



# A Survey About Dental Instruments at the Primary Health Care in Brazil

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This study describes the structure of oral health services in primary health care in Brazil and the instruments available for the provision of oral health care and to compare the number of instruments according to organizational characteristics of health services and among the macroregions. Of the 23,251 oral health teams (OHTs) in the Public Health System, 17,513 (75.3%) participated in this study. Trained researchers observed the structures of the health services and determined the presence of and whether a sufficient quantity of 36 dental instruments existed. The score of each oral health service was determined by the sum of the number of dental instruments present in sufficient quantity (0 to 36). Central tendency measures were compared along with the variability in these scores according to the organizational characteristics of the services and according to the Brazilian macroregion. No instrument was found to be present in all evaluated services. Basic, surgical and restorative instruments were the most frequently found. Periodontal, endodontic and prosthetic instruments exhibited the lowest percentages. The mean and median numbers of dental instruments were higher for teams that operated over more shifts, those with an oral health technician and those in the South and Southeast regions. The oral health services were equipped with basic, surgical and restorative instruments. Instruments designed for periodontal diagnosis, emergency care and denture rehabilitation were less frequently found in these services. The worst infrastructure conditions existed in the OHTs with the worst forms of care organization and in regions with greater social issues.

**Key Words:** Primary health care, oral health, dental instruments, public health dentistry.

## Introduction

Public oral health policies have achieved important advances in recent decades in Brazil. The proposal to create polyarchic health care networks implies the construction of integrated practices in the Brazilian Unified Health System (*Sistema Único de Saúde – SUS*, in Portuguese) while respecting the characteristics of each region, which will enable the actions of oral health teams (OHTs) to become more effective and strengthen the attributes of first contact, longitudinality, completeness and coordination within Primary Health Care (PHC) (1,2). Data from February 2016 indicate the existence of at least one OHT in 5,007 Brazilian municipalities (89.9% of the total). Given this scale, it is important to evaluate oral health actions in Brazil. In 2014, the Brazilian Ministry of Health organized a second cycle of a program aiming to evaluate and improve PHC quality. This was called the National Program for Improving Access to and Quality of Primary Care (*Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica – PMAQ-AB*, in Portuguese), which examined, among other factors, the structure of PHC oral health services, (3) as an adequate health equipment and the presence enough instruments should be considered when evaluating PHC quality (4,5). After the evaluation of the OHT, the performance will be classified as excellent,

very good, good, fair or poor. The amount of financial incentive that the health manager will receive depends on the team's certification in relation to performance. For the purposes of team certification, some quality standards are evaluated. Dental instruments are classified as essential, meaning that OHT with no conformity to the PMAQ-AB standard will have their performance impaired (3). The World Health Organization recommends that the structure of health facilities should be monitored at a national level (6). In the health evaluation field, physical structure is one of the components highlighted by Donabedian, (7) who believes that good structural conditions are a prerequisite for good processes and increase the likelihood of a positive outcome. The health service's structure is considered a key component in the analysis of a health care system. Although the presence of a good structure does not necessarily lead to good processes and results, one cannot ignore the importance to health outcomes of an adequate structure (7,8). No studies in the literature have examined the effect of organizational factors of health services on the oral health service infrastructure. Little is known about how to improve the quality of organizational aspects of the oral health sector in primary care. Most of the literature and evidence base originates from general medical practice and not oral health care settings (9). More than 20 years after

the creation of the Family Health Strategy (FHS), which provides for the reorganization of PHC in the *SUS* and a reformulation of the current health care model in Brazil, concern exists regarding its structuring and strengthening (10). Brazilian law places importance upon issues pertaining to the structure and funding of health services, with a priority of structuring the Basic Health Units in the form of Family Health teams (11).

Despite the expansion in populational coverage by the OHTs, for the activities proposed in this strategy to be performed in a quality manner, it is necessary that health facilities have a minimum structure (3). Specifically, clinical actions for dental care require sufficient equipment, instruments and materials to meet the health care demands required due to the oral disease burden (12).

Despite the large investment that has been made in the OHT structure, (10,11) factors that might explain differences in this structure among different oral health services have not been evaluated. Thus, to examine a topic that has rarely been researched in the organization of primary oral health care, that is, whether the organizational processes of oral health services affect their infrastructure, this study describes the structure of Brazilian PHC oral health services, focusing on the instruments available for the provision of oral health care. The study also compares the number of instruments according to organizational characteristics of the oral health services and according to Brazilian macroregion.

## Material and Methods

The study was approved by the National Council for Research Ethics and by the Research Ethics Committee of the Federal University of Minas Gerais (Universidade Federal de Minas Gerais - UFMG) (Protocol CAAE 02396512.8.0000.5149). Data from the Brazilian Public Ministry of Health were analyzed, and no participant was identified at any stage of this study.

Of a total of 23,251 OHTs in Brazil in January 2014, 19,946 (85.8%) participated in this second PMAQ-AB cycle. Of these, 2,433 were not included because they did not follow PMAQ-AB regulations. Thus, 16,202 PHC oral health services were evaluated, corresponding to 17,513 (75.3%) OHTs.

An observational instrument, developed through a partnership between the Ministry of Health and six teaching and research institutions in Brazil, was applied by a team of trained health professionals with university degrees. After a pilot study, the questions and observations were recorded on tablets using a program designed specifically for the PMAQ-AB. The program contained photos of equipment and criteria for evaluating the presence (existence of at least one unit) and sufficient quantity (existence of a

quantity sufficient to meet the needs of the service, i.e., to perform oral health care during 40 hours per week) of the instruments, based on Ministry of Health regulations. The list of dental instruments was drawn randomly in the program. The observational instrument was developed to prevent possible last minute purchases or instrumental loans. The teaching and research institutions validated the questionnaire responses. The Ministry of Health organized the database and made it available to the teaching and research institutions. A certification of the interviewer's presence was made with a sample of the study, by phone.<sup>3</sup>

The questions were predominantly dichotomous and evaluated the presence of 36 clinical instruments from different clinical dentistry areas, including instruments for performing restorative, surgical, endodontic, prosthetic and periodontal procedures and clinical instruments used in various dental care areas. This variety of instruments is justified due to the scope of procedures performed by the OHT (emergency care, preventive care, restorations, oral surgery, basic periodontal treatment, dental prostheses). It is important to point out that OHT covers all age groups, from early childhood to seniors. Thirty-six instruments were defined in the list of Essential Dental Instruments of the Ministry of Health.

In addition to these variables, several oral health service characteristics were evaluated using structured interviews with the dental surgeons, including dental care shifts, performing dental care between 12pm and 2pm and at night; type of OHT (dentist and oral health assistant; dentist, oral health technician and oral health assistant; or no adherence to the FHS); and instrument sharing with other OHTs.

The statistical analysis involved the calculation of ratios for each evaluated instrument. The score of each oral health service was calculated as the sum of the number of dental instruments present in sufficient quantity (0 to 36). The central tendency measures were compared along with the variability in these scores according to organizational oral health service characteristics and geographical regions within Brazil. Confidence intervals and inferential statistics were not calculated because this was a census study of teams that had joined the second PMAQ cycle. The decision to not perform statistical tests and hence to not show *p* values was also due to the number of evaluated OHTs, which could lead to the identification of statistical associations even where there were no relevant differences between groups (13). All analyses were performed using SPSS for Windows version 19.0 (IBM Corp., Armonk, USA).

## Results

Table 1 shows the frequency of each type of dental instrument in the 16,202 Brazilian services that participated

Table 1. Description of primary oral health care units, SUS, Brazil, 2013-2014 (n=16,202)

Variables	N (%)
Brazilian regions and states	
North	1,097 (6.7)
Acre	60 (0.4)
Amazonas	230 (1.4)
Amapá	39 (0.2)
Pará	443 (2.7)
Rondônia	93 (0.6)
Roraima	19 (0.1)
Tocantis	213 (1.3)
Northeast	7,199 (44.3)
Alagoas	494 (3.0)
Bahia	1609 (9.9)
Ceará	1074 (6.6)
Maranhão	331 (2.0)
Paraíba	1006 (6.2)
Pernambuco	1120 (6.9)
Piauí	711 (4.4)
Rio Grande do Norte	663 (4.1)
Sergipe	191 (1.2)
Central-West	1,389 (8.6)
Distrito Federal	22 (0.1)
Goiás	739 (4.6)
Mato Grosso do Sul	327 (2.0)
Mato Grosso	301 (1.9)
Southeast	4,256 (26.3)
Minas Gerais	2012 (12.4)
Espírito Santo	256 (1.6)
Rio de Janeiro	657 (4.1)
São Paulo	1331 (8.2)
South	2,261 (14.0)
Paraná	856 (5.3)
Rio Grande do Sul	618 (3.8)
Santa Catarina	787 (4.9)
Oral Health Team mode	
Type I	13,982 (86.3)
Type II	1,928 (11.9)
Not FHS	292 (1.8)
Service shifts	
One shift	1,334 (8.2)
Two shifts	14,862 (91.7)
Not treating	6 (0.1)
Service available between 12pm and 2pm	
Yes	4,711 (29.1)
No	11,485 (70.8)
Not treating	6 (0.1)
Service available at night	
Yes	589 (3.6)
No	15,613 (96.4)
Shares instruments with other OHTs	
Yes	2,079 (12.8)
No	9,682 (59.8)
Does not know/Did not answer	4,441 (27.4)

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in the evaluation of the second PMAQ-AB cycle in 2013 and 2014. Basic, surgical and restorative instruments were the most frequently found instruments. Periodontal, endodontic and prosthetic instruments exhibited the lowest percentages.

The analysis of the number of instruments present in each oral health service (Fig. 1) showed that only 0.4% of these services (n=66) had all 36 dental instruments. One-quarter of the oral health services had up to 23 dental instruments, the median number was 27 instruments, and three-quarters of the teams had up to 30 instruments.

The different forms of oral health service organizations exhibited differences in the number of available instruments. Services that offered more shifts and longer opening hours had more instruments available. OHTs including an oral health technician (OHTech) and those sharing instruments with other OHTs reported a higher number of dental instruments (Table 2).

The mean and median values for the number of dental instruments were higher in the South and Southeast regions and lower in North, Northeast and Central-West Brazil (Table 3).

## Discussion

Health service infrastructure is a key component in the quality of a health system (5). PHC oral health services in

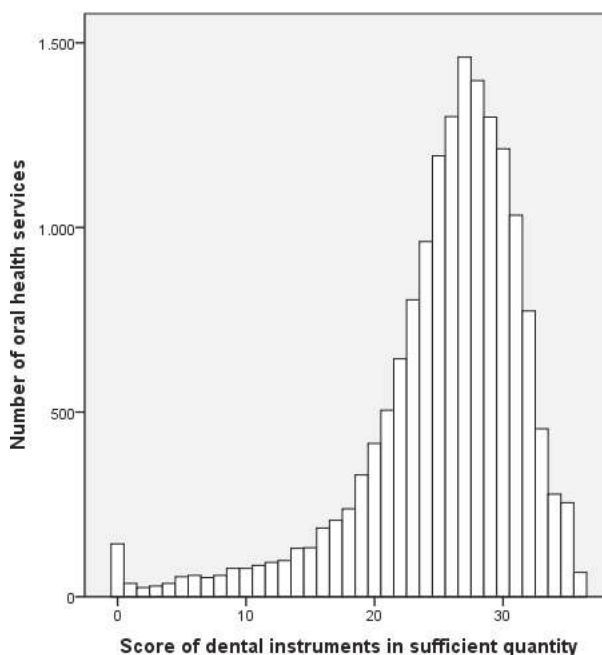


Figure 1. Distribution of the scores on a survey of presence of dental instruments in sufficient quantity conducted in Brazilian primary oral health care offices, 2013-2014. The score was the number of criteria (out of 36) met for each clinic. Survey items focused on the basic dental instruments, surgical instruments, restorative instruments, periodontal instruments, endodontic instruments and prosthesis instruments.

Brazil have shortages of the instrumentation necessary for performing dental care, and differences exist among OHTs according to organizational characteristics and across different Brazilian regions.

The evaluated dental instruments can be considered to form part of the minimum necessary equipment to perform PHC procedures. The lack of these instruments, as identified in this study, may be important in defining the work process and may hinder access to and the quality of oral health services (14,15).

In addition to the high frequency of basic dental

instruments that are used for many clinical interventions, surgical and restorative instruments, with few exceptions, were most commonly identified in the oral health services. This finding may reflect the fact that surgical-restorative practice is still very common in Brazil (16,17), despite the major changes that have occurred in public policy in recent years (1). However, the oral disease burden in the country, identified in recent epidemiological oral health surveys (12), requires the performance of surgical and restorative procedures, for which the Brazilian oral health services seem to have a good structure.

Table 2. Frequency of dental instruments in primary oral health care, SUS, Brazil, 2013-2014 (n=16,202)

Basic instruments	%
1 Steel trays	92.3
Sufficient quantity of steel trays	84.5
2 Boxes with stainless steel covers	85.1
Sufficient quantity of boxes with stainless steel covers	77.6
3 Dental mirrors	98.4
Sufficient quantity of dental mirrors	91.7
4 Dental tweezers	98.3
Sufficient quantity of dental tweezers	93.9
5 Glass plates	97.9
Sufficient quantity of glass plates	91.5
6 Carpule syringes	98.6
Sufficient quantity of carpule syringes	93.9
7 Exploratory probes	96.7
Sufficient quantity of exploratory probes	93.0
Surgical instruments	
8 Extracting forceps	81.6
Sufficient quantity of extracting forceps	74.6
9 Elevators	98.4
Sufficient quantity of elevators	91.9
10 Scalpel handles	90.9
Sufficient quantity of scalpel handles	83.0
11 Surgical curettes	86.9
Sufficient quantity of surgical curettes	81.1
12 Child forceps	89.1
Sufficient quantity of child forceps	79.4
13 Adult forceps	98.3
Sufficient quantity of adult forceps	96.1
14 Bone files	67.4
Sufficient quantity of bone files	61.7
15 Needle holders	96.9
Sufficient quantity of needle holders	90.1
16 Syndesmotomes	89.3
Sufficient quantity of syndesmotomes	84.1
17 Surgical aspirators	34.5
Sufficient quantity of surgical aspirators	32.7
18 Surgical scissors	93.4
Sufficient quantity of surgical scissors	84.6

Restorative instruments	
19 Calcium hydroxide applicators	96.0
Sufficient quantity of calcium hydroxide applicators	91.1
20 Amalgam restoration burnishers	94.1
Sufficient quantity of amalgam restorative burnishers	90.5
21 Amalgam filling condensers	91.7
Sufficient quantity of amalgam filling condensers	88.3
22 Dentin scrapers	95.1
Sufficient quantity of dentin scrapers	90.5
23 Pulpotomy scrapers	63.3
Sufficient quantity of pulpotomy scrapers	60.2
24 Carvers	90.3
Sufficient quantity of carvers	85.7
25 Resin insertion spatulas	92.1
Sufficient quantity of resin insertion spatulas	84.4
26 Amalgam holders	91.1
Sufficient quantity of amalgam holders	84.3
27 Matrix holders	95.3
Sufficient quantity of matrix holders	89.1
Periodontal instruments	
28 Millimeter probes	48.6
Sufficient quantity of millimeter probes	44.0
29 Periodontal curettes	92.1
Sufficient quantity of periodontal curettes	84.3
30 Periodontal curette sharpening hones	48.9
Sufficient quantity of periodontal curette sharpening hone	46.7
Endodontic instruments	
31 Endodontic aspiration cannulas	26.8
Sufficient quantity of endodontic aspiration cannulas	24.9
32 Broaches	43.7
Sufficient quantity of broaches	41.4
33 Endodontic files	50.7
Sufficient quantity of endodontic files	47.5
Prosthesis instruments	
34 Plaster and alginate spatulas	17.5
Sufficient quantity of plaster and alginate spatulas	16.6
35 Rubber mortars	16.4
Sufficient quantity of rubber mortars	15.7
36 Molds	14.3
Sufficient quantity of molds	13.6

The lack of instruments necessary for the clinical diagnosis of periodontal disease in more than half of the oral health services is troubling. One of the principles of PHC is first contact (18), and in this regard, oral health care in the SUS provides the first scheduled dental appointment, which defines the clinical diagnosis to perform a preventive and therapeutic treatment plan (19). The diagnosis and treatment of periodontal disease in PHC is therefore important, given the disease burden and its interrelationships with systemic conditions (20).

The low numbers of endodontic instruments and curettes for pulpotomy may make the treatment of acute cases of odontogenic origin inviable and compromise the service's ability to resolve issues, especially due to the relatively high prevalence of dental pain in Brazil (21).

Frequent and early tooth loss in the Brazilian population has led to the generation of policies to address its causes and its consequences. In this regard, the fitting of dental prostheses in PHC may increase access, especially among the adult and elderly population, to rehabilitation

procedures (22). Although it is not the only complicating factor of access to oral health services, the frequent absence of prosthesis instrumentation may contribute to the non-performance of such procedures in the PHC of most services, as has been identified in another study (23).

One of the characteristics of oral health in the FHS is the presence of oral health assistants and technicians. International studies (24,25) have suggested that the inclusion of these professionals in health teams can increase service access and productivity and reduce disparities in oral health and health care costs. Accordingly, the fact that OHT type II services (with an Oral Health Technician) have a greater mean number of instruments than type I services (without an Oral Health Technician) is consistent, as the inclusion of an Oral Health Technician facilitates increased productivity.

Services with more service shifts also have a higher number of instruments. The number of shifts reflects an increase in the population's access to oral health services (especially for workers, who have difficulty accessing health facilities during conventional working hours). This creates a need for a better infrastructure for treating these users. Management has the role of developing strategies, diagnosing situations and scaling resources. Thus, management decisions can affect the determination of service shifts, which has a direct relationship with access and hence in the planning of that service's care provision infrastructure (18). However, due to the

Table 3. Comparison of the distribution of instrument presence scores (0 to 36) primary oral health care, SUS, Brazil (n=16,202) according to the health service's organizational features, 2013-2014

Variable	Mean (SD)	Minimum	Median	Maximum
<b>Service shifts</b>				
One shift (n=1,334)	22.50 (7.51)	0	24.00	36
Two shifts (n=14,862)	25.63 (6.14)	0	27.00	36
Not treating (n=6)	9.33 (14.51)	0	0.00	30
<b>Service available between 12pm and 2pm</b>				
Yes (n=4,711)	25.77 (6.20)	0	27.00	36
No (n=11,485)	25.20 (6.38)	0	26.00	36
Not treating (n=6)	9.33(14.51)	0	0.00	30
<b>Service available at night</b>				
Yes (n=589)	28.01 (6.15)	0	30.00	36
No (n=15,613)	25.26 (6.33)	0	26.00	36
<b>OHT Mode</b>				
Type I (n=13,982)	25.15 (6.34)	0	26.00	36
Type II (n=1,928)	26.94 (5.95)	0	28.00	36
Not FHS (n=292)	25.39 (7.14)	0	27.00	36
<b>Shares instruments with other OHTs</b>				
Yes (n=2,079)	25.66 (6.58)	0	27.00	36
No (n=9,682)	25.11 (6.25)	0	26.00	36
Does not know/Did not answer (n=4,441)	25.79 (6.41)	0	27.00	36

Table 4. Comparison of scores for the presence of instruments (0 to 36) primary oral health care, SUS (n=16,202), among Brazil's five geographic regions, 2013-2014

Brazilian region	Mean (SD)	Minimum	Median	Maximum
North (n=1,097)	21.59 (8.20)	0	24.00	36
Northeast (n=7,199)	24.09 (6.41)	0	25.00	36
Central-West (n=1,389)	26.08 (6.38)	0	27.00	36
Southeast (n=4,256)	27.00 (5.20)	0	28.00	36
South (n=2,261)	27.71 (5.08)	0	29.00	35

cross-sectional design of this study, it is not possible to ascertain whether the presence of an increased number of instruments was a cause or consequence of different working process strategies.

The regional differences identified in this study are similar to those found in other Brazilian oral health service evaluations (23) and likely reflect the social and economic diversity of the country. Previous studies have shown that social differences, including those identified at the municipal level, are key to the organization of oral health services and should be considered when formulating organizational strategies for these services (19).

The results of this study should be interpreted with caution regarding the external validity, given the significant percentage of OHTs that were not involved in the PMAQ-AB. It is not possible to define objectively the reliability and reproducibility of each measurement made by the trained researchers in this survey. Moreover, it is known that infrastructure of the OHT is more than dental instruments. The reason for describing dental instruments is based on the fact that there is a standardization of the minimum instruments necessary for the development of actions in primary care in oral health, which does not occur for other items analyzed by the PMAQ. The diagnoses of the structural conditions of oral health services of PHC at a national level are rare in the scientific literature, and such a diagnosis can contribute to advances in the planning and scheduling of oral health actions. In the case of the evaluated PHC system, a need was identified to improve the availability of dental instruments to satisfactorily meet the epidemiological reality of the Brazilian population. An inability to resolve the demands of the population due to a lack of adequate infrastructure has likely been an important factor in the work process and, ultimately, in outcomes in terms of morbidity, satisfaction and quality of life of the population served. World Health Organization has pointed out the relevance of evaluating inputs, outputs and outcomes in health services evaluation and monitoring (26, 27). In this regard, robust analytical studies, with outstanding quantitative methods (28), should be conducted to examine the associations between structure, process and results, given the need to really understand the relationship between these quality dimensions (7), especially in oral health services.

The studied Brazilian oral health services were equipped with basic, surgical and restorative dental instruments. Instruments designed for periodontal diagnosis, emergency care and prosthetic rehabilitation were less frequently found in these establishments. The worst infrastructure conditions existed in the OHTs with the worst forms of care organization and in regions with greater social issues.

## Resumo

Este estudo descreve a estrutura dos serviços de saúde bucal na atenção primária em saúde no Brasil e os instrumentos disponíveis para a assistência à saúde bucal e compara o número de instrumentais de acordo com as características organizacionais dos serviços de saúde e entre as macrorregiões. Das 23.251 equipes de saúde bucal (ESB) no Sistema Único de Saúde, 17.513 (75,3%) participaram deste estudo. Pesquisadores treinados observaram a estrutura dos serviços de saúde e determinaram a presença e a existência de uma quantidade suficiente de 36 instrumentais odontológicos. A pontuação de cada serviço de saúde bucal foi determinada pela soma do número de instrumentos dentários presentes em quantidade suficiente (0 a 36). As medidas de tendência central e de variabilidade desse escore foram comparadas com as características organizacionais dos serviços e de acordo com a macrorregião brasileira. Nenhum instrumental foi encontrado em todos os serviços avaliados. Os instrumentos básicos, cirúrgicos e restauradores foram os mais frequentemente encontrados. Os instrumentos periodontais, endodônticos e para realização de prótese exibiram as percentagens mais baixas. O número médio e mediano de instrumentos dentários foi maior para as equipes que operavam em mais turnos, aqueles com um técnico em saúde bucal e aqueles nas regiões Sul e Sudeste. Os serviços de saúde bucal estavam equipados com instrumentos básicos, cirúrgicos e restauradores. Os instrumentos indicados para diagnóstico periodontal, cuidados de emergência e reabilitação com próteses dentárias foram menos frequentemente encontrados nesses serviços. As piores condições de infra-estrutura existiam nos ESB com as piores formas de organização de cuidados e em regiões com maiores problemas sociais.

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