



Oral pathology in developing countries: the reality of Guinea-Bissau — an integrative review

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ABSTRACT

Introduction: Oral pathology remains a significant public health challenge in developing countries, particularly in contexts of socio-economic vulnerability and limited access to healthcare.

Objectives: To analyze the available evidence on oral pathology in Guinea-Bissau, identifying prevalent conditions, associated risk factors, and public health implications.

Methodology: An integrative literature review was conducted using PubMed, Embase, SciELO, BVS, ScienceDirect, Cochrane Library, and Google Scholar, including studies published in Portuguese, English, French, and Spanish up to April 2025. Studies involving human populations from Guinea-Bissau were prioritized. Due to the limited availability of country-specific data, studies from similar socio-economic contexts were also considered.

Results: The findings indicate a high prevalence of preventable oral diseases, particularly dental caries and periodontal disease, along with frequent reports of odontogenic infections and oral manifestations associated with Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome. Less commonly reported conditions include oral cancer, cysts, and odontogenic tumors. Noma emerged as the most severe condition, strongly associated with extreme poverty, malnutrition, poor oral hygiene, and immunosuppression. Important gaps were identified, including limited epidemiological data, heterogeneity of available studies, absence of surveillance systems, and restricted access to healthcare.

Conclusion: The evidence highlights the urgent need to strengthen public health strategies, including preventive interventions, workforce training, healthcare infrastructure development, and community-based education. The recognition of noma as a Neglected Tropical Disease by the World Health Organization in 2023 represents a critical opportunity to promote research, mobilize resources, and implement policies aimed at reducing health inequalities in Guinea-Bissau.

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RESUMO

Introdução: A patologia oral continua a constituir um importante desafio de saúde pública nos países em desenvolvimento, particularmente em contextos de vulnerabilidade socioeconómica e acesso limitado aos cuidados de saúde.

Objetivos: Analisar a evidência disponível sobre patologia oral na Guiné-Bissau, identificando as condições mais prevalentes, os fatores de risco associados e as suas implicações em saúde pública.

Metodologia: Foi realizada uma revisão integrativa da literatura com recurso às bases de dados PubMed, Embase, SciELO, BVS, ScienceDirect, Cochrane Library e Google Scholar, incluindo estudos publicados em português, inglês, francês e espanhol até abril de 2025. Os estudos envolvendo populações da Guiné-Bissau foram priorizados. No entanto, devido à limitada disponibilidade de dados específicos do país, foram também considerados estudos provenientes de contextos socioeconómicos semelhantes. O processo de seleção seguiu as orientações PRISMA 2020 e foi realizado por três revisores independentes. Foram incluídos nove estudos, analisados qualitativamente.

Resultados: Os resultados evidenciam uma elevada prevalência de doenças orais preveníveis, nomeadamente cárie dentária e doença periodontal, bem como relatos frequentes de infeções odontogénicas e manifestações orais associadas ao Vírus da Imunodeficiência Humana/ Síndrome da Imunodeficiência Adquirida. Condições menos frequentemente reportadas incluem cancro oral, quistos e tumores odontogénicos. O noma destacou-se como uma condição mais grave, fortemente associada à pobreza extrema, desnutrição, má higiene oral e imunossupressão. Foram identificadas lacunas importantes, incluindo a escassez de dados epidemiológicos, a heterogeneidade dos estudos disponíveis, a ausência de sistemas de vigilância e o acesso limitado aos cuidados de saúde.

Conclusões: A evidência evidencia a necessidade urgente de reforçar estratégias de saúde pública, incluindo intervenções preventivas, formação de profissionais, desenvolvimento de infraestruturas de saúde e educação comunitária. O reconhecimento do noma como Doença Tropical Negligenciada pela Organização Mundial da Saúde em 2023 representa uma oportunidade crítica para promover investigação, mobilizar recursos e implementar políticas que visem reduzir as desigualdades em saúde na Guiné-Bissau.

Introduction

Oral health is an essential component of general health and overall well-being, influencing key functions such as eating, speaking, and social interaction, as well as self-esteem. According to the World Dental Federation, oral health is a multifaceted concept.¹ Despite its recognised importance, it remains frequently neglected, with consequences at both local and systemic levels.² Poor oral hygiene, tobacco use, excessive alcohol consumption, and diets high in sugar are well-established risk factors for oral diseases.² As a result, dental caries and periodontal diseases are among the most prevalent conditions worldwide.³ In addition to these common conditions, other oral diseases, although less frequent, may have significant clinical and social consequences if not diagnosed and managed at an early stage.⁴ Guinea-Bissau is a tropical country located in West Africa, comprising more than 80 islands and characterised by significant ethnic diversity. The country faces considerable socio-economic challenges, exacerbated by political instability, which negatively impacts the healthcare system. It has one of the lowest gross domestic products worldwide, and overall health indicators remain poor. Healthcare continues to be a low priority within public health policies, with a severe shortage of professionals, limited access to equipment, and insufficient medical infrastructure.⁵ The leading causes of

mortality include malaria, diarrhoeal diseases, acute respiratory infections, tuberculosis, and HIV/AIDS (Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome).⁶ Poor sanitation conditions, lack of access to safe drinking water, inadequate infrastructure, and low levels of education further contribute to increased disease burden and mortality rates.⁷ Although clinical observations suggest a high prevalence of oral diseases, there is a scarcity of scientific evidence documenting this reality in Guinea-Bissau. This gap highlights the need for structured research to better understand oral health conditions in this context. Dentists play a crucial role in the early detection of oral and systemic diseases, as the oral cavity may reflect underlying systemic conditions.⁸ However, in developing countries, oral health remains a major public health challenge due to limited access to care, social inequalities, and the absence of effective public health strategies. The World Health Organization estimates that 485 million people in Africa are affected by oral diseases, representing approximately 44% of the population.⁹ Access to oral healthcare is often restricted to urban centres, leaving rural and underserved populations without adequate care. This situation is compounded by a shortage of oral health professionals, limited resources, and high treatment costs.¹⁰ Poverty further restricts access to healthcare and basic hygiene products, while low levels of education hinder the adoption of

preventive behaviours. Diets high in sugars and low in essential nutrients contribute to the development of dental caries and periodontal disease, as well as more complex oral conditions.⁹ In contrast, developed countries benefit from better access to healthcare, stronger preventive strategies, and advanced clinical approaches.^{11,12} However, in developing settings such as Guinea-Bissau, the priority remains addressing basic healthcare needs and preventable diseases. The healthcare system in Guinea-Bissau is structurally fragile. The country has a limited number of healthcare facilities, often operating with insufficient resources and infrastructure.¹³ Geographic barriers further restrict access to care, leading many individuals to seek treatment only in emergency situations. The training of oral health professionals is another critical issue. There are only a few practising dentists in the country, resulting in an extremely low dentist-to-population ratio.⁶ The absence of local training programmes forces students to seek education abroad, with many not returning after qualification. Oral health remains poorly integrated into national public health policies. Despite efforts by governmental institutions, the country continues to rely heavily on international support. Prevention programmes and awareness campaigns are limited, and existing initiatives are often sporadic and unsustainable.¹⁴ Therefore, this integrative review aims to analyse the available evidence on oral pathology in Guinea-Bissau, identifying prevalent conditions, associated risk factors, and their implications for public health.

Methodology

This study is an integrative literature review. This study follows an integrative review design, structured according to the PIO framework (Table 1). The research question was defined as: “What are the most common oral diseases in Guinea-Bissau, their associated risk factors, and their impact on public health?”.

Table 1. PIO strategy used to formulate the research question.

Component	Description
Population (P)	Population of Guinea-Bissau
Intervention (I)	Existing oral conditions
Outcome (O)	Risk factors and their impact on society

Note: Table compiled by the authors, 2025.

The overall objective was to examine oral diseases in Guinea-Bissau and their associated factors. Specifically, this study aimed to: i) identify the most frequently reported oral diseases in Guinea-Bissau; ii) describe associated risk factors and social determinants; iii) summarize clinical and public health implications (including early diagnosis, prevention, and treatment); iv) identify gaps in the existing evidence; v) propose priorities for public health policies and future research.

Table 2. List of data sources used, and number of articles found.

Database	Number of Articles
BVS (Virtual Health Library)	3
Cochrane Library	1
Embase	35
Google Scholar	680
PubMed	99
SciELO	0
ScienceDirect	82
ResearchGate	28

Note: Table compiled by the authors, 2025.

The literature search was conducted in international scientific databases: including Virtual Health Library (BVS), Cochrane Library, Embase, PubMed, Scielo and ScienceDirect. Additionally, Google Scholar was used to complement the search, and ResearchGate was used as a supplementary source to identify grey literature and open-access materials. ResearchGate was not considered a primary database. Medical Subject Headings (MeSH) terms were used, including “Ameloblastoma”, “Oral Diagnosis”, “Mouth Neoplasms”, “Noma”, “Odontogenic Tumors”, and “Oral Pathology”, combined using Boolean operators (“AND” and “OR”). To maximize retrieval, DeCS terms and free-text terms with equivalent meanings were also included (Table 2). The search was conducted up to April 2025. Duplicate records were identified and removed through database filtering and manual screening. Inclusion and exclusion criteria were defined and applied as summarized in Table 3. Studies conducted in Guinea-Bissau were prioritized for inclusion. However, due to the scarcity of country-specific data, studies from similar socio-economic and epidemiological contexts were also included as contextual evidence. These studies were analyzed separately and interpreted with caution. The screening process followed the PRISMA 2020 guidelines and was carried out by three independent reviewers (HG, OL and FPO). After applying the eligibility criteria, nine studies were included for qualitative analysis (Figure 1).

Table 3. Inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria
Studies addressing oral diseases in Guinea-Bissau (primary evidence) or in similar socio-economic contexts (contextual evidence)	Studies not related to oral health
Articles focusing on noma or relevant oral pathologies	Studies without full text available
Publications in English, Portuguese, French and Spanish	Duplicates
Studies addressing risk factors and public health impact	Irrelevant study designs
Publications within the defined time frame	Studies with insufficient data

Note: Table compiled by the authors, 2025.

The methodological quality and risk of bias were assessed using Joanna Briggs Institute (JBI) critical appraisal tools. These tools are designed to evaluate the methodological quality and reliability of the included studies. In this review, the selected articles were assessed using the checklists shown in Figure 2. Of the nine articles assessed (Figure 2), eight were found to be of high quality. The studies assessed using Textual Evidence: Opinion and Narrative,^{15,16,17} received the high scores according to the JBI checklist, reflecting methodological clarity within their respective study design. The remaining five articles (18,19,20,21,22) received a generally positive overall score, although some limitations were identified, particularly regarding reporting of adverse events, follow-up, consistency of historical data, and inclusion criteria. Vieira's study²³, was the only one classified as having moderate quality, with a final score of approximately 0.69. This reflects relevant methodological limitations, as the study was published only as an abstract. Although several studies were classified as "high quality" according to JBI criteria, these tools assess methodological rigor within each study design and do not reflect the overall strength of evidence. Therefore, narrative, opinion, and policy-based studies were interpreted as lower-level evidence, despite their high appraisal scores. Data extraction was performed independently by the reviewers, and discrepancies were resolved by consensus.

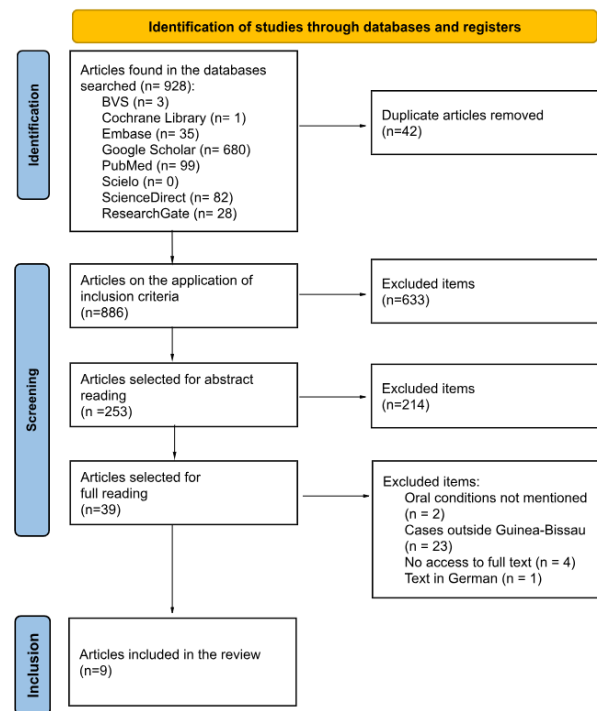


Figure 1. PRISMA 2020 flow diagram showing the results of the article selection process.
Note. Image created by the author, 2025.

Author(s) and Year	Type of JBI analysis	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	JBI Quality
Adesola et al. (2024)	TE Opinion	✓	✓	✓	✓	✓	✓	?	?	?	?	1 (High)
Holle et al. (2020)	Case report	✓	✓	✓	✓	✓	✓	✓	✓	?	?	0.94 (High)
Ile (2023)	TE Narrative	✓	✓	✓	✓	✓	✓	?	?	?	?	1 (High)
Maduen et al. (2017)	Case report	✓	✓	✓	✓	✓	✓	✓	✓	?	?	0.94 (High)
Satapathy et al. (2024)	TE Policy	✓	✓	✓	✓	✓	✓	✓	?	?	?	0.86 (High)
Smour et al. (2017)	TE Opinion	✓	✓	✓	✓	✓	✓	?	?	?	?	1 (High)
Torres et al. (2002)	Case series	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	0.95 (High)
Voladas & East (1998)	Case report	✓	✓	✓	✓	✓	✓	✓	✓	?	?	0.81 (High)
Vieira (2023)	Cross-sectional	✓	✓	✓	✓	✓	✓	✓	✓	?	?	0.69 (Moderate)

Q - Questions; TE - Textual Evidence; ✓ - Yes; ? - Unclear; ✗ - No; - - Not applicable

Figure 2. Risk of Bias Assessment – Joanna Briggs Institute Analysis.
Note. Image created by the author, 2025

Results

Table 4 summarizes the characteristics and scope of the included studies, while Table 5 synthesizes the main findings according to oral conditions and the type of evidence supporting each outcome.

Table 4. Characteristics and evidence type of included studies.

Author (Year)	Study design / Type	Setting / Population	Evidence origin
Porto (2023)	Cross-sectional (empirical)	Community (Gabú)	Guinea-Bissau
WHO (2020; 2023)	Epidemiological report (contextual)	Population-level	Contextual
Pereira (2015)	Observational (thesis)	General population	Guinea-Bissau
INASA (Epidemiological Bulletin)	Surveillance report (contextual)	National population	Guinea-Bissau
Enwonwu & Falkler (2006)	Narrative review	–	Contextual
Smour et al. (2017)	Literature review	–	Contextual
Case reports (noma/tumours)	Case reports	Clinical settings	Contextual
Rasouli (2025)	Narrative review / opinion	–	Contextual
Prakash (2013)	Narrative review	–	Contextual

Table 5. Summary of main oral conditions, key findings, and evidence sources.

Condition	Key findings	Evidence source	Evidence origin
Dental caries	Highly prevalent and preventable condition associated with poor oral hygiene, high sugar intake, and limited access to dental care	Empirical and contextual studies	Mixed
Periodontal disease	Common inflammatory condition linked to poor oral hygiene and low oral health	Empirical studies	Guinea-Bissau

	literacy, with impact on quality of life		
Odontogenic infections	Frequently associated with delayed access to care, increasing the risk of complications and hospitalisation	Empirical and contextual studies	Mixed
Oral manifestations of HIV/AIDS	Include candidiasis, ulcerative lesions, and Kaposi's sarcoma, contributing to early diagnosis and disease monitoring	Contextual studies	Contextual
Oral cancer	Less frequently reported but clinically significant, often associated with late diagnosis and high morbidity and mortality	Contextual studies	Contextual
Odontogenic tumours and cysts	Rare but relevant lesions, often diagnosed at advanced stages due to limited access to care	Case reports and contextual studies	Contextual
Noma	Severe, rapidly progressing necrotising disease associated with extreme poverty, malnutrition, poor hygiene, and immunosuppression, with high mortality and significant psychosocial impact	Narrative reviews, case reports, and contextual studies	Contextual

The included studies report a wide range of oral diseases, largely associated with adverse socio-economic conditions and limited access to healthcare services. As shown in Table 5, most conditions are supported primarily by contextual and lower-level evidence, with limited contribution from country-specific empirical studies. Within this context, noma emerges as the most extensively reported and clinically significant condition. It is a severe necrotising disease that predominantly affects young children living in conditions of extreme poverty and malnutrition. The disease is characterised by rapid progression and extensive destruction of oral and facial tissues, leading to severe disfigurement and high mortality rates if left untreated. The main associated factors include malnutrition, immunosuppression, poor oral hygiene, and limited access to healthcare.^{15-17,20,22} Noma has a multifactorial aetiology, with polymicrobial infection and host-related factors, particularly malnutrition and immunosuppression, playing a central role in disease development.^{15,17} Clinically, noma begins as a necrotising lesion of the oral mucosa and progresses rapidly, resulting in extensive tissue destruction.^{20,22} The progression of the disease can be described in five stages, as illustrated in Figure 3.

Early diagnosis is primarily based on clinical findings, supported by laboratory investigations when available, and is essential to prevent disease progression. Differential diagnosis includes other infectious and neoplastic conditions.¹⁷ Once diagnosed, early treatment with antibiotics and supportive care is crucial to limit disease progression, whereas advanced cases require hospitalisation and may involve reconstructive surgical interventions.^{15,17,19} Despite treatment, long-term consequences may include severe functional impairment, facial disfigurement, and significant psychosocial impact.^{15,20} Given these outcomes,

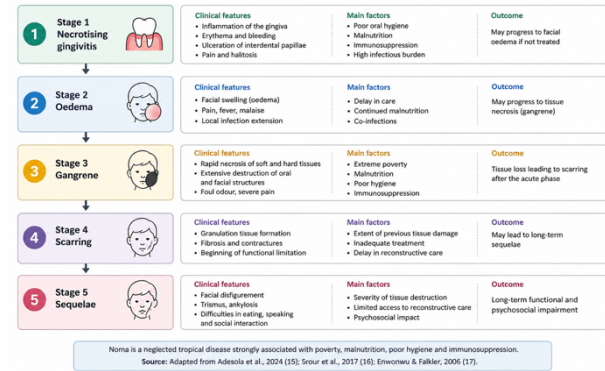


Figure 3. Clinical progression of noma (schematic representation). Developed by the authors based on the reviewed literature (15–17), with AI assistance.

prevention strategies are fundamental and include improving nutrition, access to healthcare, early detection, and strengthening public health systems.^{15,16,22}

Discussion

Recognition of Noma as a neglected tropical disease by the WHO

The included studies consistently highlight the significance of the World Health Organization's decision to classify noma as a Neglected Tropical Disease in 2023.^{15,17,21} This recognition represents an important step towards positioning noma as a global public health priority. However, its translation into effective action remains limited in low-resource settings. Several studies emphasise structural barriers, including inadequate surveillance systems for diagnosis and reporting.²³ Under-reporting continues to restrict the practical impact of this recognition. Addressing these challenges requires strengthening epidemiological surveillance, improving data collection systems, and enhancing healthcare professionals' capacity for early detection, supported by sustained policy commitment and resource allocation. Oral diseases represent a significant public health burden in Africa. Nevertheless, country-specific epidemiological data for Guinea-Bissau remain scarce. This lack of quantitative data limits the accurate estimation of disease prevalence and burden, highlighting the need for improved surveillance systems and national data collection strategies.

Socio-economic and biological determinants of Noma

The evidence consistently links noma to extreme poverty, severe malnutrition, poor hygiene, and immunosuppression, creating conditions that particularly affect vulnerable children.^{16,17,22} This highlights the disease as a marker of broader structural inequalities. Additionally, some studies report cases in immunocompromised adults, particularly individuals living with HIV, suggesting that the affected population may be broader than traditionally recognised.¹⁹ These

findings support the need to expand surveillance criteria and reinforce interventions targeting nutrition, sanitation, and the management of systemic diseases.

Limitations of surveillance and recording systems

The fragility of surveillance systems, particularly in rural areas of Guinea-Bissau, remains a critical challenge.²³ Difficulties in case detection and reporting hinder the development of effective public health responses. Importantly, the literature suggests that these limitations are not solely technical. Social stigma and cultural perceptions surrounding noma also contribute to under-reporting.^{21,23} Therefore, strengthening surveillance must be complemented by culturally sensitive approaches that improve healthcare access and community engagement.

Treatments, rehabilitation and health system constraints

Basic clinical management, including antibiotic therapy, nutritional support, and oral hygiene measures, is effective in reducing mortality and disease progression when implemented early.^{15,20} Despite this, access to timely care remains limited. Advanced cases require hospitalisation and complex reconstructive interventions. While innovative approaches, such as bone distraction techniques, show promising functional outcomes, their implementation is constrained by limited infrastructure and specialised workforce.^{18,22} These findings highlight the need for context-adapted treatment strategies that are feasible within resource-limited settings, alongside capacity building in surgical and rehabilitative care.

Psychosocial impact and human rights considerations

Beyond its physical consequences, noma is associated with profound psychosocial and human rights implications, including stigma, discrimination, and social exclusion.¹⁷ The literature emphasises the need to integrate psychosocial support into clinical management. However, these dimensions remain underexplored in most epidemiological and clinical studies. Addressing noma effectively therefore requires a broader approach that incorporates social inclusion, community education, and legal frameworks to protect affected individuals.

Prevention and public health strategies

The findings support a multi-level approach to prevention. Primary prevention focuses on reducing risk factors through improved nutrition, sanitation, vaccination, and health education.¹⁵ Secondary prevention relies on early detection and systematic case reporting, which are essential to limit disease progression and improve epidemiological understanding.^{16,23} Tertiary prevention involves minimising long-term disability through reconstructive surgery, rehabilitation, and

psychosocial support.^{18,22} Despite these strategies, their implementation remains inconsistent, particularly in rural and underserved areas. The reliance on external organisations for surgical care and rehabilitation further highlights the structural limitations of local health systems.

Gaps and future directions in research

The available evidence is limited by the scarcity of country-specific data and the predominance of studies conducted in neighbouring regions. This restricts the generalisability of findings and highlights the need for context-specific research in Guinea-Bissau. Significant gaps remain in understanding the full aetiology of noma, particularly regarding virological and environmental factors. Future research should prioritise epidemiological studies, barriers to care, and the evaluation of feasible interventions tailored to local contexts.

Implications for public health

The multifactorial nature of noma requires integrated responses that combine surveillance, early diagnosis, effective treatment, and social policies addressing underlying inequalities. Strengthening health systems, improving access to care, and promoting community-based education are essential to reducing the burden of the disease. The recognition of noma as a neglected tropical disease provides an important opportunity to advance these efforts, but sustained investment and coordinated action remain essential to achieving meaningful and sustainable improvements.

Conclusion

Healthcare in Guinea-Bissau is characterised by limited resources, restricted access, and significant socio-economic challenges, which are reflected in a high burden of preventable oral diseases and limited access to structured preventive programmes. In this context, noma emerges as a key indicator of extreme health and social inequalities, reflecting structural vulnerabilities affecting disadvantaged populations. Its rapid progression and high mortality highlight the urgent need to improve access to healthcare, sanitation, and health education. System-level barriers, including limited professional training, institutional gaps, and social stigma, contribute to underdiagnosis and poor outcomes. The recognition of noma as a Neglected Tropical Disease by the World Health Organization in 2023 represents a critical opportunity to strengthen global and local responses. Addressing noma requires integrated, multisectoral strategies focused on poverty reduction, improved sanitation, nutrition, and access to care, alongside strengthened epidemiological surveillance, early diagnosis, and social inclusion. Ultimately, combating noma depends on addressing its underlying social determinants and strengthening health systems to ensure equitable access to care.

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