Encouraging the work process of oral health teams can favour the planning of their actions in Primary Health Care

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Abstract

Background

The social determinants of health are strongly related to dental care needs. Therefore, oral health services in primary health care (PHC) must be planned to be more responsive to the needs of their local populations. The aim of this study was to evaluate the variables that are associated with planning actions by oral health teams (OHTs) in PHC.

Methods

This analytical, cross-sectional study used data from the external evaluation of the third cycle of the National Program for Improving Access and Quality of Primary Care (PMAQ-AB), carried out between 2017 and 2018, in Brazil. The final sample consisted of 22,268 OHTs from 4,679 Brazilian municipalities. The outcome variable was action planning by the OHTs and the independent variables included characteristics of the OHTs and municipal PHC Management, in addition to municipal socioeconomic indicators. Five models were sequentially built for statistical analysis, namely: an empty model (with the intercept, only), a multiple model with variables related to OHTs, a multiple model with variables related to municipal management in PHC, a multiple model with the municipal indicators, and a multilevel logistic regression model with variables at the level of OHTs and municipalities.

Results

It was observed that 32.5% of the OHTs did not plan their actions. In the final adjusted model the characteristics of OHTs were more significant for the outcome than the variables related to municipal PHC Management and municipal socioeconomic indicators. Moreover, participating in meetings together with the PHC team and carrying out case and therapeutic project discussions were the variables with the greatest effect on the outcome, that is, adjusted OR of 3.75 (95%CI: 3.42–4.10) and adjusted OR of 3.74 (95%CI: 3.46–4.05), respectively.

Conclusions

It is concluded that the indicators complicating the planning of actions by the OHTs were mainly the characteristics inherent to the work process of the OHTs, particularly the failure to hold meetings together with the PHC team, case and therapeutic project discussions, self-assessment, as well as the embracement protocols.

Background

The planning and management of public health services, mainly those at the Primary Health Care (PHC) level, require that managers and professionals in the area work to identify the health problems present in the population, establish priorities and objectives, interact with other sectors of the society and participate in the training of human resources for the health area [1, 2].

The importance of local planning originates from the acknowledgement that health and quality of life are directly related to a diverse set of interrelated social, political, economic and cultural factors, and that, in many countries, postal codes can be better indicators of duration and quality of life of a person than genetic codes [3].

Therefore, planning makes it possible to have a clear view of the situation, as well as the role that health care should play in the prevention and rehabilitation of health problems of the population [4]. In this sense, it can be observed that planning is a dynamic, multidimensional and complex process, albeit necessary for the viability of an equitable health system, able to meet the health needs of the assisted population [1, 5].

From this perspective, the integration of dental care to the Health System, especially in PHC services, is essential to reverse the high prevalence of oral diseases worldwide [6–8]. In the current global scenario, despite being largely preventable, oral diseases are among the most prevalent worldwide. Therefore, recognizing that the social determinants of health have a strong relationship with unmet dental care needs, dental care services must be planned to be more responsive to the needs of their local populations. Thus, The system
will be able to prioritize the care of groups with high need for care, such as vulnerable groups, including those with multiple morbidities [8–10].

In PHC, planning and managing approaches based on interprofessional teams with a varied combination of training areas, skills, and scopes of practice increase workforce productivity, while responding to a wide range of population and community needs [4]. This is, therefore, the ideal level of care for dentistry to use a less invasive and more preventive approach, working in partnership with other health professionals to address the shared risks of oral diseases and other non-communicable diseases [9].

In Brazil, the National Oral Health Policy (PNSB, Politica Nacional de Saúde Bucal), instituted in 2004 as part of the national health strategies, has increased the offer of public oral health services. PNSB represents an transformative strategy focused on [11, 12]. It is based on increasing the number of oral health teams (OHTs) in Primary Health Care (PHC) and expanding a comprehensive oral health care through the Centers of Specialized Dentistry (CEO, Centros de Especialidades Odontológicas) at the secondary level of attention [12].

However, difficulties persist in accessing care, mainly for the population in the most vulnerable social strata [13]. This fact brings the need to identify and analyse predictors that facilitate or hinder local planning in oral health, recognizing it as a determinant for the management of dental services and adequate attention to the population's oral health. Thus, it is important to contribute with evidence regarding the reality of planning at the local level in health care provision. Given the abovementioned facts, the aim of this study was to evaluate the variables that are associated with planning actions by OHTs in PHC.

**Methods**

**Ethical aspects**

The Ethics Committee for Research with Human Beings approved the project (CAAE 80477417.0.0000.0021).

**Study design and context**

This analytical cross-sectional study was carried out using secondary data and reported according to the STrengthening the Reporting of Observational studies in Epidemiology (STROBE) checklist [14].

The present study uses data from the external evaluation of the third cycle of the National Program for Improving Access and Quality of Primary Care (PMAQ-AB), executed between 2017 and 2018, in Brazil. The PMAQ-AB corresponded to the group of actions that investigated the access conditions and quality of health services in all participating municipalities and primary health care teams [15].

To date, 3 cycles have taken place. Participating municipalities that show an improvement in the standard of quality in care achieve increasing of financial resources transferring. External Assessments was performed with the help of Teaching and Research Institutions from all over the country, by means of interviews with users and professionals of the Health teams [15–17]. Microdata, obtained from interviews with professionals from the Oral Health teams (OHTs) of Primary Health Care Units (PHCUs) and with municipal Primary health Care managers, were used in the research.

Municipal socioeconomic indicators were included in this study, and, as a result, six OHTs from three municipalities created or emancipated after 2010 were excluded from the sample. This step was necessary because the municipal indicators are calculated based on data from the national census and the last Brazilian census took place in 2010.

The final sample consisted of 22,268 OHTs from 4,679 Brazilian municipalities, of a total of 26,905 teams and 5,570 Brazilian municipalities. Supplementary Material 1 shows the hypotheses that supported the choice of variables from the PMAQ-AB and the socioeconomic variables of the municipalities.

**Analysed variables**

The variables used in the study and how they were treated are shown in Table 1.
| Variable | Presentation |
|----------|-------------|
| **Outcome** | |
| Oral Health Team plans its actions* | Yes or No |
| **Independent variables of the Oral Health teams (OHTs)** | |
| Total PHC teams assisted by one OHT* | N. of assisted teams |
| Frequency with which the OHT attends users outside its coverage area* | Every day, some days of the week or never. |
| OHT participates in meetings together with PHC teams* | Yes or No |
| OHT conducts case and therapeutic project discussions* | Yes or No |
| OHT performs self-assessment process* | Yes or No |
| Self-assessment instrument used* | Printed AMAQ; electronic AMAQ; AMQ; municipality/team instrument; state instrument or Other |
| OHT performs actions articulated with other social facilities in the territory* | Yes or No |
| OHT performs embracement together with the PHC teams* | Yes or No |
| OHT uses protocols/criteria in embracement conduct* | Yes or No |
| Professionals from the OHT who carry out the embracement were trained to assess and classify users’ risk and vulnerability* | Yes or No |
| **Independent variables of municipal health management** | |
| Defines the number of patients under the responsibility of the primary health care team based on risk and vulnerability criteria* | Yes or No |
| Offers Permanent Health Education at the municipal level that includes primary health care* | Yes or No |
| Has financial resources aimed at Permanent Education* | Yes or No |
| Stimulates PET-Saúde actions* | Yes or No |
| Stimulates PRO-Saúde actions* | Yes or No |
| Defines Permanent Education actions based on the demands of professionals/teams* | Always, occasionally or rarely |
| Defines Permanent Education actions based on the needs of the population* | Always, occasionally or rarely |
| Defines Permanent Education actions based on the state government offers* | Always, occasionally or rarely |
| Defines Permanent Education actions based on the federal government offers * | Always, occasionally or rarely |
| Is represented in Teaching-Service Integration Commissions (CIES, Comissões de Integração Ensino-Serviço)* | Yes or No |
| **Independent municipality variables (municipal socioeconomic indicators)** | |
| Social Prosperity# | Very high; High; Medium; Low; or Very low |
| Social Vulnerability Index (SVI)# | Varies from 0 to 1 |

*Data source: 3rd Cycle PMAQ-AB [18]. #Data source: IPEA [19]. Data source: IBGE [20]. AMAQ: Self-Assessment for Improving Access and Quality of Primary Care, printed version. AMQ: Quality Improvement Assessment. PET Saúde: Education Program through Work for Health. PRO-Saúde: National Program for the Reorientation of Professional Training in Health. OHT: Oral Health Team. PHC: Primary Health Care
| Variable | Presentation |
|----------|--------------|
| Municipal Human Development Index (M-HDI)# | Varies from 0 to 1 |
| Illiteracy rate of the population aged 18 and overφ | Percentage of the population aged 18 and over considered to be illiterate |
| Gini index# | Varies from 0 to 1 |

*Data source: 3rd Cycle PMAQ-AB [18]. #Data source: IPEA [19]. Φ Data source: IBGE [20]. AMAQ: Self-Assessment for Improving Access and Quality of Primary Care, printed version. AMQ: Quality Improvement Assessment. PET Saúde: Education Program through Work for Health. PRO-Saúde: National Program for the Reorientation of Professional Training in Health. OHT: Oral Health Team. PHC: Primary Health Care

### Statistical methods

Initially, descriptive analyses of all variables were performed. For that purpose, absolute and relative frequencies were used for categorical variables and mean, standard deviation, median, minimum and maximum values were used for quantitative variables. Then, simple logistic regression models were built for each independent variable with the outcome “OHT planning”. Five models were then built sequentially, namely: an empty model (with the intercept only), a multiple model with variables related to OHTs, a multiple model with variables related to municipal management in PHC, a multiple model with municipal indicators, a multilevel logistic regression model with variables of the OHT level, and of the municipalities.

All models considered the OHT nested in the municipalities, as more than one oral health team was evaluated per municipality. Based on the models, the crude and adjusted odds ratios were estimated, with their respective 95% confidence intervals. The intraclass correlation was calculated based on the null model, which estimates the percentage of the total variation due to the municipalities’ variables.

All variables with p < 0.20 in the individual analyses were tested in the multiple models, and those with p < 0.05 remained in the models after the adjustments. The fit of the models was assessed using the quasi-likelihood information criterion (QIC).

The data were analysed using the R [21] and SAS [22] software programs.

### Results

Table 2 shows the descriptive analyses of the variables related to the Teams. It was observed that 32.5% of the OHTs did not plan their actions, 19.9% did not participate in meetings together with the PHC teams, 52.2% did not discuss cases and therapeutic projects, 23.6% did not promote a self-assessment process, 8.4% did not perform actions articulated with other social facilities in the territory and 16.8% did not use protocols/criteria for embracement conducts.
Table 2
Descriptive analysis of variables related to Oral Health Teams (n = 22,268).

| Variable                                                      | Category                      | Frequency (%) |
|---------------------------------------------------------------|-------------------------------|---------------|
| OHTs plan their actions                                       | Yes                           | 15,035 (67.5%)|
|                                                               | No                            | 7,233 (32.5%) |
| Frequency with which the OHT attends users outside its coverage area | Every day                    | 10,866 (48.8%)|
|                                                               | Some days in the week         | 9,792 (44.0%) |
|                                                               | Never                         | 1,610 (7.2%)  |
| The OHT participates in meetings together with the PHC teams  | Yes                           | 17,841 (80.1%)|
|                                                               | No                            | 4,427 (19.9%) |
| The OHT conducts case and therapeutic project discussions     | Yes                           | 10,641 (47.8%)|
|                                                               | No                            | 11,627 (52.2%)|
| The OHT performs the self-assessment process                  | Yes                           | 17,023 (76.4%)|
|                                                               | No                            | 5,245 (23.6%) |
| Self-assessment instrument used                                | Printed AMAQ                  | 10,519 (47.2%)|
|                                                               | Electronic AMAQ               | 6,063 (27.2%) |
|                                                               | AMQ                           | 97 (0.4%)     |
|                                                               | Municipality/team instrument  | 220 (1.0%)    |
|                                                               | State instrument              | 53 (0.2%)     |
|                                                               | Other                         | 71 (0.3%)     |
|                                                               | Does not apply                | 5,245 (23.6%) |
| The OHT performs actions articulated with other social facilities in the territory | Yes | 20,397 (91.6%) |
|                                                               | No                            | 1,871 (8.4%)  |
| The OHT performs embracement together with the PHC teams      | Yes                           | 18,547 (83.3%)|
|                                                               | No                            | 3,638 (16.3%) |
|                                                               | Does not apply                | 83 (0.4%)     |
| The OHT uses protocols/criteria for the embracement conduct  | Yes                           | 18,456 (82.9%)|
|                                                               | No                            | 3,729 (16.8%) |
|                                                               | Does not apply                | 83 (0.4%)     |
| OHT professionals who carry out the embracement were trained to assess and classify the users’ risk and vulnerability | Yes | 18,599 (83.5%) |
|                                                               | No                            | 3,586 (16.1%) |
|                                                               | Does not apply                | 83 (0.4%)     |

| Variable                                                      | Mean (standard deviation) | Median (minimum and maximum) |
|---------------------------------------------------------------|---------------------------|------------------------------|
| Total number of PHC teams assisted by an OHT                  | 1.2 (0.7)                 | 1.0 (1.0–9.0)               |

OHT: Oral Health Team. PHC: Primary Health Care

Table 3 shows the descriptive analyses of municipal management variables in Primary health Care. It was observed that in 26.5% of the municipalities, the number of patients under the responsibility of the primary health care team was not defined based on risk and
vulnerability criteria, and 32.4% did not offer Permanent Health Education (PHE) within the municipal scope that included primary health care. In 14.9%, the needs for permanent education actions were rarely or never defined considering the demands of professionals/teams, in 58.4%, these needs were sometimes defined and 52.9% had no representation in Teaching-Service Integration Commissions (CIES).
| Variable                                                                 | Category           | Frequency (%) |
|-------------------------------------------------------------------------|--------------------|---------------|
| Defines the number of patients under the responsibility of the primary health care team based on risk and vulnerability criteria | Yes                | 3,436 (73.4%) |
|                                                                         | No                 | 1,239 (26.5%) |
|                                                                         | No information     | 4 (0.1%)      |
| Offers Permanent Health Education at the municipal level that includes primary health care | Yes                | 3,162 (67.6%) |
|                                                                         | No                 | 1,517 (32.4%) |
| Has financial resources aimed at Permanent Education                     | Yes                | 2,217 (47.4%) |
|                                                                         | No                 | 1,037 (22.2%) |
|                                                                         | Does not apply     | 1,425 (30.5%) |
| Stimulates PET-Saúde actions                                            | Yes                | 207 (4.4%)    |
|                                                                         | No                 | 4,472 (95.6%) |
| Stimulates PRO-Saúde actions                                            | Yes                | 152 (3.2%)    |
|                                                                         | No                 | 4,527 (96.8%) |
| Defines Permanent Education actions based on the demands of professionals/teams | Always             | 1,249 (26.7%) |
|                                                                         | Occasionally       | 2,732 (58.4%) |
|                                                                         | Rarely             | 698 (14.9%)   |
| Defines Permanent Education actions based on the needs of the population | Always             | 1,474 (31.5%) |
|                                                                         | Occasionally       | 2,167 (46.3%) |
|                                                                         | Rarely             | 1,038 (22.2%) |
| Defines Permanent Education actions based on state government offers     | Always             | 870 (18.6%)   |
|                                                                         | Occasionally       | 2,016 (43.1%) |
|                                                                         | Rarely             | 1,793 (38.3%) |
| Defines Permanent Education actions based on federal government offers   | Always             | 702 (15.0%)   |

*PETSaúde*: Education Program through Work for Health. *PRO-Saúde*: National Program for the Reorientation of Professional Training in Health.
| Variable                                      | Category   | Frequency (%) |
|----------------------------------------------|------------|---------------|
| Occasionally                                 | 1,500      | (32.1%)       |
| Rarely                                       | 2,477      | (52.9%)       |

Has representation in the Teaching-Service Integration Commissions (CIES).

- Yes 1,013 (21.6%)
- No 2,477 (52.9%)

*PET Saúde*: Education Program through Work for Health. *PRO-Saúde*: National Program for the Reorientation of Professional Training in Health.

The descriptive analyses of municipal indicators are shown in Table 4. It was observed that 26.9% of the municipalities were classified as very high Social Prosperity and 25.7% as very low. The average Social Vulnerability index was 0.36, the Municipal Human Development index was 0.65, the illiteracy rate was 18.42 and the Gini index was 0.51.

### Table 4
Descriptive analysis of variables related to municipal indicators (n = 4,679).

| Variable                                      | Category   | Frequency (%) |
|----------------------------------------------|------------|---------------|
| Social Prosperity                            | Very low   | 1,204 (25.7%) |
| Low                                          | 719 (15.4%)|
| Medium                                       | 815 (17.4%)|
| High                                         | 684 (14.6%)|
| Very high                                    | 1,257 (26.9%)|

| Variable                                      | Mean (standard deviation) | Median (minimum and maximum) |
|----------------------------------------------|---------------------------|------------------------------|
| Social Vulnerability Index                    | 0.36 (0.13)               | 0.35 (0.09–0.77)             |
| M-HDI                                        | 0.65 (0.07)               | 0.66 (0.45–0.86)             |
| Illiteracy rate in individuals over 18 years | 18.42 (10.76)             | 15.76 (0.97–47.64)           |
| Gini index                                    | 0.51 (0.07)               | 0.51 (0.28–0.81)             |

M-HDI: Municipal Human Development Index

The crude analyses of the associations of each variable with the outcome (OHT plans its actions) are shown in Table 5. Based on the crude analyses, there was a greater chance of not planning their actions by OHTs that assisted more than one Primary health Care Team, cared for people residing outside the coverage area, did not participate in meetings together with the PHC team, did not carry out case and therapeutic project discussions, did not perform a self-assessment process in the previous year, used the electronic AMAQ instrument in comparison to the printed form, did not carry out actions articulated with other social facilities in the territory, whose team professionals did not carry out embrace together with the Primary health Care Team, who did not use protocols/criteria in the embrace conduct and whose professionals who provided embrace were not trained to evaluate and classify the users’ risk and vulnerability (p < 0.05).
Table 5
Crude (individual) analyses between independent variables and failure to carry out action planning by the Oral Health Teams (n = 22,268).

| Variable                                    | Category | n(%) | Oral Health Team plans its actions | crude OR (95%CI) | p-value |
|---------------------------------------------|----------|------|------------------------------------|------------------|---------|
| Oral health Teams                           |          |      |                                    |                  |         |
| Total number of assisted PHC teams          | #1       | 18,971 (85.2%) | 12,811 (67.5%) | 6,160 (32.5%) | Ref     |
|                                             | > 1      | 3,297 (14.8%) | 2,224 (67.5%) | 1,073 (32.5%) | 1.19 (1.09-1.31) | 0.0001 |
| Frequency with which the OHT attends users outside its coverage area | Every day | 10,866 (48.8%) | 7,487 (68.9%) | 3,379 (31.1%) | 0.81 (0.73-0.90) | < 0.0001 |
|                                             | Some days | 9,792 (44.0%) | 6,551 (66.9%) | 3,214 (33.1%) | 0.86 (0.78-0.96) | 0.0058 |
|                                             | Never    | 1,610 (7.2%) | 997 (61.9%) | 613 (38.1%) | Ref     |
| The OHT participates in meetings together with PHC teams | Yes     | 17,841 (80.1%) | 13,812 (77.4%) | 4,029 (22.6%) | Ref     |
|                                             | No       | 4,427 (19.9%) | 1,223 (27.6%) | 3,204 (72.4%) | 5.94 (5.45-6.47) | < 0.0001 |
| The OHT discusses cases and therapeutic projects | Yes     | 10,641 (47.8%) | 9,419 (88.5%) | 1,222 (11.5%) | Ref     |
|                                             | No       | 11,627 (52.2%) | 5,616 (48.3%) | 6,011 (51.7%) | 5.69 (5.28-6.13) | < 0.0001 |
| The OHT performs a self-assessment process  | Yes     | 17,023 (76.4%) | 12,932 (76.0%) | 4,091 (24.0%) | Ref     |
|                                             | No       | 5,245 (23.6%) | 2,103 (40.1%) | 3,142 (59.9%) | 3.20 (2.97-3.44) | < 0.0001 |
| Self-assessment instrument used             | Printed AMAQ | 10,519 (47.2%) | 8,020 (76.2%) | 2,499 (23.8%) | Ref     |
|                                             | Electronic AMAQ | 6,063 (27.2%) | 4,555 (75.1%) | 1,508 (24.9%) | 1.12 (1.04-1.21) | 0.0027 |
|                                             | AMQ      | 97 (0.4%) | 86 (88.7%) | 11 (11.3%) | 0.85 (0.57-1.27) | 0.4232 |
|                                             | Municipality/team instrument | 220 (1.0%) | 182 (82.7%) | 38 (17.3%) | 0.84 (0.60-1.17) | 0.3135 |
|                                             | State instrument | 53 (0.2%) | 35 (66.0%) | 18 (34.0%) | 1.31 (0.72-2.38) | 0.3787 |

* Outcome event. Ref: Reference category for independent variables. # Median of the sample. OR: Odds ratio. CI: Confidence Interval. M-HDI: Municipal Human Development Index OHT: Oral Health Team. PHC: Primary Health.
| Variable                                                                 | Category                      | n(%)   | Oral Health Team plans its actions | crude OR (95%CI) | p-value |
|-------------------------------------------------------------------------|-------------------------------|--------|-----------------------------------|------------------|---------|
|                                                                         |                               |        | Yes  | *No  |                               |         |         |
|                                                                         |                               |        | n (%) | n (%) |                               |         |         |
| Other                                                                   |                               |        | 71   | 54   | 17                                           | 1.08 (0.67–1.75) | 0.7456  |
|                                                                         | Does not apply                |        | 5,245| 2,103| 3,142                                        | -       |         |
| The OHT carries out actions articulated with other social facilities in the territory | Yes                            | 20,397 | 14,341 | 6,056 | Ref                                          |         |         |
|                                                                         | No                             | 1,871  | 694   | 1,177   | 2.60 (2.37–2.85) | < 0.0001 |
| Does not apply                                                           |                               | 83     | 36    | 47    | -                                            |         |         |
| The OHT carries out the embracement together with the PHC teams         | Yes                            | 18,547 | 12,979 | 5,568 | Ref                                          |         |         |
|                                                                         | No                             | 3,638  | 2,020 | 1,618   | 1.57 (1.47–1.69) | < 0.0001 |
| Does not apply                                                           |                               | 83     | 36    | 47    | -                                            |         |         |
| The OHT uses protocols/criteria in the embracement conduct             | Yes                            | 18,456 | 13,451 | 5,005 | Ref                                          |         |         |
|                                                                         | No                             | 3,729  | 1,548 | 2,181   | 2.52 (2.34–2.72) | < 0.0001 |
| Does not apply                                                           |                               | 83     | 36    | 47    | -                                            |         |         |
| Professionals from the OHTs who carry out the embracement were trained to assess and classify the users’ risk and vulnerability | YesYes                         | 18,599 | 13,288 | 5,311 | Ref                                          |         |         |
|                                                                         | No                             | 3,586  | 1,711 | 1,875   | 1.90 (1.76–2.05) | < 0.0001 |
| Does not apply                                                           |                               | 83     | 36    | 47    | -                                            |         |         |
| Municipal Management in Primary Health Care                              | Defines the number of patients under the responsibility of the primary health care team based on risk and vulnerability criteria | 17,688 | 12,248 | 5,440 | Ref                                          |         |         |
|                                                                         | No                             | 4,562  | 2,774 | 1,788   | 1.33 (1.20–1.47) | < 0.0001 |
| No information                                                           | 18                             | 13     | 5     | (27.8%)                                    | -       |         |
| Offers Permanent Health Education at the municipal level that includes primary health care | Yes                            | 16,829 | 11,696 | 5,133 | Ref                                          |         |         |
|                                                                         | No                             | 5,439  | 3,339 | 2,100   | 1.32 (1.20–1.46) | < 0.0001 |
| Has financial resources aimed at Permanent Education                   | Yes                            | 11,659 | 8,135 | 3,524   | Ref                                          |         |         |

* Outcome event. Ref: Reference category for independent variables. *Median of the sample. OR: Odds ratio. CI: Confidence Interval. M-HDI: Municipal Human Development Index OHT: Oral Health Team. PHC: Primary Health.
| Variable | Category | n (%) | Oral Health Team plans its actions | crude OR (95%CI) | p-value |
|----------|----------|-------|-----------------------------------|-----------------|---------|
|          |          |       | Yes | *No |                |       |
|          |          |       | n (%) | n (%) |                |       |
| No       |          | 5,569 | (25.0%) | 3,789 | (68.0%) | 1.08 (0.97–1.22) | 0.1545 |
|          | Does not apply | 5,040 | (22.6%) | 3,111 | (61.7%) | 1.929 (38.3%) | - |
| Stimulates PET-Saúde actions | Yes | 3,650 | (16.4%) | 2,809 | (77.0%) | 841 (23.0%) | Ref |
|          | No       | 18,618 | (83.6%) | 12,226 | (65.7%) | 6,392 (34.3%) | 1.44 (1.20–1.74) | < 0.0001 |
| Stimulates PRO-Saúde actions | Yes | 1,950 | (8.8%) | 1,543 | (79.1%) | 407 (20.9%) | Ref |
|          | No       | 20,318 | (91.2%) | 13,492 | (66.4%) | 6,826 (33.6%) | 1.36 (1.08–1.70) | 0.0092 |
| Defines Permanent Education actions based on the demands of professionals/teams | Always | 7,002 | (31.4%) | 5,069 | (72.4%) | 1,933 (27.6%) | Ref |
|          | Occasionally | 13,044 | (58.6%) | 8,748 | (67.1%) | 4,296 (32.9%) | 1.16 (1.05–1.29) | 0.0047 |
|          | Rarely | 2,222 | (10.0%) | 1,218 | (54.8%) | 1,004 (45.2%) | 1.79 (1.55–2.07) | < 0.0001 |
| Defines Permanent Education actions based on the needs of the population | Always | 7,858 | (35.3%) | 5,526 | (70.3%) | 2,332 (29.7%) | Ref |
|          | Occasionally | 10,690 | (48.0%) | 7,223 | (67.6%) | 3,467 (32.4%) | 1.04 (0.94–1.15) | 0.4387 |
|          | Rarely | 3,720 | (16.7%) | 2,286 | (61.5%) | 1,434 (38.6%) | 1.31 (1.16–1.49) | < 0.0001 |
| Defines Permanent Education actions based on state government offers | Always | 4,460 | (20.0%) | 3,037 | (68.1%) | 1,423 (31.9%) | Ref |
|          | Occasionally | 10,312 | (46.3%) | 7,145 | (69.3%) | 3,167 (30.7%) | 0.98 (0.87–1.11) | 0.7736 |
|          | Rarely | 7,496 | (33.7%) | 4,853 | (64.7%) | 2,643 (35.3%) | 1.16 (1.02–1.31) | 0.0180 |
| Defines Permanent Education actions based on federal government offers | Always | 4,286 | (19.2%) | 3,024 | (70.6%) | 1,262 (29.4%) | Ref |
|          | Occasionally | 8,278 | (37.2%) | 5,961 | (72.0%) | 2,317 (28.0%) | 0.89 (0.78–1.02) | 0.0998 |
|          | Rarely | 9,704 | (43.6%) | 6,050 | (62.4%) | 3,654 (37.6%) | 1.28 (1.13–1.45) | 0.0001 |

* Outcome event. Ref: Reference category for independent variables. #Median of the sample. OR: Odds ratio. CI: Confidence Interval. M-HDI: Municipal Human Development Index OHT: Oral Health Team. PHC: Primary Health.
Table 6 shows that the intraclass correlation coefficient was 0.3233, indicating that 32.3% of the total variation is due to the variation between municipalities and 67.7% is due to the variation between OHTs.

The first multiple model studied was of the variables related to the OHT, with the following variables remaining in the final model: carrying out meetings together with the PHC team, discussion of cases and therapeutic projects, self-assessment process, actions
articulated with other social facilities of the territory, use of protocols/criteria for embracement conduct and prior training of OHT professionals who perform the embracement (p < 0.05).

In model 2, the variables of Municipal Management in Primary Health Care were tested, and the following variables remained in the model: defines the number of patients under the responsibility of the primary health care team based on risk and vulnerability criteria, offers PHE at the municipal level that includes primary health care, defines these actions based on the demands of professionals/teams, defines PHE actions based on federal government offers and has representation in the Teaching-Service Integration Commissions (CIES), p < 0.05.

Municipal indicators were tested in model 3. The Social Prosperity Index and the Gini Index remained in the model. It was observed that the model with the OHT variables showed the highest decrease in the QIC (quasi-likelihood criterion) when compared to the empty model. The better the fit of the model, the lower the QIC value.

Next, a multilevel model was tested considering the variables of the OHT and Municipal Management in Primary Health Care, but only the OHT variables remained in the model. Municipal indicators were then introduced and only the Social Prosperity index remained in the final adjusted model, together with the OHT variables.

There was little variation in the QIC value between the model with only the OHT variables and the final model, with the inclusion of the Social Prosperity Index, indicating that the former were more significant for the outcome than the latter. According to the final adjusted model, it was observed that the OHT that did not participate in meetings together with the PHC team, did not discuss cases and therapeutic projects, did not carry out a self-assessment process, did not carry out articulated actions with other social facilities in the territory, did not use protocols/criteria for embracement conduct and whose professionals who performed the embracement were not previously trained to assess and classify users’ risk and vulnerability are more likely to not carry out action planning (p < 0.05).

It was also observed that the OHTs from municipalities with a very low Social Prosperity Index were more likely not to carry out action planning, when compared to municipalities with a very high Social Prosperity Index (p < 0.05).
| Variable                                                                 | Category                          | Model 1                     | Model 2                     | Model 3                     | Model 4                     |
|-------------------------------------------------------------------------|-----------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|                                                                         |                                   | Oral health Teams           | Municipal management in PHC | Municipal Indicators         | Final                       |
|                                                                         |                                   | adjusted OR (95%CI)          | adjusted OR (95%CI)          | adjusted OR (95%CI)          | adjusted OR (95%CI)          |
|                                                                         |                                   | p-value                      | p-value                      | p-value                      | p-value                      |
| Oral Health Teams                                                       | Yes                               | Ref                          | Ref                          | Ref                          | Ref                          |
|                                                                         |                                   |                              |                              |                              |                              |
| The OHT participates in meetings together with PHC teams                 | Yes                               | Ref                          | Ref                          | Ref                          | Ref                          |
|                                                                         | No                                | 3.75 (3.43–4.10)             | < 0.0001                     | 3.75 (3.42–4.10)             | < 0.0001                     |
| The OHT discusses cases and therapeutic projects                         | Yes                               | Ref                          | Ref                          | Ref                          | Ref                          |
|                                                                         | No                                | 3.74 (3.46–4.05)             | < 0.0001                     | 3.74 (3.46–4.05)             | < 0.0001                     |
| The OHT performs self-assessment process                                | Yes                               | Ref                          | Ref                          | Ref                          | Ref                          |
|                                                                         | No                                | 1.91 (1.76–2.07)             | < 0.0001                     | 1.92 (1.77–2.08)             | < 0.0001                     |
| The OHT performs actions articulated with other social facilities in the territory | Yes                               | Ref                          | Ref                          | Ref                          | Ref                          |
|                                                                         | No                                | 1.70 (1.52–1.91)             | < 0.0001                     | 1.70 (1.52–1.91)             | < 0.0001                     |
| The OHT carries out embracement together with the PHC teams             | Yes                               | Ref                          | Ref                          | Ref                          | Ref                          |
|                                                                         | No                                | 1.66 (1.52–1.83)             | < 0.0001                     | 1.66 (1.52–1.83)             | < 0.0001                     |
| OHT professionals who perform the embracement were trained to assess and classify users’ risk and vulnerability | Yes                               | Ref                          | Ref                          | Ref                          | Ref                          |
|                                                                         | No                                | 1.32 (1.20–1.45)             | < 0.0001                     | 1.32 (1.21–1.45)             | < 0.0001                     |
| Municipal management in Primary Health Care                              | Yes                               | Ref                          | Ref                          | Ref                          | Ref                          |
|                                                                         | No                                | 1.22 (1.10–1.36)             | 0.0002                       |                              |                              |
| Defines the number of patients under the responsibility of the primary health care team based on risk and vulnerability criteria | Yes                               | Ref                          | Ref                          | Ref                          | Ref                          |
|                                                                         | No                                | 1.16 (1.06–1.29)             | 0.0024                       |                              |                              |
| Defines Permanent Health Education at the municipal level that includes primary health care | Yes                               | Ref                          | Ref                          | Ref                          | Ref                          |
|                                                                         | No                                |                              |                              |                              |                              |
| Defines Permanent Education actions based on the demands of professionals/teams | Always                            | Ref                          |                              |                              |                              |

Ref: Reference category for independent variables. #Median of the sample. OR: Odds ratio. CI: Confidence Interval. Variance between municipalities = 0.323; Residual variance = 0.6594; ICC: Intraclass correlation coefficient (Part of the total variation that is due to the contextual level - Municipalities) = 0.3290. QIC (empty model) = 28,244.86. OHT: Oral Health Team. PHC: Primary Health Care.
| Variable                                                                 | Category                                      | Model 1          | Model 2          | Model 3          | Model 4          |
|------------------------------------------------------------------------|-----------------------------------------------|------------------|------------------|------------------|------------------|
|                                                                       | Adjusted OR (95% CI)                         | Adjusted OR (95% CI) | p-value          | Adjusted OR (95% CI) | p-value          |
| Oral health Teams                                                     |                                               |                   |                  |                   |                  |
|                                                                       | Occasionally                                 | 1.13 (1.01–1.26)  | 0.0295           |                   |                  |
|                                                                       | Rarely                                       | 1.54 (1.32–1.79)  | < 0.0001         |                   |                  |
| Municipal management in PHC                                          |                                               |                   |                  |                   |                  |
|                                                                       | Occasionally                                 | 0.84 (0.73–0.97)  | 0.0161           |                   |                  |
|                                                                       | Rarely                                       | 1.13 (0.99–1.29)  | 0.0725           |                   |                  |
| Municipal indicators                                                  |                                               |                   |                  |                   |                  |
| Social Prosperity                                                     | Very low                                     | 1.33 (1.17–1.51)  | < 0.0001         | 1.19 (1.06–1.34)  | 0.0038           |
|                                                                       | Low                                          | 1.03 (0.89–1.19)  | 0.6737           | 0.91 (0.80–1.04)  | 0.1811           |
|                                                                       | Medium                                       | 0.98 (0.84–1.12)  | 0.7340           | 0.85 (0.74–0.98)  | 0.0214           |
|                                                                       | High                                         | 1.05 (0.90–1.23)  | 0.5389           | 0.91 (0.78–1.06)  | 0.2376           |
|                                                                       | Very high                                    | Ref               |                  | Ref               |                  |
| Gini index                                                            | ≤0.51                                        | 1.14 (1.04–1.26)  | 0.0051           |                  |                  |
|                                                                       | >0.51                                        | Ref               |                  |                  |                  |
| QIC (quasi-likelihood information criterion)                          |                                               | 21,076.34        | 27,599.40        | 28,155.67        | 21,051.65        |

Ref: Reference category for independent variables. #Median of the sample. OR: Odds ratio. CI: Confidence Interval. Variance between municipalities = 0.3233; Residual variance = 0.6594; ICC: Intraclass correlation coefficient (Part of the total variation that is due to the contextual level - Municipalities) = 0.3290. QIC (empty model) = 28,244.86. OHT: Oral Health Team. PHC: Primary Health Care.

**Discussion**

The study results indicate the relevance of the characteristics of the work processes, the fulfilment of the scope of practices inherent to PHC and the extreme territory social vulnerabilities regarding the failure to carry out planning by the OHTs. This becomes critical, given
the importance of effective participation and position of the several social actors at different moments of planning aiming to respond to the real health needs of the population, structuring it in such a way that can contribute to solving the health problems and improving the health level of the population [23]. Thus, planning in SUS starts with the acknowledgment of the dynamics present in the territory that influence health, as well as the health needs of the population of the municipalities [24].

Hence, the analysis of the health situation primarily involves adequate and detailed knowledge of the population’s living conditions. These are the needs that guide the creation of guidelines, objectives, goals and indicators identified as essential to increase the citizens’ quality of life and fully guarantee their citizenship rights [24].

Although most OHTs are complying with the guidelines proposed by the National Oral Health Policy, which establishes that dental actions and services must result from an adequate knowledge of the population’s health reality, aiming to construct a truly effective practice [25], approximately one third of this sample does not do it.

Our results demonstrate that the fulfillment of the attributions predicted by the OHT in PHC is significantly related to the intrinsic constitutive and operational issues of these teams when compared to the variables related to municipal management and socioeconomic indicators. In this sense, these results may reflect the importance of the health professionals’ profile among those who work at the PHC level and fulfills the need to analyze the policy and governance environment, as well as the mechanisms aimed at the development and implementation of policies for professional training in health [2].

This is supported by legislation, which has been present since the proposal and implementation of SUS, with the constitutional provision that it is the responsibility of SUS, in addition to other attributions, to order the training of human resources in the health area [26].

Moreover, our results are reinforced by those of another study that demonstrated that the provision of dental care for children up to five years of age, at the PHC level, is associated with teamwork organization, planning actions and the dental surgeon’s characteristics [27].

The OHTs that did not hold meetings together with the PHC teams, did not discuss cases and therapeutic projects, and did not practice embrace together with the PHC teams, are more likely to not plan their health actions. These three variables are directly related to teamwork, which requires constant attention to interprofessional teamwork, aiming at the integration of all involved in health services [28].

For effective planning to actually take place, which contributes to increase the impact of primary health care actions, it is important the presence of integrated work, an attitude of sharing responsibilities, that is, the commitment of professionals in systematic actions with role definition [23]. The facing of this challenge involves the need for changes in professional training to reorient the care model and promote the organization of work in interprofessional teams, aiming to guarantee universal and integral care in SUS [29].

In this regard, it should be noted that the traditional training still persists in Dentistry, as a rule, which does not promote the learning of teamwork, and does not promote training aimed at SUS and the real health needs of the population [30]. Even though these topics are present in the National Curriculum Guidelines for Dentistry courses [31], the practice field is focused on a Flexnerian, technicist, biologicist model of teaching-learning process, disconnected from the reality of the territories in Brazil.

These training limitations could be overcome through investments in the consolidation and expansion of teaching-learning strategies based on the principles of Teaching-Service-Community Integration (IESC, Integração Ensino-Serviço-Comunidade). That way, it would provide students with opportunities to learn in different scenarios and with different actors represented by SUS, individuals, communities and adjoined territories, reorienting the training towards the development of skills and abilities that are essential to health actions in a broad sense and within the context in which students, teachers, health professionals and the community build their experiences [30].

Consequently, and also as a possibility of generating IESC strategies, the concept of Interprofessional Education (IPE) is presented. It promotes the improvement in knowledge, skills and attitudes and emphasizes the collaborative practice in working relationships between two or more health professions. Ideally, IPE should start at the undergraduate level, with students learning about and from the different areas of knowledge, promoting an understanding of the value and importance of other professions [32].

But IPE also has the potential to provide learning for professionals already working in the services and who have not had this opportunity of skill development before. It is understood, therefore, that IPE can help PHC professionals in their approach to resolve
complex issues with patients, in addition to increasing their ability to use other resources [32, 33].

The planning and organizing of health actions do not refer solely to everyday actions, such as assistance or administrative ones. It involves the possibility of building group processes, a project of collective interest and raises people's health awareness, facilitating the political mobilization of those interested in health issues [27, 34–36]. It is during routine work that the identified problem situations emerge, which must be debated, also being the responsibility of the entire team [23].

Considering that oral health, particularly in the context of primary health care and health surveillance, must deal with daily difficulties and find effective solutions to solve these challenges [27], IPE can be a potential tool for these group processes to effectively function.

Although the variables of the municipal management in Primary Health Care did not remain significant in the final model, it is noteworthy that health service planning is influenced by regulatory, normative and cultural-cognitive forces of the broader institutional field [37]. Therefore, we consider that offering PHE that include primary health care at the municipal level and having representation in Teaching-Service Integration Commissions are relevant actions for the training and development of the necessary skills for professionals working in PHC.

This becomes relevant when we consider that, from an institutional point of view, the management and work processes in health are influenced by micro and macro-political issues that direct the ways of providing health care in daily life, which may reflect instructions for the operationalization and implementation of PHE actions and the development of productive meetings for the consolidation of the IESC guidelines.

Our results also showed that the Teams that did not carry out actions in conjunction with other social facilities in the territory are more likely to not carry out action planning. According to SUS regulations, it is understood that PHC should promote comprehensive, continuous and organized care for the registered population. For this purpose, it is acknowledged that many of the causes of illness are outside the Health Unit, which makes it necessary to carry out health care actions in places inside the territory, such as community halls, schools, day care centers, squares, etc. [38].

Therefore, there is an even greater challenge than teamwork, because to work with other social facilities in the territory, the professional must have the ability to communicate, demonstrate empathy and be sensitive to cultural differences [2]. Furthermore, in view of this finding, one verifies the fragility of intersectorality, implying limitations to oral health promotion and the scope of potentially relevant actions for the territories. With that, the distance between the OHT and the community/users is increased, which leads us to infer that the quality and magnitude of the adequate response of the service to the user's demands and expectations is possibly compromised.

In turn, the teams that do not use protocols/criteria for the embracement conduct and of which professionals who perform the embracement were not previously trained also have a greater chance of not performing the planning of actions. Embracement must be present in all care relationships, in meetings between health workers and users, in the actions of welcoming and listening to people, their needs, problematizing and recognizing them as legitimate, and carrying out a risk and vulnerability assessment of the families in that territory, recalling that the greater the degree of vulnerability and risk, the smaller the number of people should be per team [38]. The fact that the teams have not been trained to carry out the embracement as recommended may explain why teams from municipalities with a very low Social Prosperity Index are less likely to carry out action planning, when compared to municipalities with a very high index.

Finally, we observed that OHTs that did not undergo a self-assessment process are more likely to not carry out activities for action planning. From a relational perspective among health workers, self-assessment actions have the power to promote meetings that encourage the development of critical-reflective skills. These can interfere with the reorientations required for individual behaviour patterns, increased collaborative activities, development of interprofessional work and user embracement, aiming to optimize the work process [39].

When evaluating the factors associated with the non-performance of planning by the OHTs working in Primary Health Care, this study aims to bring a contribution to oral health management, as the knowledge of this type of finding can be used as an operationalization marker of optimization actions of the OHT work process in PHC. In brief, our findings showed that, indirectly, teams that are less skilled in teamwork, communication, embracement and self-assessment were more likely not to plan their actions. Therefore, it is understood that managers can direct efforts in the organization of OHTs, so they can acquire the necessary knowledge to work as recommended by the National Oral Health Policy. The planning will allow these teams to identify and reach the most vulnerable populations, contributing to the improvement of oral health indicators in Brazil.
The main limitation of this study is that the causal relationship cannot be inferred, as this is a cross-sectional study. However, the analysis allowed us to identify the factors with the greatest magnitude of effect size on the outcome and that deserve a more detailed investigation using other study designs. In turn, the strengths of this investigation are its sample size and distribution, which included teams from the entire national territory of a country known for its continental dimensions.

**Conclusion**

We conclude that the complicating predictors of action planning by the OHTs were mainly the characteristics inherent to the work process of the OHTs, mainly the failure to hold meetings together with the Primary Health Care Team, carry out case and therapeutic project discussions, self-assessment, as well as embracement protocols.

**Abbreviations**

- AMAQ: Self-Assessment for Improving Access and Quality of Primary Care
- AMQ: Quality Improvement Assessment
- ERI: Education and Research Institutions
- IPE: Interprofessional Education
- OHT: Oral Health Team
- PHC: Primary Health Care
- PHE: Permanent Health Education
- PMAQ-AB: National Program to Improve Access and Quality of Primary Care
- PNSB: National Oral Health Policy

**Declarations**

**Ethics approval and consent to participate**

The project was approved by an Ethics Committee for Research with Human Beings (CAAE 80477417.0.0000.0021). The microdata were obtained through public and unrestricted access on June 25, 2019.

**Consent for publication**

Not applicable.

**Availability of data and materials**

Datasets used and analysed during the current study are available from the corresponding author upon reasonable request.

**Competing interests**

The authors declare that they have no competing interests.

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**Authors' contributions**
LFP: Contributed to the study concept, design, acquisition and interpretation of data for the research and drafting of the manuscript. EAM: Contributed to the study conception, design and drafting of the manuscript. EPST: Contributed to the study concept, design, and critically revised the manuscript. ADDC: Contributed to the study concept, design, and critically revised the manuscript. ACP: Contributed to the study concept, design, and critically revised the manuscript.

All of the authors approved the final version of the manuscript to be published and agree to be accountable for all aspects of the research by ensuring that questions related to the accuracy or integrity of any part of the research are appropriately investigated and resolved.

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