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Oral Health and Planetary Health: The Interconnection Between Nutrition, Environment, and Oral Health

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The Planetary Health concept highlights the critical connections between human health, ecosystems, and the environment. By addressing the root causes of health challenges – such as climate change, biodiversity loss, and pollution – it offers a transformative framework for safeguarding both population health and the planet's future.

The Planetary Health concept stems from evolving approaches to public and environmental health. It integrates the close connections between human health, the environment, and ecosystems, emphasizing how disruptions to natural systems impact human health – such as climate change, biodiversity loss, and pollution. Historically, global health efforts focused on combating infectious diseases and improving worldwide healthcare. Over time, this perspective expanded to include the One Health approach, which connects human health, animal health, and ecosystems (OHHLEP, 2022).

In the 2010s, as the impacts of climate change, pollution, and biodiversity loss increasingly affected human health, the concept of Planetary Health emerged. Formulated in 2015 by The Lancet Commission on Planetary Health (Whitmee, 2015), this framework goes beyond One Health by incorporating a systemic approach: human health directly depends on the condition of ecosystems and natural resources. This integration calls for cross-sectoral policies to safeguard both population health and planetary health (Gonzalez-Holguera, 2022).

The erosion of natural ecosystems and the rise of chronic diseases demand an integrated approach, with oral health recognized as a vital indicator of global well-being. Although often treated separately, oral health plays a crucial role due to its links with diet, product usage, and environmental change (Fisher, 2024). Oral health is a key marker of overall health, directly influenced by lifestyle changes and food systems. However, its environmental impact – especially concerning resource consumption and waste – is often overlooked (Martin, 2024).

The Role of Oral Health in Planetary Health

Oral health is a cornerstone of global health, with significant implications for Planetary Health. Research increasingly links the oral microbiome, nutrition, and systemic diseases (Bourgeois, 2022). Oral diseases, including periodontal disease, are associated with higher risks of systemic conditions such as cardiovascular disease, diabetes, and other chronic inflammatory disorders (Sanz, 2022; Genco, 2020).

These conditions share common roots in dietary habits, industrial practices, and consumption patterns that directly impact the environment. Diets high in sugars and ultra-processed foods exacerbate oral health problems, underscoring the need for sustainable dietary practices that benefit both individual health and the planet (Cascaes, 2022).
Sustainable agricultural practices promoting diverse, environmentally friendly crops play a crucial role. A shift towards plant-based, biodiverse, and organic diets, such as those featuring ancient grains and legumes, benefits both oral health and environmental sustainability (Inchingolo, 2024). These diets support a balanced oral microbiome, reduce meat consumption, and decrease greenhouse gas emissions. In addition to the health benefits, these practices offer substantial environmental advantages, particularly in terms of reducing ecological footprints (Dixon, 2023).

The Oral Microbiome and its Systemic Implications

The oral microbiome, as an extension of the gut microbiome, plays a critical role in oral health and the management of systemic diseases (Rajasekaran, 2024). Diets rich in antioxidants, such as fruits and vegetables, along with essential nutrients like omega-3s, polyphenols, polyunsaturated fatty acids, and probiotics, promote a more diverse and resilient oral microbiome. This can help reduce the risk of periodontal disease and cavities (Santonocito, 2022; Pytko-Polończyk, 2021). For example, green tea consumption has been shown to decrease the growth of Porphyromonas gingivalis by 30% (Paczkowska-Walendowska, 2025).
Environmental factors such as air pollution and climate change can also disrupt the balance of the oral microbiome. Pollutants like ultrafine particles (PM0.1) have been shown to affect oral microbiota, promoting inflammation, particularly in children (Gupta, 2022). Climate change may also create conditions favorable for the proliferation of pathogenic bacteria in the mouth. Areas experiencing global warming could see a 15% increase in periodontal disease risk due to the optimal conditions for certain oral bacteria (Lin, 2021).

The Importance of Sustainable Diets for Oral and Systemic Health

Adopting sustainable diets that emphasize organic, plant-based, and antioxidant-rich foods, while also managing environmental factors, can prevent oral microbiome disruption and reduce the risk of systemic diseases (Martinon, 2021). A plant-based diet promoting a balanced oral microbiome can reduce the risk of bacterial migration to other organs, exacerbating systemic inflammation, especially in cardiovascular diseases. Diets such as vegetarian, vegan, and Mediterranean offer beneficial approaches to improving oral health, partially due to the absence of saturated fats and animal products.

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These diets, rich in fruits, vegetables, legumes, nuts, and seeds, reduce gingival inflammation by neutralizing the free radicals responsible for oxidation and inflammation (Augimeri, 2024). Furthermore, they have a positive environmental impact by lowering meat consumption and promoting sustainable food choices, thus contributing to global planetary health. Incorporating foods from dietary biodiversity, particularly those high in fiber, cruciferous vegetables, and colorful fruits, has also been shown to reduce cancer risk (Mentella, 2019). Their antioxidant and anti-inflammatory properties help protect against cancers by inhibiting cell proliferation and promoting the elimination of cancer cells.

Challenges and Considerations

Despite the benefits, some studies suggest that vegetarian diets may increase the risk of dental erosion (Smits, 2020). Comparative studies have also shown that plant-based products may not be as effective as dairy products in maintaining healthy teeth (Shkembi, 2023).
In terms of environmental benefits, the rise of edible insects as a sustainable protein alternative has gained attention. According to EU Food Regulation (EU) 2015/2283, insects are now recognized as a potential food source. Incorporating alternative proteins and omega-3 fatty acids from such sources can support oral tissue regeneration and reduce gingival inflammation (Mazur, 2025).

Conclusion

Integrating oral health into the broader concept of Planetary Health represents a critical shift in how we approach public and environmental health. The discussions and findings presented in this paper underscore the interconnectedness of human health, food systems, professional practices, and public health policies. It is becoming clear that oral health issues must not be treated in isolation from environmental and societal challenges. Understanding the oral microbiome and its links to systemic diseases opens the door to new prevention strategies based on sustainable nutrition and reduced consumption of ultra-processed foods. Ultimately, oral health must be incorporated into a global, sustainable framework, where prevention, education, and scientific innovation converge to create a healthier future for both individuals and the planet.

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