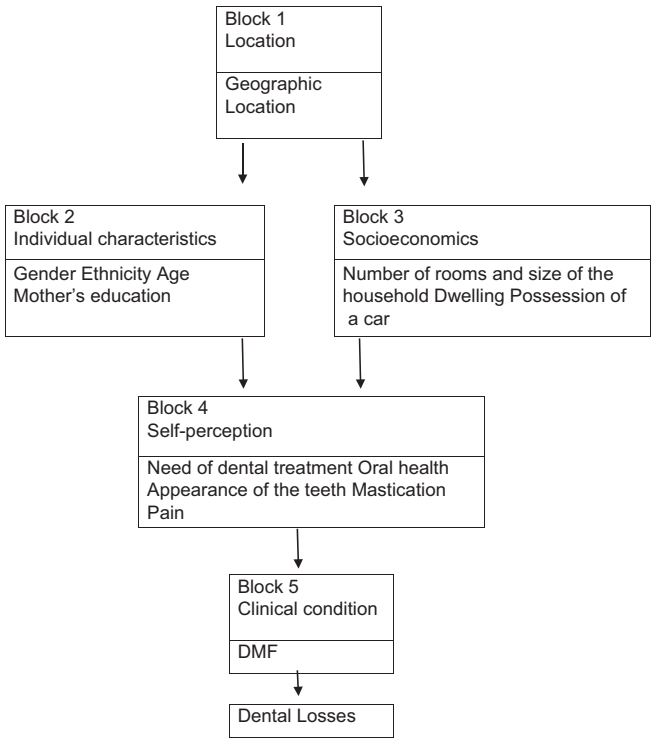


Figure 1: Hierarchical model for the analysis of the data.

The data related to the socioeconomic aspects, as well as self-perceived oral health was collected through a questionnaire that was completed prior to the oral exam. The form used was the same as that used in the National Survey of Oral Health.[5]

The questions relating to the mother's education were dichotomized and classified according to the education level, similarly to what is observed in the study that was conducted in Joaçaba, Brazil.[8] In this way, the mothers who started high school or university studies were classified as having more years of education.

The characteristics of the dwelling of the adolescents were also dichotomized according to the number of people per house hold and the number of rooms per dwelling.[9]

The variables were grouped in blocks (Figure 1), based on the hierarchical theoretical model of dental loss determination.[3]

The statistical analyses were performed using the program Stata 11. For the multivariate Poisson regression analysis, only values of $P > 0.05$ were considered statistically significant.

Results

For this population, the average occurrence of "missing" components due to dental caries corresponded to 0.8 (±1.2), equating to 17.2% of the DMF index average (Table 1).

The most common missing elements due to caries disease in this sample were the first molars, followed by the second permanent molars, both superior and inferior as shown on Graph 1.

Adolescents with one or more missing teeth due to caries corresponded to 40% of the sample size differences between the genders were not verified. However, higher age of the adolescents was associated with greater dental loss (Table 2).

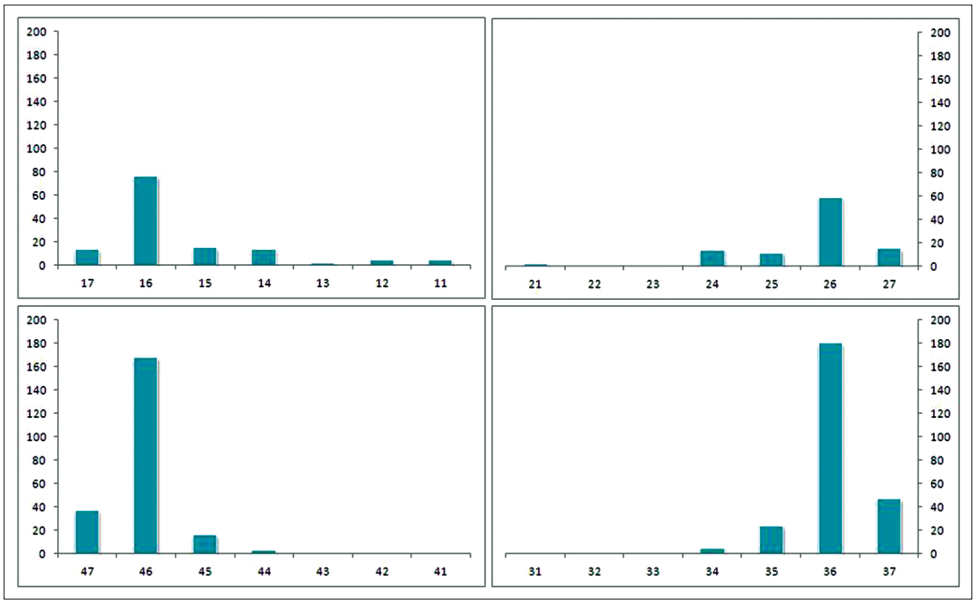
In relation to the household circumstances (Table 1), it was observed that more than half of the interviewed adolescents lived together with more than four people, and only a minority lived in dwellings with more than five rooms. Considering the correlation between room sand dwellers, this data suggests a sample that can be considered to have low income.[10]

According to the bivariate statistical analysis presented in Table 3, the appearance of the teeth reported to be bad by the adolescents proved to be significant for the dental-loss

Table 1: Average of the DMF index and of the lost component.

DMF			Missing		
Average	**Minimum**	**Maximum**	**Average**	**Minimum**	**Maximum**
4.65 (±3.71)	0	20	0.8 (±0.12)	0	7

DMF: Decay-missing-filled



Graph 1: Proportion of dental elements loss in relation to the total missing teeth in adolescents of Manaus, 2007.

Table 2: Distribution of the students according to variables, Manaus 2007.

Variable	Category	*N* (%)
Dental loss	*P*=0	530 (60)
	P≥1*	359 (40)
Gender	Female	490 (55)
	Male	399 (45)
Age	14	218 (24)
	15	240 (27)
	16	151 (17)
	17	121 (14)
	18	95 (11)
	19	64 (7)
Areas	North	173 (19)
	South	360 (41)
	East	178 (20)
	West	178 (20)
Ethnical group	White	183 (21)
	Non-white	702 (79)
Possession of a car	Yes	159 (18)
	No	730 (82)
Household size	Up to four people	347 (39)
	More than four people	542 (61)
Number of rooms in the dwelling	Up to five rooms	609 (69)
	More than five rooms	280 (31)
Considers that needs dental treatment	Yes	810 (91)
	No	79 (9)
Oral health self-perception	Good	405 (46)
	Bad	484 (54)
Self-perception of appearance teeth/gum	Good	413 (46)
	Bad	476 (54)
Self-perception of mastication	Good	591 (66)
	Bad	298 (34)
Pain in the last 6 months	With	615 (69)
	Without	274 (31)
Mother's education	With more years of education	260 (29)
	With less years of education	629 (71)

*Individuals with 1 or more teeth missing

outcome. Adolescents who believed they needed dental treatment were associated with a dental loss in the multivariate analysis, as well as the DMF (Table 3).

In this study, there was an association between students who were reported to live together with more than four people and dental loss due to caries.

Discussion

The city of Manaus is devoid of fluoridation in the public water supply, which can result in a significant increase of the DMF index, as has been demonstrated in studies in other cities with and without fluoridated water.[11] Therefore, the comparisons of this data once it refers specifically to the north region of Brazil, which is little explored.

The most commonly extracted teeth were the first permanent molars, specifically the first permanent inferior molars (Table 2). Verification of these findings, as well as the negative consequences for the stomatognathic system, have already been extensively discussed in the literature.[12] The same can be said in relation to the increase of dental loss with respect to advancing age, as previously reported.[13,14]

Many authors emphasize that the distribution of dental loss tends to be asymmetric;[15] that is, few individuals account for a large number of losses. Despite that, this asymmetry has not been identified in this study and special attention was accorded to the statistical analyses.

The dental loss of these adolescents did not prove to be associated with the individual aspects studied. Differences in dental loss between the genders were not observed, however, studies reporting women with greater dental loss

Table 3: Bivariate and multivariate Poisson regression of the association between dental losses, according to the variable block. Manaus, 2007.

Variables	Bivariate			Multivariate		
	RP	CI	*P*	RP	CI	*P*
Individuals						
Male	0.907	0.734-1.119	0.361	0.891	0.722-1.100	0.283
Legal age	1.143	1.071-1.221	0.000*	1.143	1.071-1.221	0.000*
Non-white	1.122	0.911-1.382	0.277	1.114	0.894-1.388	0.336
Lower education of the mother	1.234	0.967-1.574	0.091	1.183	0.926-1.512	0.178
Socio-economics						
Higher number of individuals per household	1.023	0.984-1.064	0.251	1.065	1.004-1.129	0.036*
Lower number of rooms per dwelling	0.964	0.915-1.016	0.171	0.974	0.896-1.058	0.536
Possession of a car	0.845	0.658-1.083	0.182	0.763	0.501-1.160	0.205
Self-perception						
Oral health	1.131	0.917-1.396	0.251	1.078	0.785-1.481	0.642
Appearance of the teeth	1.245	1.008-1.538	0.042*	1.097	0.807-1.492	0.554
Mastication	1.006	0.808-1.252	0.958	0.933	0.684-1.273	0.664
Pain	1.223	0.984-1.521	0.070	1.041	0.755-1.436	0.806
Need of treatment	2.079	1.259-3.433	0.004*	3.390	1.243-9.246	0.017*
Clinical condition						
DMF	1.117	1.092-1.143	0.000*	1.083	1.048-1.118	0.000*

*P<0.05, RP: Regression Poisson, CI: Confidence interval, DMF: Decay-missing-filled

than the men.[3,16] Yet, when adjusted for age or changes in the methodology, these differences do not exist.[17]

Despite the impact of the parent's educational level previously highlighted by several researchers,[18] no association was found in this study. This maybe because the adolescents who composed this sample presented are few social discrepancies.

Lower socio-economic conditions seem to be associated with greater dental loss.[3] In this study, this relation was found only regarding the greater number of individuals per household. An analysis with other socioeconomic variables that were not contemplated in this research could better emphasize these results. It should also be remembered that the social inequalities represent a scenario considered decisive for health and disease processes; however, they are not difficult to be quantified.

The appearance of the teeth that were reported to be bad by the adolescents was demonstrated to be associated with dental loss in the bivariate analysis. However, in the multivariate model it was not significant. Some studies emphasize that this finding indicates that the absence of a tooth without its proper replacement can generate an aesthetical discomfort often caused by the improper repositioning of the remaining teeth, which can affect the general harmony of the dental arch.[14]

The need for dental treatment as reported by the adolescents was also demonstrated to be associated with the absence of at least one tooth in the oral cavity, suggesting that the dental mutilation of these adolescents is not being followed by the replacement of the missing elements. It is worth emphasizing the importance of the preventive measures in all the age groups, both related to the specific protection and to the rehabilitating ones.

The average DMF observed in this population of 15-19 year olds (4.65) is a little lower than the one presented in the last national survey for the city of Manaus, Brazil (4.85). It should also be pointed out that the sample was restricted to students of the elementary and high schools concentrated in the urban area of the capital of the state of Amazonas, who, count with more information and access to the health services.

The average rate of the "missing" components corresponded to 0.8 (±1.2), which was 17.2% of the average DMF index; this in turn corresponds to more than double the national average of same age-group Brazilians (0.38).[6] This situation suggests some level of access to dental services, but, on the other hand, evidence suggests that dental mutilation is still high among the adolescents of this city.

Conclusion

The authors conclude that dental loss in the adolescents of Manaus is greater than the national average of Brazil, and this loss is associated with a worse self-perception of the oral health of these adolescents.

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