

# The Dental Caries Profile of Two Brazilian Amazonian Population: An Epidemiological Approach

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## ABSTRACT

**Objective:** The objective of this paper was to compare the dental caries profile among rural riverine (RR) inhabitants and Montenegro (MN) epidemiologic study to assess the inequalities in oral health into the Brazilian Amazonian state of Rondônia.

**Methods:** Rural riverine population sample of rivers Preto and Madeira was published carrying dental caries epidemiologic data from 2005 to 2006. Dental caries survey ran with the same DMFT criteria in the small town of Montenegro in 2008. The groups of age for comparison (t-test) were accomplished with preschool children (RR/MN; 4-5/5), school children (RR/MN;12), adolescents (RR/MN; 18/15-19), adults (RR/MN; 35-44) and elderly (RR/MN; 65-74). In this present study, the rural riverine sample totalized 237 participants and 369 people participated in Montenegro. The entire sample was 606 participants.

**Results:** Only on preschool children [MN 3.15 (3.12); RR 4.31 (3.42);  $p = 0.03$ ] and on elderly groups [MN 25.96 (9.82); RR 21.56 (11.95);  $p = 0.05$ ], the dmft (SD) and DMFT (SD) were significantly different. Despite of no statistical difference in DMFT (SD) of other groups, the component filling teeth (FT) was higher among Montenegro inhabitants at 12 ( $p = 0.03$ ), at 15-19/18 ( $p = 0.02$ ) and at 35-44 (0.00). The caries-free participants were higher, represented among RR in all ages but the 4-5/5.

**Discussion:** The international trend of dental caries decline has been shown in both epidemiological surveys. The caries polarization phenomenon may be observed in both localities in all ages also. The tooth loss increases with aging in both studies due to dental caries but in Montenegro the missing teeth (MT) component in the elderly group is significantly higher ( $p = 0.03$ ).

**Conclusion:** Dental caries was high in both Amazonian regions and tooth loss was apparently the most clinical problem to be avoided. Oral health care measures are necessary to take part on daily life of these populations in educational, preventive and clinical aspects.

**Keywords:** Dental caries, Amazonia, Riverine population, Oral health surveys.

## INTRODUCTION

The World Health Organization (WHO) recommended many subjects for research on oral health/disease in 2005 and inequity was one of them.<sup>1</sup> In 2009, reporting the global policy for improvement of oral health in the 21st century, Petersen<sup>2</sup> indicates, among others, the research about 'inequity in oral health and disease and the impact of sociobehavioral risk factors' again. The oral diseases prevention is well known and is related to sociobehavioral risk factors.<sup>3</sup> This way of

thought brings to the surface the need for policies capable to promote oral health and prevent oral disease objecting the control of the inequalities related to social class, ethnic group, sex or geographic location.<sup>4</sup>

At the first half of the last century, dental caries was highly prevalent in developed and in developing world. The fluoride studies were still in progress and the benefices of the preventive dentistry, mainly due to fluoridated drinking water and fluoridated dentifrices, was not in progress yet. When fluoridated products

have become part of day life of people worldwide the decrease of this disease has started. The decrease on dental caries year by year became to be expressive among young population, initially in highly industrialized countries and after in developing nations. Nevertheless reports has shown some kind of halt in this decrease when it gets at low scores of DMFT.<sup>5</sup>

This dental caries decline in 12-year-old school children also happened in Brazil. In 1986,<sup>6</sup> the national mean DMFT 6.65 changed to 2.78 in 2003,<sup>7</sup> which is 58.19% of decline. But in the north region, where the Amazonia is localized, the scores were 7.49 (1986) and 3.13 (2003) registering a decline of 58.21% in the prevalence of disease. The north region had been declining this disease at similar percentage of entire Brazil at the same period but in higher means. Differences between communities must be considered. Some towns like Bauru, Southeast of Brazil, in the period between 1976<sup>8</sup> (9.89) and 2006<sup>9</sup> (0.90), the decline at this age was 90.90%. In 2004, riverine inhabitants of river Negro, Amazonian region, in 12 to 14-year-old Indian children the DMFT was 6.0 with 2.9 only at the decayed component. There are still places in Brazil where dental caries remains with high scores.<sup>10,11</sup>

The aim of this paper is to analyze oral health conditions between the dental caries profile of rural riverine population of rivers Preto and Madeira, in 2005 and 2006,<sup>12</sup> and the Montenegro dental caries profile, in 2008.<sup>13</sup> Both places are localized at the Amazonian Brazilian state of Rondônia.

## MATERIALS AND METHODS

### The Rural Riverine Population Study

A report has been published by Silva et al (2008),<sup>12</sup> carrying data from rural riverine population of rivers Machado and Preto (RR), into the state of Rondônia. The examinations were done in three moments, in February and July of 2005 and in January of 2006, by the same group of researchers, gathering same two examiners on board of the boat Floriano Riva Filho. At least 0.86 scores for kappa test were achieved. The sample population was examined by dental mirrors and tongue lowers, in doubt cases the CPI probe was used for dental caries.

The WHO form was used for DMFT index in deciduous and permanent teeth. Silva et al (2008)<sup>12</sup> examined 469 subjects described in the following groups per age: 0-3, 4-5, 6-10, 12, 18, 35-44 and 65-74.

According to the Brazilian Health National Board, this research was approved by the Institutional Review Board of Bauru Dental School, University of São Paulo, Brazil, process 82/2004.

### The Montenegro Study

With the same diagnostic criteria used by Silva et al (2008),<sup>12</sup> an epidemiological survey ran in the small town of Montenegro (MN), state of Rondônia, into Amazonian biome, urban and rural area. The data collection ran in 2008.<sup>13</sup>

The participants of 5 years old were all from the same kindergarten in urban area and totalized two-thirds examined from all of children into this institution, all the children within

this age present at school on that day were examined. In rural areas, there were no institutions attending preschool children; therefore, it was impossible to assess the spread children. The same reason to group of elderly (65-74 years of age) people happened and no data were collected from rural area. The urban area collection of data was possible by the cooperation of the independent league of rural health (LISURA) bringing to the place of examinations this group. The group of 12 was assessed at school in both areas and the index age of 15 grouped the ages 16 to 19 because the sample would be the same used by Brazilian national surveys since the first one in 1986.<sup>6</sup> The group of adults (35-44 years of age) was carried out randomly with teachers and employees in which the examiners in schools were working during this dental survey. All the participants were chosen at random and signed their agreements.

This research was approved also by the Institutional Review Board of Bauru Dental School, University of São Paulo, Brazil, process 25/2008.

### The Comparison of Riverine and Montenegro Population Sample

Some particular groups are not just the same. In the preschool children group of Montenegro, only 5-year-old subjects were in and among the riverines, 4 years old were added and the comparison was upon deciduous teeth obviously. The adolescent group among riverine population contemplated only 18 years old subjects and in the Montenegro study this group was represented by adolescents of 15 to 19 years of age.

For this present study, the statistical comparison analyzes the t-test among the groups (MN/RR) of preschool children (5 and 4-5), school children (12), adolescents (15-19 and 18), adults (35-44) and elderly (65-74).

It is important to understand the limitations of this research regarding two dental caries surveys ran in different moments with different examiners. In the contrary, there are few studies regarding Amazonian populations and the data unified in this present study must be seen as a relevant source of data of two particular Brazilian population of the state of Rondônia, sometimes forgotten.

## RESULTS

The sample distribution is shown at Table 1 as in the original studies. The riverine groups of 0 to 3 and 6 to 10 years old were not used for the present study but are also described. The total number of participants included in the present study was 606, distributed in these groups of age: Preschool children (5 and 4-5), school children (12), adolescents (15-19 and 18), adults (35-44) and elderly (65-74), with a total of 111, 132, 139, 140 and 79 participants respectively.

Table 2 shows the comparison of the means dental caries profile of each group. The means dmft for the group of preschool children and the riverine sample shows 26.74% more elevated dmft index than the sample of Montenegro ( $p = 0.03$ ). Instead of the differences between these two populations, studied is the

**Table 1:** Sample distribution of dental caries survey of an Amazonian urban population (Montenegro, Rondônia, 2008) and an Amazonian riverine population (Rondônia, 2005-06)

Age		Sample population		Total
Montenegro-RO	Riverine-RO	Montenegro-RO	Riverine-RO	
–	0-3	–	104	–
–	4-5	–	55	111
5	–	61	–	–
–	6-10	–	128	–
12	12	81	51	132
15-19	–	98	–	139
–	18	–	41	–
35-44	35-44	73	67	140
65-74	65-74	56	23	79
Total		369	469	606

**Table 2:** Comparison of dental caries profile of Montenegro in 2008 and riverine population in 2005-06 by t-test

Age		DMFT (SD)		p (t-test)
Montenegro	Riverine	Montenegro	Riverine	
5	4-5	3.15* (3.12)	4.31* (3.42)	0.03**
12	–	3.41 (2.69)	2.65 (3.01)	0.07***
15-19	18	5.98 (4.19)	5.42 (5.33)	0.24***
–	35-44	16.00 (7.30)	17.73 (8.61)	0.10***
–	65-74	25.96 (9.82)	21.56 (11.95)	0.05**

\*DMFT data; \*\*Statistically significant; \*\*\*Nonstatistically significant

**Table 3:** Components of means DMFT decayed teeth [DT(SD)], missing teeth [MT(SD)] and filling teeth [FT(SD)] of Montenegro and riverine population compared by t-test (p)

Age		DT (SD)			MT (SD)			FT (SD)		
MN*	R**	MN*	RR**	p	MN*	RR**	p	MN*	RR**	p
5	4-5	2.67***	4.20***	0.01	0.00***	0.00***	—	0.48***	0.11***	0.01
		(3.06)	(3.44)		0.25	0.29		(1.15)	(0.49)	
15-19	18	2.53	2.15	0.24	(0.64)	(0.72)	0.37	0.63	0.21	0.03
		(2.24)	(4.03)		1.09	1.54		(1.45)	(0.89)	
35-44	18	3.27	3.17	0.43	(1.59)	(2.89)	0.12	1.62	0.71	0.02
		(2.87)	(3.69)		9.79	14.33		(2.66)	(1.75)	
65-74	18	2.21	2.54	0.22	9.79	14.33	0.00	4.00	0.86	0.00
		(2.33)	(3.66)		(8.65)	(8.83)		(4.16)	(2.99)	
65-74	18	0.89	1.96	0.02	24.71	19.56	0.03	0.36	0.04	0.19
		(1.60)	(3.13)		(10.74)	(11.92)		(1.15)	(0.20)	

\*MN: Montenegro population; \*\*RR: Riverine population; \*\*\*These components are DMFT index related

DMFT score of school children, adolescents and adults showed no statistical significance in t-test. But in the elderly group the differences were statistically significant between both samples (p=0.05), in Montenegro the 25.96 that means DMFT represents 17.08% elevated than the riverine sample (21.56 DMFT).

The components decayed, missing and filled of dmft and DMFT were statistically compared by t-test for every group of this study; these results are shown in Table 3. Among the preschool children groups, the decayed teeth components (dt) were higher in the riverine sample by 36.42% (p = 0.0058) and the filled teeth components (ft) were higher (77.08%) in the Montenegro sample (p = 0.01). The only component of the

school children group that showed statistically different data (p = 0.03) was the filled component (FT). Also, this component is the only statistical difference among the adolescent samples (p = 0.02). In both cases, the higher mean difference is upon Montenegro with 66.67 and 56.17% respectively. The adult group shows the component missing teeth (MT) with higher score for riverine sample 14.33 and to Montenegro sample 9.79 (p = 0.00) which represents 31.69% higher score for riverine sample. On the same group, the filled components (FT) were statistically higher among the Montenegro participants (4.00; p = 0.00). The decayed (DT; p = 0.02) and missing (MT; p = 0.03) components were statistically different for the elderly

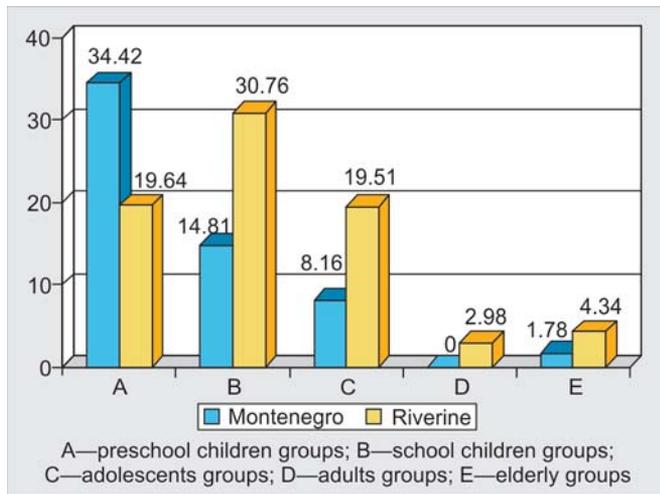


Fig. 1: Percentage of caries-free of Montenegro and riverine population

group. In the DT case, the riverine sample shows more than double of Montenegro score and the MT of Montenegro were 20.84% higher than riverine participants.

Figure 1 shows the caries-free percentage of both populations concerned in this report. Only in the preschool children groups the percentage is higher in Montenegro, all the other ages studied the riverine sample showed higher percentage of caries-free subjects.

A—preschool children groups; B—school children groups; C—adolescents groups; D—adults groups; E—elderly groups.

**DISCUSSION**

The knowledge of the prevalence of any disease, in a population is always an important start to public health services attend people’s necessities. This is the reason why researchers have been improving methods concerning randomized samples and welfare examinations to take part on methodologies to accomplish reliable epidemiological surveys. Dental caries has been the most studied oral disease in the entire world and the methodology used to collect this kind of data has been published for more than a century. But the report of Klein and Palmer<sup>14</sup> (1937) has given the scientific community an important start reference. In modern days, WHO has been worried in preparing reliable criteria, not only for dental caries but also to be used for several diseases, therefore, the results could be compared by different countries, towns and communities.<sup>15</sup> So, the oral health promotion and prevention of oral disease may be a reality into action programs.<sup>2</sup> This concern has given the possibility of comparing DMFT data published by Silva et al (2008)<sup>12</sup> among riverine population of rivers Negro and Madeira to the rural and urban population of the small town of Montenegro, both places into the Amazonian biome.

The Brazilian state of Rondônia does not have an oral health care policy to look for its inhabitants. In the contrary for humanitarian reasons, no governmental organizations and religious groups sometimes do campaigns concerning the urgent health needs commonly infectious diseases such as hydric epidemic diseases, sexual diseases and dental caries into

Amazonian area among rural riverine populations. The dental education must be continued as in the period of assistance, the population gets motivated but further this pattern is questionable,<sup>16</sup> and the education must be focused at parents because they have an important role on the health behavior of their children.<sup>17,18</sup> In Montenegro, the oral health attention is given in other way. Gathering with local public health services the University of São Paulo presents a program in this town. At least two times a year, since 2002, graduate and postgraduate students and also professors with the aim to increase the health, and oral health knowledge throughout the region. Clinical attention is also done without any charges either for population or to municipality concentrating efforts on educational, preventive and clinical dentistry and speech and language pathology and audiology. The results of such efforts are not still apparent on epidemiological data in this report because of the early years of its start, despite the interest of autonomy and independence. However, nowadays, Montenegro has shown interests on it as a public dental health service with dentists hired by the municipality is now available to the population. unfortunately, the rural area is not covered yet.

The caries polarization phenomenon might be observed in both localities in all ages. Part of the sample was formed by rural inhabitants of Montenegro where industrialized food is harder to reach, therefore, probably caries-free individuals were present in the adults and even in the elderly group. But the only age group which Montenegro inhabitants showed higher percentage of caries-free, was at preschool children (Fig. 1). At all other ages the percentage was higher among rural riverine participants. The hypothesis for such result may be due, first of all, by the most difficult access to cariogenic industrialized products and even for dental decay prevention, mainly by fluoridated dentifrices and for carbohydrates incorporated in many soft drinks and foods among the rural riverine population, which are less expensive. Obviously, in a town, the access of any industrialized product is easier, even in an Amazonian town. Other hypothesis concerned is the higher access of Montenegro population to dental care provided by public and private services, it may cause an overtreatment by urban population increasing dental restorations and tooth extractions. It is important to remember the absence of fluoridated water supply in both populations and also the fluoridated dentifrices present in the Brazilian market since 1989, surely present at the state of Rondônia.

After the year 2000, many Brazilian cities were already with more than 50% of caries-free school children,<sup>8,9,19,20</sup> but in Montenegro (2008)<sup>13</sup> only 14.81% were free from cavities. Similar or better percentage was already achieved in Campinas<sup>21</sup> by the year 1976 (18.14%), Belo Horizonte<sup>22</sup> in 1993 (33.80%), Bauru in 1995<sup>8,9,23</sup> (16.70%), Piracicaba<sup>24</sup> in 1996 (38.60%), São Paulo<sup>25</sup> in 1996 (39.80%), all Brazilian cities.

The mean dmft in preschool children was significantly different (p = 0.03), the rural riverine sample was higher and after analyzing decayed (p = 0.01) and filling (p = 0.01)

components, the data shows differences too. Rural riverine sample was higher in DMFT component probably due to the less use of fluoridated dentifrices and low knowledge about transmissibility of dental caries. Among the Montenegro sample the more clinical dental service available may explain the difference.

No statistical difference was found in DMFT between both samples but higher Montenegro filling component ( $p = 0.03$ ) was found maybe due to the more constant availability of dental clinical care. This kind of thought may persist for the data of the other ages. The adolescents groups showed only difference at filling component ( $p = 0.02$ ) and the higher number was in Montenegro score to. In adults groups, the differences lay on MT component ( $p = 0.00$ ), may be due to the difficult access to dental treatment and the tooth loss happened. The FT component also showed statistical difference ( $p = 0.00$ ) but the higher number is now upon the Montenegro participants, maybe due to the dental services availability.

The tooth loss increases with aging in both studies but in Montenegro the MT component in the elderly group is significantly higher ( $p = 0.03$ ). In the same group DT components are statistically different too, but the few teeth left in mouth let the statistical difference ( $p = 0.02$ ) be not important.

Dental caries was prevalent in both Amazonian regions and tooth loss was apparently the most clinical problem to be avoided. Oral health measures are necessary to take care of these populations in educational, preventive and clinical aspects. The rural riverine population of river Preto and Madeira is in a worse epidemiological situation than the inhabitants of Montenegro despite of the better caries-free aspect. Other epidemiological studies are necessary to increase knowledge about the habits of oral health and feeding to serve as basis data for setting future oral health promotion and oral disease prevention policies.

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