



Oral Health within Tobacco Control Policies: Global and Brazilian Perspectives

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This integrative review aimed to examine how public anti-smoking policies address oral health and the role of dentists in tobacco control, highlighting gaps in policy integration and professional involvement.

Methodology: The literature search was performed using the electronic databases PubMed and Google Scholar, covering publications from January 1995 to August 2024. The search terms “anti-smoking policies” AND “oral health” were applied using Boolean operators. Seventeen relevant studies were identified. The analysis focused on four main themes: (1) dentists’ role in smoking cessation; (2) evaluation of tobacco prevention programs; (3) tobacco-related content in dental education; and (4) public awareness of tobacco’s oral health effects.

Results: Dentists are in a strategic position to support smoking cessation through brief interventions in clinical practice. However, barriers such as insufficient training, lack of institutional support, time constraints, and tobacco use among dental students limit their engagement. Gaps in dental curricula and the low visibility of oral health risks in public campaigns were also noted. Some initiatives, such as Brazil’s Tobacco Control Program and the WHO’s MPOWER strategy, show potential for better integrating oral health into broader tobacco control policies.

Conclusion: Dentists have substantial potential to contribute to tobacco cessation and control strategies, yet their role remains underrepresented in public health policies. Strengthening dental education, professional training, and explicit inclusion of oral health in anti-smoking policies is essential to enhance the effectiveness of tobacco control initiatives and ensure comprehensive public health outcomes.

Keywords: Tobacco control; smoking cessation; oral health; dentists; public health policy.

ABBREVIATIONS

ENDS : Electronic Nicotine Delivery Systems
FCTC : WHO Framework Convention on Tobacco Control
INCA : National Cancer Institute (Brazil)
NRT : Nicotine Replacement Therapies
PCC : Population, Concept, and Context
PNCT : National Tobacco Control Program (Brazil)
WHO : World Health Organization

1. INTRODUCTION

Nicotiana tabacum, commonly known as tobacco, is the source of products containing nicotine, such as cigarettes, electronic devices, cigars, straw cigarettes, cigarillos, bidis, snuff, roll-your-own tobacco, and pure tobacco (INCA, 2024). Additionally, electronic nicotine delivery systems (ENDS) and nicotine replacement therapies (NRT), including transdermal patches, chewing gum, lozenges, sublingual tablets, inhalers, and nasal sprays, are widely used (O’Connor, 2012).

Tobacco use is a neurobehavioral disorder caused by nicotine dependence. Behavioral and psychological factors—such as anxiety, depression, psychiatric disorders, low self-esteem, habits, and cultural and genetic influences—often hinder cessation. Many individuals continue smoking due to addiction

rather than conscious choice (Brazil Ministry of Health, 2013).

According to the World Health Organization (WHO), nicotine is highly addictive and accounts for approximately 7 million deaths annually. Secondhand smoke causes an additional 1.2 million deaths each year (WHO, 2023). Tobacco’s impact on oral health includes oral cancer, mucosal lesions, periodontal disease, peri-implantitis, dental staining, salivary gland dysfunction, and caries (Gajendra et al., 2023). Smoking cessation is essential to prevent these conditions and improve oral health outcomes (Rodakowska et al., 2020, Holliday et al., 2021).

Pharmacotherapies recommended for cessation include varenicline, bupropion, and NRT, such as nicotine gum and patches. Healthcare professionals also play a key role through behavioral interventions, such as routine

counseling (WHO, 2024). Then, dentists are particularly important in educating patients and promoting oral health (Bati et al., 2024).

In Brazil, the National Cancer Institute (INCA), under the Ministry of Health, has coordinated the National Tobacco Control Program (PNCT) since 1989. The PNCT aims to reduce smoking prevalence and related morbidity and mortality via guidelines, operational strategies, and educational initiatives. Its objectives include preventing smoking initiation—especially among youth—increasing cessation rates, and protecting against secondhand smoke (Márquez-Arrico et al., 2019, Cavalcante, 2005).

Globally, tobacco control policies follow the WHO Framework Convention on Tobacco Control (FCTC). The MPOWER framework, introduced 15 years ago, supports demand-reduction strategies: monitoring tobacco use and policies; protecting people from smoke; offering help to quit; warning about dangers; enforcing advertising bans; and raising taxes (WHO, 2023).

Despite progress, challenges persist: high tobacco-related mortality, emerging threats from ENDS, and strong opposition from the tobacco industry. Effective enforcement of anti-smoking legislation is crucial, relying on coordinated efforts from governmental and non-governmental sectors (Bati et al., 2024, Cavalcante, 2005).

Although public anti-smoking policies are widely recognized, integrative studies addressing their intersection with oral health and the role of dental professionals remain scarce. This article consolidates recent evidence from Brazilian and global contexts, critically analyzing current strategies and proposing recommendations to better integrate oral health into tobacco control policies. Therefore, this study aims to examine how public anti-smoking policies address oral health and the role of dentists in tobacco control, highlighting gaps in policy integration and professional involvement.

2. METHODS

2.1 Study Design

An integrative literature review was conducted to systematically identify, evaluate, and synthesize empirical and theoretical evidence concerning tobacco control policies and their impact on oral health. The review protocol adhered to the methodological framework delineated by Ganong

(1987) and incorporated a thematic analysis approach following Braun and Clarke's six-phase framework (Braun and Clarke, 2006) to ensure a comprehensive and interpretive synthesis of findings.

2.2 Research Guiding Question

The guiding question was formulated using the PCC framework, which stands for Population, Concept, and Context. In this review, the population (P) refers to public health tobacco control policies. The concept (C) covers anti-smoking policy elements related to oral health outcomes. The context (C) includes both global and Brazilian settings. The central research question was: "What elements of public anti-smoking policies pertain to oral health?"

2.3 Search Strategy

The literature search was performed in August 2024 utilizing the electronic databases PubMed and Google Scholar. Publications from January 1995 through August 2024 were considered. The search strategy was formulated to address the central research question. The search terms employed were "anti-smoking policies" AND "oral health," applied using Boolean operators to optimize retrieval of relevant literature.

2.3.1 Eligibility criteria

Inclusion criteria encompassed studies that explicitly addressed the intersection of tobacco use and public health policies targeting oral health outcomes. Eligible documents included original research articles, narrative reviews, case reports, theses, and other pertinent scientific works published in Portuguese or English within the specified date range. Studies were excluded if they (i) focused solely on tobacco's effects on oral health without linking to public policies or preventive interventions, (ii) provided only general epidemiological data unrelated to anti-smoking policy frameworks, (iii) represented duplicated or redundant data sets, or (iv) were deemed irrelevant based on title and abstract screening.

2.4 Study Selection

A comprehensive search of electronic databases resulted in the identification of relevant records. These records underwent an initial screening of titles and abstracts, conducted independently and based on predefined inclusion and exclusion

Table 1. Included studies addressing public oral health anti-smoking policies

First Author and Year	Title	Type	Study Design	Objective	Main Theme
Artici, (1995)	Ten years of anti-smoking programs in Italy: a review	Article	Qualitative	Investigated attitudes and behaviors of various groups involved in a long-term anti-smoking program in Italy.	Anti-smoking programs for public health promotion.
Naidu, (2002)	Tobacco smoking in the Caribbean. The role of dental professionals in smoking cessation programmes	Article	Qualitative	Proposed a strategy for integrating tobacco cessation into daily dental practice in the Caribbean.	Implementation of cessation programs in dentistry.
McCartan, (2005)	Policies and practices of European dental schools in relation to smoking; a ten-year follow-up	Article	Qualitative	Investigated smoking-related policies and practices of European dental schools.	Anti-smoking policies in dental education.
Matias, (2013)	Do school-based anti-smoking campaigns delivered by oral health therapists work?	Article	Qualitative	Assessed a tobacco prevention and cessation program targeting high school students in a dental setting.	Prevention and cessation of smoking in the dental clinic setting.
Tamí-Maury, (2014)	Perception of tobacco use prevention and cessation among faculty members in Latin American and Caribbean dental schools	Article	Qualitative	Identified dental faculty perceptions on prevention and cessation competencies to be included in dental curricula.	Smoking prevention and cessation in dental school curricula.
Busnardo, (2016)	Participation of the dental surgeon in tobacco cessation	Article	Case Report	Presented a clinical case involving a smoker patient and the dentist's role in tobacco cessation.	Dentist's role in cessation and effects of tobacco on oral health.
Komar, (2018)	Impacts of Smoking on Oral Health: Knowledge and Attitudes of Croatian Dentists and Dental Students	Article	Quantitative	Studied the role of dentists and dental students in smoking prevention and compared attitudes of Croatian dentists.	Dentist's role in prevention, control, and cessation of tobacco use.
Marqu��z-Arrico, (2019)	Oral health knowledge in relation	Article	Quantitative	Analyzed the relationship	Public knowledge of

First Author and Year	Title	Type	Study Design	Objective	Main Theme
	to educational level in an adult population in Spain			between oral health knowledge, educational level, hygiene practices, dietary habits, harmful behaviors, and oral health-related quality of life.	the oral health-smoking relationship.
Rodakowska, (2020)	Smoking Prevalence, Attitudes and Behavior among Dental Students in Poland and Italy	Article	Quantitative	Conducted a preliminary study comparing prevalence, attitudes, and behaviors toward smoking among dental students in two European universities.	Smoking prevalence among dental students.
Beklen, (2021)	The impact of smoking on oral health and patient assessment of tobacco cessation support from Turkish dentists	Article	Qualitative	Investigated Turkish dentists' approach to smoking and whether cessation guidance is provided during appointments.	Dentists' approach to smoking and provision of cessation support.
Holliday, (2021)	Interventions for tobacco cessation delivered by dental professionals	Article	Qualitative	Evaluated the effectiveness, adverse effects, and outcomes of dentist-led tobacco cessation interventions.	Dentist's role in smoking cessation interventions.
Leonel, (2021)	Tobacco Use, Attitudes, Knowledge, and Perception About Smoking Cessation Counseling Among Brazilian Dental Students: a Cross-Sectional Study	Article	Quantitative	Evaluated smoking prevalence, passive smoke exposure, and counseling knowledge among Brazilian dental students.	Dental students' knowledge on tobacco prevention and control.
Luo, (2022)	Examining a WeChat-based smoking cessation program for Chinese smokers	Thesis	Qualitative	Examined the feasibility of using WeChat for smoking cessation and its potential for integrating oral health information.	Awareness strategies on the negative effects of smoking.

First Author and Year	Title	Type	Study Design	Objective	Main Theme
Gautam, (2022)	The influence of smoking on oral health and patient evaluation of tobacco cessation help from dentists working in the dental college of Bareilly city	Article	Quantitative	Studied dentists' competence in delivering tobacco cessation as part of routine dental treatment.	Dentists' role in patient tobacco cessation support.
Gajendra, (2023)	Effects of tobacco product use on oral health and the role of oral healthcare providers in cessation: A narrative review	Article	Qualitative	Analyzed the effects of tobacco on oral health and the role of dentists in tobacco prevention.	Role of dentists in preventing tobacco-related oral health issues.
Bati, (2024)	Examining awareness of tobacco's oral health effects: Dentists' role in smoking cessation among dental patients	Article	Quantitative	Examined awareness of the negative effects of tobacco products on oral health and the role of dentists in helping patients quit smoking.	Role of dentists in tobacco cessation.
Karthikeyan, (2024)	An Overview on Determinants and Impact of Passive Smoking on Oral Health among Adults in Malaysia	Article	Qualitative	Explored the factors associated with passive smoking and its oral health impacts among Malaysian adults, highlighting the need for effective interventions.	Determinants and oral health impact of passive smoking; key interventions.

criteria. Articles that did not meet the eligibility requirements were excluded at this stage. The remaining full-text articles were then subjected to a thorough evaluation to determine their final inclusion. All procedures followed the integrative review methodology proposed by Ganong (1987).

2.5 Data Extraction and Analysis

Data were systematically extracted by one researcher and cross-checked by a second to ensure accuracy. Key characteristics of each study were catalogued in a structured matrix (Table 1), including author(s), publication year, study design, research type, objectives, and thematic focus. The dataset was then analyzed through an inductive thematic analysis framework as articulated by Braun and Clarke (2006). This six-step analytical procedure comprised: (1) data familiarization, (2) initial coding, (3) theme identification, (4) theme review, (5) theme definition and naming, and (6) report production. This method facilitated the emergence of four major thematic categories grounded in the selected sources of evidence.

2.6 Collaborative Review and Manuscript Preparation

After data extraction and thematic analysis, all authors discussed the findings to reach consensus on themes and conclusions. The manuscript was subsequently drafted, revised, and edited based on collective feedback to ensure clarity and rigor.

3. RESULTS

Among the 83 publications initially identified to answer the guiding research question, 66 articles were excluded due to the absence of content directly related to public tobacco control policies, relevant epidemiological data, or because they focused exclusively on the effects of tobacco use on oral health. Seventeen articles met the inclusion criteria, specifically addressing the relationship between tobacco use and policies aimed at oral health. These studies were analyzed according to the stages of integrative review proposed by Ganong (1987) as illustrated in Fig. 1.

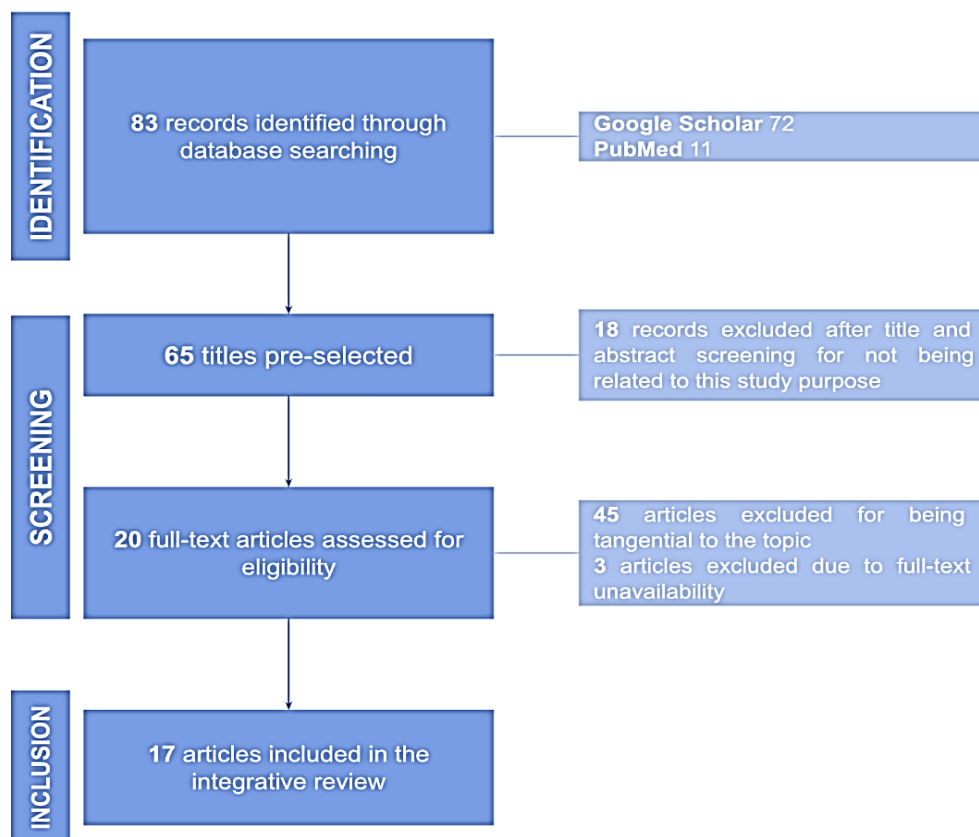


Fig. 1. Flowchart of study selection process

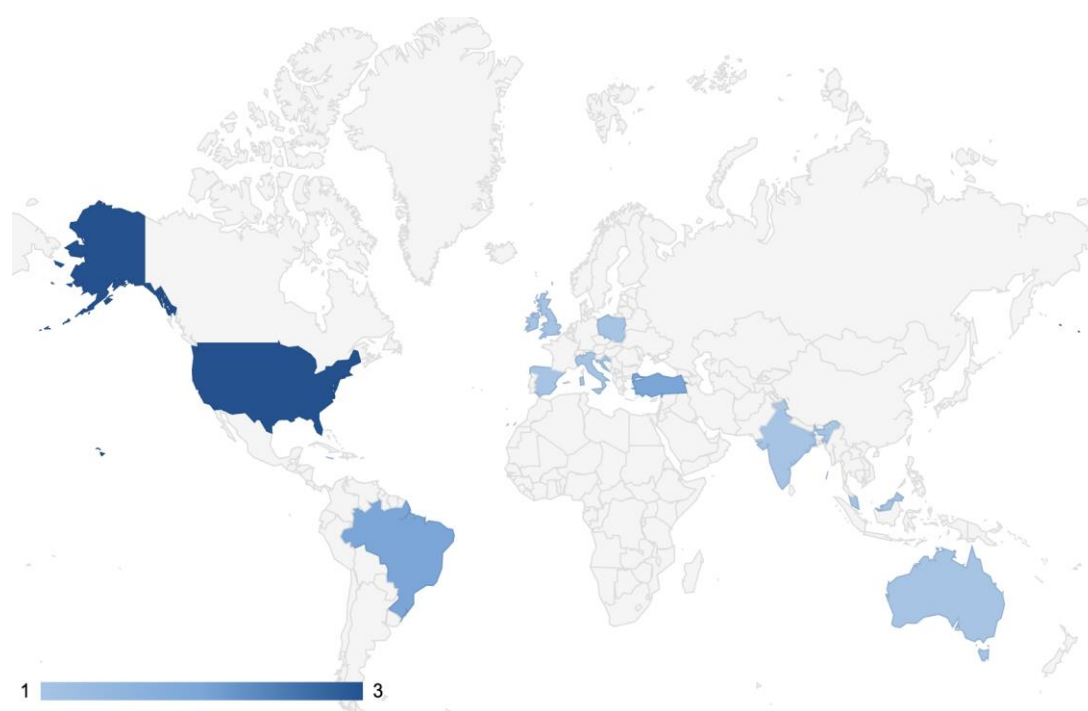


Fig. 2. Geographic distribution of the included studies

3.1 Overview of Included Studies

Of the 17 selected studies, six used a quantitative approach and ten used a qualitative one, reflecting methodological diversity in the literature (Table 1). Notably, the majority (88%) of the articles demonstrated the direct involvement of dentists in anti-smoking policies, although some studies challenged this connection. A significant portion (41%) of the studies was published between 2021 and 2024. Geographically, there was a predominance of international research from 14 different countries: three from the United States, two from Turkey, two from Brazil, and one each from Italy, Ireland, Spain, Jamaica, India, the United Kingdom, Poland, Australia, Malaysia, and Croatia (Fig. 2).

3.2 Thematic Analysis

The thematic analysis, following Braun and Clarke's framework (Braun and Clarke, 2006), enabled the construction of four thematic groups reflecting the most recurrent and significant patterns within the data: (1) the role of dentists in smoking cessation; (2) evaluation of tobacco prevention and control strategies; (3) inclusion of tobacco education in dental school curricula; and (4) tobacco and oral health awareness.

3.3 The Role of Dentists in Smoking Cessation

Beklen et al. (2021) and Gautam et al. (2022) found that dentists commonly inquire about patients' smoking habits. However, effective assistance for smoking cessation is rarely offered, despite many patients expressing willingness to quit. Komar et al. (2018) emphasized the importance of recognizing dentists as promoters of healthy lifestyles and highlighted their central role in tobacco prevention and control. Holliday et al. (2021) reinforced the potential of dentists in public anti-smoking policies, noting the negative impact of tobacco on oral health as a motivator for cessation.

Conversely, Busnardo et al. (2016) reported that dentists are often discouraged from engaging in tobacco cessation efforts due to a lack of training, limited time, and the absence of financial incentives. Creating conditions that enable dentists to engage more fully in tobacco control—by incorporating this issue into daily clinical routines—is therefore essential.

3.4 Evaluation of Tobacco Prevention and Control Strategies

Several studies addressed the evaluation of tobacco control policies and programs within the

context of oral health. Gajendra et al. (2023) described brief educational interventions delivered in dental clinics, including behavioral counseling and pharmacological therapies. Naidu et al. (2002) discussed comprehensive programs that encompass prevention, cessation support, use of media, and professional training, proposing new strategies to address tobacco use.

Luo et al. (2022) examined the feasibility of digital platforms in cessation campaigns, while Matias et al. (2013) highlighted the dental setting as an effective space for tobacco prevention and education. Artici et al. (1995) noted a troubling prevalence of tobacco use among dentists and dental students, who are expected to serve as role models for colleagues and patients (McCartan and Shanley, 2005).

3.5 Inclusion of Tobacco Education in Dental School Curricula

Integrating tobacco-related content into dental school curricula is critical for preparing professionals to effectively participate in tobacco prevention and management. McCartan and Shanley, (2005) emphasized the need to include specific guidelines in dental education to enable future dentists to contribute to public tobacco control policies.

Tamí-Maury et al. (2014) identified high smoking rates on university campuses—especially among dental students—as a barrier to cessation initiatives. In addition, Leonel et al. (2019) observed that although dental students are aware of the harmful effects of tobacco, there remain significant gaps in their training for prevention and management.

3.6 Tobacco and Oral Health Awareness

Limited public awareness regarding the harmful effects of tobacco on oral health remains a major challenge to smoking cessation (Karthikeyan et al., 2024). This knowledge gap is closely associated with individuals' educational levels (Brazil Ministry of Health, 2024). Effective dissemination of information requires public awareness campaigns, targeted messaging, continuous evaluation of existing policies, promotion of smoke-free environments, and regular oral health check-ups (INCA, 2011).

4. DISCUSSION

This integrative review identified four key thematic domains linking oral health and tobacco

control: the role of dental professionals in cessation efforts, evaluation of prevention strategies, the integration of tobacco content in dental education, and public awareness of oral health risks. Most studies demonstrated a consensus on the importance of dentists in supporting anti-smoking initiatives, yet significant barriers—such as lack of training and institutional support—persist (Table 1).

Analysis of the 17 selected studies revealed methodological diversity, with a predominance of qualitative (10) over quantitative (6) approaches. This reflects the multidimensional nature of the topic. However, there is a clear need for more quantitative research to deepen the understanding of dentists' subjective involvement in tobacco control policies. The majority of the studies demonstrated a direct link between dentists' professional roles and efforts to combat tobacco use, emphasizing their strategic position in promoting oral health and supporting smoking cessation (Beklen et al., 2021, Gautam et al., 2022, Komar et al., 2018, Busnardo et al., 2016).

There has been a notable increase in academic output between 2021 and 2024, suggesting growing scholarly and societal interest in this area. The geographical distribution of the studies—including contributions from the Americas, Europe, Asia, and Oceania—underscores the global relevance of dental professionals in tobacco control efforts (Fig. 2).

Findings indicate that while dentists often identify smoking behavior among patients, the provision of effective cessation support is insufficient, revealing critical gaps in both education and clinical practice (Komar et al., 2018, Busnardo et al., 2016). Barriers such as limited knowledge, lack of time, and inadequate financial incentives hinder dentists' engagement in tobacco cessation programs (Busnardo et al., 2016). Furthermore, the high prevalence of tobacco use among dentists and dental students represents a major obstacle to strengthening tobacco control efforts (McCartan and Shanley, 2005, Tamí-Maury et al., 2014, Leonel et al., 2019).

Tobacco prevention and cessation programs—including brief interventions, behavioral counseling, and pharmacological therapies—have proven effective when implemented in dental settings (WHO, 2023, Gautam et al., 2022, Komar et al., 2018, Busnardo et al., 2016, Naidu, 2002). Integrating these strategies into clinical routines and dental school curricula is

essential to empower future professionals and enhance preventive outcomes (McCartan and Shanley, 2005, Tami-Maury et al., 2014, Leonel et al., 2019). Additionally, the general population's limited awareness of tobacco's impact on oral health reinforces the need for educational campaigns and more effective public policies (Bati et al., 2024, Brazil Ministry of Health, 2024, INCA, 2011).

In the Brazilian context, the National Tobacco Control Program (PNCT) has been central to coordinating educational, therapeutic, and legislative actions aimed at reducing smoking (WHO, 2013, WHO, 2024). The PNCT includes structured measures that integrate prevention, cessation support, and promotion of smoke-free environments, reinforcing the role of healthcare professionals—including dentists—as key agents in this effort. Despite significant progress, challenges remain, particularly in low- and middle-income countries where access to effective interventions is limited (WHO, 2024).

Globally, initiatives such as the MPOWER package have expanded protections against tobacco-related harms, particularly through the implementation of 100% smoke-free environments and the adoption of strict legislative measures (WHO, 2024). Brazil has achieved noteworthy reductions in tobacco consumption, although continuous monitoring is essential to preserve and advance these gains.

Despite the methodological variety and wide geographic scope of the selected studies, the predominance of qualitative research limits the ability to quantitatively measure the impact of dentists' involvement in tobacco control policies. A significant gap exists between the recognized role of these professionals in smoking cessation and their actual clinical engagement, partly due to insufficient training in dental education, lack of institutional support, and the high rate of tobacco use among dental professionals themselves. These limitations highlight the urgent need for investment in educational strategies and public policies that enhance training and promote greater engagement by dentists in advancing tobacco-free oral health—backed by rigorous quantitative research.

Regarding this review, although the use of only two databases may be perceived as a methodological limitation, the selection was strategic and enhanced the quality of the

analysis. The inclusion of Google Scholar—due to its extensive coverage—allowed access to a wide range of journals and secondary sources, reducing geographic bias commonly seen in reviews restricted to traditional databases. This approach also contributed to a more efficient screening process by minimizing duplicate entries.

The heterogeneity of the included studies posed challenges for direct comparisons and precluded the application of more formal designs such as systematic reviews (Table 1). Nevertheless, this work stands out by offering a critical integration of public policy analysis with a focus on the role of dentistry in addressing tobacco use—an angle often neglected in previous reviews, which tend to concentrate solely on clinical or epidemiological aspects.

In summary, the clear negative effects of tobacco on oral health—combined with the underutilized potential of dentists as key actors in tobacco control—underscore the urgent need to strengthen professional training, expand educational strategies, and integrate anti-smoking actions into both clinical practice and academic curricula. Doing so will enable dentists to contribute more effectively to tobacco prevention, control, and cessation, resulting in meaningful improvements in public health. Importantly, this study highlights existing gaps and underscores the policy implications needed to achieve a significant impact in tobacco control and oral health promotion.

5. CONCLUSION

Dentists play a crucial role in supporting smoking cessation. However, oral health remains marginal in broader public health strategies. Expanding anti-tobacco education in dental curricula and explicitly integrating oral health into public tobacco control policies are essential next steps. Policymakers should prioritize the inclusion of dental professionals in tobacco prevention initiatives, ensure adequate training and resources, and strengthen the alignment of oral health with national and global tobacco control strategies. Strengthening these connections will enhance cessation effectiveness and contribute to improved population health.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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