

Tooth Loss in Older Adults: A Focus on the Determinants of Health

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Abstract

Introduction: Being an older adult is a risk for the occurrence of systemic multimorbidities. Edentulism is closely related to the structural and intermediate determinants of health, and they influence the association of being partially or totally edentulous. **Objective:** To analyze, from the context of health determinants, the process of tooth loss in older adults. **Materials and Methods:** An integrative documentary-type review was carried out in the databases Scopus, ScienceDirect, ProQuest, Pubmed, using the descriptors "Tooth Loss", "Older Adults", "relationship with structural and intermediate determinants", "oral health determinants", and AND connectors, including references published since 2018, in English and Spanish languages with scientific information on the determinants of health and tooth loss in older adults, were recovered a total of 462 records, of which 68 were chosen. **Conclusions:** Presenting edentulism is related to the determinants of health. Components such as the economic, social and political order influence the health conditions of the geriatric population. Health determinants act as risk factors for tooth loss in older adults. Socioeconomic contexts contribute to the prevalence of systemic multimorbidities. There is a connection between tooth loss in older adults and the determinants of dental health.

Keywords: Older adults, tooth loss, health determinants (source: DeCS, BIREME).

1. Introduction

The world's population is made up of 20% older adults [1,2], and in it there is pre-availability of the occurrence of multiple morbidities [3], among which the loss of teeth. It ranks 36th in the ranking of the 100 chronic diseases. Becoming, in this way, on a topic of interest in public health [4], immersed in the context of the determinants of health.

In order for the elderly to have quality of life, a holistic and transversal approach to their health is required. Likewise, it should be taken into account that the determinants of health involve

actions that favor success in public policies and the socioeconomic development of countries and States [5,6].

The determinants of health, among which are the structural ones made up of the socioeconomic, political, and social structure; which in turn, are foundations that determine macroeconomic policies, types of government, social policies, the labor market, public policies related to education, health and social protection, and even the importance of the interaction of culture and social values [6,7]. Consequently, socioeconomic stratification has an impact on the prevention of edentulism. Therefore, economically privileged social classes, such as those from rich territories, obtain better health benefits [8].

It should also be mentioned in the field of determinants of health, those of an intermediate type made up of employment and working conditions, the unpaid workload, the level of income and the economic and patrimonial situation, the quality of housing and its equipment, the neighborhood or area of residence and its characteristics, access to and opportunity to health services [7], in addition to behavioral factors and psychosocial circumstances, which have an influence on lifestyles and biological processes involved in public health [9,10].

Tooth loss in the elderly is the latest consequence of the burden of oral diseases [11,12]. Hence, its importance, in the context of public health, to understand the influence of structural and intermediate determinants, and their probable association in partial or total edentulism [9,13]. In the same way, oral pathologies and edentulism interact with systemic diseases, which manifest a series of bidirectional relationships [14,15,16,17].

Other constituent elements of these determinants have to do with advanced age and sex, which have a causal relationship with diseases such as diabetes mellitus, rheumatoid arthritis, high blood pressure, heart disease, respiratory diseases, neurodegenerative diseases such as Alzheimer's, cancer, kidney disease and osteoporotic disease [18,19,20,21,22]. In this way, tooth loss in older adults becomes an indicator of the functioning of the public health system of the countries. Because the health and well-being of human beings is also reflected in the oral health conditions of the individual [23].

2. Methods

This article was carried out through an integrative review of the literature and herself they provide elements for the understanding of the subject. Discusses existing findings regarding tooth loss and public health [24]. Integrative reviews in the words of Whittemore and Knafl[25], define its composition in four stages: Identification of the concept, search for the literature, evaluation of the data, analysis of the information and conclusions.

The review was carried out through the Scopus, ScienceDirect, ProQuest and Pubmed databases, using the descriptors "Tooth Loss", "Older Adults", "relationship with structural and intermediate determinants", "oral health determinants", and the AND connector, the search equation included publications from 2018 to 2023, in English and Spanish languages of the determinants of health and their relationship with tooth loss in older adults. A total of 462 records

were retrieved, of which 68 were chosen, as shown in Figure 1. In the bibliographic search, original scientific articles were taken into account as an inclusion criterion, as shown in Table 1, published in indexed journals during the study period.

In a first review, the recurring and relevant aspects of the topic were identified, they were deepened in a second search, and a geospatial bibliometric characterization was carried out that allowed establishing the behavior and thematic relevance, as shown in Figure 2. Within the exclusion criteria, publications of duplicate works, texts in languages other than Spanish and English, articles outside the time frame of the study, those not published in the databases selected for the review, and those with incomplete information for the research were eliminated, in line with what is presented in Figure 3.

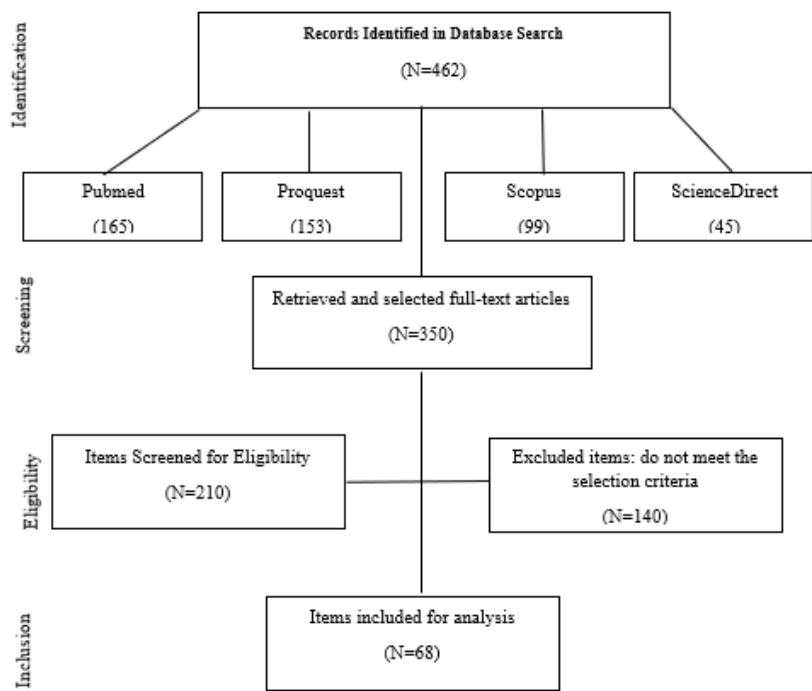


Figure 1. Flowchart for the selection of sources of the integrative documentary review

Source: Library databases consulted

Board 1. Characterization of publications for integrative review

Item Name	Country	Authors	Magazine	Year
Assessment of risk factors of tooth loss in adult population.	India	Bali E, Tandon S, Sahota J, Chand S	Journal of Advanced Medical and Dental Sciences Research	2021

Aging & Health - 2023	Switzerland	World Health Organization	WHO website - 2023	2023
Indicators of oral health in older adults with and without the presence of multimorbidity	Mexico	Islas-Granillo H, Borges-Yañez SA, de Jesús Navarrete-Hernández J, Veras-Hernández MA, Casanova-Rosado JF, Minaya-Sánchez M, et al	Dove Medical Press journal: Clinical Interventions in Aging	2019
Edentulism and functional dentition in older adults in Tuxtla Gutiérrez	Mexico	Suárez MMP, Castillejos AM, Zavala ÁG	Tamé Magazine	2020
Social determinants of oral health in older adults. Plaza de la Revolución Municipality.	Cuba	Ramos RMG, González JAV, Reyes SÁR, Suárez SR, Carballo OMS.	Habanera Journal of Medical Sciences	2021
Oral diseases: a global public health challenge	United Kingdom	Peres MA, Macpherson LMD, Weyant RJ, Daly B, Venturelli R, Mathur MR, et al.	The Lancet - 2019	2019
Oral health inequality in Canada, the United States and United Kingdom.	United States	Chari M, Chari C equally to this work with: M, Ravaghi V, Sabbah W, Quiñonez C, , et al	Plos One	2022
Contextual and individual determinants of tooth loss in adults: a multilevel study.	United Kingdom	Roberto LL, Silveira MF, de Paula AMB, Ferreira E Ferreira E, Martins AME de BL, Haikal DS	BMC Oral Health	2020
Reducing social inequalities in the oral health of an adult population.	Brazil	Silva MF Jr, Sousa MDLRD, Batista MJ	Brazilian Oral Research	2019

Dental attendance and behavioural pathways to adult oral health inequalities.	United Kingdom	Guarnizo-Herreño CC, Scholes S, Heilmann A, O'Connor R, Fuller E, et al	Journal of Epidemiology and Community Health	2021
Edentulous disparities among geriatric population according to the sexual difference in South Korea	United Kingdom	Park HA, Shin SH, Ryu JI	Scientific Reports	2023
Table 1. (Continued)				
Oral diseases and risk factors in the geriatric population belonging to a doctor's office	Cuba	Díaz Sánchez LS, Jiménez Castellanos MI, Páez Delgado D, Díaz Sánchez LH.	Medisan	2018
Edentulism in Relation to Sociodemographic Status of Patients.	India	Hira IA, MEMON MR, SHAIKH G, Memon H, SAMEJO I.	Pakistan Oral & Dental Journal	2019
Association between tooth loss and hypertension among older Chinese adults	United Kingdom	Da D, Wang F, Zhang H, Zeng X, Jiang Y, Zhao Q, et al	BMC Oral Health	2019
Influence of Micronutrient Intake, Sociodemographic, and Behavioral Factors on Periodontal Status of Adults Assisted by a Public Health Care System in Brazil	Switzerland	Costa PD, Canaan JCR, Castelo PM, Fonseca DC, Pereira-Dourado SM, et al.	Nutrients	2021
Association of Edentulism with Various Chronic Diseases in Mexican Elders 60 Years	Switzerland	Casanova-Rosado AJ, Casanova-Rosado JF, Minaya-Sánchez M, Robles-Minaya JL, Casanova-Sarmiento JA, Márquez-Corona M de L, et al	Health Care	2021
Predictive factors for tooth loss in older adults vary according to occlusal support:	Holland	Sato H, Hatta K, Murotani Y, Takahashi T, Gondo Y, Kamide K, et al.	Journal of Dentistry	2022

The epidemiology of edentulism and the associated factors: A literature Review.	India	Al-Rafee MA.	Journal of Family Medicine and Primary Care	2020
Tooth loss and risk of cardiovascular disease and stroke: A dose-response meta-analysis of prospective cohort studies	United States	Cheng F, Zhang M, Wang Q, Xu H, Dong X, Gao Z, et al	Plos One	2018
The Association between Tooth Loss and Alzheimer's Disease: A Systematic Review with Meta-Analysis of Case Control Studies	United States	Dioguardi M, Di Gioia G, Caloro GA, Capocasale G, Zhurakivska K, Troiano G, et al.	Dentistry Journal	2019
Oral and Systemic Health in the Elderly	Switzerland	Di Spirito F.	Applied Sciences	2022
Oral Health-Related Quality of Life, A Proxy of Poor Outcomes in Patients on Peritoneal Dialysis.	United States	Purinsinith S, Kanjanabuch P, Phannajit J, Kanjanabuch T, Puapatanakul P, Johnson DW, et al.	Kidney International Reports	2022
Socio-Economic Factors associated with Tooth Extraction in Can Tho	Turkey	Le KVP, Huynh HLN, Truong KN, Bui MTN	Journal of International Dental and Medical Research	2023
Table 1. (Continued)				
Usefulness and types of literature review.	Spain	Goris G, Adolf SJ.	Jan - Nursing Journal	2015
The integrative review: updated methodology. J Adv Nurs	United Kingdom	Whitemore R, Knafl K	Journal of Advanced Nursing	2005
Theoretical-conceptual bases for the analysis of social inequities in health: a discussion	Costa Rica	Barboza-Solís C, Sáenz-Bonilla JP, Fantin R, Gómez-Duarte I, Rojas-Araya K, Barboza-Solís C, et al.	Odovtos International Journal of Dental Sciences	2020
Social Causation Versus Health Selection in the Life Course: Does Their Relative Importance Differ by Dimension of SES?	Holland	Hoffmann R, Kröger H, Geyer S	Social Indicators Research	2019
Life course socioeconomic position and general and oral health in later life: Assessing the role of social causation and health selection pathways	United Kingdom	Letelier A, Jivraj S, Heilmann A, Watt RG, Tsakos G.	SSM Population Health	2022
The life course cube: A tool for studying lives.	Holland	Bernardi L, Huinink J, Settersten RA.	Advances in Life Course Research	2019

Pathways between socioeconomic status and health: Does health selection or social causation dominate in Europe?	Holland	Hoffmann R, Kröger H, Pakpahan E.	Advances in Life Course Research	2018
What makes inequality in the area of dental and oral health in developing countries? A scoping review.	United Kingdom	Bastani P, Mohammadpour M, Mehralian G, Delavari S, Edirippulige S	resource-allocation.biomedcentral	2021
Contextual and individual factors associated with self-reported tooth loss among adults and elderly residents in rural riverside areas	United States	de Souza VGL, Herkrath FJ, Garmelo L, Gomes AC, Lemos UM, Parente RCP, et al	Plos One	2022
Measuring local strategies to address the determinants of population health	France	Le Bodo Y, Fonteneau R, Diallo D, Harpet C, Hudebine H, Jabot F, et al	HAL Portal EHESP	2022
Rapid Oral Health Deterioration in Older People—A Narrative Review from a Socio-Economic Perspective.	United Kingdom	Slack-Smith L, Arena G, See L	Journal of Clinical Medicine	2023
Risk factors for tooth loss in adults: A population-based prospective cohort study	United States	Silva Junior MF, Batista MJ, de Sousa M da LR	Plos One	2019
Contextual and individual determinants of tooth loss in the Afro-descendant older adult populations of different countries: a scoping review.	United Kingdom	Dos Santos LR, Hugo FN, Costa CM, Brondani MA, Coelho Alves CM	Community Dent Health	2023
Table 1. (Continued)				
Associations Among Social Health Determinants and Oral-Related Health Behaviors Among Elderly Thais in 2015	Thailand	Nhan TLT, Somkotara T, Bhuridej P	Southeast Asian Journal of Tropical Medicine and Public Health	2015
Burden of Oral Diseases and Access to Oral Care in an Ageing Society	United States	Aida J, Takeuchi K, Furuta M, Ito K, Kabasawa Y, Tsakos G	International Dental Journal	2022
Rural-urban disparities in Oral Health-related Quality of Life for middle-aged and older adults with diabetes in Taiwan.	Switzerland	Chen HF, Lin YT, Lin JY, Lee HE.	Frontiers in Public Health	2023
Disparities in spatial accessibility to public dental services relative to estimated need for oral health care among refugee populations in Victoria.	United Kingdom	Veginadu P, Gussy M, Calache H, Masood M.	Community Dentistry and Oral Epidemiology	2023

Access to oral healthcare for vulnerable and underserved populations.	United States	World Dental Federation F.	International Dental Journal	2020
Perspectives on Social and Environmental Determinants of Oral Health.	United Kingdom	Abreu MHNG de, Cruz AJS, Borges-Oliveira AC, de Castro Martins R, Mattos F de F	International Journal of Environmental Research and Public Health	2021
Systematic review of methods used to study the intersecting impact of sex and social locations on health outcomes	United Kingdom	Phillips SP, A V, S Y, R R, S I, E Z, et al.	SSM - Population Health	2020
Race (black-white) and sex inequalities in tooth loss: A population-based study.	United States	Terra E Souza LH, Diaz-Quijano FA, de Azevedo Barros MB, Lima MG	Plos One	2022
Racial Inequalities in Oral Health: A Population-Based Study.	United States	Souza LHT e., Santiago SM, de Azevedo Barros MB, Lima MG.	Race and Social problem	2021
Unconscious Racial Bias May Affect Dentists' Clinical Decisions on Tooth Restorability: A Randomized Clinical Trial	United Kingdom	Patel N, Patel S, Cotti E, Bardini G, Mannocci F.	JDR Clinical and Translational Research	2019
Ethnic differences in treatment preferences among adults in East London	United Kingdom	Naz S, Bernabé E, Marcenés W, Delgado-Angulo EK.	The British Dental Journal	2021
Intersectionality and eco-social theory: a review of potentials for public health knowledge and social justice.	United Kingdom	Merz S, Jaehn P, Mena E, Pöge K, Strasser S, Saß AC, et al.	Critical Public Health	2023
Undoing structural racism in dentistry: Advocacy for dental therapy.	United States	Bianchi T, Wilson K, Yee A.	Journal of Public Health Dentistry	2022
OECD. Health at a Glance 2019	France	OECD. Health at a Glance 2019	OECDilibrary	2019
OECD. Health at a Glance 2021	France	OECD. Health at a Glance 2021	OECDilibrary	2021
Health economics and public health: global situation and local perspectives.	Colombia	Segura O.	Biomedical Journal	2018
Public health priority setting on a national scale: The Scottish experience	United Kingdom	Sumpter C, Bain M, McCartney G, Blair A,	Public Health in Practice	2023

		Stockton D, Frank JW		
Socio-Economic Disparities in Dental Health and Dental Care Utilisation Among Older Chinese	United States	Li C, Yao NA.	International Dental Journal	2021
Importance of socioeconomic factors in predicting tooth loss among older adults in Japan: Evidence from a machine learning analysis.	United Kingdom	Cooray U, Watt RG, Tsakos G, Heilmann A, Hariyama M, Yamamoto T, et al.	Social Science & Medicine	2021
Socioeconomic Inequality in Dental Caries Experience Expressed by the Significant Caries Index: Cross-Sectional Results From the RaNCD Cohort Study.	United States	Soofi M, Karami-Matin B, Kazemi-Karyani A, Soltani S, Ameri H, Moradi-Nazar M, et al.	International Dental Journal	2021
Willingness to Pay for Preventive Dental Care Amongst Older Adults	United States	Mittal R, Loke WM, Seng DOL, Na TM, Yan GLK, Allen PF.	International Dental Journal	2022
Tooth loss is associated with an increased risk of hypertension: A nationwide population-based cohort study	United States	Woo HG, Chang Y, Lee JS, Song TJ.	Plos One	2021
Oral health, between systemic health and public health.	Colombia	Franco-Giraldo Á	University and Health Journal	2021
Factors Associated with Self-Report of Type 2 Diabetes Mellitus in Adults Seeking Dental Care in a Developing Country	United Kingdom	López-Gómez SA, González-López BS, Scougall-Vilchis RJ, Márquez-Corona M de L, Minaya-Sánchez M, de Jesús Navarrete-Hernández J, et al.	International Journal of Environmental Research and Public Health	2023
Association of Oral Health with Risk of Rheumatoid Arthritis: A Nationwide Cohort Study	Switzerland	Chang Y, Chung MK, , Jung-Hyun P, Tae-Jin S	Journal of Personalized Medicine	2023
Osteoporosis and periodontal diseases - An update on their association and mechanistic links	United States	Yu B, Wang CY.	Periodontal 2000	2022
Association between presence of 20 or more natural teeth and all-cause, cancer-related, and cardiovascular disease-related mortality:	United Kingdom	Ishikawa S, Konta T, Susa S, Ishizawa K,	BMC Oral Health	2020

Yamagata (Takahata) prospective observational study.		Togashi H, et al.		
Multiple Chronic Diseases Associated With Tooth Loss Among the US Adult Population	Switzerland	Zhang Y, Leveille SG, Shi L	Frontiers in Big Data	2022
Complete Edentulism and Comorbid Diseases: An Update	United States	Felton DA.	Journal of Prosthodontics	2016
Factors Associated with Tooth Loss in General Population of Bialystok, Poland	United Kingdom	Gabiec K, Bagińska J, Rodakowska E, et al	International Journal of Environmental Research and Public Health	2022
Caries risk and social determinants of health.	United States	Rodriguez JL, Thakkar-Samtani M, Heaton LJ, Tranby EP, Tiwari T.	The Journal of the American Dental Association	2023
Relationship between oral health and physical frailty in patients with cardiovascular disease.	Japan	Ogawa M, Satomi-Kobayashi S, Yoshida N, Tsuboi Y, Komaki K, Nanba N, et al.	Journal of Cardiology	2021

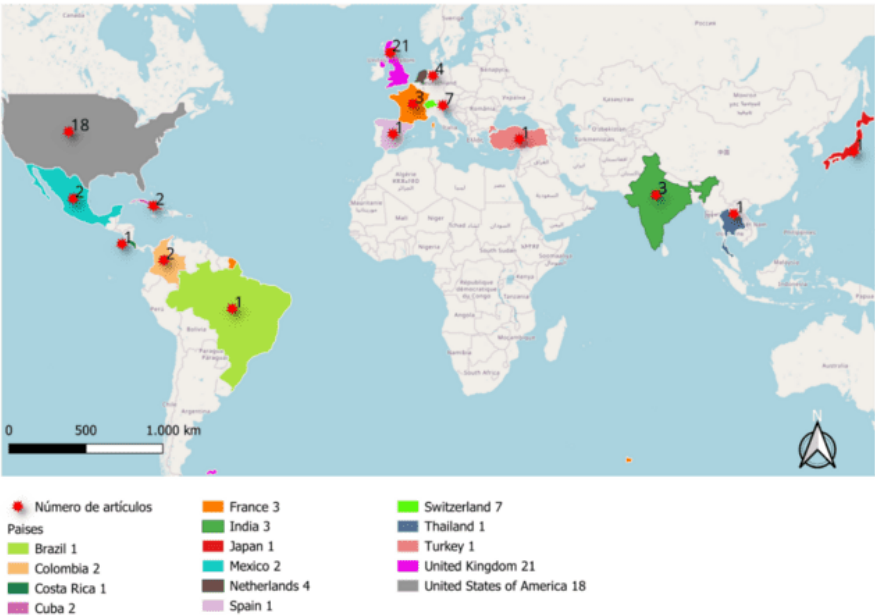


Figure 2. Geospatial bibliometric characterization of the articles in the integrative review

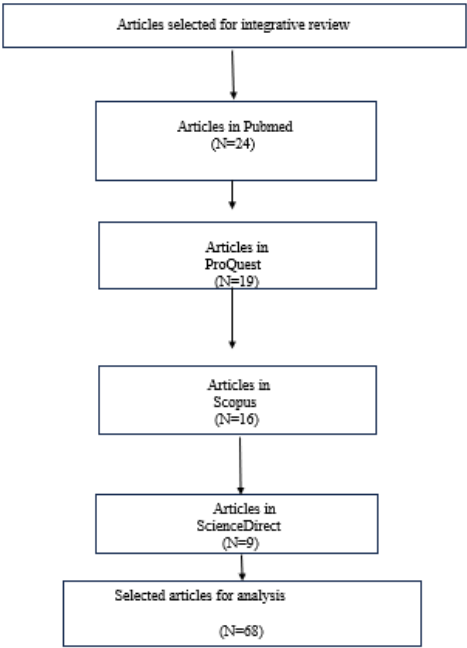


Figure 3. Flowchart by databases

Source: Databases of the library of the University of Córdoba – Colombia

Structural and intermediate determinants of health and their relationship with tooth loss

The socioeconomic and political context influences oral public health, constituent variables of structural determinants. In this way, they collectively affect the conditions of the health-disease process. In turn, the intermediate determinants; such as socioeconomic status, biological, behavioral, and health care services [8,10], influence individually, promoting the conditions for tooth loss. In this sense, the negative impact of these determinants is reflected in the social inequalities of socio-political and economic systems with large gaps in social structures, generating inequities in health [26].

When performing an analysis between socioeconomic position and health status, three important theories emerge: The theory of social causality [27], which determines that people from the highest socioeconomic groups are exposed to favorable social determinants of health, which can lead to better health in adulthood. Conversely, people from lower socioeconomic groups may be exposed to unfavorable conditions that increase the risk of disease in the elderly. On the other hand, the theory of health selection [28]; which determines whether people move up or down the socioeconomic hierarchy. The third theory; Indirect selection [29], includes factors such as genetic endowment, behaviors, and lifestyles.

In this way, the scientific support of the coexistence of social causality and the effects of health selection is evidenced, but with a more dominant position of the theory of social causality, determined in the socioeconomic position [26,30].

However, in the face of the need to establish direct action on the determinants of health, it is imperative that global health promotion and prevention policies decisively encompass global, national and regional interventions that assess the impact of social and economic inequalities[31]. Therefore, government commitments must be made to cross-sectoral policies that reduce the pathways that lead to inequalities, such as excluding some financial barriers to accessing oral health benefits [32].

However, there is a set of connections between the structural and intermediate determinants of health, which modify social conditions, lifestyles and work contexts, which can translate into economic, social and oral health inequalities [33]. Precisely, Guarnizo-Herreño et al., in research on adults from England, Wales and Northern Ireland, showed that the paths to inequalities in oral health could be unintelligible and also socioeconomic position does have a direct effect on oral health. Hence, the need to generate State policies that address the unequal distribution of financial resources, and to reflect on the possibility of improving inequities in oral health [10].

Different epidemiological studies have confirmed the significance of the economic contexts of nations and the impacts generated by State and Government policies on economic systems, with the application of macroeconomic policies, and the repercussion of the structural economic determinant on tooth loss [5].

In another study conducted by de Souza et al., 603 people from 357 households were evaluated and it was estimated that the average number of missing teeth was 11.2 and 27.4% of individuals had lost more than 20 teeth. That is, they had non-functional dentition while 12.1% were completely edentulous [32], associating tooth loss with contextual territorial factors related to the primary health service, demographic, behavioral, and socioeconomic characteristics such as per capita income, poverty index, Gini index of per capita income, and extreme poverty status [34].

Understanding the variability of environments in which older adults find themselves, and the risks to which they are exposed, is a priority to study in a comprehensive and integrated way the causes of tooth loss in this population group. Hence, the importance of its hierarchical approach in relation to structural, intermediate, proximal and even commercial determinants. Consequently, to be able to achieve an articulated mechanism, in which one determinant positively influences another, giving a cascade effect on social gradients [26].

Socio-behavioral risk factors for tooth loss

Socio-behavioral risk indicators such as low educational attainment, negative attitudes and behavior toward life, beliefs, and cultural values are relevant when addressing tooth loss [35]. Similarly, marital status, experience of caries, smoking, high sugar consumption, excess of alcoholic beverages, irregular visits to dental consultations, time elapsed since the last dental

visit, self-perception of the need for dental treatment, greater access to information, health education, and poor oral hygiene habits influence tooth loss [36].

In a study by Nhan et al., [37] on the associations between the social determinants of health and some oral health behaviours; Like the Smoking Disorder, Alcohol Consumption and Utilization of Dental Care Services among the Older Adult Population in Thailand in 2015, it demonstrated among oral health-related behaviors that alcohol consumption is a significant independent parameter associated with social determinants of health. Concomitantly, oral conditions manifest patterns of social behavior, reflecting relationships of inequality and affecting the quality of life among population groups of older adults [38,39].

Tooth loss and sociodemographic status

Living in dispersed or rural geographic areas limits the accessibility and affordability of dental and medical services. In the same way, The spatial dimension encompasses a series of demographic, cultural and cultural attributes and specific oral health needs, which have a special value in old age and have an impact on health outcomes [40].

Conditions such as living alone or living with more than five residents per household, social relationships without adequate psychosocial support, and low education of the elderly, are factors for dental loss, due to the high prevalence of neglected oral diseases, and systemic diseases with regular or no treatment [13]. This phenomenon, of geographical dispersion, is tangible in some Latin American countries and especially in Colombia, in which the provision of oral health services is segmented and fragmented, with oral health benefit plans offered in a high percentage with insufficiency, without access to technologies, without scientific development and with dental materials in inadequate conditions for their use. affecting the optimal quality and relevance of dental treatments [31,41].

When interacting with the demographic context, the physical aspect and environmental determinants of health are analyzed, which influence the needs of the territories in which older adults transcend, such as water scarcity, climate change, and environmental pollution, among others [42].

The sex difference is a variable associated with tooth loss in older adults, due to biological plausibility, financial income and educational background [43,44]. According to Park et al., [11] in the study on edentulous disparities among the geriatric population according to sex difference in South Korea, it was shown that being a woman is a limiting factor for tooth loss.

Race, which is immersed within the biological approach, but also has a dynamic historical context and the construct of power relations, which is manifested in racial inequities [45]. That is, being of one type of race influences access to oral health services, either by their position or social status, by having influences in positions of power and education. On the contrary, other types of races present restrictions on economic and labor income, restricting civil rights that undermine the conditions of a dignified life in an old age that is considered to be healthy [44].

Ethnicity, as well as distinction in races, are conditions that predispose to receive optimal dental care, turning dental consultation and procedures into rational segregations for clinical decision-

making that must be assertive and fair [46]. For example, in some regions of the world, in the 21st century, the condition of being black or belonging to an ethnic group still interferes with dental treatment plans, in which non-preserving treatments such as dental extractions are suggested to these racial groups. While to other racial groups, like whites, under the same clinical conditions, they are proposed more conservative treatments and oral rehabilitation [47,48]. Consequently, there is a need to dismantle dental racism and equitably distribute access to oral health procedures, offering dental services on equal terms will reduce any type of discrimination, providing a comprehensive solution from the social determinants of health [49].

Tooth Loss and the Economy

Socioeconomic inequalities are significant in most countries of the Organization for Economic Cooperation and Development (OECD), which denotes a difference in visits to the dentist of almost 20%, between high- and low-income groups [50]. Colombia joined this organization in 2020, and presented public spending on health financing with 72% between government transfers and social security contributions, with health spending of 7.6% of GDP, in contrast to other countries such as the United States that spent 16.8% of Gross Domestic Product on health. Germany with a GDP of 11.7% and countries such as France, Canada, Japan and the United Kingdom, which spent more than 10% of their GDP on health services [51].

The economies of nations have a decisive influence on the financial investment they make in health, countries with strong, stable economies manage to transcend health systems with high coverage, accessibility, quality, advances in care, with technological tools and integration of community primary care with other levels of health [34,52]. Thus, the recommended scenario for Latin American and developing countries is to combat poverty levels and eradicate extreme poverty, in order to achieve solid economic growth that supports the growth of health spending [53].

According to Li and Yao, in the research conducted in China on economic disparities in dental health in older adults [54], it was evident that there are marked differences in the costs of care between economic income groups and the use of dental care in older adults, with notable high financial burdens to access dental procedures that are not covered by their health system. Therefore, the influence of high income to prevent and treat oral diseases and thus avoid the final burden of these pathologies such as dental loss is consistent, with the low income factor being a significant predictor for edentulism [55,56].

It is proposed that macroeconomic strategies encourage countries to increase labor production and high economic incomes for citizens and that, in addition, these financial returns have an impact on pension systems so that older adults enjoy the power to acquire comprehensive and quality dental services [57].

Proximal determinants for tooth loss

Oral health could contribute to the development of systemic diseases, due to the direct displacement of bacteria and toxins from the mouth to other organs of the body, among these pathologies are documented, causal associations with bacterial endocarditis, respiratory diseases,

osteoporosis, cancer, rheumatoid arthritis, kidney disease, diabetes, high blood pressure. In addition, some pathologies have a more direct relationship at the pathophysiological level, such as Alzheimer [58,59,60,61,62,63,64].

In relation to the above, it should be mentioned the existence of a double hypothesis, where it is established, which disease is decisive for the appearance of the other, that is, which is first. Some researchers propose that it has been the effect of systemic pathology on the mouth, and others defend the hypothesis that there is a contrary direction, in which oral pathology predisposes systemic disease[65]. However, there could be a bidirectional association between the underlying systemic diseases and the oral pathologies that act as determining factors for tooth loss [66].

Among the most representative proximal determinants in dental health for tooth loss are poor oral hygiene habits, which produce oral diseases such as; Tooth decay [67], gingival and periodontal diseases. Oral cancer with the risk factors of smoking and alcohol consumption. Therefore, these proximal determinants weaken the periodontal support structures, generating tooth mobility and tooth loss [38].

Poor nutritional status in older adults behaves as a predictor of tooth loss, and is a proximal element to generate conditions for dental caries and periodontal diseases. In such a way, diets with high levels of refined sugars, fermentable carbohydrates, and deficiency in the consumption of vegetables and fruits, influence the meagre absorption of vitamins and minerals, which are essential for general and oral health[15,34,68].

Public health worldwide is influenced by the food industry, which behaves as commercial determinants of health; this is due to the production of foods high in sugars that cause diseases at the systemic level and in the oral cavity. However, this commercialization of products generates high economic dividends, commercial and political power that can intervene controversially on health systems and even influence organizations in charge of ensuring global health [6].

3. Conclusions

Socio-political contexts, government institutions, and state policies are interrelated [8,10,26]. The structural determinants of inequality in oral health play a preponderant role in the adequate performance of health systems and oral health subsystems [33].

Tooth loss stands out as a decisive factor in exacerbating oral health inequality [26,35]. The health risks that forge the social determinants of health and that interact with each other converge in the appearance of systemic diseases and comorbidities that deteriorate the health of older adults and exponentially explain health inequities [52,34].

The various epidemiological studies shared in this integrative review are related to intermediate variables such as age, sex, behavioral and psychoaffective conditions that are also directly related to tooth loss [11,40,36,37,38,39].

There is a relationship between tooth loss in older adults and the determinants of health, where various variables are involved that lead to adverse and negative conditions in the development of multiple diseases of systemic and dental origin. Different studies determine that there is a cascade effect in social gradients, when they are subjected to inequalities that generate inequities in the different areas or environments of the human being. Edentulism is the result of the sum of unfavorable elements immersed in the social determinants of health.

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