

# Oral and Maxillofacial Injury Research at a Tertiary Care Hospital in the SUS Network of the State of Ceará

George Matos Ferreira Gomes Junior <sup>1,\*</sup>, Daniel Facó Silveira Santos <sup>1</sup>, Jonas Nogueira Ferreira Maciel Gusmão <sup>2</sup>, Eliardo Silveira Santos <sup>1</sup>

<sup>1</sup> Oral and Maxillofacial Surgery and Traumatology Service, Fortaleza General Hospital, Fortaleza, Ceará, Brazil.

<sup>2</sup> Post-Graduate Program in Pathology, Federal University of Ceará, Fortaleza, Ceará, Brazil.

\* Correspondence: george\_gomes\_@hotmail.com.

**Abstract:** The Dentist, trained as a health professional and scientist, should not limit themselves to the care of teeth and their supporting structures, but also dedicate themselves to the area of prevention and diagnosis of diseases of the buccomaxillofacial complex, based on the collection and addition of epidemiological data about oral health. Dental epidemiology can be characterized as the area that studies the factors conditioning the emergence and distribution of determinants related to the state of oral health and disease, as well as using this study to improve the population's health conditions. Particularly, radiographic examination contributes information about the prevalence of dental anomalies in a specific population. In Ceará, the available epidemiological data on oral health have rarely been subjected to systematic and periodic analysis, making it difficult to define adequate local epidemiological parameters. In this sense, the present study aimed to establish the clinical epidemiological profile of the participants of the dental evaluation project carried out during the 48th anniversary of the General Hospital of Fortaleza, which took place on May 30 and 31, 2017. Based on the data obtained in this study, it was observed that a portion of our population presents dentition problems that lead, for example, to the need for prostheses and surgical procedures for tooth extractions, more specifically of the 3rd molars, in both sexes. Considering these results, the discussion of this study clarifies that these findings are repeated in dental epidemiology studies already conducted in literature with the population of the municipality of Fortaleza. Thus, the results obtained in this research contribute to the management of goals of the Unified Health System, which should seek improvement in prevention measures, education, and systematization of care in controlling oral health problems in Ceará.

**Keywords:** Epidemiology; Oral Health; Health Promotion.

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## 1. Introduction

The dental professional, trained as a health professional and scientist, should not limit themselves to the care of teeth and their supporting structures but should also engage in the prevention and diagnosis of diseases of the buccomaxillofacial complex, based on the collection and addition of epidemiological data on oral health, especially for their region of operation. Thus, in the field of dentistry, the recognition of oral lesions is fundamental in professional practice. The systematic clinical examination of the oral cavity is always the responsibility of the dental surgeon, regardless of the specialty they practice. Dental epidemiology can be characterized as the area that studies the factors that influence the emergence and distribution of determinants related to the state of oral health and disease, as well as the use of this study to improve the population's health conditions [1-3]. The identification of a problem in the oral health field of a given popu-

lation must be carried out through epidemiological surveys of cases/individuals, consisting of cross-sectional intervention studies, characterized as methodological tools that generate data to assist in planning new actions [1]. In Brazil, and consequently in the State of Ceará, there are few and conflicting epidemiological studies that characterize the main oral health problems, usually prioritizing studies with the child and elderly population [1, 4].

It is known, for example, that the oral cavity presents wide morphological diversity at different life stages. It is continuously subject to modifications due to physical, chemical, and biological factors acting on it. The individual's aging can also lead to tissue modifications, influencing their general state. These factors need to be considered for the diagnoses and therapeutics of each population. Moreover, the study of dento-osseous anomalies of the maxillomandibular complex is an important chapter in Dentistry, with the dental surgeon responsible for identifying them, mainly because early treatment avoids developments that can seriously compromise an individual's health and well-being [5].

In this context, the intra and extraoral clinical examination is assisted by radiographic evaluation for the diagnosis of hard tissue lesions. Thus, it is seen that the main diagnostic tool in epidemiological studies of oral health is panoramic radiographic examinations. Hence, the radiographic examination is recognized for its importance in diagnosis, planning, and therapy of anatomical variations and pathological lesions [5]. For example, orthopantomography is widely recognized and recommended for initial radiographic dental evaluation due to its low cost, relative ease of execution, and low radiation exposure, offering a broad view of the middle and lower thirds of the face and adjacent regions [6, 7].

The General Hospital of Fortaleza (HGF), inaugurated on May 23, 1969, is a reference in 33 specialties and 64 subspecialties, making it the largest public hospital in the state of Ceará's network. It is also a reference for high-complexity procedures, including in the dental field, recognized as one of the largest training centers in Brazil. Its mission is to provide health care to the population as a hospital of the Unified Health System (SUS), offering humanized, safe, and high-quality services, contributing to the production and dissemination of knowledge in its field of activity. Since 1990, HGF has been part of the SUS, integrating the healthcare network of the State Health Department (SESA) of Ceará. As a teaching hospital, HGF is also part of the Brazilian Network for Health Technology Assessment – REBRATS, the National Network of Clinical Research – RNPC, and the University Network of Telemedicine – RUTE. Additionally, HGF dedicates its mission to the training of health professionals.

Currently, the Dentistry Sector of HGF specializes around traumatology and Hospital Dentistry, focusing on the treatment of lesions and buccomaxillofacial poly-trauma and attending to all hospital patients. Promoted by the Ceará State Health Department, the 2017 edition of the HGF Annual Meeting, from the public network of the State Government of Ceará, was held with the theme "Knowing HGF: Who we are, what we do," on May 30 and 31, as part of the unit's anniversary celebration. Among the various activities offered on the 48th anniversary of HGF, dental services were provided to investigate oral alterations in HGF professionals or students. As part of the event, participants were invited to undergo a dental evaluation by specialized dentists, who could refer them for radiological evaluation at the imaging service of the University of Fortaleza (UNIFOR) if necessary. Participants with dental issues related to restorative dentistry, endodontics, or periodontics would be treated by the UNIFOR dental team. Those requiring surgical intervention would be assisted by the HGF dental surgeons' team.

This action led to the development of the present research, aiming to establish the clinical epidemiological profile of the patients participating in the dental intervention project carried out during the 48th anniversary of the General Hospital of Fortaleza, correlating the dental clinical findings according to the affiliation, gender, and indicated dental specialty (restorative dentistry, endodontics, periodontics, prosthodontics, and/or

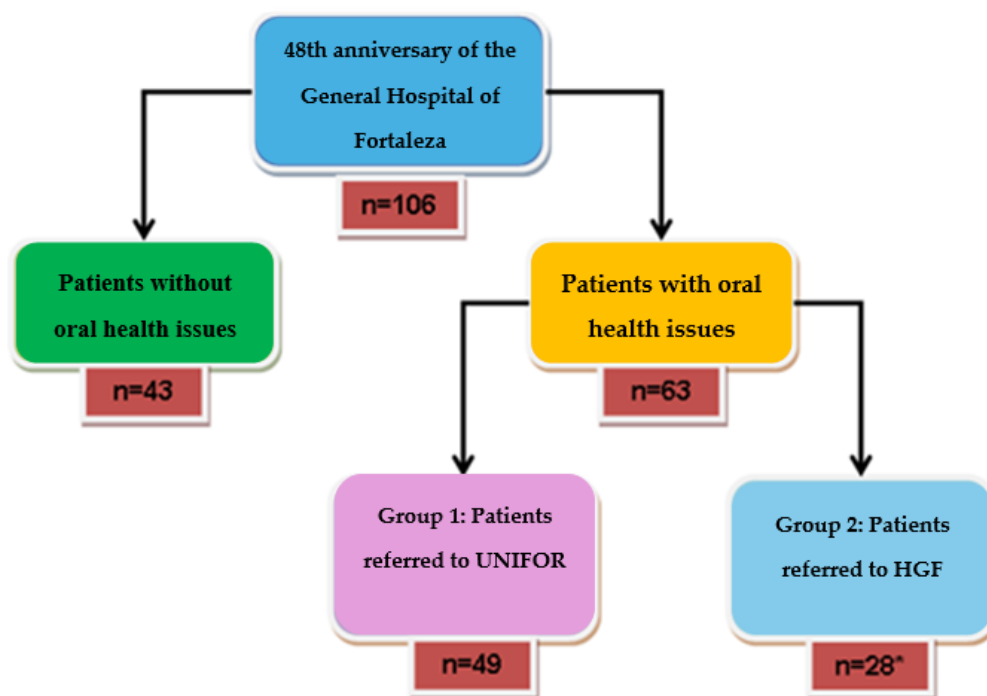
surgery). Such health promotion actions are beneficial not only for dental health professionals but also for SESA, as they generate essential epidemiological information for the enhancement and improvement of the public health management in the state of Ceará.

## 2. Material and methods

### 2.1 Casuistry

A descriptive, prospective, and interventional study was conducted through the analysis of 106 interviews and clinical-dental evaluations regarding the clinical epidemiological profile of the patients participating in the dental intervention project carried out during the 48th anniversary of the HGF, which took place on May 30 and 31, 2017. The flowchart for the reception and follow-up of the participants is described in figure 1. The inclusion criteria were designed to retrieve clinical-dental cases, with authorization from the HGF Research Ethics Committee, authorization for the performance of imaging exams by UNIFOR, and the signing of the Informed Consent Form, from participants of the said event, whether they are academics from the University of Fortaleza (UNIFOR) or health professionals working at the HGF, of both sexes, with a minimum age of 18 years. All participants were assisted using a specific service form.

**Figure 1:** Schematic representation of synthesis and analysis of results.



\*There are participants who were concurrently referred to UNIFOR and HGF.

### 2.2 Service Flow and Division by Study Groups

All patients were referred to for a complementary panoramic radiography exam at UNIFOR. Based on the results of this exam, the patients were stratified into two distinct groups, according to the recommended referral: group 1, patients who were referred for treatment in the areas of restorative dentistry, endodontics, periodontics, or prosthodontics; and group 2, referring to patients who were recommended for surgical treatment. Patients referred to group 1 received a specific referral for treatment by the UNIFOR dental team. Meanwhile, patients indicated for surgical intervention (group 2) were referred to the HGF's Maxillofacial Surgery and Traumatology service.

Patients were grouped to stratify them according to gender, type of dentition, use of prostheses, type of clinical diagnosis, and indication of procedure/specialty for treatment purposes. It is noteworthy that all patients in the study were assisted in a dental room equipped and operated by specialized professionals according to the protocol of the Dentistry sector of the General Hospital of Fortaleza. As exclusion criteria, patients/participants who did not qualify as employees/health professionals of the HGF, and UNIFOR academics, who did not start the diagnosis at the said health unit or did not attend the UNIFOR Dental Radiology Sector for the panoramic radiography, were excluded from this study.

### 2.3 Statistical Analyses

The data obtained from the analysis of the variables contained in the medical records were tabulated and analyzed using descriptive-analytical statistics, with the aid of Microsoft Office Excel 2010 software (Microsoft Corporation, Redmond, WA). When appropriate, Pearson's chi-square test was used.

### 3. Results

A total of 106 participants from a dental intervention project conducted during the 48th anniversary of the General Hospital of Fortaleza, which took place on May 30 and 31, 2017, were analyzed. The participants included both males and females, comprising professionals from the General Hospital of Fortaleza or dental students interning at the hospital. Initially, regarding the evaluated population, a total of 26 (24.53%) male patients and 80 (75.47%) female patients were identified, with 5 (4.72%) patients being academics and 101 (95.28%) being professionals at the HGF (Table 1).

**Table 1:** Stratification of evaluated patients according to gender and type of affiliation.

Variables	N	%
<b>Gender</b>		
Male	26	24.53
Female	80	75.47
<b>Affiliation</b>		
Academic	5	4.72
Professional	101	95.28

Regarding the initial clinical diagnosis concerning the patient's dentition, it was identified that 53.8% (14/26) of male patients had complete bimaxillary dentition compared to 26.3% (21/80) of female cases (Table 2). Specifically for male patients, it was observed that patients are primarily classified as partially edentulous bimaxillary (30.8%), followed by patients with a profile of partial lower edentulism and complete upper dentition (11.5%), and complete upper edentulism with partial lower edentulism (3.8%) (Table 2). Similarly, for female patients, the cases predominantly presented 48.8% of individuals with partial bimaxillary edentulism and 17.5% of cases with partial lower edentulism and complete upper dentition, followed by 3.8% of patients described as completely edentulous in the upper and partially edentulous in the lower jaw, and 2.5% of individuals with partial upper edentulism and complete lower dentition (Table 2). It is also highlighted that 1 (1.3%) female patient was diagnosed with complete bimaxillary edentulism (Table 2).

**Table 2:** Stratification of patients according to the dentition profile diagnosed in the clinical evaluation.

Characteristics of dentition	Male		Female		p-value
	N	%	N	%	
Fully dentate bimaxillary	14	53.8	21	26.3	0.195
Partially edentulous upper and fully dentate lower	0	0.0	2	2.5	
Partially edentulous lower and fully dentate upper	3	11.5	14	17.5	
Partially edentulous bimaxillary	8	30.8	39	48.8	
Fully edentulous upper and fully dentate lower	0	0.0	0	0.0	
Fully edentulous lower and fully dentate upper	0	0.0	0	0.0	
Fully edentulous upper and partially edentulous lower	1	3.8	3	3.8	
Fully edentulous lower and partially edentulous upper	0	0.0	0	0.0	
Fully edentulous bimaxillary	0	0.0	1	1.3	
<b>Total</b>	<b>26</b>	<b>24.5</b>	<b>80</b>	<b>75.5</b>	

\*p<0.05, Pearson's chi-square test.

Regarding the use of dental prostheses, a total of 19 cases were identified, with 3 (15.8%) male and 16 (84.2%) female (Table 3). Stratifying the cases by gender, it was initially observed that all male patients (3/100%) had an upper removable partial denture (RPD). On the other hand, it was noted that female patients predominantly had 7 patients (43.75%) using an upper RPD and 3 patients (18.75%) with both upper and lower RPDs, followed by 2 cases (12.5%) using an upper complete denture (CD) and fixed prostheses, and 1 case (6.25%) of a patient using both upper and lower CDs and a lower RPD (Table 3).

**Table 3:** Stratification of patients according to the use of dental prostheses.

Prosthesis	Male		Female		p-value
	N	%	N	%	
Complete Denture (CD) upper and lower	0	0.0	1	6.25	0.668
Complete Denture (CD) upper and Removable Partial Denture (RPD) lower	0	0.0	0	0.0	
Removable Partial Denture (RPD) upper and Complete Denture (CD) lower	0	0.0	0	0.0	
Removable Partial Denture (RPD) upper and Removable Partial Denture (RPD) lower	0	0.0	3	18.75	
Complete Denture (CD) upper	0	0.0	2	12.5	
Complete Denture (CD) lower	0	0.0	0	0.0	
Removable Partial Denture (RPD) upper	3	100.0	7	43.75	
Removable Partial Denture (RPD) lower	0	0.0	1	6.25	
Fixed Prosthesis	0	0.0	2	12.5	
<b>Total</b>	<b>3</b>	<b>15.8</b>	<b>16</b>	<b>84.2</b>	

CD - Complete Denture; RPD - Removable Partial Denture.

\*p<0.05, Pearson's chi-square test.

Out of the total cases evaluated at the event, 63 patients were referred for radiological examinations to be performed at the radiology department of the UNIFOR School of Dentistry. From these requests, distinct clinical diagnoses (restorative dentistry, endodontics, periodontics, and prosthodontics) were obtained for a total of 49 patients of both sexes (Table 4). Regarding cases with a restorative dentistry diagnosis (39/49), 33 (84.6%) cases of caries and/or unsatisfactory restorations, 3 (7.7%) cases of bacterial plaque presence, and 3 (7.7%) cases requiring prophylaxis were diagnosed (Table 4). In

relation to patients with diagnoses related to the endodontics specialty (5/48), 3 (60.0%) cases were confirmed to need endodontic treatment, and 2 (40.0%) cases required endodontic evaluation on tooth 36 (Table 4). Regarding the clinical findings in periodontics (9/49), 8 (88.9%) cases of patients with tartar presence and 1 (11.1%) patient with critical issues of bone resorption, generalized tooth mobility, gingival bleeding, and chronic periodontitis were identified (Table 4). Finally, 4 patients were referred to for prosthetic treatment with a specialist (Table 4).

Among the 13 male patient cases referred for additional examinations, 8 cases of caries and/or unsatisfactory dental restorations, 3 cases of dental plaque presence, 2 cases requiring prophylaxis, 1 case with tartar presence, and 1 referral for prosthetic use were identified (Table 4). Regarding the 36 female patients, 25 cases of dental caries, 1 case re-quiring prophylaxis in restorative dentistry, 4 endodontic evaluation cases, 7 cases of tar-tar presence, and 3 referrals for prosthetic treatment were diagnosed (Table 4). It is noteworthy that the patient with critical issues in periodontics was female (Table 4).

**Table 4:** Stratification of patients according to the use of dental prostheses.

Cases	Gender	Diagnostic			
		Restorative Dentistry	Endodontics	Periodontics	Prosthodontics
1	Male	Unsatisfactory restorations	-	-	-
2	Male	Presence of caries	-	-	-
3	Male	Presence of bacterial plaque	-	-	-
4	Male	Presence of caries	-	-	-
5	Male	Needs prophylaxis	-	-	Yes
6	Male	Needs prophylaxis	-	-	-
7	Male	Presence of caries	-	Presence of tartar	-
8	Male	Presence of caries	-	-	-
9	Male	Bacterial plaque	-	-	-
10	Male	Bacterial plaque	-	-	-
11	Male	Presence of caries	-	-	-
12	Female	Needs prophylaxis	-	-	-
13	Female	Presence of caries	-	-	-
14	Female	Presence of caries	-	Presence of tartar	-
15	Female	Presence of caries	-	-	-
16	Female	Presence of caries	Need for endodontic treatment	Presence of tartar	-
17	Female	Presence of caries	-	-	-
18	Female	Presence of caries	-	-	-
19	Female	-	-	-	-
20	Female	Presence of caries	-	Presence of tartar	-
21	Female	Presence of caries	-	-	-
22	Female	Presence of caries	-	-	-
23	Female	Presence of caries	Endodontic evaluation of tooth 36	-	-
24	Female	-	-	-	-
25	Female	Presence of caries	-	Presence of tartar	-

26	Female	Presence of caries	-	-	-
27	Female	Presence of caries	-	-	-
28	Female	Presence of caries	Endodontic evaluation of tooth 36	-	-
29	Female	Presence of caries	-	-	Yes
30	Female	Presence of caries	-	-	-
31	Female	Presence of caries	-	-	-
32	Female	Presence of caries	-	-	-
33	Female	-	-	-	-
34	Female	Presence of caries	-	-	-
35	Female	-	-	-	-
36	Female	Presence of caries	-	Presence of tartar	-
37	Female	Presence of caries	-	-	-
38	Female	Presence of caries	-	-	-
39	Female	-	-	Horizontal bone resorption	-
40	Female	Presence of caries	-	Generalized tooth mobility	Yes
41	Female	-	-	Gingival bleeding	-
42	Female	-	-	Chronic periodontitis	-
43	Female	Presence of caries	-	-	-
44	Female	-	-	Presence of tartar	-
45	Female	Presence of caries	-	Presence of tartar	-
46	Female	-	Need for endodontic treatment	-	Yes
47	Female	-	-	-	-
48	Male	-	-	-	-
49	Male	Presence of caries	-	-	-

A total of 28 cases were referred for surgical procedures to be performed by the dentistry team of the General Hospital of Fortaleza (Table 5). Observing all patients, 59 tooth extraction procedures, 5 residual root extractions, 1 mandibular lesion biopsy, 1 foreign body removal in the maxillary sinus, and two evaluations of Eagle Syndrome were performed (Table 5). Finally, it is noteworthy that the 2 cases of female patients evaluated for Eagle Syndrome had a negative diagnosis because the patients did not exhibit painful symptoms, despite having an elongation of the styloid process, but without complaints of pain.

**Table 5:** Stratification of patients according to diagnosis and surgical referral.

Cases	Gender	Surgical diagnosis
1	Male	Extraction of tooth 13
2	Male	Extraction of teeth 18, 28, 38, 48
3	Male	Lesion on the left mandibular branch (biopsy)
4	Male	Extraction of tooth 47
5	Male	Extraction of tooth 18
6	Male	Extraction of teeth 18 and 28

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7	Male	Extraction of residual root of tooth 27 in maxillary sinus and of tooth 15
8	Male	Extraction of teeth 18, 28, 38, 48
9	Female	Extraction of residual root of tooth 36
10	Female	Extraction of teeth 18, 28, 38, 48 molars / Evaluate Eagle Syndrome
11	Female	Evaluate Eagle Syndrome
12	Female	Extraction of teeth 18, 28, 38, and 48
13	Female	Extraction of teeth 15 and 16
14	Female	Extraction of tooth 48 and included tooth 13 in the maxilla
15	Female	Extraction of tooth 28
16	Female	Extraction of residual root of tooth 25
17	Female	Aphthous lesion in maxilla / biopsy
18	Female	Extraction of residual root of tooth 38 and extraction of tooth 18
19	Female	Extraction of teeth 18, 28, 38, and 48
20	Female	Extraction of teeth 18, 28, 38, and 48
21	Female	Extraction of residual root of tooth 16 and extraction of teeth 15 and 27
22	Female	Extraction of teeth 18, 38, and 48
23	Female	Extraction of teeth 24 and 47
24	Female	Extraction of teeth 18, 26, 28, 38, and 48
25	Female	Extraction of teeth 18, 28, and 38
26	Female	Extraction of teeth 18 and 48
27	Male	Extraction of teeth 18 and 28
28	Male	Extraction of molars 18, 28, 38, and 48

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### 3. Discussion

This cross-sectional study showcased the profile of 106 participants of the 48th anniversary of the General Hospital of Fortaleza who underwent dental evaluation and, subsequently, specialized dental treatment by the General Hospital of Fortaleza and the University of Fortaleza, on May 30 and 31, 2017. Initially, a high participation of female individuals and health professionals working at HGF was observed in the dental intervention project conducted during the 48th anniversary of the General Hospital of Fortaleza (HGF). Regarding the participants' dentition, a high number of cases with partial bimaxillary edentulism and a profile of partial lower edentulism with complete upper dentition were observed in both genders.

Radiographic epidemiological studies on the prevalence of dental anomalies in each population are highly valuable for understanding the reality of oral diseases regionally, creating possibilities for earlier and more appropriate treatment of oral issues from early childhood to old age. Furthermore, such research can prepare patients to live with potential anomalies permanently but without hindering their normal life and societal integration. Various studies report clinical characteristics of patients with dental impairments. For instance, Coutinho et al. [8] radiographically evaluated 324 patients aged 4 to 12 years, of both sexes, relating them to location, sex, type of treatment performed, and associated complications. The most common complications identified were impaction (41.0%), space loss (36.0%), gyration (18.0%), and eruptive path deviation, mostly caused by the presence of supernumerary teeth.

Gaião et al. [9] demonstrated that 68.1% of a study population of 160 elderly individuals from Fortaleza, Ceará, had no healthy teeth, 58.1% were completely edentulous,

and 35% had teeth with exposed roots. In França Filho's study [10], it was found that the average tooth loss among evaluated cases was 24 teeth per person, predominantly in the age range of 20 to 24 years (27.38%). These findings, added to the results of this research, indicate that Fortaleza's population has a precarious oral health condition, necessitating intensified oral health promotion actions by competent public bodies.

Another key finding among the participants was the incidence of 19 cases, with 3 (15.8%) males and 16 (84.2%) females, using dental prostheses. The SB Ceará Epidemiological Survey in Oral Health [1, 11] showed an increase in prosthesis use among adolescents, adults, and the elderly. Among the 63 patients referred to for radiological exams at UNIFOR's radiology department, a total of 49 received various clinical diagnoses. A significant number, 84.6% of the patients with a restorative dentistry diagnosis, had caries and/or unsatisfactory restorations. These findings align with those from Landim et al. [12], who found a 100% prevalence of caries in their study population, emphasizing the need for improved dental care and public health policies.

The study underscores the crucial role of epidemiology in forming a diagnosis and adopting preventive, control, and healthcare measures for a population. It highlights the necessity for improved oral health initiatives in Brazil, especially in the Northeast, where access to basic dental care remains a significant challenge. The findings from this study contribute to the management goals of the Unified Health System, emphasizing the need for enhanced prevention, education, and systematic care to address oral health issues in Fortaleza, Ceará.

#### 4. Conclusion

Based on the clinical data obtained from the intervention project conducted in this study, we highlighted a high rate of participants with dentition problems in both genders and cases that required referrals for dental prosthesis use. We hypothesize that the high rate of tooth loss and the need for prosthesis were associated with the high incidence of caries and periodontitis caused by tartar presence, affecting both sexes. Regarding surgical aspects, there was a high incidence of cases requiring dental extractions, specifically of the 3rd molars, in both genders. Finally, we emphasize the need for the continuous development of oral health promotion actions by the public service in the city of Fortaleza, state of Ceará, to minimize the dental problems of the population, which has been observed in various dental epidemiology studies identified in the scientific literature.

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**Research Ethics Committee Approval:** We affirm that the participant consented to the research by endorsing a clear consent document, and the investigation adhered to the ethical standards outlined in the Helsinki Declaration. This study was approved by the Research Ethics Committee of the Hospital Geral de Fortaleza.

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**Conflicts of Interest:** None.

**Supplementary Materials:** None.

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