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Reporting toothache in primary health care: rate and associated factors in municipalities of Bahia between 2015 and 2024

Notificação da dor de dente na atenção primária à saúde: taxa e fatores associados em municípios baianos entre 2015 e 2024

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ABSTRACT

BACKGROUND AND OBJECTIVES: Primary Health Care (PHC), as a coordinator of care within the Health Care Network, should use indicators such as toothache for oral health planning. The aim of the study was to analyze the rates of toothache notification in primary health care and the associated contextual factors in municipalities of Bahia over 10 years (2015-2024).

METHODS: The time series used data from the 417 municipalities of Bahia extracted from the Health Information System for Primary Care (SISAB - *Sistema de Informação em Saúde para a Atenção Básica*), the Institute for Applied Economic Research (IPEA - *Instituto de Pesquisa Econômica Aplicada*), the Brazilian Institute of Geography and Statistics (IBGE - *Instituto Brasileiro de Geografia e Estatística*), and the e-Gestor for Primary Health Care (*e-Gestor Atenção Primária à Saúde*). The occurrence, annual rate, and Annual Percent Change (APC) were calculated, comparison was performed using the Mann-Whitney test, and temporal trend analysis utilized generalized linear regression of Prais-Winsten (p<0.05).

RESULTS: Over 10 years, 3,778,971 toothache notifications were recorded, with the lowest median rate in 2015 (4.4 per 1,000 inhabitants/year) and the highest in 2022 (39.0 per 1,000 inhabitants/year). The highest medians were found in municipalities with smaller population sizes, higher human development, and greater oral health coverage in Primary Health Care (p<0.05). The mean APC was 17.5% (95% CI: 4.7%-28.8%), showing an upward trend in the general model and in all classes of contextual factors (p<0.05).

CONCLUSION: The toothache notification rate in PHC showed an upward trend in the municipalities of Bahia. The highest toothache rates were found in municipalities with smaller population sizes, higher human development, and greater oral health coverage in PHC.

KEYWORDS: Public health surveillance, Primary Health Care, Toothache.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A Atenção Primária à Saúde (APS) como coordenadora do cuidado da Rede de Atenção à Saúde, deve utilizar indicadores, como dor de dente, para planejamento em saúde bucal. O objetivo deste estudo foi analisar as taxas de notificação de dor de dente na APS e os fatores contextuais associados aos municípios baianos ao longo de 10 anos (2015-2024).

MÉTODOS: A série temporal utilizou dados dos 417 municípios baianos extraídos do Sistema de Informação em Saúde para a Atenção Básica, Instituto de Pesquisa Econômica Aplicada, Instituto Brasileiro de Geografia e Estatística e e-Gestor Atenção Primária à Saúde. Houve cálculo da ocorrência, taxa anual e Variação Percentual Anual (VPA), comparação pelo teste de Mann Whitney e tendência temporal pela regressão linear generalizada de *Prais-Winsten* (p<0,05).

RESULTADOS: Em 10 anos foram registradas 3.778.971 notificações de dor de dente, com menor mediana da taxa em 2015 (4,4 por 1.000 hab./ano) e maior em 2022 (39,0 por 1.000 hab./ano). As maiores medianas foram encontradas nos municípios com menor porte populacional, maior desenvolvimento humano e maior cobertura de saúde bucal na Atenção Primária à Saúde (p<0,05). A VPA média foi de 17,5% (IC95%:4,7%-28,8%), com tendência crescente no modelo geral e em todas as classes dos fatores contextuais (p<0,05).

CONCLUSÃO: A taxa de notificação na APS de dor de dente teve tendência crescente nos municípios baianos. As maiores taxas de dor de dente foram encontradas nos municípios com menor porte, maior desenvolvimento humano e maior cobertura de saúde bucal na APS.

DESCRITORES: Atenção Primária à Saúde, Odontalgia, Vigilância em saúde pública.

HIGHLIGHTS

- There was a high annual rate of toothache reports in Primary Health Care among municipalities in Bahia during the period evaluated (2015-2024)
- The annual rate of toothache reports increase over the 10-year period
- There were clear differences in the rate of reports of toothache among municipalities in Bahia, associated with contextual factors, with higher rates in smaller municipalities, with greater development index, and with greater oral health coverage in PHC

INTRODUCTION

Toothache, originating from the innervated tissues of the tooth or its adjacent structures[1], is among the most prevalent symptoms in dental practice[2]. Its intensity negatively affects individuals' daily activities and, consequently, society[3].

The global prevalence of toothache in adults is 24.0%, with wide disparities between continents, with the highest prevalence in Africa (43.2%) and the lowest in North America (13.4)[4]. In Brazil, in 2023, the prevalence of toothache in the last 6 months was 20% among children aged 5 years old and 17% among children aged 12 years old, 20% among adolescents (15 to 19 years), 23% among adults (35 to 44 years old), and 11% among older adults (65 to 74 years old), with wide disparities between different Brazilian areas and states[5]. This highlights the magnitude and relevance of this condition, especially for public health[3].

Painful symptoms are associated with delayed seeking of dental care[6], mainly due to the clinical progression of major oral diseases, such as: dental caries (tooth decay) and periodontal disease[7,8], or other problems, such as dental trauma[9]. This aspect may reflect, in part, a weakness in the service, whether in promotion and prevention or in delayed care for injury recovery, in a historical context of exclusionary and mutilating care models[6].

In Brazil, the scenario began to change with the implementation of its Unified Health System (SUS - *Sistema Único de Saúde*). SUS is a universal and free health system that presents, in its organizational structure, PHC (APS - *Atenção Primária à Saúde*), as the main entrance, that is, the user's first contact for comprehensive and longitudinal care[10]. APS is a healthcare model with assigned areas that offers health services through multidisciplinary teams. SUS works from the perspective of a sanitary health care model, i.e., based on health surveillance[11].

In 2001, the Brazilian public health care system reached an important milestone with the possibility of including oral health teams (eSB - *equipes de saúde bucal*) in PHC through the Family Health Strategy (ESF - *Estratégia de Saúde da Família*)[12]. In 2004, one of the main objectives of the implementation of the National Oral Health Policy (PNSB - *Política Nacional de Saúde Bucal*) was to expand eSB in APS, in addition to including oral health at the secondary and tertiary levels[13]. One of the PNSB guidelines was the reorganization and reorientation of oral health care model towards health promotion and improvement of quality of life, in line with the principles of SUS[12]. Furthermore, one of the assumptions of the PNSB regards the production and dissemination of epidemiological information on the health-disease conditions of the population to support the planning of oral health actions[14].

From this perspective, it is important to include health surveillance, which is currently understood in Brazil as a structural component for managing SUS practices[15]. In 2013, in an attempt to minimize the fragmentation of different health information systems, Brazil adopted the Health Information System for Primary Care (SISAB - *Sistema de Informação em Saúde para a Atenção Básica*) with the purpose of providing essential information for the funding of health services and adherence to the programs and strategies of the National Primary Care Policy (PNAB - *Política Nacional de Atenção Básica*), whose system management is carried out through the strategy called e-SUS Primary Care (e-SUS *Atenção Básica*), under the supervision of the Department of Primary Care (*Departamento de Atenção Básica*)[16]. The requirement to fill in information for the SISAB database only came into effect in 2016, through Ordinance GM/MS No. 1.113, of July 31, 2015[17].

In practical terms, secondary data from health services are used as oral health indicators in SISAB and can be essential tools for the management of health services, as they can summarize and organize disordered information from various sources[16]. However, the mandatory nature of SISAB does not guarantee the completion and reporting of oral health surveillance indicators. Therefore, identifying the occurrence of dental pain and associated contextual factors in municipalities in the state of Bahia is essential for the development of more efficient planning of oral health services offered there. In this sense, the present study's objective was to analyze the rates of notification of toothache in PHC and the contextual factors associated with the municipalities in Bahia over the course of 10 years (2015-2024).

METHODS

This research is an ecological, time series study conducted using secondary data provided by the Brazilian Ministry of Health in the Health Information System for Primary Care (SISAB)[18], the Department of Information and Informatics of the Unified Health System (Datasus - *Departamento de Informação e Informática do Sistema Único de Saúde*)[19,20], Instituto Brasileiro de Geografia e Estatística[21], and Instituto de Pesquisa Econômica Aplicada[22,23].

Ethical aspects

The present study used secondary data from public domain, thus it did not require a review by the Research Ethics Committee.

Study location

Bahia, a state located in northeastern Brazil, is the region with the highest coverage of oral health in primary health care in the country (70%)[24]. The state has 417 municipalities and, in 2024, its estimated population was 14,141,626 inhabitants[25].

Bahia is the largest state in the Northeast in terms of area, covering 564,760.427 km^2. The state ranks very poorly in terms of extreme poverty, with the fourth highest rate in Brazil, as 11.9% of the population lives in this situation. Bahia also does not fare well in terms of schooling, ranking among the ten worst states in the country. These factors are highly relevant when assessing the oral health of the population and may influence the rate of toothache[25]. In terms of the Municipal Human Development Index (IDH - *Índice de Desenvolvimento Humano Municipal*), the state ranks 22nd in the national ranking, with an IDH-M of 0.69125. It stands out with 82.4% coverage of Primary Health Care[20].

Data extraction source

Data extraction was performed by two researchers between March and April 2025. For the variable toothache, the absolute

number of annual cases reported (January to December) between 2015 and 2024 was extracted from the 417 municipalities in Bahia from the SISAB website[18]. Although the database contains data from July 2013 onwards, the year 2013 was disregarded because it did not present complete annual data, and the year 2014 was disregarded due to the high number of municipalities with missing data.

The absolute number of the municipal population according to the 2022 and 2023 Census, and the estimated population for the years 2015 to 2021 and 2024, were extracted from the IBGE website[21]. The IDH-M (2010) and the Social Vulnerability Index (IVS - *Índice de Vulnerabilidade Social*) (2010) were extracted from the IPEA website[22,23]. These years were used because they are the most up-to-date data at the municipal level.

Income inequality data were extracted from Datasus using the Gini Index of per capita household income[19]. The most current data available on Oral Health Coverage in Primary Health Care (%) (2021) were extracted from the e-Gestor for Primary Health Care website[20].

Variables

The dependent variable in the study was the annual municipal rate of cases of toothache reported in PHC, obtained using the annual rate, which was calculated as follows (Equation 1):

$$Annual\ rate = \left[\begin{array}{c} absolute\ value\ of \\ annual\ production \div \\ population\ (annual) \times \\ constant\ (x1{,}000) \end{array} \right] \quad (1)$$

The constant was defined by obtaining a reference rate expressed as an integer.

The independent variables were: Population Size, which was dichotomized into smaller (<25,000 inhabitants) or larger (medium/large) (≥25,000 inhabitants)[26].

Development Index, measured using the IDH-M, was dichotomized into lower development (low and very low) (<0.600) or higher development (high and medium) (≥0.600). No municipalities with a very high IDH-M were identified.

Social Vulnerability was dichotomized into greater vulnerability (very high and high) (≥0.401) or lower vulnerability (low, medium) (<0.401). No municipalities were classified as having very low vulnerability.

Income Inequality was dichotomized into greater inequality (high and extreme) (≥0.500) or lesser inequality (considerable) (<0.500). There were no municipalities with total equality, low inequality, or moderate inequality.

Oral Health Coverage in PHC was measured by the proportion of the municipal population covered by oral health services in PHC, and was dichotomized according to the World Health Organization (WHO) target set out in the Bangkok Declaration[27], into lower coverage (<80.0%) or higher coverage (≥80.0%).

Data analysis

The raw data extracted were organized by municipality in Excel spreadsheets (Microsoft). For data analysis, the Statistical Package for the Social Sciences (IBM SPSS, Chicago), version 20.0, was used. A descriptive analysis with absolute frequencies (n) was performed.

Initially, the Kolmogorov-Smirnov normality test ($p<0.05$) was performed, and none of the annual means followed a normal distribution. Therefore, the comparison of municipal annual medians and contextual factors was performed by year using the Mann Whitney test ($p<0.05$).

For temporal analysis, generalized linear regression was used by the Prais-Winsten method[28] in the Stata 13.0 software. Serial autocorrelation analysis to assess the dependence of a serial measure on its own values at previous moments (autocorrelation) was evaluated using the Durbin-Watson test, ranging from 0 (maximum positive autocorrelation) to 4 (maximum negative autocorrelation), with values close to 2 indicating the absence of serial autocorrelation[29].

The annual percentage change (APC) and Confidence Interval (95% CI)[30] were calculated as follows (Equations 2 and 3):

$$APC\ (\%) = \left[-1+10^{b1}\right]*100 \quad (2)$$

$$\begin{aligned} CI\,(95\%)min &= \left[-1+10^{b1min}\right]*100; \\ CI\ (95\%)max &= \left[-1+10^{b1max}\right]*100 \end{aligned} \quad (3)$$

*b1 = Trend estimator coefficient; Max = maximum; Min = minimum.

RESULTS

Between 2015 and 2024, it was identified that most municipalities in Bahia have: smaller Population Size (70.3%), lower Development Index (63.1%), greater Social Vulnerability (79.8%), greater Income Inequality (75.0%), and Greater Oral Health Coverage in Primary Health Care (78.4%) (Table 1).

Between 2015 and 2024, 3,778,971 notifications of toothache were recorded in PHC among municipalities in Bahia, with the lowest median rate in 2015 (4.4 per 1,000 inhabitants/year) and the highest in 2022 (39.0 per 1,000 inhabitants/year) (Figure 1).

The highest median rates occurred in municipalities with smaller populations, higher development indices, lower social vulnerability, greater income inequality, and greater oral health coverage in PHC (Figure 2).

Regarding the rates of notification of toothache in PHC, the highest medians were found in municipalities in Bahia with smaller populations (2016 to 2024), higher Development Index (2016 to 2019), and greater Oral Health Coverage in PHC (2016 to 2024) ($p<0.05$). There was no statistical difference for Social Vulnerability and Income Inequality ($p>0.05$) (Table 1).

The rates of toothache reports in PHC showed a increase trend over the ten-year period (2015-2024), including for all classes of contextual factors analyzed ($p<0.05$), and did not present autocorrelation (DW>1.5). The annual percentage change (APC) in rates was 17.5% (95% CI: 4.7%-28.8%) per year, ranging from 14.8% to 17.5% for the classes of contextual factors analyzed (Table 2).

Table 1. Characteristics of municipalities in Bahia and distribution of the median (Md) and interquartile range (IQR) of the annual rate of reported cases of toothache in Primary Health Care according to contextual factors, Bahia, Brazil, 2014-2024 (n=417).

Variables	Annual Rate of Toothache among Municipalities in Bahia									
	2015 Md (IQR)	2016 Md (IQR)	2017 Md (IQR)	2018 Md (IQR)	2019 Md (IQR)	2020 Md (IQR)	2021 Md (IQR)	2022 Md (IQR)	2023 Md (IQR)	2024 Md (IQR)
Population Size										
Smaller (n=293)	4.5 (18.4)	12.8 (25.2)	26.4 (34.0)	33.0 (48.1)	30.9 (46.9)	23.3 (35.8)	44.5 (53.1)	47.6 (52.7)	41.5 (50.6)	39.7 (45.5)
Larger (n=124)	3.6 (9.8)	9.0 (17.8)	15.1 (25.0)	20.5 (28.5)	22.1 (29.8)	15.2 (20.6)	22.0 (31.0)	29.0 (29.3)	27.8 (34.6)	25.4 (28.4)
p-value*	0.069	**0.020**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Development Index										
Lower (n=263)	4.3 (14.0)	10.8 (19.6)	21.4 (29.6)	26.2 (40.6)	27.1 (42.4)	20.1 (32.3)	36.2 (45.6)	35.6 (45.0)	36.6 (44.8)	31.3 (38.4)
Higher (n=154)	4.7 (17.3)	14.7 (28.9)	25.0 (31.0)	30.5 (41.9)	30.9 (46.2)	20.4 (33.5)	39.4 (49.6)	42.4 (42.4)	40.8 (44.1)	37.2 (40.0)
p-value*	0.278	**0.014**	**0.055**	**0.035**	**0.037**	0.788	0.204	0.157	0.094	0.063
Social Vulnerability										
Greater (n=333)	4.3 (14.1)	11.1 (21.6)	22.7 (31.3)	26.9 (42.4)	27.3 (42.1)	19.9 (30.6)	36.3 (48.1)	38.5 (44.7)	37.9 (43.3)	33.1 (38.4)
Lower (n=84)	4.9 (19.5)	15.8 (28.1)	22.6 (24.3)	29.8 (40.4)	30.9 (45.2)	23.8 (38.1)	39.4 (43.4)	39.3 (39.1)	37.0 (45.2)	36.2 (42.3)
p-value*	0.356	0.022	0.576	0.388	0.472	0.139	0.470	0.748	0.918	0.619
Income Inequality										
Greater (n=313)	4.5 (15.1)	11.1 (22.8)	22.5 (32.8)	28.4 (43.8)	27.6 (41.2)	20.1 (33.8)	37.3 (44.8)	41.1 (44.6)	37.9 (41.4)	34.2 (35.8)
Lesser (n=104)	4.2 (15.1)	13.6 (24.8)	24.1 (24.0)	28.8 (38.6)	28.6 (45.3)	20.7 (28.4)	36.2 (52.0)	32.6 (40.1)	37.0 (48.5)	31.2 (46.3)
p-value*	0.785	0.262	0.894	0.456	0.804	0.387	0.768	0.124	0.517	0.377
Oral Health Coverage in Primary Health Care										
Greater (n=327)	4.5 (15.1)	12.8 (23.3)	26.0 (29.8)	31.8 (42.9)	48.2 (70.2)	22.5 (34.9)	41.1 (46.8)	44.4 (45.7)	39.7 (41.6)	36.4 (40.1)
Lower (n=90)	3.2 (13.7)	6.6 (23.3)	10.8 (22.9)	14.2 (28.3)	12.1 (22.0)	9.0 (22.6)	19.2 (36.8)	28.2 (32.4)	27.6 (38.7)	26.4 (35.2)
p-value*	0.275	**0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0.001**	**0.009**
Global Rate	**4.4 (15.1)**	**11.6 (23.6)**	**22.7 (29.9)**	**28.7 (42.0)**	**27.8 (42.7)**	**20.2 (32.6)**	**36.6 (47.7)**	**39.0 (44.2)**	**37.9 (43.2)**	**33.2 (38.6)**

*Mann-Whitney test (p<0,05); Md = Median; IQR = Interquartile Range; Source: Ministry of Health (2024), IBGE (2015-2024), IPEA (2010), Datasus (2010), e-Gestor APS (2021); Population Size: smaller (<25,000 inhabitants) or larger (≥25,000 inhabitants); Index Development: lower (IDH<0.600) or higher (high and medium) (IDH ≥0.600); Social Vulnerability: greater (IVS≥0.401) or lower (IVS <0.401); Income Inequality: greater (Gini≥0.500) or lesser (Gini<0.500); Oral Health Coverage in PHC: lower (<80.0%) or greater (≥ 80.0%).

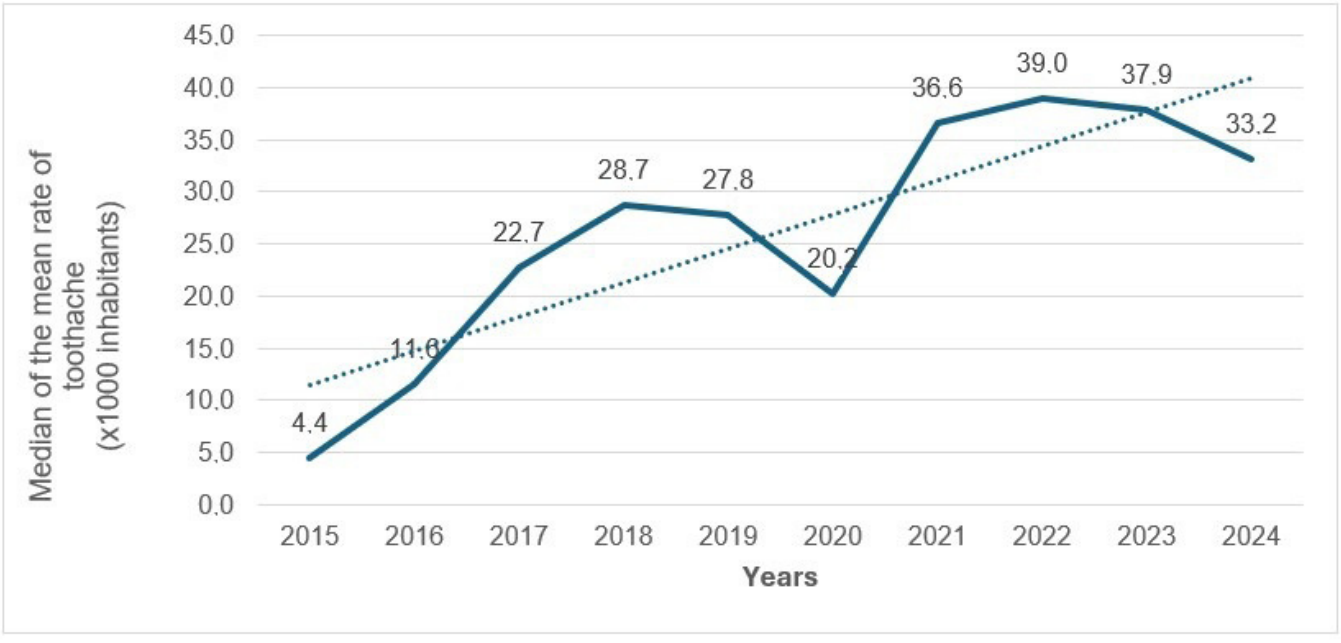
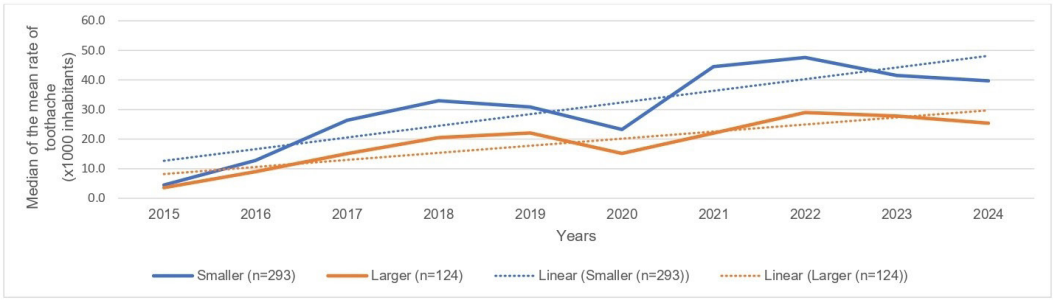
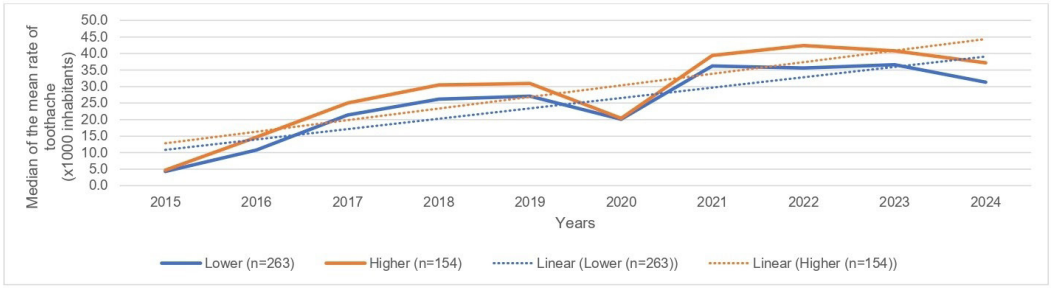


Figure 1. Temporal trend in median rates of toothache notifications in Primary Health Care among municipalities in Bahia. Bahia, Brazil, 2015–2024.
Source: Brazilian Ministry of Health (2024), IBGE (2015-2024).



(a)



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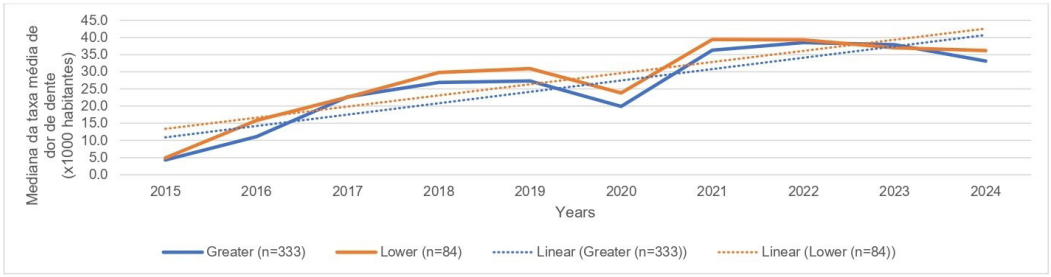

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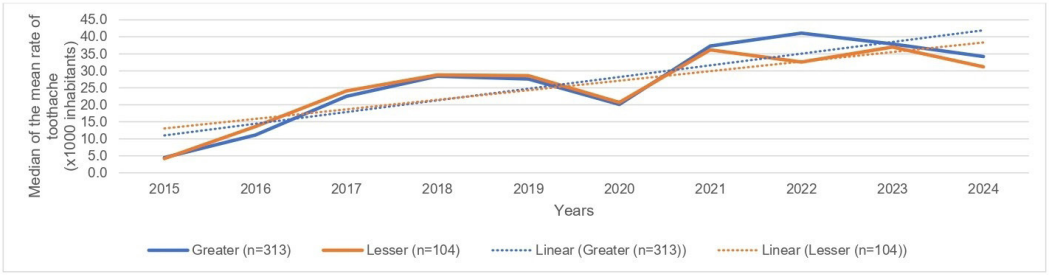

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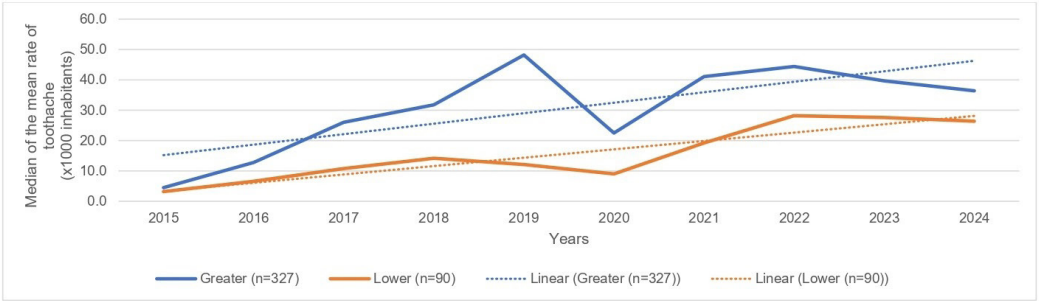

(e)

Figure 2. Temporal trend of median rates of toothache notification in Primary Health Care according to (A) Population Size, (B) Development Index, (C) Social Vulnerability Index, (D) Income Inequality, and (E) Oral Health Coverage in Primary Health Care. Bahia, Brazil, 2015-2024.
Source: Brazilian Ministry of Health (2024), IBGE (2015-2024), IPEA (2010), Datasus (2010), e-Gestor Primary Health Care (2021). Population size: smaller (<25,000 inhabitants) or larger (≥25,000 inhabitants). Development Index: lower (IDH<0.600) or higher (high and medium) (IDH ≥0.600). Social Vulnerability Index: greater (IVS≥0.401) or lower (IVS <0.401). Income Inequality: greater (Gini ≥0.500) or lesser (Gini <0.500). Oral Health Coverage: lower (<80.0%) or greater (≥ 80.0%).

Table 2. Annual variation in the rate of toothache notifications in Primary Health Care according to municipal contextual factors. Bahia, Brazil, 2015-2024 (n=417).

Prevalence rate	Coefficient (95% CI)*	APC (%) (95% CI)**	p-value	Trend	DW***
Population Size					
Smaller (n=293)	0.07 (0.02 – 0.12)	17.5 (4.7 – 31.8)	**0.014**	↑ increase	1.8
Larger (n=124)	0.06 (0.01 – 0.11)	14.8 (2.3 – 28.8)	**0.016**	↑ increase	1.7
Development Index					
Lower (n=263)	0.07 (0.02 – 0.11)	17.5 (4.7 – 28.8)	**0.012**	↑ increase	1.8
Higher (n=154)	0.06 (0.02 – 0.11)	14.8 (4.7 – 28.8)	**0.013**	↑ increase	1.8
Social Vulnerability					
Greater (n=333)	0.07 (0.02 – 0.11)	17.5 (4.7 – 28.8)	**0.013**	↑ increase	1.8
Lower (n=84)	0.06 (0.02 – 0.10)	14.8 (4.7 – 25.9)	**0.009**	↑ increase	1.8
Income Inequality					
Greater (n=313)	0.07 (0.02 – 0.12)	17.5 (4.7 – 31.8)	**0.014**	↑ increase	1.8
Lesser (n=104)	0.06 (0.01 – 0.11)	14.8 (2.3 – 28.8)	**0.016**	↑ increase	1.8
Oral Health Coverage in Primary Health Care					
Greater (n=327)	0.07 (0.01 – 0.12)	17.5 (2.3 – 31.8)	**0.021**	↑ increase	1.8
Lower (n=90)	0.06 (0.01 – 0.12)	14.8 (2.3 – 31.8)	**0.035**	↑ increase	1.5
Taxa Global	0.07 (0.02 – 0.11)	17.5 (4.7 – 28.8)	**0.014**	↑ increase	1.8

95% CI: 95% confidence interval; *Generalized linear regression, Prais-Winsten method (p<0.05); **Annual Percent Change (APC); ***Durbin-Watson test for final interaction (1.5>DW<2.5 – absence of autocorrelation); Source: Ministry of Health (2024), IBGE (2015-2024), IPEA (2010), Datasus (2010), e-Gestor APS (2021); Population Size: smaller (<25,000 inhabitants) or larger (≥25,000 inhabitants); Index Development: lower (IDH<0.600) or higher (high and medium) (IDH ≥0.600); Social Vulnerability: greater (IVS≥0.401) or lower (IVS <0.401); Income Inequality: greater (Gini≥0.500) or lesser (Gini<0.500); Oral Health Coverage in PHC: lower (<80.0%) or greater (≥ 80.0%).

DISCUSSION

The present study demonstrated a high rate of toothache reports in PHC among municipalities in Bahia, as well as an increase trend over the years evaluated. This finding contrasts with the reduction in the prevalence of toothache in the Brazilian population between the oral health epidemiological surveys conducted in 2010 and 2023 for children, adolescents, and adults[5,31]. This is likely due to the fact that most studies on the subject work with population and prevalence data[5,9,31] rather than secondary health service and rate data[16,32]. In a similar study conducted on toothache rates in PHC in Brazil, the temporal trend was increase between 2014 (rate = 2.63 per 1,000 inhabitants) and 2023 (rate = 35.81 per 1,000 inhabitants), with variation, with higher rates in the North and Northeast regions[32]. This aspect can be justified by the greater oral health coverage in PHC in the Northeast region, especially in Bahia[20], i.e., greater installed capacity to receive, treat, including dental emergencies, and report[20,32].

The increase in the reporting of toothache in PHC for municipalities in Bahia found in this study may reflect three main aspects: 1) increase coverage over time[24,33] through the expansion of the number of eSBs[34] that provide care and report cases; 2) improvement in the quality of the reporting system, in the mandatory nature of its completion and/or increase preparation of eSBs to perform reporting32, and 3) the design of the oral health work process in PHC still centered on welfare practices, both for professionals and users, with low incorporation and adherence to promotion and prevention actions, that is, without effective reorientation from the hegemonic model to a health care model13. Thus, the present study's data can serve as a basis for guiding outlining and decision-making in oral health at the local, state, regional, and national levels, since they are characteristic of other scenarios31.

The results herein should be analyzed with caution, as they reveal weaknesses that were not measured in the study, such as infrastructure and work processes. It is known that in the early years of the time series, many municipalities did not yet register reports due to the lack of mandatory completion of SISAB[3]. In addition, the data up to 2016 may have been impacted by the availability of technological resources and/or the internet for filling out the medical record, whether in a simplified system, such as Simplified Data Collection (CDS - *Coleta de Dados Simplificado*), or individualized, such as the Electronic Citizen Medical Record (PEC - *Prontuário Eletrônico do Cidadão*), and the form of training and/or preparation for report[32]. This historical context should be considered when interpreting the results of the present study, especially regarding the increase in rates or the upward trend in the time series from 2016 onwards. As well as a reduction in the rate in 2020, as a result of the COVID-19 pandemic, when, to mitigate the impacts, there was a suspension of elective services, removal of professionals and/or redeployment of professionals to the front line, among others[35].

The present study demonstrated a significant association between higher rates of toothache and some of the contextual factors evaluated. Smaller municipalities in Bahia had higher rates of toothache reported in PHC between 2016 and 2024. This aspect can be understood by the greater coverage, that is, greater provision of oral health services in PHC in municipalities with smaller populations, possibly because they have Full Primary Care Management and centrality of action at this level of care[36].

Larger municipalities have greater availability of specialized services, especially at the secondary level of oral health, because they have Full Management of the Municipal System (GPSM - *Gestão Plena do Sistema Municipal*)[37]. In this sense, future studies should analyze a possible weakness in the provision of emergency dental services in PHC in municipalities with GPSM, as this may impact the population that depends exclusively on SUS.

Other contextual factors measured in the study, such as social vulnerability and income inequality, were not associated over the period analyzed. However, higher rates of toothache reporting were associated with municipalities with higher human development between 2016 and 2019, but this association was not maintained from 2020 onwards. These data may demonstrate that during the COVID-19 pandemic and post-pandemic period, the rates of municipalities with lower development index, albeit belatedly, managed to approach those of municipalities with higher development index Therefore, a comprehension of the effectiveness of the principle of equity, since the system has sought to reduce disparities in access to services, but is still far from achieving ideal equality[38].

The municipalities with the highest proportion of oral health coverage in PHC between 2018 and 2024 had the highest rates of toothache reports, highlighting the association between availability of care and demand for services[32]. Bahia has stood out for its extensive oral health coverage in PHC[20], and this scenario can be explained by the high number of users who depend exclusively on SUS care in Bahia and the Northeast region[39]. Moreover, the National Health Survey shows that demand for public oral health services has been higher in this region, reflecting a consolidated pattern[40]. However, health surveillance must consider the effectiveness of public oral health policies that seek to achieve and generate significant impacts on the health of the affected population most in need[41], especially in the state of Bahia, where most municipalities have unfavorable contextual factors, such as smaller population size, lower human development, greater social vulnerability, and greater income inequality[20,22,23].

This study had limitations as it is based on secondary data, with an epidemiological surveillance bias, where the available information has limited access to clinical bias, such as: reason, causality, temporality, and/or intensity. In addition, they may be subject to underreporting, compromising the accuracy of the information, since there is no guarantee that professionals are properly trained to correctly fill out the SISAB records, mainly because it has only been mandatory since 2016[17]. Another limitation to be highlighted was the use of variables with old socioeconomic data or referring to a base year (2010) for association in a historical series (2015-2024). Nevertheless, it is worth noting that most of the contextual factors evaluated are calculated based on data from the Brazilian Population Census, and the delay in data collection (2022/2023) due to the pandemic did not allow for updates at the municipal level. This lack of more recent data may influence the accuracy of the analyses, making it difficult to understand the most current dynamics and possible changes in the patterns observed over the years. However, it is a good option to use data from municipalities in Bahia to further the discussion of the scenario experienced in other realities. It is still noticeable in Brazil that the predominant health model is curative, prioritizing the treatment of diseases rather than prevention[42]. To address this scenario, it is essential to promote the implementation of new public policies that promote the reformulation of the current care model[43] and achieve access beyond emergency situations.

The relevance of this study for public health should be highlighted, as it allows for the identification of new policies focused on the organizational structure of Primary Health Care (PHC). In addition, by establishing comparisons with the contextual factors of municipalities in Bahia, it becomes possible to assess with more accuracy the indicators that need improvement in the state. Thus, the results obtained can support managers and policymakers in implementing more effective strategies aimed at expanding access and improving the quality of services offered to the population.

CONCLUSION

A high rate of toothache reporting was observed in PHC in municipalities in Bahia, with a increase trend over the ten-year period (2015–2024), despite a reduction in the rate in 2020, possibly due to the suspension or restriction of dental services in PHC during the COVID-19 pandemic.

The highest rates of toothache reporting in PHC were associated with municipalities in Bahia with smaller populations (2016 to 2024), higher human development (2016 to 2019), and greater oral health coverage in PHC (2016 to 2024). However, there was no association with social vulnerability and income inequality.

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AUTHORS' CONTRIBUTIONS

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