

Factors Associated with Access to Oral Health Care in Primary Health Care: Data from the 3rd PMAQ-AB Cycle

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ABSTRACT

Objective: To identify characteristics of the work processes of oral health teams (eSB) associated with users' access to oral health services within primary health care (PHC) in Brazil and its geographic regions, based on data from the 3rd cycle of Brazilian National Program for Improving Primary Care Access and Quality (*Programa para Melhoria do Acesso e da Qualidade da Atenção Básica*, PMAQ-AB). **Material and Methods:** This cross-sectional study used data from Module III, which collected users' responses on oral health care, and Module VI, which collected data on the work processes of eSBs. The analysis focused on variables related to "Territorialization and Assigned Population," "Support Matrix," and "Schedule Management and Service Delivery by the Team." Descriptive and inferential analyses were performed using logistic regression ($\alpha = 0.05$). **Results:** In Brazil, 40.9% of PHC users reported having access to dental care. Among the regions, the Northeast had the highest proportion of users able to schedule dental appointments (48.4%), while the Southeast had the lowest (33.9%). Several characteristics of eSB work processes were found to influence access to oral health services positively. These include: the eSB being assigned to a single Family Health Team (eFS); the eSB not relying on the Dental Specialty Center for managing complex cases; integration of eSB actions with other services in the territory; assessment of users' health needs and provision of clinical care during the initial encounter; risk/vulnerability-based prioritization of users over first-come, first-served approaches; eSB professionals trained to assess and classify risk and vulnerability; initial dental appointments scheduled at the primary care reception desk; and follow-up appointments scheduled at the end of current consultation. **Conclusion:** Some aspects of the eSB workflow hinder user access to oral health care, underscoring the need to reorganize processes and fully implement national guidelines to ensure effective service delivery within the PHC framework.

Keywords: Primary Health Care; Health Services Research; Health Care Quality, Access, and Evaluation.

■ Introduction

In recent years, Brazil has implemented several initiatives and evaluation strategies in primary health care (PHC) to improve its health policies [1,2]. Among these initiatives, the Brazilian National Program for Improving Primary Care Access and Quality (*Programa para Melhoria do Acesso e da Qualidade da Atenção Básica*, PMAQ-AB) stands out. PMAQ-AB was established by Ordinance No. 1,654 GM/MS on July 19, 2011 [3]; it was discontinued in 2019 after completing its third evaluation cycle.

The main goal of PMAQ-AB was to promote expanded access and improved quality of PHC by ensuring a standard of care that could be assessed at national, regional, and local levels. The program sought to measure the potential impacts of health policies to support decision-making, ensure transparency in the management processes of Brazil's Unified Health System (*Sistema Único de Saúde*, SUS), and strengthen both social accountability and a user-centered approach in the health care system [3].

Evaluating work processes in PHC through data from the different PMAQ-AB cycles (1st cycle in 2011/2012, 2nd cycle in 2013/2014, and 3rd cycle in 2017/2018) has been the focus of several studies in Brazil. These evaluations have generated strategic information to identify existing problems and promote improvements in the development of health care actions. Several studies [4-9] have shown the presence of different levels of organizational structure and improvements in work processes. However, they also highlight the persistence of fragmented, top-down practices and ongoing organizational barriers.

Evaluating the work processes of oral health teams (*equipes de saúde bucal*, eSB) within the scope of PHC based on data from the different PMAQ-AB cycles is essential to characterize the quality of oral health actions and care provided in Brazil.

The present study aimed to assess whether the organization of eSB work processes is associated with users' access to oral health services in Brazil and its geographic regions by using data from the 3rd PMAQ-AB cycle.

■ Material and Methods

Study Design and Data Collection

This cross-sectional study used secondary data from the Brazilian Ministry of Health, obtained from the 3rd cycle of the PMAQ-AB External Evaluation, conducted between 2017 and 2018. These data include responses from all PHC teams that were officially part of PMAQ-AB and were collected using the "External Evaluation Tool: Health Closer to You," applied by researchers and/or faculty members from Brazilian universities and research institutions.

In this cycle, the External Evaluation Tool was organized into six modules based on the data-collection method. This study used data from Module III – Interviews with users at the PHC Unit (UBS) – and Module VI – Interviews with eSB professionals and document verification at the UBS.

The Module III questionnaire was standardized using the PMAQ-AB and administered to four users present at the UBS on the day of the External Evaluation. The Module VI questionnaire was directed to the dentist (preferably), or to another eSB member, such as a dental assistant or dental technician. The dependent variable in this study was based on the user's reported access to dental care at the UBS, specifically question III.18.1 from Module III: "Are you able to schedule a dental appointment at this primary health care Unit?"

For eSB work processes, the independent variables were selected from Module VI. They included the following sub-items: "Territorial Assignment and Reference Population of the Oral Health Team," "Support Matrix for the Oral Health Team," and "Schedule Management and Service Provision by the Team." These

variables were selected because they may be associated with users' access to dental appointments at the UBS and are presented in Table 1.

Table 1. Selected independent variables from Module VI related to the work processes of Oral Health Teams.

Variables
Territorial Assignment and Reference Population of the Oral Health Team Schedule Management
During the work routine, how many primary care teams does the oral health team work with? (quantify)
Support Matrix for the Oral Health Team
Does the Oral Health Team receive support from other professional centers for complex cases?
From Dental Specialty Centers (CEO)?
Schedule Management and Service Provision by the Team
Does the Oral Health Team coordinate actions with other social facilities in the territory?
The clinical care of the Oral Health Team guarantees*
During user embracement sessions, the Oral Health Team*
Do oral health team members participate in user embracement together with the primary care team?
Does the oral health team use protocols/criteria for user embracement?
What is the main flow of care during user embracement?*
Were the oral health team members in charge of user embracement previously trained to assess and classify users' risk and vulnerability?
What is the main way of scheduling the first dental appointment?
What is the main way of scheduling a follow-up appointment for the continuity of dental care?

*In this question, the professional could answer more than one option.

After variable selection, exploration of datasets revealed, through descriptive analysis, that 140,444 users were interviewed in UBS facilities as part of Module III. Applying the access availability criterion, users who reported being able to access dental care ($n = 57,403$) and those who reported not being able to access it ($n = 4,718$) were included in the analysis. Regarding Module VI, which involved interviews with 25,090 eSB professionals, it was verified which eSBs had responding professionals whose users were either able or unable to access dental services. Users were then matched to the responses of professionals from their respective eSBs using the National Team Identification (INE) and the National Registry of Health Facilities (CNES), both of which were available in the two datasets.

More than one user per team had accessed dental services, resulting in repeated data from eSB professional responses. eSBs were excluded if all associated users reported not having accessed dental services, either because they had never sought care or because no eSB was available at the UBS. After this linkage process, a final sample of 50,664 users and professionals with complete data was obtained (Figure 1).

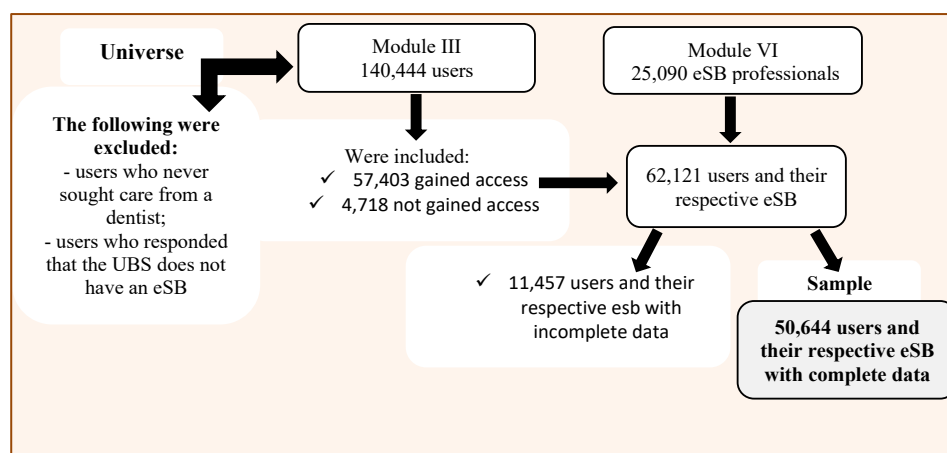


Figure 1. Study sample selection.

Data Analysis

Binary logistic regression was used for inferential analysis. Regression models were fitted using data from Brazil as a whole and from its five geographic regions (North, Northeast, Midwest, Southeast, and South) to identify characteristics of the eSB work process that may be associated with access. The outcome of interest was users' access to oral health services at PHCs, categorized as having access ($Y = 1$) or not ($Y = 0$).

Variables with p -values < 0.20 in the bivariate analysis were included in the initial model. The model was then refined using the Stepwise Backward method to obtain the final model, with a 5% significance level used for the final analysis.

To facilitate understanding of findings, graphs were created to present the interpretation of odds ratios (OR) as percentages for each category of variables that remained statistically significant after model adjustment, both for Brazil as a whole and for its regions. The OR is interpreted as the estimated increase or decrease in the probability of success – in this study, the likelihood of obtaining access to oral health services – resulting from a one-unit change in the independent variable. To calculate the percentage change in odds associated with a one-unit increase or decrease in the predictor variable, the formula $[(OR - 1) \times 100\%]$ was used [10]. A positive percentage in the graphs indicates that the category increases the user's chances of accessing oral health care, while a negative percentage indicates a decrease in those chances.

To assess model fit, deviance analysis was performed using the classification matrix (with a cutoff point that maximized sensitivity and specificity) and the Receiver Operating Characteristic (ROC) curve. All statistical analyses were conducted by using SPSS Statistics for Windows, version 25.0 (SPSS Inc., Chicago, Ill., USA).

Ethical Clearance

The external evaluation of the 3rd PMAQ-AB cycle was submitted to and approved by the Research Ethics Committee of the School of Medicine, Universidade Federal de Pelotas, under Opinion No. 2,453,230 issued on December 27, 2017. All participants signed an informed consent form.

Results

In Brazil, 40.9% of users reported being able to schedule a dental appointment at UBS. The Northeast (NE) region had the highest proportion of users who could schedule this type of appointment (48.4%), followed by the South (SU) region (41.2%). The Southeast (SE) region had the lowest proportion, with only 33.9% of users reporting access to dental appointments (Table 2).

Table 2. Frequency distribution of responses from users of UBS facilities participating in the 3rd cycle of PMAQ-AB external evaluation, in Brazil and its regions, regarding the ability to schedule a dental appointment at the UBS.

Users' Responses	Question: "Are you able to schedule a dental appointment at this primary health care Unit?"											
	Brazil		North		Northeast		Midwest		Southeast		South	
	N	%	N	%	N	%	N	%	N	%	N	%
Yes	57,403	40.9	4,085	37.9	25,226	48.4	3,760	36.9	16,004	33.9	8,328	41.2
No	4,718	3.4	518	4.8	1,467	2.8	407	4.0	1,928	4.1	398	2.0
Never sought dental care	55,449	39.5	3,917	36.3	16,983	32.6	4,395	43.1	20,972	44.5	9,182	45.4
This unit does not have OHT	21,805	15.5	2,191	20.3	8,102	15.6	1,545	15.2	7,827	16.6	2,140	10.6
Didn't respond	1,069	0.8	79	0.7	298	0.6	89	0.9	432	0.9	171	0.8
Total	140,444	100.0	10,790	100.0	52,076	100.0	10,196	100.0	47,163	100.0	2,0219	100.0

Analyzing the work processes of eSB in Brazil, 85.1% of eSBs operate within a single PHC team (*equipe de atenção básica*, eAB), and 85.2% receive support from other services to manage more complex cases, such as from Dental Specialty Centers (*Centro de Especialidades Odontológicas*, CEO), which account for 60.4% of these support instances. Among regions, the Midwest (MW) has the highest proportion of eSBs working with a single eAB (87.5%), while the Southeast (SE) has the lowest (68.2%) (Table 3).

Nationwide, 89.9% of eSBs ensure both scheduled/programmed appointments and walk-in (spontaneous demand) services. Across the regions, the percentage distribution between these two forms of care tends to be similar. Specifically, 89.9% of eSBs provide scheduled/programmed appointments in both the Northeast (NE) and Southeast (SE). In comparison, spontaneous demand services are most frequently ensured in the North (NO) (87.3%), Midwest (92.8%), and South (SU) (90%) (Table 3).

In Brazil, 90.7% of eSBs listen to users' complaints and assess their health needs during the initial encounter. In the Northeast, 81.5% of eSBs conduct this welcoming process jointly with the eAB. In contrast, the North has the lowest proportion of eSBs that use protocols or criteria to guide actions during the welcoming process (63.6%).

Nationwide, 81.6% of eSBs use a risk-and-vulnerability approach to welcome users. This was the predominant approach in all regions, with the highest rates in the Northeast (85.1%) and the Midwest (82%). Regarding training, 76.2% of eSBs in Brazil provide professional training for their teams. Among the regions, the Southeast had the highest proportion of trained eSB professionals (78.3%), while the South had the lowest (64.6%).

For 47.6% of eSBs in Brazil, the first dental appointment is primarily scheduled directly at the dental office. This was the most common scheduling method across all regions, with the highest frequency observed in the South (56.9%). As for continuity of care, most eSB professionals in Brazil reported that the next dental appointment is scheduled at the end of the previous consultation (74.2%), a trend consistent across regions, especially in the Midwest (84.8%).

Table 3. Frequency distribution of responses from eSB professionals in the 3rd cycle of PMAQ-AB external evaluation in Brazil and its regions, according to variables related to work routine, support matrix, and schedule management and service delivery by the eSB.

Variables	Brazil (N=25,90)		North (N=1,916)		Northeast (N=11,132)		Midwest (N=2,026)		Southeast (N=6,751)		South (N=3,265)	
	N	%	N	%	N	%	N	%	N	%	N	%
In the daily work routine, the eSB operates within how many eABs?												
1 eAB	19,574	78.1	1,486	77.6	9,405	84.5	1,772	87.5	4,605	68.2	2,306	706
2 eAB	2,401	9.6	182	9.5	645	5.8	128	6.3	948	14.0	498	15.3
3 or more eAB	1,018	4.1	68	3.5	160	1.4	33	1.6	560	8.3	197	6.1
eSB receives support from the CEO to help manage complex cases	15,152	60.4	959	50.1	6,665	59.9	1,099	54.2	4,389	65.0	2,040	62.5
eSB carries out joint actions with other social services in the territory	21,007	83.7	1,527	79.7	9,424	84.7	1,704	84.1	5,614	83.2	2,738	83.9
eSB reserves time slots for users to:*												
Return and present test results	22,002	87.7	1,581	82.5	9,882	88.8	1,813	89.5	5,864	86.9	2,862	87.7
Clarify questions or show treatment progress	22,261	88.7	1,640	85.6	9,983	89.7	1,847	91.2	5,913	87.6	2,878	88.1
For clinical care, is there guaranteed availability of:*												
Scheduled/programmed appointments	22,540	89.8	1,668	87.1	10,013	89.9	1,861	91.9	6,066	89.9	2,932	89.8

Walk-in (spontaneous demand) care	22,542	89.8	1,673	87.3	9,987	89.7	1,881	92.8	6,063	89.8	2,938	90.0
For spontaneous demand care, the eSB provides:*												
Urgent care	22,298	88.9	1,644	85.8	9,861	88.6	1,854	91.5	6,013	89.1	2,926	89.6
Prescription of medications	22,360	89.1	1,642	85.7	9,930	89.2	1,847	91.2	6,028	89.3	2,913	89.2
Guidance	22,253	88.7	1,629	85.0	9,868	88.6	1,838	90.7	6,016	89.1	2,902	88.9
During the welcoming process, the eSB:*												
Listens to the user's complaint	22,764	90.7	1,698	88.6	10,103	90.8	1,921	94.8	6,072	89.9	2,970	91.0
Assesses the user's health needs	22,750	90.7	1,702	88.8	10,102	90.7	1,919	94.7	6,064	89.8	2,963	90.8
Schedules the user's appointment for another day/shift	21,829	87.0	1,584	82.7	9,705	87.2	1,819	89.8	5,896	87.3	2,825	86.5
Provides clinical care	22,588	90.0	1,688	88.1	10,009	89.9	1,915	94.5	6,032	89.3	2,944	90.2
Refers the user to another service	22,101	88.1	1,601	83.6	9,862	88.6	1,838	90.7	5,919	87.7	2,881	88.2
Does not carry out the welcoming process	89	0.4	11	0.6	42	0.4	3	0.1	16	0.2	17	0.5
eSB professionals perform the welcoming process jointly with the eAB	19,092	76.1	1,462	76.3	9,069	81.5	1,613	79.6	4,716	69.9	2,232	68.4
The eSB uses protocols/criteria to guide actions during the welcoming process	18,952	75.5	1,218	63.6	8,590	77.2	1,558	76.9	5,126	75.9	2,460	75.3
Main approach to user welcoming:*												
Arrives early and waits in line	5,740	22.9	699	36.5	2,988	26.8	335	16.5	878	13.0	840	25.7
Seen in order of arrival	18,034	71.9	1,456	76.0	8,652	77.7	1,525	75.3	4,341	64.3	2,060	63.1
Seen based on risk and/or vulnerability	20,461	81.6	1,489	77.7	9,472	85.1	1,662	82.0	5,256	77.9	2,582	79.1
Other criteria	3,120	12.4	295	15.4	1,276	11.5	303	15.0	735	10.9	511	15.7
In the welcoming process, professionals were trained in risk and vulnerability assessment and classification.	19,129	76.2	1,237	64.6	8,640	77.6	1,569	77.4	5,286	78.3	2,397	73.4
Main method of scheduling the first dental appointment:												
At the UBS general reception	6,722	26.8	488	25.5	3,113	28.0	642	31.7	1,481	21.9	998	30.6
Directly at the dental office, by the oral health team	11,937	47.6	845	44.1	4,600	41.3	1,135	56.0	3,500	51.8	1,857	56.9
By the Community Health Agent	3,963	15.8	369	19.3	2,363	21.2	116	5.7	1,038	15.4	77	2.4
Other methods	371	1.5	34	1.8	134	1.2	40	2.0	94	1.4	69	2.1
Main method of scheduling follow-up dental appointments:												
At the end of the previous appointment	18,616	74.2	1,267	66.1	7,425	66.7	1,718	84.8	5,697	84.4	2,509	76.8
Scheduled by the eSB and later communicated to the user	668	2.7	47	2.5	494	4.4	19	0.9	79	1.2	29	0.9
Scheduled by the user at the UBS (later appointment)	1,751	7.0	172	9.0	1,074	9.6	99	4.9	193	2.9	213	6.5
User visits the UBS on the scheduling day (without a prior appointment)	1,177	4.7	121	6.3	771	6.9	47	2.3	76	1.1	162	5.0
On the appointment day, the user must wait in line and take a number	360	1.4	82	4.3	149	1.3	35	1.7	31	0.5	63	1.9
Other methods	421	1.7	47	2.5	297	2.7	15	0.7	37	0.5	25	0.8

*In these items, professionals could select more than one answer.

Table 4 presents the adjusted logistic models based on data from Brazil and its geographic regions, using Modules III and VI of the PMAQ-AB External Evaluation Instrument. The variables found to be associated with users being able to schedule a dental appointment at the UBS were: In daily work routines, whether the eSB operates within one, two, or three or more eABs (BR, NE, MW, SE, S); whether the eSB receives support from a CEO (BR, N, NE, MW, SE, S); whether the eSB carries out joint

actions with other social services in the territory (BR, N); whether time slots are reserved in the eSB schedule for users to return to review test results (BR, N), clarify questions, or discuss progress (SE). For walk-in services, variables included whether the eSB provides urgent care (BR, MW), prescribes medications (S); and during the welcoming process, whether the eSB assesses the user's health needs (BR, SE), schedules follow-up appointments for a different day or shift (BR), and provides clinical care (BR, N, SE); whether the eSB conducts the welcoming jointly with the eAB (BR, NE); and whether the eSB uses protocols and criteria to guide the welcoming process (NE). Main approaches to welcoming users included first-come, first-served (BR, NE, SE, S); identifying users at greater risk or vulnerability (BR, NE, MW); and order of arrival (MW). Other relevant variables included whether eSB professionals involved in the welcoming process are trained to identify risk and vulnerability (BR, NE); whether the primary method of scheduling the first dental appointment is directly at the dental office (BR, NE, MW, S) or through the Community Health Agent (BR, MW, S); and whether follow-up dental appointments are scheduled directly by the eSB and later communicated to the user (BR, N), or by other scheduling methods (BR).

Table 4. Adjusted logistic models from Brazil and its geographic regions.

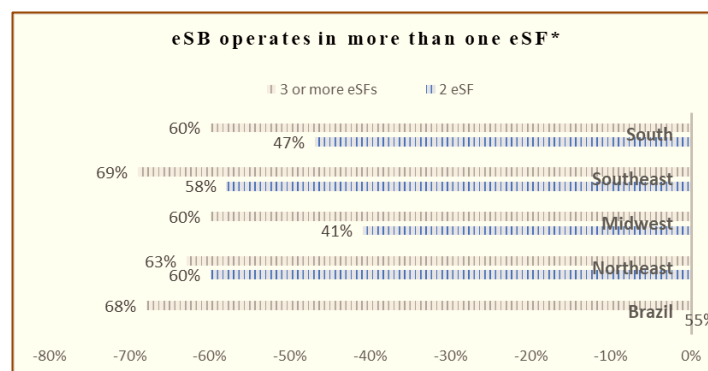
Variables	OR (95% CI)					
	Brazil	North	Northeast	Midwest	Southeast	South
The eSB operates within how many eABs?						
1 eAB ¹						
2 eABs	0.45 (0.41-0.49) ⁷		0.40 (0.34-0.48) ⁷	0.59 (0.37-0.92) ⁵	0.42 (0.37-0.49) ⁷	0.53 (0.39-0.72) ⁷
3 ou + eABs	0.32 (0.29-0.36) ⁷		0.37 (0.26-0.51) ⁷	0.40 (0.20-0.80) ⁵	0.31 (0.27-0.36) ⁷	0.40 (0.28-0.59) ⁷
eSB receives support from the CEO ²	1.62 (1.48-1.78) ⁷	1.70 (1.31-2.20) ⁷	1.37 (1.19-1.60) ⁷	1.92 (1.40-2.62) ⁷	1.82 (1.52-2.19) ⁷	1.84 (1.27-2.67) ⁶
eSB carries out joint actions with other social services in the territory ²	0.80 (0.70-0.92) ⁶	0.67 (0.46-0.99) ⁵			0.80 (0.64-1.01)	
eSB reserves time slots for users to:						
Return and present test results ²	0.69 (0.59-0.81) ⁷	0.48 (0.33-0.69) ⁷		0.52 (0.25-1.10)		
Clarify questions or show treatment progress ²				3.43 (0.96-12.19)	0.73 (0.57-0.94) ⁶	
For spontaneous demand care, the eSB provides:						
Urgent care ²	0.62 (0.44-0.85) ⁶		0.63 (0.39-1.00)	0.22 (0.08-0.57) ⁶		
Prescription of medications ²	0.72 (0.49-1.05)					0.26 (0.10-0.69) ⁶
During the welcoming process, the eSB:						
Assesses the user's health needs ²	0.58 (0.39-0.86) ⁶	0.43 (0.17-1.08)			0.38 (0.21-0.68) ⁶	
Provides clinical care ²	0.57 (0.44-0.73) ⁷	0.38 (0.19-0.74) ⁶			0.52 (0.35-0.78) ⁶	
Schedules the user's appointment for another day/shift ²	0.83 (0.70-0.99) ⁵					
eSB performs the welcoming process jointly with the eAB ²	0.87 (0.80-0.96) ⁶		0.64 (0.54-0.76) ⁷			
eSB uses protocols/criteria during the welcoming process			0.79 (0.66-0.94) ⁶			
Main approach to user welcoming						
Arrives early and waits in line ²	1.09 (1.00-1.18) ⁵		1.14 (1.00-1.30) ⁵	0.68 (0.46-1.01)	1.30 (1.12-1.50) ⁶	1.34 (1.01-1.77) ⁵
Seen in order of arrival ²	0.93 (0.85-1.01)			0.69 (0.51-0.92) ⁵		
Seen based on risk and/or vulnerability ²	0.83 (0.74-0.93) ⁶		0.64 (0.51-0.79) ⁷	0.68 (0.47-0.98) ⁵		

Professionals were trained in risk and vulnerability risk assessment and classification ²	0.87 (0.79-0.97) ⁵	0.76 (0.64-0.89) ⁶	0.74 (0.52-1.05)	
Main method of scheduling the first dental appointment ³				
Directly at the dental office	0.86 (0.79-0.94) ⁶	0.84 (0.73-0.98) ⁵	0.64 (0.47-0.87) ⁶	0.52 (0.37-0.72) ⁷
By the Community Health Agent	0.83 (0.74-0.93) ⁶	0.92 (0.78-1.11)	0.51 (0.30-0.86) ⁵	0.30 (0.15-0.60) ⁶
Other methods	0.89 (0.69-1.14)	0.46 (0.29-0.73) ⁶	0.35 (0.16-0.75) ⁶	0.50 (0.24-1.02)
Main method of scheduling follow-up dental appointments ⁴				
Scheduled by the eSB and later communicated to the user	1.29 (1.00-1.66) ⁵	4.62 (1.13-18.9) ⁵		0.39 (0.15-1.01)
Scheduled by the user at the UBS (later appointment)	1.09 (0.94-1.27)	1.27 (0.81-1.99)		2.02 (0.93-4.40)
User visits the UBS on the scheduling day (without a prior appointment)	1.01 (0.85-1.20)	0.79 (0.51-1.22)		0.77 (0.45-1.33)
On the appointment day, the user must wait in line and take a number	1.13 (0.81-1.57)	0.55 (0.33-0.89) ⁵		2.65 (0.63-11.09)
Other methods	1.52 (1.07-2.14) ⁵	1.39 (0.62-3.08)		1.49 (0.20-11.04)

eSB: Oral Health Team; eAB: Primary Health Care Team; UBS: Primary Health Care Unit. ¹Reference category: 1; ²Reference category: Yes; ³Reference category: At the general reception of UBS; ⁴Reference category: At the end of previous appointment; ⁵p < 0.05; ⁶p < 0.01; ⁷p < 0.001.

Figures 2 to 11 display the percentage interpretations of the ORs for each variable category that remained statistically significant after model adjustment for Brazil and its different geographic regions.

Figure 2 shows that the greater the number of family health teams (*equipe de saúde da família*, eSF) in which the eSB operates, the lower the likelihood that users will gain access to oral health care. At the national level, working within three or more eSFs, compared to working within a single eSF, reduces the user's chances of accessing oral health care by 68% and 55%, respectively.

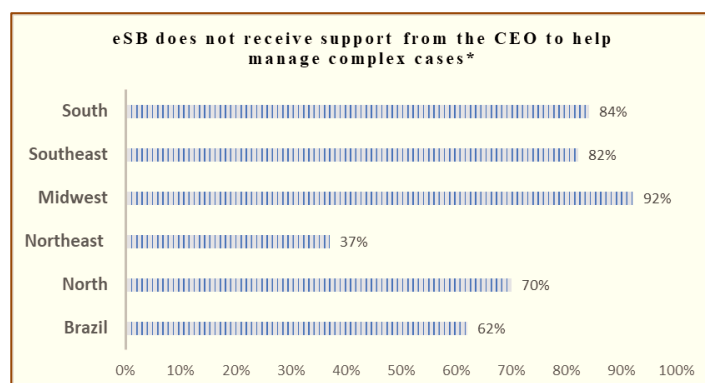


*The reference category for this variable is the eSB operating within one eSF.

Figure 2. Percentage interpretation of OR for the variable "In the daily work routine, in how many Primary Health Care Teams does the Oral Health Team operate?".

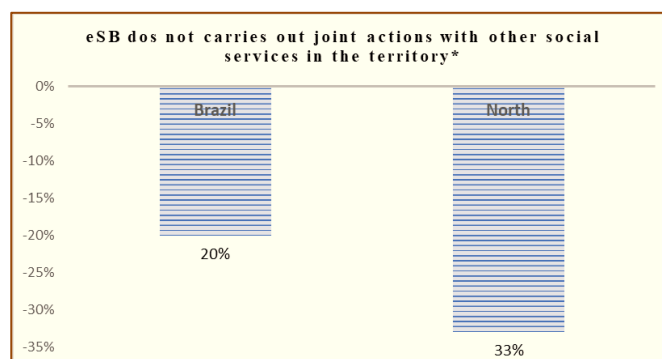
Figure 3 shows that, in Brazil and its regions, when the eSB does not receive support from the Dental Specialty Center (*Centro de Especialidades Odontológicas*, CEO) for managing complex cases, the user's likelihood of gaining access increases compared to when the eSB does receive support from the CEO. This effect is strongest in the Midwest, where the probability increases by 92%, and weakest in the Northeast, where it increases by 37%.

When the eSB does not perform joint actions with other social services in the territory, a reduction in the likelihood of access to oral health care was observed, by 20% in Brazil and 33% in the North region (Figure 4).



*The reference category for this variable is "Yes" – the eSB receives support from the CEO to assist in managing complex cases.

Figure 3. Percentage interpretation of OR for the variable "Does the Oral Health Team receive support from the CEO for managing complex cases?".



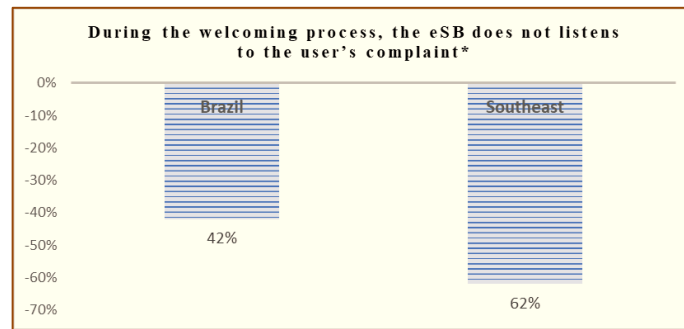
*The reference category for this variable is "Yes" – the eSB performs joint actions with other social services in the territory.

Figure 4. Percentage interpretation of OR for the variable "Does the Oral Health Team carry out joint actions with other social services in the territory?".

When the eSB does not assess the user's health needs, the likelihood of access to oral health care decreases by 42% in Brazil and 62% in the Southeast region (Figure 5).

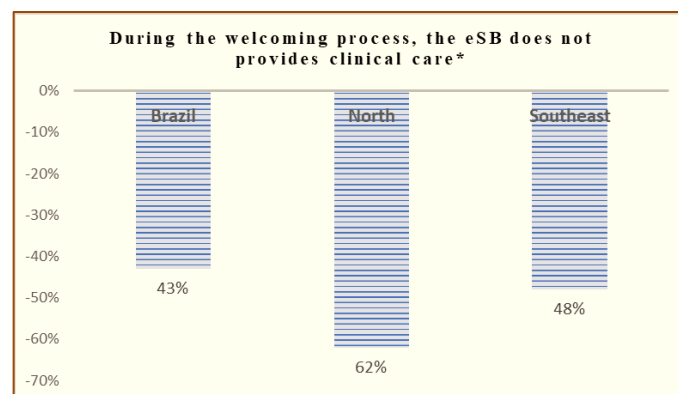
Figure 6 shows that, in Brazil and in the North and Southeast regions, when the eSB does not provide clinical care during the welcoming process, the likelihood of users gaining access decreases by 43%, 62%, and 48%, respectively.

When the main approach to user welcoming is not through arriving early, waiting in line, and taking a number, the likelihood of access to oral health care increases by 9% in Brazil, 14% in the Northeast, 30% in the Southeast, and 34% in the South (Figure 7).



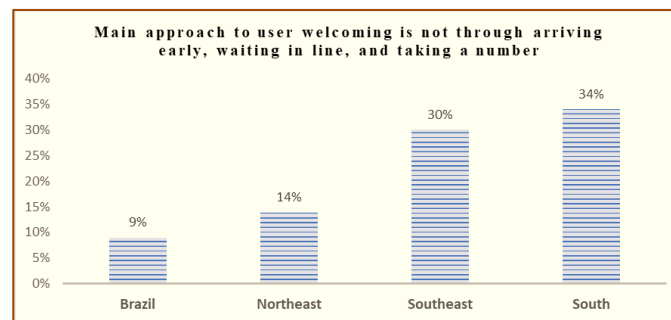
*The reference category for this variable is "Yes" – During the welcoming process, the eSB assesses the user's health needs.

Figure 5. Percentage interpretation of OR for the variable "During the welcoming process, does the Oral Health Team assess the user's health needs?".



*The reference category for this variable is "Yes" – During the welcoming process, the eSB provides clinical care.

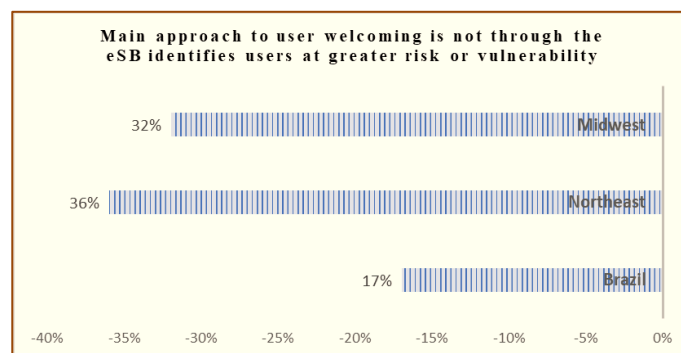
Figure 6. Percentage interpretation of OR for the variable "During the welcoming process, does the Oral Health Team provide clinical care?".



*The reference category for this variable is "Yes" – the main approach to user welcoming is through arriving early, waiting in line, and taking a number.

Figure 7. Percentage interpretation of OR for the variable "Is the main approach to user welcoming through arriving early, waiting in line, and taking a number?".

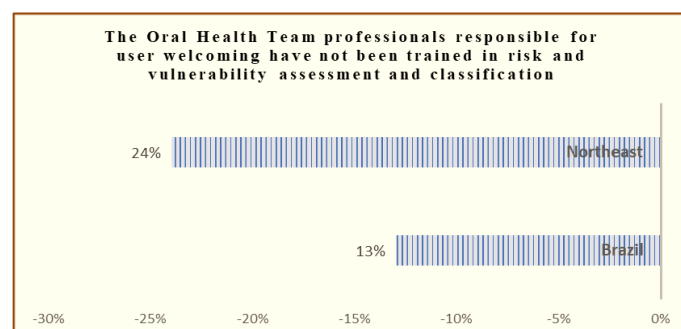
Figure 8 shows that, in Brazil and in the Midwest and Northeast regions, when the main approach to user welcoming is not based on identifying users at greater risk or vulnerability, the likelihood of access to oral health care decreases by 17%, 32%, and 36%, respectively.



*The reference category for this variable is "Yes" – the main approach to user welcoming is the eSB, which identifies users at greater risk or vulnerability.

Figure 8. Percentage interpretation of OR for the variable "What is the main approach to user welcoming?"

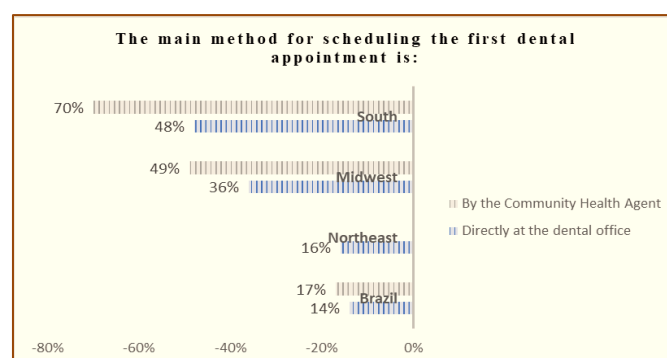
When the eSB professionals responsible for user welcoming have not been trained to identify users at greater risk and/or vulnerability, there is a decrease in the likelihood of access to oral health care, by 13% in Brazil and 24% in the Northeast region (Figure 9).



*The reference category for this variable is "Yes" – the Oral Health Team professionals responsible for user welcoming have been trained in risk and vulnerability assessment and classification.

Figure 9. Percentage interpretation of OR for the variable "Have the Oral Health Team professionals responsible for user welcoming been trained in risk and vulnerability assessment and classification?"

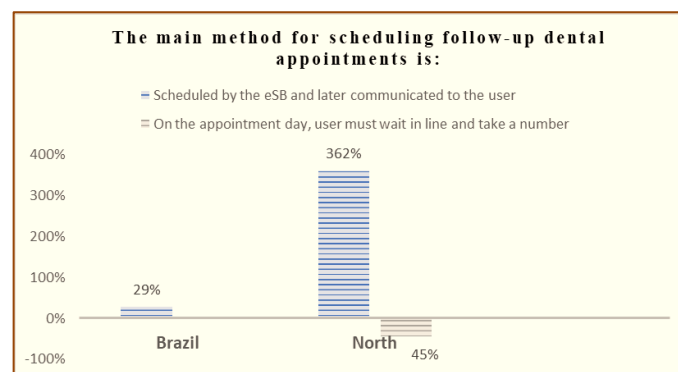
Figure 10 shows that when the main method for scheduling the first dental appointment is through the CHA or by the eSB directly at the dental office, the user's likelihood of accessing oral health services decreases compared to when the appointment is scheduled at the UBS reception. This reduction is most pronounced in the South region – 70% for scheduling through the CHA and 48% for scheduling at the dental office.



*The reference category for this variable is "At the UBS reception."

Figure 10. Percentage interpretation of OR for the variable: "What is the main method for scheduling the first dental appointment?"

When the main method for scheduling follow-up dental appointments is for the eSB to schedule the appointment and later inform the user, the likelihood of access increases by 29% in Brazil and by 362% in the North region. Conversely, when users must wait in line and take a number to schedule their follow-up appointment, the likelihood of access in the North region decreases by 45% (Figure 11).



*The reference category for this variable is "At the end of previous appointment".

Figure 11. Percentage interpretation of OR for the variable "What is the main method for scheduling follow-up dental appointments?".

Regarding the assessment of model fit for Brazil and its geographic regions, the results are shown in Table 5. In all geographic scenarios, the deviance function was lower than the chi-square distribution, indicating that the models are statistically acceptable. The area under the curve (AUC) was approximately 0.70 in all cases, suggesting moderate performance.

Table 5. Verification of the model's quality, considering Brazil and its geographic regions.

Region	Residual Deviance	Chi-Square	Area Under the Curve (AUC)	ROC Curve Sensitivity	ROC Curve Specificity	Performance
Brazil	23409,11	51165,61	0.650	0.49	0.73	Moderate
North	2220,664	3645,884	0.611	0.29	0.85	Moderate
Northwest	8707,043	23755,96	0.628	0.77	0.43	Moderate
Milwest	1732,788	3469,443	0.656	0.80	0.42	Moderate
Southwest	8308,396	14367,25	0.671	0.69	0.59	Moderate
South	1944,346	6458,368	0.676	0.66	0.59	Moderate

■ Discussion

This study, based on national data from the 3rd cycle of PMAQ-AB, identified characteristics of the eSB work process associated with users' access to dental care within PHCs. Given Brazil's vast territory and the diversity and uniqueness of its health services and population across different geographic regions, it is strategically important to identify, at both national and regional levels, aspects of work process organization that facilitate or hinder access to oral health care.

According to this study, in Brazil and most of its geographic regions, when the eSB operates within two or three or more eABs – as compared to a single eAB – the likelihood that users will access oral health care decreases. Therefore, assigning the eSB to a single eAB may provide broader coverage and greater access to oral health care for the population within its designated territory. Moreover, the literature indicates that a disproportionate ratio of one eSB to two eSFs prioritizes curative procedures and hampers the implementation of preventive and health promotion activities in oral health [11]. This imbalance also increases professionals' workload, leads to frustration [12], contributes to a backlog in service demand and overcrowding in UBS

facilities, and forces users to seek care elsewhere [13]. Notably, the demand for dental appointments is higher when eSBs are assigned to a single eSF [14]. The National Primary Health Care Policy [15] establishes that, “regardless of the adopted model, eSB professionals must be linked to one eAB or eSF team, share in the team’s management and work processes, and bear responsibility for the same population and assigned territory as the AB or eSF team to which they belong.” Therefore, efforts should be made to ensure a proportional alignment between the number of eSBs and eSFs.

Regarding support from other levels of care to the eSB, the study found that when the eSB does not receive support from the CEO in managing complex cases, the likelihood of users accessing care increases in Brazil and in the Midwest and Northeast regions. Organizational factors may help explain these results, particularly in municipalities where PHC is the only level of care available. In such settings, eSBs are likely to rely on the broadest possible range of available technologies and resources to address users’ oral health needs within this first level of care.

In this regard, a study analyzing specialized dental care in terms of access, demand, and work processes offered by CEOs – using secondary data from the PMAQ-CEO cycles – found that specialized dental care provided by CEOs in Brazil has expanded and improved. However, the authors also identified inequalities in the distribution of these specialized services, with significant unmet demand and care gaps, especially in the North region [16].

In the present study, it was found that when the eSB engages in joint actions with other social services in the territory, users’ access to care is improved. In Brazil and the North region, when the eSB does not perform these actions, the likelihood of accessing oral health care decreases. This association was not observed in the other geographic regions. Developing joint actions with services relevant to the community is essential for integrating initiatives and social support networks to strengthen comprehensive health care for the population [15]. However, some studies evaluating the organization of teamwork processes in PHC have identified challenges in implementing intersectoral actions. These include low team engagement in shared management efforts and shortcomings in communication and coordination across sectors [17-20]. Thus, intersectoral collaboration in the health sector still faces significant weaknesses and is not yet fully consolidated, compromising the delivery of comprehensive care to users and the community.

Regarding the organization of the eSB schedule, the study found that in Brazil and in the North region, when the eSB does not reserve accessible time slots for users to return and present test results, the likelihood of accessing oral health services decreases. The planning and organization of the team’s schedule should include both scheduled appointments and time slots for walk-in visits identified during the welcoming process that require same-day attention, as well as opportunities to actively listen to users [21]. Therefore, organizing the team’s schedule not only enhances user access to services but also improves the quality of care and reduces the workload on health professionals. The schedule is a key tool for optimizing time, prioritizing care, and planning services based on the population’s oral health needs. It can contribute to reorganizing team workflows and help ensure equity and comprehensive care delivery [22].

As observed in this study, schedule organization has also been analyzed in other studies conducted across different regions of Brazil, with findings indicating that most eSBs schedule both programmed appointments and walk-in (spontaneous demand) care [23-26].

Regarding care for spontaneous demand, this study shows that when the eSB does not provide urgent care, the likelihood of accessing care decreases in Brazil and the Midwest. Many users still do not prioritize preventive dental care, often seeking treatment only when experiencing acute oral health conditions [27,28].

In health care work processes, the welcoming approach is not meant to be a bureaucratic step but rather a personalized way to welcome each user, ensure access to services, and enable comprehensive and continuous care by fostering a user-professional bond [29]. This study found that when the eSB does not assess users' health needs during the welcoming process, the likelihood of accessing oral health care decreases in Brazil and in the Southeast region. Incorporating a welcoming approach into the daily routine of health services is complex. It must be carried out in a humanized manner, with active, qualified listening to address users' diverse demands. Implementing the welcoming process brings significant and sustainable changes, with impacts on both management and care within PHC [30]. It contributes to strengthening bonds, reducing waiting times, and resolving demands [31].

This study also found that when the eSB does not provide clinical care during the welcoming process, the likelihood of accessing oral health care decreases in Brazil, particularly in the Southeast and the North. Welcoming practices vary by location, as they take into account the specific characteristics of each territory, including users' lifestyles and socioeconomic and cultural conditions. This form of care must be organized to address spontaneous demand, manage urgent cases, and effectively meet users' health needs [32,33].

Another important factor in strengthening PHC is the multidisciplinary team's participation in the UBS's welcoming process. This study found that when eSB professionals do not conduct the welcoming process jointly with the eAB, the likelihood of user access decreases in Brazil and in the Northeast region. These findings reinforce that welcoming practices by the eSB – along with professionals' availability to discuss users' doubts, concerns, and oral health problems – have a significant impact on the quality of care and users' access to health services [34]. Because multidisciplinary work requires collective decision-making, teams need to discuss and define how different professionals will take part in the welcoming process. In this model, knowledge is specific to each profession, but responsibilities are equal and shared [35].

Still, regarding the welcoming process, the present study shows that when the main approach to welcoming users is not based on arriving early and waiting in line to receive a number, the likelihood of accessing oral health care increases in Brazil. Regionally, this alternative approach increases access in the Northeast, Southeast, and South regions. These findings are consistent with those of Giordani et al. [36], who, using data from the 1st cycle of PMAQ-AB, evaluated the prevalence of welcoming practices carried out by teams in PHC across Brazil's macro-regions and found an unequal distribution of these practices across the country.

This study also found that when the main approach to user welcoming is not based on order of arrival at the UBS, the likelihood of accessing oral health services decreases in the Midwest region. In this region, access barriers are part of the daily routine in health services, where the first-come, first-served logic prevails, often requiring users to arrive early at the UBS to schedule an appointment [37].

From the perspective of implementing welcoming practices by eSBs within PHC, this study found that when the main approach to welcoming is not based on identifying users at greater risk or vulnerability, the likelihood of accessing oral health care decreases in Brazil and in the Midwest and Northeast regions. The study also showed that when eSB professionals responsible for welcoming are not trained to identify users at greater risk and vulnerability, the likelihood of user access decreases in Brazil and in the Northeast region.

These results highlight the importance of ensuring that welcoming is carried out by professionals who are well-trained, guided, and sensitive to users' health needs, so that the practice can be fully implemented in all its dimensions – ultimately ensuring both access and quality care.

Not all users who seek care at the UBS require clinical treatment. Often, users believe that their needs can be met simply by being heard. It is during the welcoming process – through identifying user needs – that the professional can guide them toward the most appropriate type of care [37].

Another aspect analyzed in this study was the main method for scheduling the first dental appointment at the UBS. When appointments are primarily scheduled by the Community Health Agent (CHA), the likelihood of user access decreases in Brazil, with an even greater reduction in the South region. When users go directly to the UBS, they participate in the team's welcoming process, enabling better care coordination and the resolution of their needs. The CHA should primarily assist with scheduling in specific situations – particularly for users who, due to certain conditions, are unable to visit the UBS for this purpose.

Still, regarding the main method for scheduling the first dental appointment, this study showed that when the appointment is scheduled directly at the dental office by the eSB, the likelihood of user access decreases in Brazil, and even more markedly in the South region. Implementing an effective appointment scheduling system improves team workflows, enhances the quality of care, increases patient safety, and ensures timely access to health care services [38,39].

This study also analyzed the main method for scheduling follow-up dental appointments. When the eSB schedules follow-up appointments and later communicates with the user, the likelihood of accessing care increases in Brazil and in the North region. In contrast, when users must wait in line and take a number on the scheduling day for oral health care, access decreases in the North region. These results may be related to the geographic characteristics of this region, where certain localities face logistical challenges related to transportation, making it difficult for users to visit the UBS multiple times. Similar findings were reported by Guimarães et al. [40], who observed that riverside populations tend to seek care more frequently at hospitals, with scheduling difficulties identified as a main barrier to accessing services at the UBS.

Based on study findings, the following practical actions for PHC managers could facilitate access to oral health care: 1) adjust the eSB:eSF ratio, ensuring that each eSB is responsible for only one eAB; 2) strengthen user embracement, guaranteeing qualified listening, risk and vulnerability assessment, clinical care when needed; 3) improve scheduling processes, prioritizing the scheduling at the PHC reception desk, transparent and equitable criteria, elimination of first-come, first-served systems; 4) reserve dedicated time slots for follow-up visits, such as returning with test results or clarifying doubts; 5) expand professional training on risk stratification, embracement, and interprofessional communication; 6) strengthen integration between PHC units and CEOs, establishing clear referral and counter-referral flows.

Due to its nationwide scope, the PMAQ-AB provides broad, valuable, and highly accurate information. However, the present study has several limitations. These include the use of secondary data, which may introduce measurement bias due to potential inaccuracies in data recording by interviewers during collection; the possibility of selection bias, given the nonrandom selection of users who responded to Module III of PMAQ-AB; and the potential for information bias due to the length and complexity of data collection instruments used in the PMAQ-AB External Evaluation, since data quality depends on respondent comprehension. Another point worth highlighting is the high proportion of positive responses from eSBs regarding their work processes, which may be influenced by performance-based certification and, consequently, the financial incentives transferred to municipal management. Because the program was linked to performance evaluations and financial incentives, teams may have overreported positive behaviors, resulting in positive response bias. At last, the exclusive reliance on quantitative data is another limitation. Without qualitative insights, it is not possible to understand the nuances of daily work processes, professionals' perceptions, or underlying systemic barriers.

Despite these limitations, this study's findings provide valuable insights into users' access to dental care. They identify specific characteristics of eSB work processes in Brazil and its geographic regions that hinder access and may compromise both the continuity of care and the resolution of oral health problems within the PHC framework.

Finally, future research should include qualitative studies to examine how embracement practices, scheduling procedures, and team dynamics are operationalized in daily work routines. It would also be valuable to conduct longitudinal investigations to assess changes over time resulting from organizational or policy modifications, as well as to evaluate the impact of discontinuing PMAQ-AB on the structure and quality of oral health teams. Additionally, studies should explore the integration between PHC and specialized dental care, particularly the performance of CEOs and the functioning of referral and counter-referral flows.

■ Conclusion

Some characteristics of eSB work processes hinder users' access to oral health care and call for a reorganization of practices, along with the effective implementation of national guidelines that govern service delivery within PHC. Although regional differences exist across Brazil, several factors stand out as essential to improving access. These include aligning the number of eSBs with eSFs, ensuring support from secondary-level oral health care, adopting standardized care protocols and service flows, and implementing more effective methods for scheduling dental appointments.

■ Authors' Contributions

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AMGV	 https://orcid.org/0000-0001-8460-3981	Conceptualization, Methodology, Writing - Original Draft, Writing - Review and Editing, Visualization, Supervision, and Project Administration.
All authors declare that they contributed to the critical review of intellectual content and approval of the final version to be published.		

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None.

■ Conflict of Interest

The authors declare no conflicts of interest.

■ Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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