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pricilaferreira15@gmail.com

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Rodrigues Suizani, Tiago; Leal de Mello, Bruna; de Azevedo Koch, Luiza Foltran; Dea
Bruzamolin, Carolina; Leão Gabardo, Marilisa Carneiro
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Original Research Article

Epidemiological survey in oral health of the residents of the Teixeira Island, Paraná, Brazil

Tiago Rodrigues Suizani¹
Bruna Leal de Mello¹
Luiza Foltran de Azevedo Koch²
Carolina Dea Bruzamolín¹
Marilisa Carneiro Leão Gabardo²

Corresponding author:

Marilisa Carneiro Leão Gabardo
Rua Professor Pedro Viriato Parigot de Souza, n. 5.300 – Campo Comprido
CEP 81280-330 – Curitiba – PR – Brasil
E-mail: marilisagabardo@gmail.com

¹ Undergraduate in Dentistry, Positivo University – Curitiba – PR – Brazil.

² Postgraduate Program in Dentistry, Positivo University – Curitiba – PR – Brazil.

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Abstract

Introduction: The epidemiological surveys aim to evaluate the distribution and state determinants or events in health in given populations. **Objective:** To conduct an epidemiological survey on the socioeconomic condition, use of dental services, referred oral morbidity, self-perception, and oral health of inhabitants of the Teixeira Island, Paraná, Brazil. **Material and methods:** The study followed the statements of the World Health Organization and the Brazilian National Epidemiological Survey (SB Brazil 2010). Questionnaires were applied, and in the clinical examination the following data were collected: dental trauma, edentulism, fluorosis, caries in deciduous teeth (dmft), caries in permanent teeth (DMFT), Community Periodontal Index (CPI) and Loss of Periodontal Insertion Index (LPII). The data were analyzed with Statistical Package for Social Sciences software, version 21.0, and expresses in frequency tables. **Results:** Of the 108 inhabitants, 90 participated in the study. The socioeconomics conditions unfavorable were: low income and low schooling. The water supplying was not fluoridated. The perception of oral problems was reported by 82.2%; 48.9% declared to have had toothache in last the six months; the reason of search for care was predominantly for curative treatments. Almost 30% of the participants declared to be unsatisfied with their oral health. The

values of DMFT and dmtf indexes were 13.9 and 1.2, respectively. The greater demand for maxillary prosthesis occurred in 39.7% of the sample, while 34.2% needed mandibular prosthesis. **Conclusion:** The oral diseases illnesses and need of treatment were evidenced in the sample, as well as risk factors that deserve attention of the public power.

Introduction

The epidemiological surveys in oral health have basic role in the definition of strategies directed to the improvement of this condition in populations [1, 22, 37]. A variety of oral conditions have been searched in Brazil [3, 4, 6, 7, 23, 30, 34, 40].

Historically, in national level, four great studies have been carried through. In 1986, data referring to the dental caries, periodontal disease, and need for prosthesis requirement in individuals of the urban zone of 16 capitals were obtained [11]. In 1996, the experience of caries at 6 and 12 years-old was studied, but only in the Brazilian capitals and Federal District [13].

Due to the necessity of the accomplishment of a larger project, in middle 1999s, a discussion lead to the project so-called “SB Brasil: Conditions of Oral Health in the Brazilian Population”. This project counted on the involvement of diverse entities and dental institutions and contemplated the examination of inhabitants of 250 cities of Brazil [14].

Seven years later, The Health department launched “SB Brasil 2010 - National Research on Oral Health”. Basically, with the same delineation, the study incorporated 26 state capitals, the Federal District, and 150 interior cities of different population numbers [15].

In the SB Brasil 2010 survey, other variables were studied in addition to the oral condition, such as: income, schooling, use of dental services and self-perception of oral health [15]. The literature reports that these factors are associated with the outcomes in oral health [20, 24], which exceeds the unidirectional practice and concept of interpretation of the oral health-disease process as exclusively base in the professional interpretation, still prevalent [28].

Additionally, the literature is gradually offering evidences that the greatest rates of oral diseases and problems are related to worse indicators of social inequities pointers of social inequities, enabling the deleterious action of social determinants of health [2, 5, 32, 39].

The Teixeira Island was the elect place for the accomplishment of this research because it did not

undergo an epidemiological survey in oral health. The island belongs to the city of Paranaguá, the coast of the state of the Paraná. It is located between the Paranaguá and Antonina bays. The access is only possible by boat. Non-official data indicate that it has approximately 108 inhabitants, who live basically of fishes, tourist houses, and of the small local commerce. It does not have water treatment station; from a reservoir (well) hoses lead the water to the houses. The only municipal structure is an agricultural school called Eulália M. da Silva. To have a dental appointment, the inhabitants go by boat to the city of Antonina, a trip of 15 minutes.

This study aimed to conduct an epidemiological survey on the socioeconomic condition, use of dental services, referred oral morbidity, self-perception, and oral health of inhabitants of the Teixeira Island, Paraná, Brazil.

Material and methods

The study was approved by the Research Ethics Committee of the Universidade Positivo regarding to ethical aspects (protocol #1.585.052). A trained and calibrated examiner applied the questionnaires and performed the oral examination (table 1) as established by the handbooks of WHO [31] and SB Brasil epidemiological survey [10].

A questionnaire was applied containing: individual demographic (age, gender, color/race), and socioeconomic evaluations of the family (number of residents, rooms, properties; familiar income; schooling; oral morbidity; prevalence of toothache in last six months; toothache severity; frequency, place, and reason for using oral health services; evaluation of oral health services, self-perception and impacts on oral health).

Because of the small population, age ranges were not established, but we aimed at analyzing the oral conditions and respective criteria found in previous surveys [14, 15]:

- Dental trauma (from 12 years-old): we considered only signs of crown fracture and dental avulsion in maxillary and mandibular permanent incisors;
- Edentulism (from 15 years-old): use and necessity of protheses;

- Fluorosis (from 12 years-old): classified by means of the Dean Index into normal, questionable, very mild, mild, moderate, and severe;
- Dental caries in deciduous teeth: the sum of decayed, missing, and treated teeth (dmft);
- Dental caries in permanent teeth: the sum of decayed, missing, and treated teeth (DMFT);
- Community Periodontal index (CPI) (from 12 years-old);
- Loss of Periodontal Insertion Index (LPII) (from 35 years-old).

Complementarily, a collection of the water consumed for the inhabitants was taken, in accordance with WHO instructions [31]. A sample of 30 ml was stores in plastic bottle previously rinsed with distilled water. After the collection, this bottle was sealed up and identified. The responsible laboratory for the analysis was the LimnoBras, with headquarters in Curitiba, Paraná. The Hach Company Water Analysis was used, under number #10263/16. The data were analyzed regarding to the distribution with Statistical Package for Social Sciences software, version 21.0.

Results

Of the 108 inhabitants, 90 had been examined. Table I showed the results of the calibration stage.

Table I - Results of the agreement test (Kappa) for the analyzed variables

Year	Kappa
Trauma	1.00
Edentulism	0.81
Fluorosis	0.78
dmft	0.77
DMFT	0.77
CPI	0.78
LPII	0.74

The mean age was of 34.9 (SD = 20.5), with minimum of 2 years and maximum of 84. It was evidenced that 47.8% were male, while 51.1% were brown (table II). The family income was from R\$ 251.00 to R\$ 1,500.00 (73.3%).

Table II - Distribution of the demographic and socioeconomical variables of the inhabitants of the Teixeira Island, Paraná, Brazil (n = 68)

Variable	n (%)
<i>Age range</i>	
0-14 years	17 (18.9)
15-29 years	24 (26.7)
30-59 years	37 (41.1)
Above 60 years	12 (13.3)
<i>Gender</i>	
Male	43 (47.8)
Female	47 (52.2)
<i>Color/race</i>	
White	24 (26.7)
Black	20 (22.2)
Brown	46 (51.1)
<i>Family income*</i>	
Up to R\$ 250.00	8 (8.9)
From R\$ 251.00 to R\$ 500.00	26 (28.9)
From R\$ 501.00 to R\$ 1,500.00	40 (44.4)
From R\$ 1,501.00 to R\$ 2,500.00	8 (8.9)
From R\$ 2,501.00 to R\$ 4,500.00	6 (6.7)
Do not know/Do not answer	2 (2.2)

* In Reals (current Brazilian currency)

Still regarding to socioeconomic family characterization, on average the domiciles contained almost five inhabitants, three rooms, and more than six properties. The schooling average was of 5.2 years of study (SD = 2.8).

In relation to the oral health variables, 82.2% of the residents believed to have some dental problem, and 48.9% declared they had had toothache in last the six months. However, 58.9% characterized it as "very little pain". Most of (71.1%) already made use of oral health services, with 32.2% had searched dental care in the past three years. The search for care in public health units prevailed (53.3%). When questioned about the reasons that had taken to search care, 31.1% did it for tooth extraction, and the qualification of the attendance was "good" for 47.8% of the respondents (table III). With regards to the satisfaction with the proper oral health, 34.4% declared satisfied and 45.6% already had some level of to the Oral health related impact on their life (table III).

Table III – Distribution of the Oral health-related variables of the inhabitants of the Teixeira Island, Paraná, Brazil (n = 68)

Variable	n (%)	Variable	n (%)
<i>Oral morbidity</i>		<i>Reasons of use of oral health services</i>	
No	14 (15.6)	Follow-up, preventive, or check-up	2 (2.2)
Yes	74 (82.2)	Pain	8 (8.9)
Do not know/Do not answer	2 (2.2)	Extraction	25 (27.8)
<i>Prevalence of toothache in the past 6 months</i>		Treatment	28 (31.1)
No	46 (51.1)	Others	3 (3.3)
Yes	44 (48.9)	Do not apply	14 (15.6)
<i>Toothache severity</i>		Do not know/Do not answer	2 (2.2)
Little pain	53 (58.9)	<i>Assessment of oral health services</i>	
Moderate pain	25 (27.8)	Very good	25 (27.8)
Strong pain	12 (13.3)	Good	43 (47.8)
<i>Use of oral health services</i>		Regular	7 (7.8)
No	25 (27.8)	Poor	1 (1.1)
Yes	64 (71.1)	Do not apply (those who never went to the dentist)	13 (14.4)
Do not know/Do not answer	1 (1.1)	Do not know/Do not answer	1 (1.1)
<i>Frequency of use of oral health services</i>		<i>Degree of satisfaction with oral health</i>	
Less than a year	19 (21.1)	Very satisfied	9 (10.0)
One to two years	26 (28.9)	Satisfied	31 (34.4)
Three years or more	29 (32.2)	Neither satisfied nor dissatisfied	21 (23.3)
Do not apply	13 (14.4)	Dissatisfied	26 (28.9)
Do not know/Do not answer	3 (3.3)	Very dissatisfied	3 (3.3)
<i>Place of use of oral health services</i>		<i>Impacts on oral health</i>	
Public	48 (53.3)	No	65 (72.2)
Private	24 (26.7)	Yes	25 (27.8)
Do not apply	1 (1.1)	Do not know/Do not answer	1 (1.1)
Do not know/Do not answer	1 (1.1)		

When the caries indices were analyzed, the dmtf average was of 1.2, while the DMFT was of 13.9. In table IV the data referring to the distribution of periodontal variables CPI and LPII are compiled. In relation to CPI and LPII, high prevalence of bleeding, calculus and pockets in searched sample were not found. Most of the insertion loss was from 0 to 3 mm.

Table IV – Distribution of the periodontal variables (CPI and LPII) of the inhabitants of the Teixeira Island, Paraná, Brazil

Variable	n (%)	Variable	n (%)
<i>CPI*</i>		Not examined	19 (24.4)
<i>Bleeding teeth #16 and #17</i>		<i>Bleeding teeth #26 and #27</i>	
Absence	55 (70.5)	Absence	55 (70.5)
Presence	6 (7.7)	Presence	4 (5.1)
Not examined	17 (21.8)	Not examined	19 (24.4)
<i>Bleeding tooth #11</i>		<i>Bleeding teeth #36 and #37</i>	
Absence	55 (70.5)	Absence	51 (65.4)
Presence	4 (5.1)	Presence	5 (6.4)

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Variable	n (%)	Variable	n (%)
Not examined	22 (28.2)	Not examined	19 (24.4)
<i>Bleeding tooth #31</i>		<i>Pocket teeth #36 and #37</i>	
Absence	53 (67.9)	Absence	51 (65.4)
Presence	3 (3.8)	Shallow pocket	4 (5.1)
Not examined	22 (28.2)	Deep pocket	1 (1.3)
<i>Bleeding teeth #46 and #47</i>		Not examined	22 (28.2)
Absence	53 (67.9)	<i>Pocket tooth #31</i>	
Presence	3 (3.8)	Absence	56 (71.8)
Not examined	22 (28.2)	Shallow pocket	7 (9.0)
<i>Calculus teeth #16 and #17</i>		Deep pocket	1 (1.3)
Absence	56 (71.8)	Not examined	14 (17.9)
Presence	5 (6.4)	<i>Pocket teeth #46 and #47</i>	
Not examined	17 (21.8)	Absence	53 (67.9)
<i>Calculus tooth #11</i>		Shallow pocket	3 (3.8)
Absence	53 (67.9)	Deep pocket	1 (1.3)
Presence	6 (7.7)	Not examined	21 (26.9)
Not examined	19 (24.4)		
<i>Calculus teeth #26 and #27</i>		PIP**	
Absence	53 (67.9)	<i>Teeth #16 and #17</i>	
Presence	6 (7.7)	Loss of insertion from 0 to 3 mm	20 (48.8)
Not examined	19 (24.4)	Loss of insertion from 4 mm to 5 mm	2 (4.9)
<i>Calculus teeth #36 and #37</i>		Loss of insertion from 6 mm to 8 mm	1 (2.4)
Absence	49 (62.8)	Loss of insertion above 12 mm	1 (2.4)
Presence	4 (7.3)	Not examined	17 (41.5)
Not examined	6 (10.9)	<i>Tooth #11</i>	
<i>Calculus tooth #31</i>		Loss of insertion from 0 to 3 mm	19 (46.3)
Absence	55 (70.5)	Loss of insertion from 4 mm to 5 mm	1 (2.4)
Presence	9 (11.5)	Loss of insertion from 6 mm to 8 mm	1 (2.4)
Not examined	14 (17.9)	Loss of insertion above 12 mm	1 (2.4)
<i>Calculus teeth #46 and #47</i>		Not examined	19 (46.3)
Absence	50 (64.1)	<i>Teeth #26 and #27</i>	
Presence	6 (7.7)	Loss of insertion from 0 to 3 mm	20 (48.8)
Not examined	22 (28.2)	Loss of insertion from 4 mm to 5 mm	1 (2.4)
<i>Pocket teeth #16 and #17</i>		Loss of insertion from 6 mm to 8 mm	1 (2.4)
Absence	57 (73.1)	Loss of insertion above 12 mm	1 (2.4)
Shallow pocket	3 (3.8)	Not examined	18 (43.9)
Deep pocket	1 (1.3)		
Not examined	17 (21.8)		
<i>Pocket tooth #11</i>			
Absence	55 (70.5)		
Shallow pocket	3 (3.8)		
Deep pocket	1 (1.3)		
Not examined	19 (24.4)		
<i>Pocket teeth #26 and #27</i>			
Absence	56 (71.8)		
Shallow pocket	2 (2.6)		
Deep pocket	1 (1.3)		

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Variable	n (%)	Variable	n (%)
<i>Teeth #36 and #37</i>		Loss of insertion above 12 mm	1 (2.4)
Loss of insertion from 0 to 3 mm	16 (39.0)	Not examined	15 (36.3)
Loss of insertion from 4 mm to 5 mm	3 (7.3)	<i>Teeth #46 and #47</i>	
Loss of insertion from 6 mm to 8 mm	1 (2.4)	Loss of insertion from 0 to 3 mm	18 (43.9)
Loss of insertion above 12 mm	1 (2.4)	Loss of insertion from 4 mm to 5 mm	1 (2.4)
Not examined	20 (48.8)	Loss of insertion from 6 mm to 8 mm	1 (2.4)
<i>Tooth #31</i>		Loss of insertion above 12 mm	1 (2.4)
Loss of insertion from 0 to 3 mm	18 (43.9)	Not examined	20 (48.8)
Loss of insertion from 4 mm to 5 mm	6 (14.6)		
Loss of insertion from 6 mm to 8 mm	1 (2.4)		

* n = 78 from the 12 years-old
 ** n = 41 from the 35 years-old

No case of fluorosis was found amongst the residents for the age range of 12 years-old. The inhabitants were questioned on the self-perception of necessity of use of total prosthesis or necessity of exchange of that they were wearing. Of the interviewed, 72.2% had answered no to the question.

Table V displays the data referring to the use and the necessity of prosthesis of the inhabitants. High prevalence of necessity of either fixed/removable or total/partial prostheses were seen with values of 39.7% for maxilla and 34.2% for mandible (table V).

Table V - Distribution of the use and necessity of prosthesis of the inhabitants of the Teixeira Island, Paraná, Brazil, from 15 years of age (n = 73)

Variable	n (%)	Variable	n (%)
<i>Use of maxillary prosthesis</i>		Need of one denture, fixed or removable, to replace more than one tooth	11 (15.1)
Do not use denture	55 (75.3)	Need of a combination of fixed/removable dentures to replace one/more than one tooth	3 (4.1)
Use fixed denture	1 (1.4)	Need of total denture	13 (17.8)
Use more than one fixed denture	1 (1.4)	<i>Need of mandibular prosthesis</i>	
Use removable partial denture	4 (5.5)	Do not need denture	48 (65.8)
Use total denture	12 (16.4)	Need of one denture, fixed or removable, to replace one tooth	16 (21.9)
<i>Use of mandibular prosthesis</i>		Need of one denture, fixed or removable, to replace more than one tooth	3 (4.1)
Do not use denture	62 (84.9)	Need of a combination of fixed/removable dentures to replace one/more than one tooth	6 (8.2)
Use fixed denture	1 (1.4)		
Use more than one fixed denture	1 (1.4)		
Use removable partial denture	2 (2.7)		
Use total denture	7 (9.6)		
<i>Need of maxillary prosthesis</i>			
Do not need denture	44 (60.3)		
Need of one denture, fixed or removable, to replace one tooth	2 (2.7)		

The water supply was analyzed, and the level of natural fluoride was of 0.1 mg/L. No artificial fluoridation occurred.

Discussion

The present study conducted an epidemiological survey in oral health of the inhabitants of the Teixeira Island, with inherent factors to the region to be observed. In similar way to other localities [25], the main source of income is fishes, the island does not have treatment of water or sewer, so the dejections are collected in tanks or opened in the sky, and most of the houses are constructed in wood. Local official data do not exist, only information obtained with the inhabitants.

Communities distant from urban centers suffer more impacts from oral diseases [18, 19]. About the access and the use of the health services, the difficulty is in the distance covered for the search for health care, either general or oral. In the case of the studied population, the displacement was exclusively by boat. For obtaining dental care in Paranaguá, city which the Island belongs, the residents take one hour approximately, which it makes that most of the time the care is searched in the neighboring city, Antonina, a trip of half hour.

The inequality of access and use of dental services is not exclusive fact resultant from this research. In national level, results indicate that richer individuals search dental care more. The poor groups primarily search care in the Brazilian Unified Health System (Sistema Único de Saúde – SUS), as also found here [4].

Studies have been conducted in isolated communities, as the case of the Teixeira Island [19, 25]. These analyses identified that, the more distant of the of the city, the greater the prevalence of periodontal disease and edentulism, and worse the self-perception of the impact of the oral health on the quality of life [18, 19]. Also, in these communities the literature reports the presence of radicular remnants with indication of extraction, toothache due to non-treated caries lesion, and indiscriminate use analgesics with palliative effect.

Literature evidences the impact of sociodemographic and socioeconomic factors on the oral health outcomes [35, 38, 41]. It is known that to get sick in a population is closely linked to the way people live and their environment and cultural access. Thus, the health-disease process is a phenomenon culturally constructed and interpreted [43].

The income average of the searched families, whose main source comes from fishes, also can be a favorable factor. The prevalence (73.3%) in this study was between the values of R\$ 251.00 R\$ 1,500.00, corroborating the findings of the Brazilian survey [15].

Studies have shown the association between low schooling and the increase of DMFT [38]. The average of study years of the Island inhabitants was of 5.2 years, very below the results gotten in the National Research for Samples of Domiciles (Pesquisa Nacional por Amostra de Domicílio – PNAD) in 2011, which disclosed that the average of study years of Brazilians was of 7.7 years [8].

In an analogous way of other localities, the Teixeira Island has only one agricultural school, with a room comprising many series, which is commonly observed in agricultural way [16]. The other chance to go to school is the displacement to other cities by boat. Therefore, the residents leave school early.

Most of the inhabitants pointed the self-reported dental morbidity, necessity to receive some type of dental care, and had sensible pain in the last six months, which was one of the main reasons that take the individuals to search care [29]. In this study, most inhabitants searched care for tooth extraction rather than prevention or routine procedures. This behavior is still predominant in most part of the populations and shed light on the curative approach [33]. In comparison to the national data, the morbidity and the toothache prevailed in sample [15].

The prevalence of caries in permanent teeth in adults (DMFT) was of 13.9. In accordance with WHO, this value is considered moderate for adults from 35 to 44 years [35]. To illustrate and compare, without inferential assumptions, in the Brazilian Epidemiological Survey, in 2010, the mean DMFT for the age range of 35-44 years (the age range close to that of this study) was of 16.75 [15].

The dmft index of the examined children was of 1.2. With illustrative intention, the WHO considers this a low prevalence of caries in children [35]. This exactly value was found in a sample of 110 children examined for researchers in small localities of Portugal [21]. The mean 5 years-old mean dmft of the Brazilian children was of 2.4 in 2010 [15].

The periodontal condition of the inhabitants was also evaluated. Although the low rates of bleeding, calculus, and pocket in the CPI examination, one must attempt regarding to the exclusion of sextants, which indicates that the examination was not carried out because at least one tooth could not be examined [9]. In national level, 30.5% of the sextants had been excluded from the sample for the examination of LPII for the age range from 35 to 44 years-old, while this value increased to 90.1% in the age range from 65 to 74 years-old [15].

The analysis of the periodontal condition of inhabitants is important for diagnosis purposes

because it can cause harmful effect on general health [17]. Social, physical, and psychological impacts can be observed in edentulous individuals [26]. The high values of not examined sextants confirm the impact of the periodontal disease.

The edentulism, due to either caries or periodontal disease, makes that almost 40% of the inhabitants with 15 years-old required prosthesis, to replace one or more teeth, in both the dental arches. The examiner evidenced many poorly adapted, worn prostheses. This fact is risk factor for oral cancer [42].

In Brazil, it is observed the need of prosthesis in 13.7% of the examined individuals, with need of maxillary partial prosthesis partial (10.3%), followed by mandibular and maxillary partial prosthesis partial (3.4%) [15].

The water analysis used for the daily consumption indicated that the level of fluoride (0.1 mg/L) was below that recommended by the Law GM/MS n. 518, that points out that the average fluoride level in the water of human consumption must be of 0.7 mg/L [12]. The island possesses a system of supplying proceeding from natural source that, after collected, is only chlorinated. Thus, the level of fluoride does not contribute in preventive way regarding caries disease, and it is necessary the study of measures aiming at offering access to other fluoride sources for this population.

Studies in diverse countries demonstrate the advantages of public water supplying fluoridation. Regions that receive this treatment have significant decrease in caries, so that such measure is a factor of extreme importance for the improvement of oral health, even with impacts in the inhabitant's life, with reduction in health inequities [27].

The limitation of this present study was the number of inhabitants that did not undergo the clinical examination, which did not allow the accomplishment of a census, the ideal for populations with less than 250 inhabitants [36]. The place has access difficulty in some parts and many inhabitants work per season in other cities.

Conclusion

Within the study limitations and sample profile of the, we observed risk factors for dental caries, due to either the difficulty of access to the health services or lack of supplying water fluoridation, as well as the unfavorable social and economic conditions.

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