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# Now is the time to take gum disease seriously

A roadmap for improving oral health  
in the United States



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# About this report

*“Now is the time to take gum disease seriously: A roadmap for improving oral health in the United States”* is an Economist Impact report that is supported by Procter & Gamble. Centered on the insights of extensive research and expert interviews, the report focuses on the prevalence of gum (gum) disease, its risk factors and impact, definitions of best practices to prevent gum disease, and steps to improve prevention. We have concentrated on opportunities and challenges in the US, with some lessons learned from other countries. The research program incorporated a literature review, extensive desk research and live interviews—interviewees are listed below. The interviews complemented the other research and also offered us an opportunity to dive further into key areas of gum disease. We would like to thank the following individuals for sharing their insight and experience as interviewees:

- **Melissa Burroughs**, associate director for strategic partnerships at Families USA
- **Manuel Cordero**, executive director and CEO of Hispanic Dental Association, and a private practice dentist
- **Mary E Foley**, executive director for Medicaid/Medicare/CHIP Services Dental Associations
- **Sarah Bedard Holland**, CEO of Virginia Health Catalyst
- **Purnima Kumar**, professor of dentistry and chair of the Department of Oral Medicine at the University of Michigan School of Dentistry
- **Pamela Maragliano-Muniz**, prosthodontist, chief editor of Dental Economics, lecturer
- **David Okano**, associate professor at University of Utah School of Dentistry, president-elect of American Academy of Periodontology (AAP)
- **Panos Papapanou**, professor in the College of Dental Medicine at Columbia University, director of the Division of Periodontics
- **Chris Richardson**, Immediate Past President AAP
- **Tim Ricks**, general officer of US Public Health Service, US assistant surgeon general
- **Marko Vujicic**, chief economist and vice-president of the American Dental Association’s Health Policy Institute

Economist Impact bears sole responsibility for the content of this report. The project team consisted of Michael Guterbock, Neeladri Verma, and Roshni Chagan, and the report was copy edited by Paul Tucker. The findings and views expressed in the report do not necessarily reflect the views of the sponsor or interviewees.

# Executive summary



Gum disease is a serious but often overlooked health issue in the US. Despite its profound health implications, self-awareness among adults in the US is low. Gum disease is highly preventable, despite its seriousness and wide reach. Everyone, from dental professionals to individuals to advocacy groups, can take concrete actions to prevent gum disease. The role of home care, in prevention or in partnership with a dental professional to restore health, is of paramount importance, especially for preventing gingivitis and periodontitis.

For several reasons, there is a strong case for the early and widespread prevention of gum disease. In its early stages, gum disease is reversible, but once it progresses, it leads to tooth loss and other serious ailments. Furthermore, access to dental care in the US is surprisingly low and deeply inequitable. Many individuals lack access to dental care based on income level, health insurance status, racial or ethnic background, immigration status, age, or location.

Perhaps the best reason for early intervention is the economic burden gum disease causes to affected individuals and the US health system at large—the annual cost of untreated gum disease is an estimated US\$154bn. Proper gum disease prevention could save billions of dollars in medical costs each year. Luckily, there are many policies that can help to prevent gum disease, some developed in the US and some originating from other countries.

The management of gum disease requires a strong awareness of the social determinants of health, as they are a crucial concern in the care and prevention of oral disease. This is even more important considering oral health and overall health are much more interconnected than is often assumed. The importance of education on preventing gum disease also cannot be overstated and is outlined in this report.

The major takeaway from this research is that gum disease is highly preventable through a combination of appropriate policy design, gum disease prevention education, proper tooth care by individuals using home care prevention techniques (such as tooth brushing, interdental brushing, and use of fluoridated antibacterial toothpaste and mouth rinses) and strong efforts from dental professionals to promote prevention. The social and monetary costs of gum disease are too large to ignore, and gum disease prevention must be moved higher in the healthcare priority hierarchy.

# Introduction

Oral health is essential to overall health and wellbeing and significantly contributes to quality of life. Good oral health provides the ability to freely eat, smile, speak and interact with others, and helps to ensure freedom from dysfunctional conditions or pain that can interfere with normal functioning.<sup>1,2</sup>

Oral diseases are a largely preventable yet significant public health concern that affect about 3.5bn people worldwide.<sup>3</sup> Gum diseases and tooth decay are the most common forms of disease worldwide. They are chronic and progressive and are caused by the accumulation of dental plaque biofilm.<sup>4</sup> In the US, an estimated 42% of adults are affected by some form of gum disease, with significant disparities affecting some population groups.<sup>5</sup>

Untreated gum diseases often result in missing teeth, negatively impacting nutritional intake and leading to deficiencies, especially in older adults. The long-term inflammation related to gum disease has been associated with heart diseases, rheumatoid arthritis, worsened glycemic control among people with diabetes, an increased risk

of preterm birth and increased cognitive decline in patients with Alzheimer's. As such, improving gum health could help to counter these medical conditions.<sup>6,7</sup>

This study captures the gum care landscape in the US, identifies evidence around policies and practices that link to better gum health outcomes, and provides relevant considerations to develop an enabling environment associated with gum health.

Ultimately, this study has five key aims:

- Evaluate the prevalence of gum disease, its risk factors, its impact and the existing care pathway
- Build the economic case for the prevention of gum disease
- Review current oral health-related policies in the US
- Recognize best practices
- Identify the steps to create an enabling environment associated with gum health and develop a roadmap

# Chapter 1: What is gum disease and why is it important?

Gum disease is an important public health issue in the US. The US Department of Health and Human Services has designated gum disease as one of 42 health topic areas in its Healthy People 2030 initiative, which sets objectives to improve health and wellbeing among people in the US by 2030.<sup>8</sup> Yet awareness among adults in the US of their own risk of gum disease is low.<sup>9</sup>

Gum disease, or periodontal disease, results from the imbalance of bacteria in the mouth and inflammation of the gum and bone surrounding and supporting the teeth. In its early stages, gum disease presents as gingivitis, a reversible inflammation of the gums resulting in bleeding and swelling. If left untreated, this progresses to the advanced form of the disease known as periodontitis, characterized

by the gradual destruction of the teeth-supporting apparatus. It manifests as receding gums and loose gums around the root of the tooth, creating a gum pocket that gradually deepens, supporting bone loss, loose teeth or, in extreme cases, tooth loss (Figure 1). In addition to the destruction of the teeth-supporting apparatus, gum disease can also impact the digestive process. "Inability to chew food leads to a loss of nourishment, which impacts the digestive process," says Dr Chris Richardson, the past president of the American Academy of Periodontology (AAP). Furthermore, Periodontitis is a non-communicable disease (NCD) that shares social determinants and risk factors with major NCDs such as heart disease, diabetes, cancer and chronic respiratory disease.<sup>10</sup>

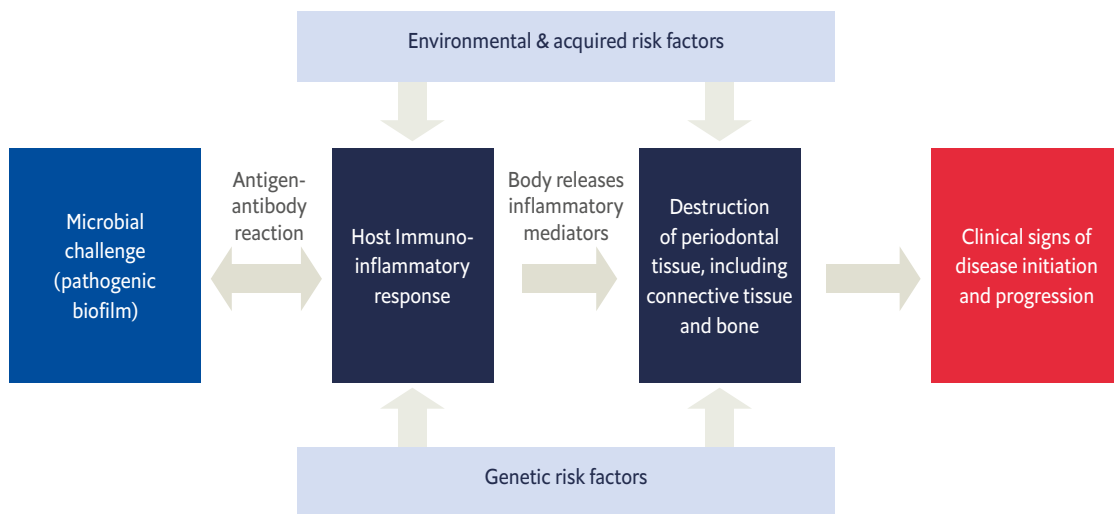
**Figure 1: Progression of gum disease**



Gum disease results from the interaction of several factors. Even though microbial dental plaque biofilm initiates the disease, additional factors, such as the individual’s inflammatory and immune responses, genetic susceptibilities, and other identified environmental and systemic risk factors like smoking, are associated with its clinical

manifestation, progression, and severity (Figure 2).<sup>11,12</sup> “The disturbance in the balance between good and bad bacteria present in the plaque biofilm in one’s mouth,” says Dr Purnima Kumar, chair of the Department of Periodontology at the University of Michigan. “And it’s built up to a level that is incompatible with health, triggers gum disease”.

**Figure 2: Origination and development of Periodontitis**

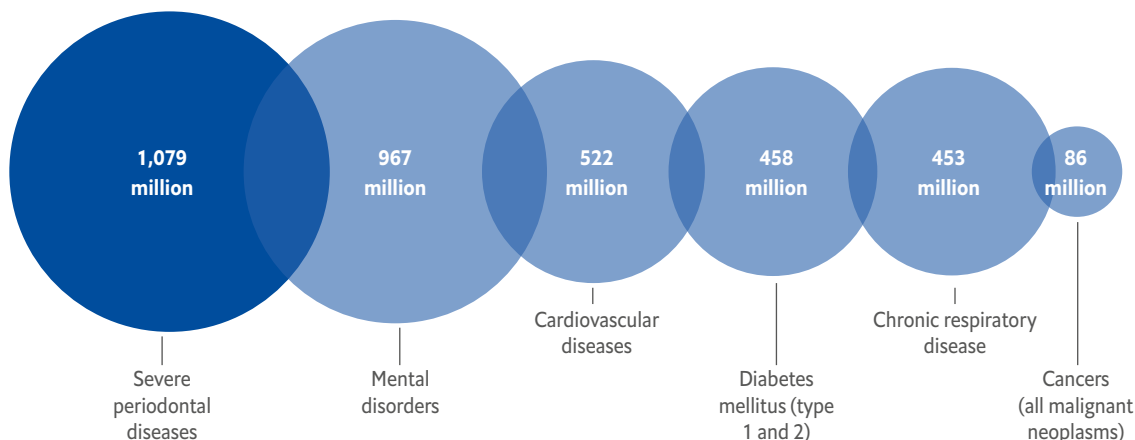


Source: Joerg Meyle, et al., Molecular aspects of the pathogenesis of periodontitis. Periodontology 2000

Globally, approximately 19% of the world’s adult population may have severe periodontitis, equating to around 1.1bn individuals.<sup>13</sup>

The prevalence of moderate periodontitis has been found in up to 60% of the general population.<sup>14</sup>

**Figure 3: Comparison of estimated global cases for selected NCDs, 2019**



Source: WHO Global Oral health status report, 2022

## Overview of gum disease in the US

### Observed epidemiological trends in gum disease

Prevalence of periodontitis is high in the US—the condition affects almost 42% of the population aged 30 years old or older, with 7.8% having an advanced form of the disease.<sup>5</sup>

There are racial and ethnic disparities in the prevalence of periodontitis in the US, with Hispanic people (63.5%) reporting the highest number of cases, followed by non-Hispanic Black people (59.1%), non-Hispanic Asian Americans (50%), and non-Hispanic whites (40.8%).<sup>15</sup> Differences in the prevalence and severity of gum disease are also associated with socioeconomic factors, such as education and income. Studies have shown that people from socioeconomically disadvantaged backgrounds have poor gum health outcomes.<sup>16,17</sup> In the US the prevalence of periodontitis is twice

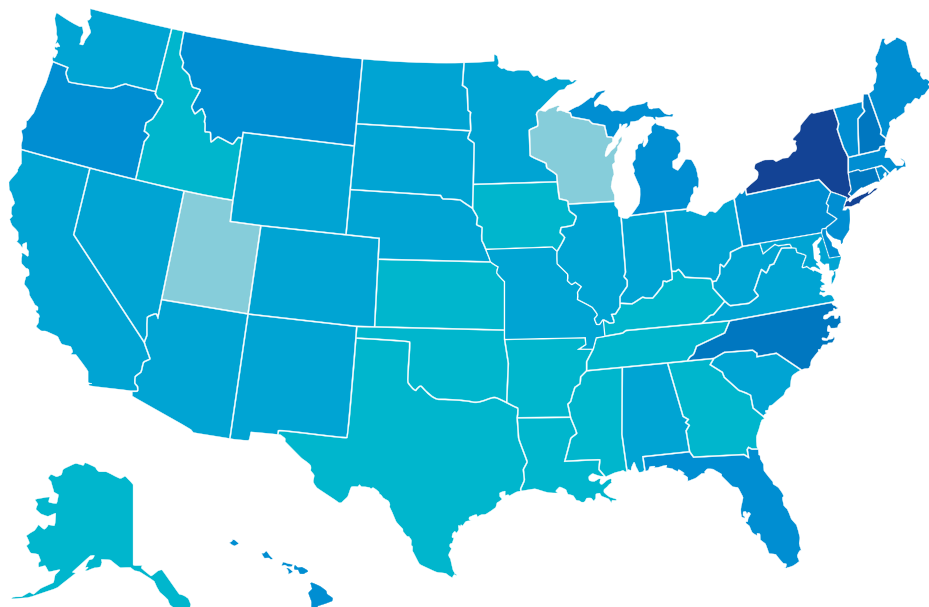
as high among those of the lowest socioeconomic status than those of the highest, whether defined by wealth or education.<sup>15</sup>

Reflecting global trends, the prevalence of periodontitis is higher among older people, affecting approximately two-thirds (68%) of people aged 65 years and older who have teeth, of whom 11% suffer from a severe form of the disease.<sup>18</sup>

Geographically, there is also a clear variation in disease prevalence in the US. Utah has the lowest prevalence of periodontitis at around 10,167 cases per 100,000 population. In contrast, New York shows a significant disease burden with the highest prevalence rate of about 17,229 cases per 100,000 population. Other regions with a high prevalence rate of more than 13,500 per 100,000 population include east coast states such as North Carolina, Connecticut, New Hampshire, Maine, Vermont, Florida and Massachusetts (Figure 4).<sup>19</sup>

**Figure 4: The prevalence of periodontitis per 100,000 population by states in the USA, 2019**

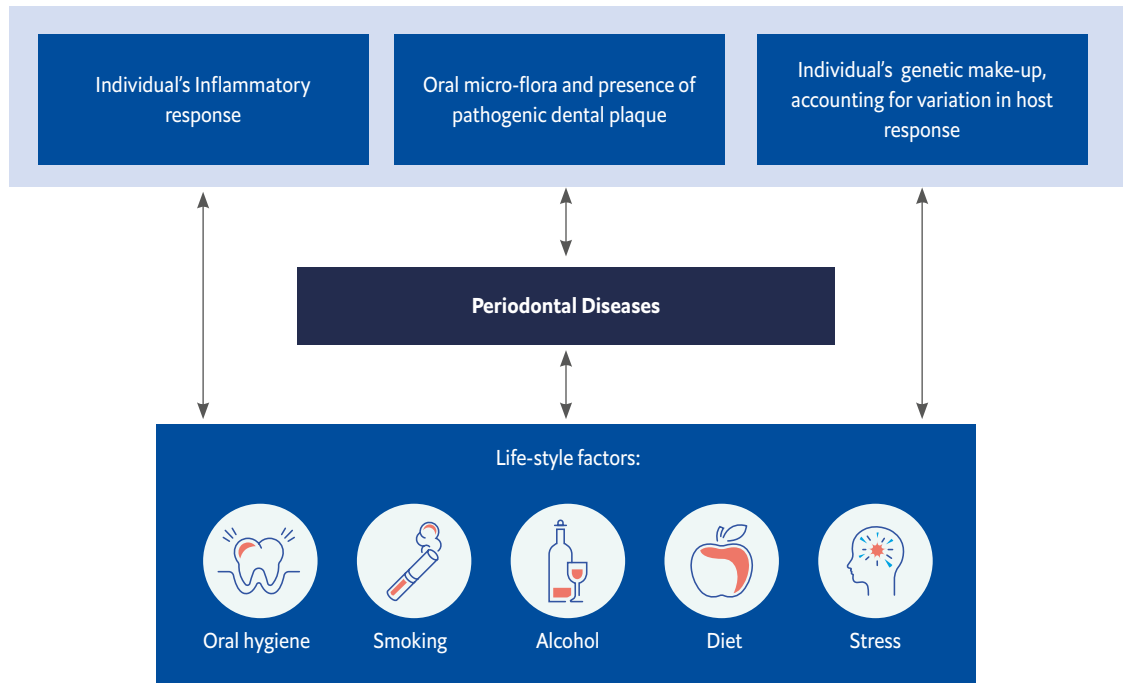
10,166.76 cases per 100,000 population  17,228.7 cases per 100,000 population



Source: IHME data.



**Figure 5: Factors responsible for gum disease**



Source: Adapted from A. Akcali et al., Periodontal diseases and stress: a brief review. Journal of Oral Rehabilitation 2012.

**Risk factors associated with gum disease**

There are multiple risk factors for gum disease, the most obvious being poor dental hygiene: plaque biofilm, a colorless bacterial layer that initiates gum disease, forms on the teeth as a result of poor oral hygiene practices.

Yet the drivers of gum disease go well beyond poor hygiene. Lifestyle factors, such as smoking, alcohol and stress, are commonly associated with the disease, for example.<sup>20</sup> Gum disease is also linked with metabolic and hormonal conditions such as diabetes, obesity, hormonal changes in women and certain medications.<sup>21,22</sup> Dietary factors, such as calcium and vitamin D, impact bone health and, thus, gum disease progression. 20 Factors such as age, gender, genetics, race, and the presence of some immunosuppressive conditions (HIV/AIDS, for example) and some systemic conditions (such as osteoporosis) also

influence the disease outcome.<sup>22</sup> In addition to these, local factors such as defective fillings, abnormal teeth features and mal-positioned or crowded teeth lead to high plaque biofilm and tartar deposition levels.<sup>23</sup>

**The impact of gum disease on individuals**

Early-stage gum disease (better known as gingivitis) is reversible and limited to superficial gum inflammation that presents as bleeding and swelling. But gingivitis, if not managed, can progress to periodontitis, a more profound gum inflammation that destroys the supporting soft tissue, ligament and bone that holds the teeth. Periodontitis is irreversible and often leads to pain, pus discharge, bad breath, loose teeth and eventual teeth loss.<sup>24</sup>

The impact of gum disease is not confined to the mouth. For example, periodontitis negatively

impacts the quality of life, speech, nutrition, confidence and overall well being.<sup>25</sup> The impact of poor oral health on food selection and nutrient intake can lead to malnutrition and, consequently, frailty.<sup>26</sup>

Gum disease can also cause difficulties in one's social life because of bad breath and the impact on physical appearance.<sup>27</sup> "The social consequences of periodontal disease are just as great as the physical ones, especially when one's ability to get a job can be impacted by the way teeth look or breath smells," says Dr Tim Ricks, general officer of the US Public Health Service and Assistant Surgeon General. Bad breath due to periodontitis has been recognized as a "social complaint" because of its effects on one's social life.<sup>28</sup>

#### The link between gum disease and other systemic conditions

As well as being impacted by other conditions, gum disease can also impact how certain systemic conditions manifest. For example, periodontitis is a reported oral complication of diabetes.<sup>29</sup> Susceptibility to periodontitis is increased approximately threefold in diabetic patients, and controlling diabetes is a preventive measure that people can take to reduce the risk and severity of periodontitis.<sup>30</sup> Prevalence and severity of non-oral diabetes-related

complications, including retinopathy, diabetic neuropathy, and cardiovascular complications, correlate with periodontitis severity.<sup>30</sup>

Cardiovascular disease is another chronic disease associated with periodontitis.<sup>31</sup> People with gum disease have two to three times the risk of having a heart attack, stroke or other serious cardiovascular event compared to those who reportedly do not have gum disease.<sup>32</sup> For better management of cardiovascular diseases, patients must be aware that gum disease may aggravate their condition, and gum examination should occur as part of their ongoing management.<sup>31</sup> Studies also show that patients with advanced gum disease may be more likely to develop cognitive impairment. Individuals with cognitive decline, as seen in Alzheimer's disease, may present deficits in self-care and oral hygiene, leading to a higher incidence of periodontitis in these patients.<sup>33</sup> Periodontitis is also a known risk factor for preterm birth and low-birth-weight babies. Studies show that mothers with gum disease are more likely to give birth early and deliver smaller babies than mothers without gum disease.<sup>34</sup>

#### Access to dental care in the US

Inequity in access to quality oral healthcare is a significant issue for certain sections of US society. Those impacted include low-income groups, uninsured individuals, people from racial/ethnic minorities, immigrants, the elderly and rural populations.<sup>35</sup> While there has been advancement in narrowing the oral healthcare gap for disadvantaged children over the past decade, the gap for others has either stayed the same or widened.<sup>35</sup> These access issues echo the higher prevalence of gum diseases experienced by relatively vulnerable populations.<sup>36</sup>

In the US, most rural areas have dental professional shortages, as the majority of periodontists practice in cities and suburbs.<sup>18</sup> The result is that more than 49m Americans live in places that are dentally underserved.<sup>37</sup> Only 24%



**"The social consequences of periodontal disease are just as great as the physical ones."**

Dr Tim Ricks, general officer of the US Public Health Service and Assistant Surgeon General



of adults in rural areas live within ten miles of a gum specialist, compared to 95% of adults residing within ten miles of a periodontist in urban areas.<sup>5,18</sup> Disparities factors such as lower incomes, low insurance rates and reliance on Medicare/Medicaid (which have limited dental coverage) exacerbate the prevalence of gum disease in rural areas.<sup>35</sup>

“Medicare coverage exists but is not very good,” says Melissa Burroughs, associate director for strategic partnerships at Families USA. “Many dentists in the US do not even see Medicaid patients, so they are not concerned with coverage changes here, but increased Medicare coverage means that patients will pay the Medicare rate [which is assumed to be less] ... Economic questions are a driving force for dentists between supporting Medicare versus Medicaid.”

People residing in rural areas also tend to neglect oral health because there is a lack of overall awareness of dental diseases, inadequate access to dental services and high tobacco consumption (a significant risk factor for gum diseases).<sup>20</sup>

Workforce shortages may also become a more generalized issue, as many practicing dentists in the US are near retirement age. In 2014 the estimated number of dentists needed to fill gaps in oral healthcare services as older dentists retire was over 7,200.<sup>37</sup> This number will have risen since.

Figure 6 describes the determinants of three key dimensions of access (financial, physical and acceptability of services) that have influenced inequality in access to dental services in relatively wealthy Organization for Economic Cooperation and Development countries, including the US.<sup>38</sup> Another barrier to access is insurance status.

Figure 6: Determinants of access to dental services

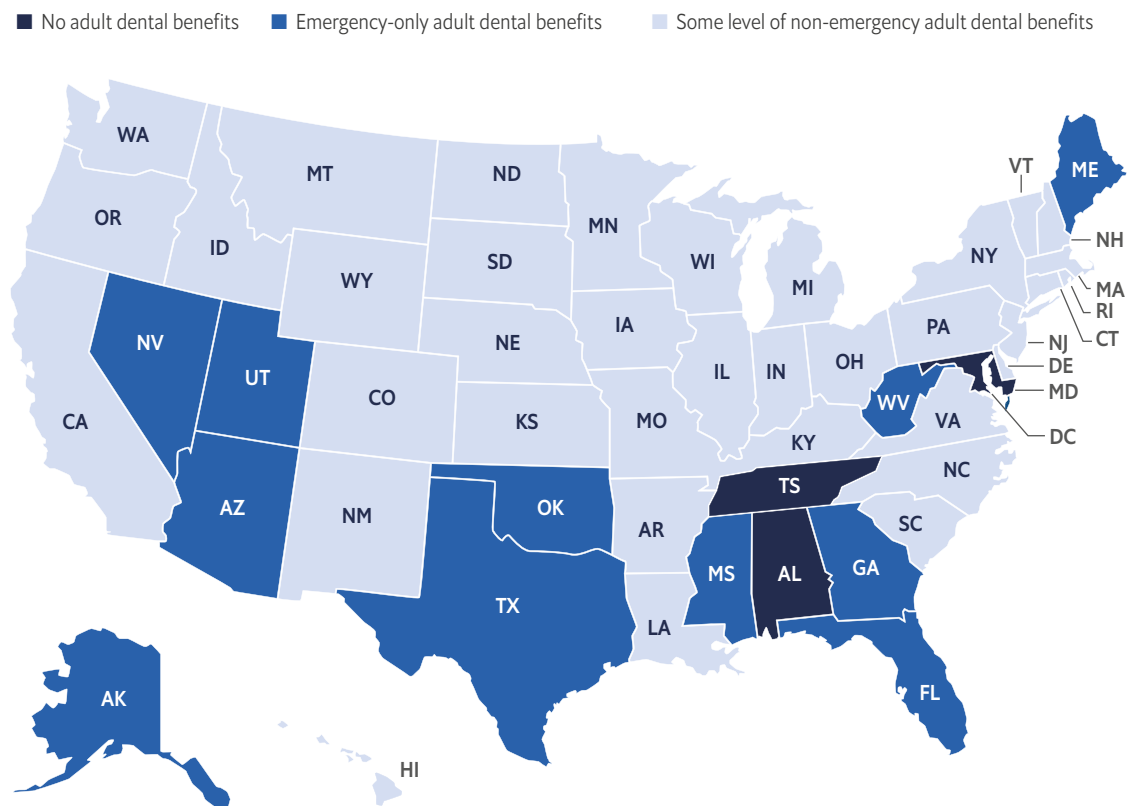
Dimensions of access	Main determinants	Sub-determinants
Acceptability of service	Family condition	<ul style="list-style-type: none"> <li>• Existence of an elderly member and/or child in the family</li> <li>• Families living in poverty</li> <li>• Race/ethnic minority/aboriginality of a family</li> <li>• Occurring pregnancy in the family</li> <li>• Member living alone</li> <li>• Education level of the whole family</li> <li>• Primary language spoken at home</li> <li>• Number of children at the shelter</li> </ul>
	Cultural factors	<ul style="list-style-type: none"> <li>• Fear of dental treatment or phobias</li> <li>• Oral health beliefs</li> <li>• Victimization</li> <li>• Poor oral health behaviors</li> </ul>
Financial	Health demands	<ul style="list-style-type: none"> <li>• Unmet oral healthcare needs</li> <li>• Health problems</li> <li>• Poor oral condition</li> </ul>
	Affordability of services	<ul style="list-style-type: none"> <li>• Income</li> <li>• Health insurance</li> <li>• Cost of services (out of pocket payment)</li> <li>• Medicaid and Medicare</li> <li>• Federal government's funding</li> </ul>
Physical	Availability of services	<ul style="list-style-type: none"> <li>• Oral health delivery system</li> <li>• Public coverage of dental services</li> <li>• Dentists visits/preventive care</li> <li>• Specialized treatment</li> <li>• Virtual dental home</li> <li>• Long waiting time</li> <li>• High proportion of dentists</li> <li>• Shelter based care</li> <li>• Access to oral hygiene products</li> <li>• Pensioners</li> </ul>
	Socio-environmental factors	<ul style="list-style-type: none"> <li>• Refugees</li> <li>• Immigrants</li> <li>• Disadvantages people</li> </ul>
	Geographical distance	<ul style="list-style-type: none"> <li>• Geographical access</li> <li>• Travel time</li> <li>• Using public transportation</li> <li>• Rural populations</li> <li>• Living in census areas</li> <li>• Living in the regions outside major cities</li> </ul>

Source: Arash Ghanbarzadegan et al., Inequality in dental services: a scoping review on the role of access toward achieving universal health coverage in oral health. BMC Oral Health. 2021.

Research shows that those lacking adequate insurance might avoid or delay vital dental care.<sup>39</sup> About 74m people in the US have no dental coverage.<sup>40</sup> As of 2019, 12 states only cover emergency dental services through Medicaid, while 34 states cover services beyond emergency care. Four states offer no dental benefits through Medicaid. Medicare also excludes most dental services for adults.<sup>39</sup> Dental service utilization among Medicaid beneficiaries is subject to the

availability of dentists who accept Medicaid coverage; as such, Medicaid beneficiaries are more likely to experience access barriers and have lower rates of use than those with private insurance.<sup>41</sup> Meanwhile, “cost” is the most common reason that younger adults avoid dental care.<sup>42</sup> More people report financial barriers to dental care than to any other form of healthcare, regardless of age, income level or type of insurance.<sup>42</sup>

**Figure 7: Scope of Adult Dental Benefits Covered by Medicaid as of September 2019**



Source: Center for Health Care Strategies Medicaid Adult Dental Benefits: An Overview Fact Sheet 2019 Sept.

Note. NH and DE: As of 2019, following legislation, New Hampshire and Delaware were transitioning towards offering some non-emergency dental benefits.

## Chapter 2: The economic case for prevention

There is a clear economic impact arising from gum disease. The economic impact of unmanaged gum disease can be broken down into three main costs: direct costs for treating or managing the disease, indirect costs associated with complications, and indirect costs associated

with productivity loss.<sup>43</sup> A recent European study underscores that effective prevention of gum disease could save billions of dollars in healthcare costs and lead to healthier lives.<sup>44</sup> “We are spending millions of dollars to treat gum disease, a disease that is preventable for nearly free if we start early enough,” says Manuel Cordero, executive director and CEO of the Hispanic Dental Association and a private practice dentist, who compares the difference between the cost of treatment and the cost of a toothbrush.

“Given the impact periodontal disease can have on other systemic diseases, the costs of not preventing it can be pretty enormous,” agrees Dr Kumar. “If this disease is not addressed promptly, it can result in loose teeth or teeth loss, thus eventually the loss of ability to chew, speak clearly, facial aesthetics, temporomandibular joint function; these issues require a higher level of treatment that is more costly.”

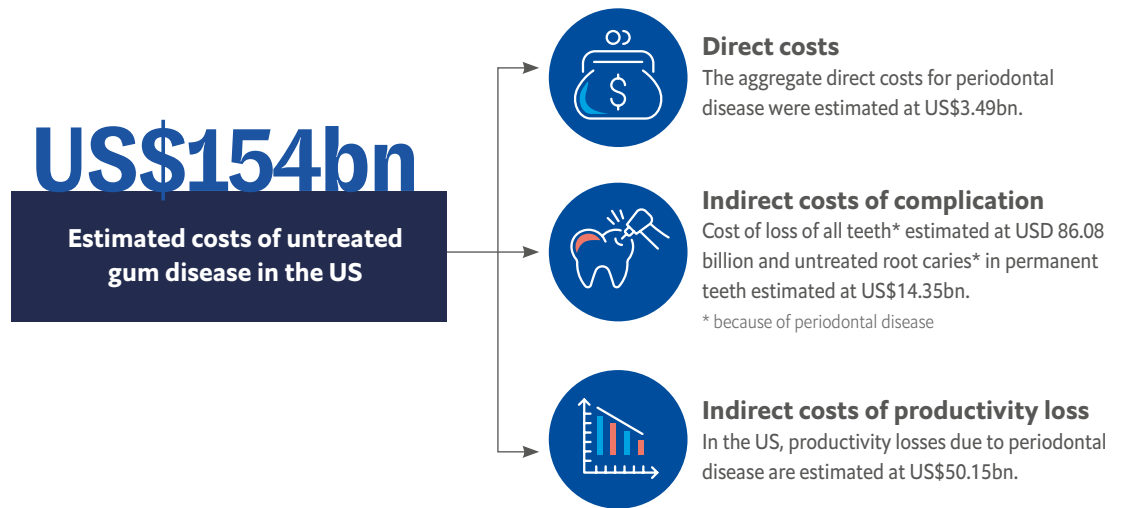
There are also secondary economic advantages to embracing preventive dental care. At an advanced stage, gum disease strongly affects the quality of life and productivity at work. Evidence highlights that severe tooth loss (67%) and severe periodontitis (21%) are the leading causes of global productivity losses due to dental diseases.<sup>45</sup>



**“If this disease is not addressed promptly, it can result in loose teeth or teeth loss, thus eventually the loss of ability to chew, speak clearly, facial aesthetics, temporomandibular joint function.”**

Dr Purnima Kumar, professor of dentistry and chair of the Department of Oral Medicine at the University of Michigan School of Dentistry

Figure 8: Estimated cost of untreated gum Disease in 2018 in the US



Source: Botelho J, Machado V, Leira Y, Proença L, Chambrone L, Mendes JJ. Economic burden of periodontitis in the United States and Europe: An updated estimation. Journal of Periodontology. 2022

Although preventive care is associated with more dental visits and treatments, overall treatment expenditure is lower.<sup>41</sup> Low-cost preventive services and community health programs are cost-effective and essential services for the most common oral health needs. Such care should be available for all segments.<sup>46,47</sup>

“An ounce of prevention is worth a pound of cure. If the patient can prevent it, it is much more impactful and avoids treatment. Prevention and therapeutic cleaning can keep disease away and

when those diseases are not kept away, patients get a more involved version of the disease,” says Dr David Okano, the current president of the AAP.

“There is lots of good work being done currently in lower socioeconomic settings on a community level,” says Dr Panos Papapanou, the director of the Division of Periodontics at Columbia University’s College of Dental Medicine.

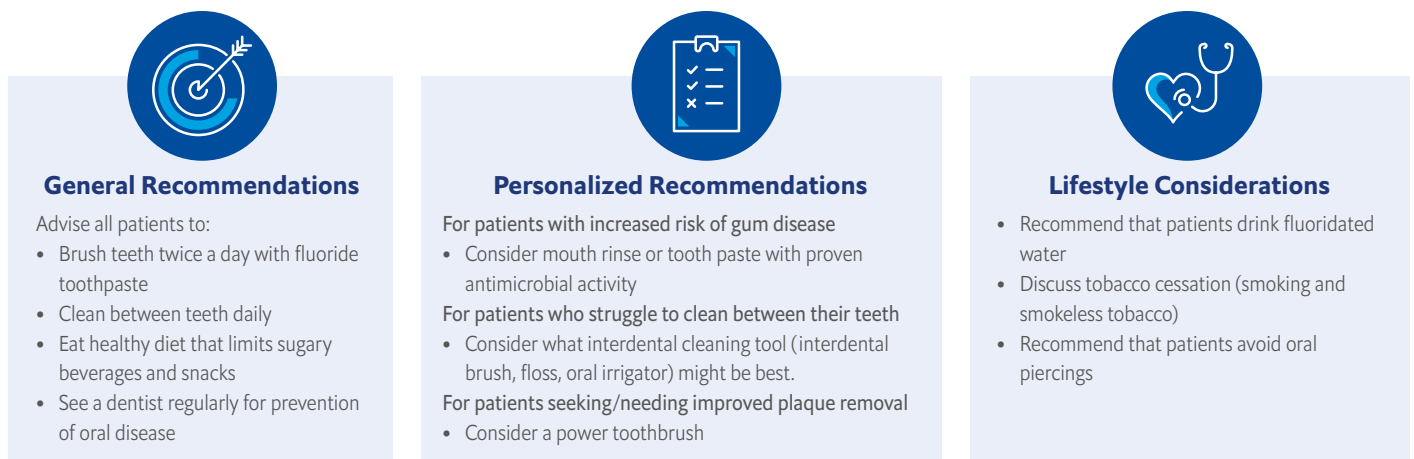
“However, we need to introduce a shift towards focusing prevention strategies for gingivitis in addition to just [tooth decay].”

# Chapter 3: Oral health policy: opportunities for a change

When it comes to gum health, certain best practices have yielded long-term and sustainable benefits in the prevention of periodontitis. Specific best practices include the prevention of tooth decay, treatment of gingivitis and paying attention to overall health. It is also imperative to better understand the overall burden of gum disease—by calculating the prevalence statistics through surveillance and using disability-adjusted life years (DALYs) as a measure of the burden of disease—and identify risk factors.<sup>48</sup>

An easy win is self-care. The American Dental Association recommends several self-care measures that dental professionals should recommend to patients to reduce the risk of gingivitis (Figure 9).<sup>49</sup> These include basic, regular tasks such as tooth brushing using anti-bacterial and antiplaque toothpaste, interdental cleaning using dental floss and interdental brush, and mouth rinsing with an antibacterial mouth rinse. However, the increasing prevalence of gum disease suggests that home-use practices are either not followed regularly or are not carried out effectively by most people.<sup>50</sup>

**Figure 9: Home care recommendations to reduce risk of gingivitis**



Source: American Dental Association.



### Existing oral health policy— understanding the federal focus on education, access, prevention and intervention

Oral health plans in the US exist on state and national levels. At the national level, as part of the Healthy People 2030 initiative, the Department of Health and Human Services aims to “improve oral health by increasing access to oral health care, including preventive services”.<sup>51</sup> Strategies to achieve this include interventions such as community water fluoridation, school-based programs for topical fluoride applications and health literacy promotion around preventive oral health steps. Many core objectives accompany the oral health goal of Healthy People 2030,

but many are still in the “baseline only” phase, meaning that there is only initial baseline data; longer-term data are needed to measure progress.<sup>8,51</sup> In addition to the core objectives, there are high-priority developmental objectives that have not been explored enough to garner reliable baseline data.<sup>8</sup>

### State-level approaches to oral health

On a state level, there is clear inconsistency. As of 2021, the CDC identified 28 states with active oral health plans, 19 states with no recognized plan, two states with health objective plans that touch on oral health and one state that was in the process of developing an oral health plan. None of the plans present an endorsement or recommendation. Many states focus preventative efforts on school-aged children and focused treatment efforts on adults. Education, access and prevention are recurring themes across many states’ plans, but different plans dictate different approaches to these themes.

Some but not all states identify education as a key point to improving oral health. Where plans do discuss education, they emphasize the importance of educating non-dental professionals, community health workers, families, providers, policymakers and children, although very few plans aimed to simultaneously educate all of these groups. States focused mostly on educating the patient population but differed in the specific patient population they were targeting. Some focus on educating school-aged children, whereas others focus on educating everyone, regardless of age. These education programs broadly focus on the importance of dental hygiene, the impact of oral disease and best practices for prevention.

States cite policy development and funding for stronger oral health infrastructures as avenues for increasing access to oral health care.<sup>52</sup> Many US states have recognized a severe lack of access to oral healthcare driven by





## Education, access and prevention are recurring themes across many states' plans, but different plans dictate different approaches to these themes.

both cost and local limitations in the number of dental professionals.<sup>53</sup> Yet although the number of dental professionals is important to consider, there are many moving parts to what accessibility of oral healthcare looks like. For example, Delaware has the lowest number of dentists per 100,000 people (39.6) in the US, yet the periodontitis prevalence rate of 45.9% is, though high, lower than the 50.1% reported in Washington DC, where there are 103.7 dentists per 100,000 people.<sup>54</sup> The difference is in the approach: Delaware's Oral Health Plan approaches oral healthcare with a focus on vulnerable communities, listing seven recommended actions.<sup>55</sup> On the other hand, Washington DC's oral health plan is still "in progress," according to the CDC.<sup>56</sup>

State plans take different approaches to access. Some, such as Maryland, aim to facilitate affordable and comprehensive access to the prevention and treatment of oral disease by changing public and private insurance policies, strengthening the dental workforce, and promoting coordination among dental professionals and other professionals.<sup>57</sup> South Dakota, meanwhile, has also focused on increasing access through insurance by increasing Medicaid coverage<sup>58</sup>, whereas Vermont has focused on access through financing systems.<sup>59</sup> New Hampshire has drafted a "sliding scale" fee that will charge the price of care according to one's income.<sup>60</sup>

Michigan, New Mexico and New Jersey, like Maryland, advocate for changes in public and private insurance policies to ensure comprehensive and affordable coverage and for strides in health literacy.<sup>61-63</sup> Their objectives include using the internet to promote messages about oral health, connecting with providers to use evidence-based prevention strategies and increasing oral health awareness activities through public schools.<sup>59</sup>

Among many approaches to improve the prevention of issues with oral health, some states emphasise methods of at-home care to prevent gum disease. These measures include brushing twice a day for at least two minutes with a soft bristle toothbrush, flossing daily, drinking plenty of water (especially fluoridated water), limiting sugar-sweetened beverages, foods and snacks, avoiding sticky foods, scheduling regular dental visits, and changing a toothbrush every three months or when the toothbrush bristles fray.<sup>64-67</sup>

Arkansas, Idaho, Indiana, Kansas, Louisiana, Maryland, Massachusetts, Missouri, Nevada, North Dakota, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, and Virginia have all emphasized the importance of prevention in reducing the prevalence of periodontitis.<sup>53,57-59,68-80</sup> Figure 9 below provides further insight into what prevention measures look like in each of these states. All states have set goals to implement some variation of the prevention measures listed above.

Figure 9: Home care recommendations to reduce risk of gingivitis

	Community Water Fluoridation	Dental Sealants	Education	Dental Screenings	Tobacco Cessation Programs	Mouth Guard	Fluorish Varnish
Arkansas							
Idaho							
Indiana							
Kansas							
Louisiana							
Maryland							
Massachusetts							
Missouri							
Nevada							
North Dakota							
Oklahoma							
Pennsylvania							
South Carolina							
South Dakota							
Tennessee							
Vermont							
Virginia							

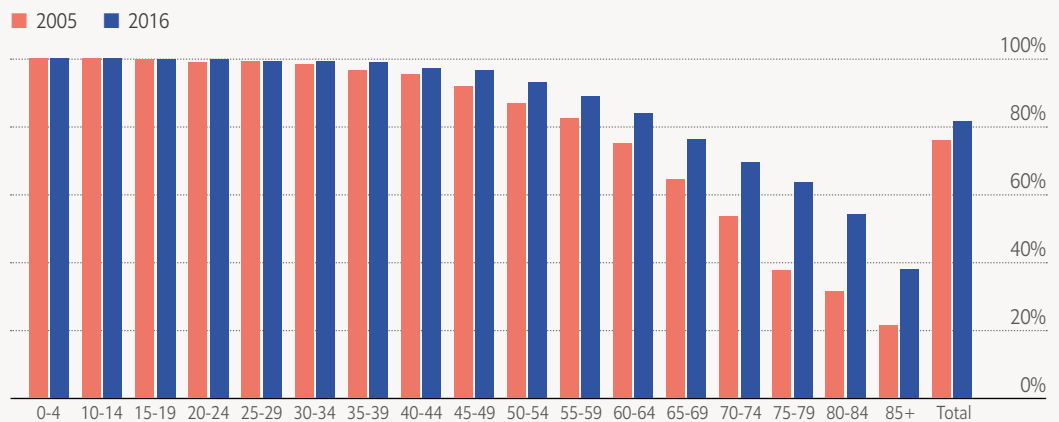
### National policy impact: Japan’s 80/20 oral health initiative

As part of a response to Japan’s ageing population, the 80/20 initiative was established in 2000 to motivate positive behaviors that would result in individuals retaining 20 or more teeth by the age of 80. This initiative encourages collaboration between local health authorities and dental associations to encourage positive oral care for older adult populations.<sup>81</sup>

The plan set the target that 20% of people aged 80 or above should retain 20 or more teeth and 50% of people that are 60 years old should retain 24 or more teeth.<sup>81</sup> Another goal highlighted in the plan was that the proportion of people suffering from advanced periodontitis at ages 40 and 50 should decrease by 30%.<sup>81</sup>

The 80/20 plan is supplemented by regulating dental visits for professional cleaning and regular health check-ups. The impact of 80/20 is seen as an improvement in oral health in Japan. According to the Dental Hygiene Survey conducted in Japan in 2016, 51.2% of 80 year olds had 20 or more teeth remaining.<sup>82</sup> Figure 11 compares tooth-retention statistics from 2005 and 2016, demonstrating the improvement in oral health outcomes.

#### Age-specific survival of permanent teeth in the Japanese population, 2005-2016



Source: E. Okamoto, Japan’s dental care facing population aging: how universal coverage responds to the changing needs of the elderly, 2021.

Japan also provides dental care coverage as part of its universal health insurance system and expands the scope to home dental care to accommodate elderly patients.<sup>82</sup> The utilization of home care services has increased steadily in recent years and is expected to grow further, reflecting the rising age of the population.<sup>82</sup>

#### Key takeaways:



A combination of advocacy, public awareness raising, and research can successfully promote positive behaviors that help people retain more teeth throughout their lifespan.



Comprehensive dental care coverage, including home care promotes dental care utilization especially among older adults.

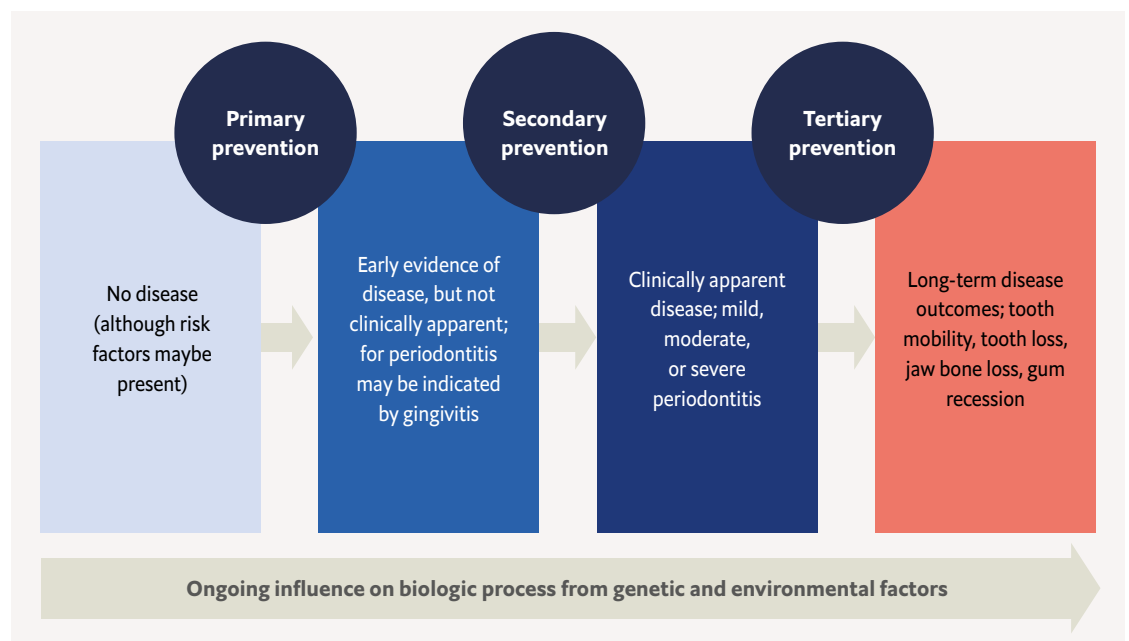
# Chapter 4: Identifying best practices, enablers and barriers to the adoption of preventative care to avert gum disease

## Prevention and management strategies

Gingivitis and periodontitis can both be prevented, treated and managed. Routine oral check-ups by dental professionals are paramount to diagnosing gum disease in a timely fashion. Even if gum disease is diagnosed at an advanced

stage, when destruction is mainly irreversible, treatment can halt its progression in most cases.<sup>83</sup> The progression of the disease can be checked at several points (Figure 11). In this section, we take a closer look at how prevention can be implemented across the process of disease progression.

Figure 11: Disease progression and the possibilities for prevention





### **Primary Prevention—before the development of asymptomatic disease**

The aim of primary prevention is to avoid the onset of disease by reducing the risk factors of plaque biofilm development and gum inflammation.<sup>84</sup> Primary prevention is both the most effective and cost-effective method of coping with gum disease and its complications.<sup>21,83</sup> Primary prevention mainly consists of communicating good oral hygiene practices to patients.<sup>85</sup> “Efforts that work well to address periodontal disease are surprisingly very simple,” says Dr Richardson. “The prevention of periodontal disease can be [achieved] through brushing twice daily and flossing appropriately.” Gum health education (that is, providing information on brushing technique, frequency of brushing, interdental cleaning methods, and use of antiplaque toothpaste and mouthwashes) should be started at a young age and reinforced regularly.<sup>23</sup>

### **Secondary Prevention—during asymptomatic disease**

Secondary prevention concerns the proper management of the disease at an early stage based on timely detection and prompt treatment to regain gum health by halting, slowing or reversing disease progression.<sup>84</sup> For gum disease, secondary prevention measures include the same measures as primary prevention, accompanied by an evaluation of oral hygiene and, if necessary, repeated oral hygiene instruction. Secondary prevention can also include deep teeth cleaning at intervals recommended by a dental professional.<sup>23</sup>

### **Tertiary Prevention—after the clinically apparent disease has developed**

The aim of tertiary prevention is to delay or limit the impact of established disease. Tertiary prevention applies to irreversible disease to restrain the consequences, restore function and prevent the recurrence of gum disease.<sup>84</sup>

### Clinician’s experience: win-win with preventive dentistry

Prevention is at the core of the dental practice. Every new non-emergency patient begins with the dental hygienist, who performs a thorough exam, collects baseline data, understands disease status and conducts a thorough risk assessment to identify factors leading to the disease.

Steps followed for all patients:



**Risk Assessment**



**Disease Assessment & Management**



**Risk Management**

A comprehensive treatment plan, including an assessment of gum health and diagnosis of gingivitis followed by other oral health needs, is developed. The goal is not only to treat gum and tooth decay problems in the dental office but to mitigate their impacts when the patient is not present in the clinic by advising oral hygiene instructions and products that could improve gum/oral health.

Advantages of this model of care:

**Patients:**

- Patients can see the improvement and make objective assessments of their oral health condition
- Patients are proactively engaged in maintaining their oral health

**Dental Healthcare Professional:**

- Improved gum health is foundation for better restorative procedure outcomes
- More engaged patients, better oral health outcomes and enhanced job satisfaction



**Practice Manager:**

- Happy patients result in a successful practice
- Enhanced job satisfaction leads to retention of skilled dental healthcare professionals

**“It doesn’t matter from what perspective you prioritize oral health, you’re helping everybody involved, and I find that to be a win-win for everybody.”**

Dr Pamela Maragliano Muniz, prosthodontist in Salem, Massachusetts; chief editor, Dental Economics; Lecturer

## Self-care

Possibly the most effective and simple prevention method is self-care. Self-care is most effective when individuals have high oral health literacy and desire functional and aesthetically appealing teeth or smiles. Brushing twice and flossing daily reduces the prevalence of gum disease. “The patient’s role should be to manage the gum disease through brushing, flossing, and removing plaque biofilm,” says Dr Okano. “Flossing is particularly important, more so than brushing, because periodontitis is most active between teeth, where the brush does not necessarily reach.”

The impact of the type of brush (electronic versus manual) on plaque biofilm removal and gingivitis has been extensively researched. Evidence shows the benefit of using rechargeable powered brushes over manual ones in the long term.<sup>86-88</sup> Electric toothbrush features may assist the cleaning efficacy, particularly on difficult to access surfaces like tooth and gum margins.<sup>89</sup> Yet dental professionals must take a patient-centered approach and provide tailored toothbrushing instructions for the patient, regardless of the toothbrush type used.<sup>90</sup> Irrespective of the type of toothbrush, a good and thorough mouth cleaning using fluoridated toothpaste may be sufficient for maintaining oral health.<sup>85</sup> Several kinds of toothpaste are recommended for preventing plaque biofilm formation and gingivitis. Stannous fluoride toothpaste formulations have shown to reduce, dental plaque biofilm, gingivitis, and bad breath.<sup>91,92</sup> The use of cleaning aids such as floss and interdental brushes for areas between teeth are associated with a lower prevalence of gum disease, as is brushing teeth after eating.<sup>86</sup>

There is often a need to reinforce the oral hygiene offered by dental professionals. The best self-care results are achieved when individuals and dental professionals work as a team in which the former are proactively involved in taking care of their oral health. Dental professionals can promote good oral health habits in patients by using psychological

approaches to behavior management, which improve the uptake of self-care and effectively improve oral gingival health in people receiving regular professional dental care.<sup>50</sup> Self-care should be augmented by a healthy diet, including refraining from excessive alcohol intake, while tobacco use also worsens dental health.<sup>93</sup>

## Professional care

Although self-care is the practical root of daily prevention, it must be reinforced by the actions and messaging of professionals. “If we stress the preventive side of the fence (which every dentist and hygienist does or should do), instill early-age healthy habits in the patient, emphasize the importance of good homecare and encourage regular visits to the dentist, then we really have an opportunity to influence overall dental health for the long term,” says Dr Richardson.

But how is professional care structured in the US? Dental hygienists, general dentists and periodontists provide a continuum of gum care in the US, with general dentists and hygienists providing 95% of adult dental prophylaxis; a thorough cleaning procedure performed by a dental professional to get rid of plaque build-up.<sup>94</sup> Periodic dental visits are essential for maintaining oral health and catching dental diseases early. However, as we have seen, there are several barriers, such as socioeconomic status, lower oral health literacy, comorbidities, limits to dental insurance coverage, that hinder individuals’ commitment to regularly visit their dental care provider. Such individuals are at a higher risk of developing severe outcomes of the disease, while barriers to specialist care can also force many people to visit the emergency department (ED) for a flare up—about a third of all hospital-based ED visits for gum diseases are by people in the lowest income group and/or who are uninsured.<sup>95</sup> Treatment delivered at the ED is often only palliative (it may not stretch beyond the provision of antibiotics and pain medications, for example) and may not be adequate to improve the underlying condition.<sup>96</sup>



## CASE STUDY

### Integrated care via the nurse-practitioner dentist model

Integrated care pathways can streamline care-delivery providing better health outcomes and improved patient education in accessing care.<sup>98</sup> In 2016, the Harvard School of Dental Medicine partnered with the Northeastern University School of Nursing to promote interprofessional collaborative practice and education by integrating primary care services in a dental practice environment.<sup>98</sup>

The nurse-practitioner dentist (NPD) model places a nurse practitioner in a dental setting to act as a gateway to comprehensive care and to deliver primary care. The aim is to bring focus on oral health as part of overall health and provide comprehensive care to the patient.<sup>99</sup> The Harvard/Northeastern program ensures that patients receive an annual wellness visit in combination with a dental visit, creating an integrated approach to care. The wellness visit is conducted by the nurse practitioner and includes a check on the health and mental health risk factors, as well as a review of a patient's current healthcare providers.<sup>100</sup> Nurse practitioners have to carry out these assessments in dental office settings.

This unique model provides a personalized and patient-centric approach at potentially lower costs.<sup>100</sup> Patients experience better continuity of care and care coordination as their dental electronic health record integrates with elements of primary care, ensuring that student teams can access the patient's care plan and communicate effectively.<sup>101</sup>

The model yielded a decrease in biometric risk factors, patient self-confidence in achieving health goals and improvement in advanced care planning. However, the costs of implementation were not tracked. It was funded by a US\$1.2m Health Resources and Services Administration grant.<sup>98,99</sup>

Once a person is diagnosed with periodontitis, the pathway for treatment and prevention should be life-long. It should start with an initial diagnosis aimed at staging and grading the severity of the gum disease, followed by sequential management and maintenance of the disease. For decades, the dominant treatment modalities in dentistry primarily focused on a treatment-oriented approach as opposed to health promotion and improvement. The US National Academy of Medicine has recognized the need for a patient-centered model of care

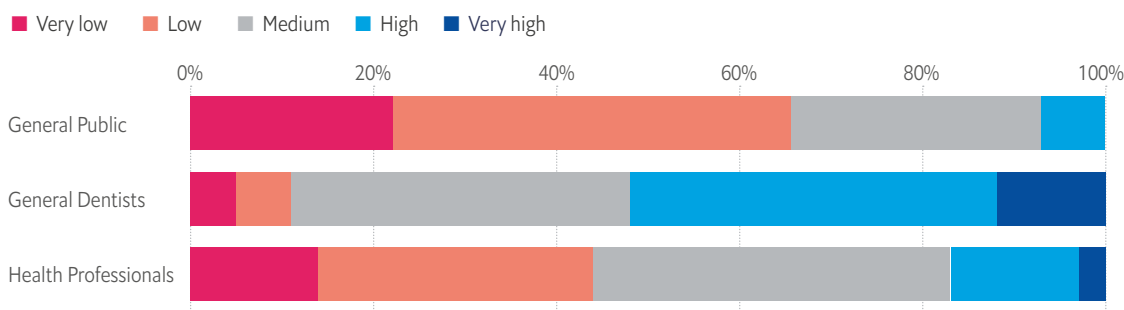
that focuses on disease management and prevention-oriented primary care.<sup>97</sup>

## Awareness

Periodontitis is a silent epidemic with an enormous burden of disease, meaning that awareness raising is a vital tool. "It is not a widely recognized fact that periodontitis is preventable," says Dr Cordero. According to the 2010 Global Burden of Disease study, periodontitis was the 6th most prevalent condition in the world. Yet, awareness of gum diseases remains low worldwide, and a majority of people affected do not initiate early care.<sup>23,102</sup> A recent report indicates that disease awareness (80%), the origin of disease (75%) and periodontitis-related risks (71%) are the most important knowledge deficits in the general public.<sup>103</sup> Another study flags that among adults aged over 30 years in the US classified as having periodontitis, only 27% are self-aware of the disease.<sup>9</sup> Poor oral health literacy prevents individuals from implementing preventive oral health practices.<sup>37</sup>

Awareness among healthcare professionals is also an issue. Although there has been an increase in awareness of the link between oral health and general health in recent years, the awareness of gum diseases is still low among healthcare professionals. For example, a substantial lack of understanding and limited knowledge of oral health and hygiene practices has been reported among cardiologists in the US. According to a survey, though the majority of physicians (71%) agreed that it is important for cardiologists and periodontists to work together to educate their patients about oral systemic disease risks, only 18% knew about the origin of gum disease, and almost half of cardiologists surveyed were unsure that treatment of gum disease could decrease a patient's risk for cardiovascular disease.<sup>104,105</sup> "One big innovation happened around five years ago when the AAP and [European Federation of Periodontology] developed a new disease classification system in Chicago. This system

**Figure 12: Gum health awareness among the general public, general dentists, and health professionals, 2019**



Source: FDI Global Periodontal Health Project: Follow-up survey on periodontal health 2019.

streamlines and creates personalized approaches for gum disease management and provides structure and guidelines for the working relationship between general dentists and periodontal specialists,” says Dr Richardson.

There is clearly much work to be done, however. In 2019 the World Dental Federation conducted a gum health survey among all its member national dental associations. The report shows that awareness of gum health is perceived to be low or very low by 67% of the general public, 44% of health professionals and by 10% of general dentists. (Figure 12)<sup>106</sup>

### Value-based oral healthcare

Value-based care helps providers to provide quality preventive care at an affordable cost.<sup>107</sup> Value-based oral healthcare is evolving as an approach to address the deficiencies of the existing oral healthcare system.<sup>108</sup> “Value based care models incentivise providers to initiate preventive care services as opposed to treatments,” says Mary Foley, executive director for Medicaid/Medicare/CHIP Services Dental Associations. “Preventistry incentivizes dentists to design and implement preventive services to at-risk individuals within their practice, resulting in better care, better outcomes and lower cost.”

When navigating toward value-based oral health care, questions revolve around how to measure oral health outcomes that matter to people.<sup>108</sup>

**Figure 13: Opportunities for improvement of oral health care through Value-based oral health care**

-  More transparency about oral health outcomes versus costs in dental practice settings
-  Better integration of dental services into the broader health care system
-  Provider payments that emphasize keeping people in good oral health instead of incentivizing restorative dental treatment
-  Reorienting oral health prevention more toward public health than chairside clinical approaches
-  Dental service planning to be more responsive to the population’s oral health needs.

Source: Listl S. Value-Based Oral Health Care: Moving Forward With Dental Patient-Reported Outcomes.2019.

## CASE STUDY

### Promoting gum health via a remote monitoring app

The first mHealth app, developed in Israel, monitors gingivitis using self-photography. This app facilitates the information flow between dentists and patients between checkups.<sup>109</sup>

Gingivitis is easy to treat and its early signs, such as bleeding while brushing or eating something hard, bad breath and swollen gums, are easy to identify. Yet, as this stage is not painful, many people delay dental appointments until the disease is more advanced.<sup>109</sup> This issue intensified during the pandemic.

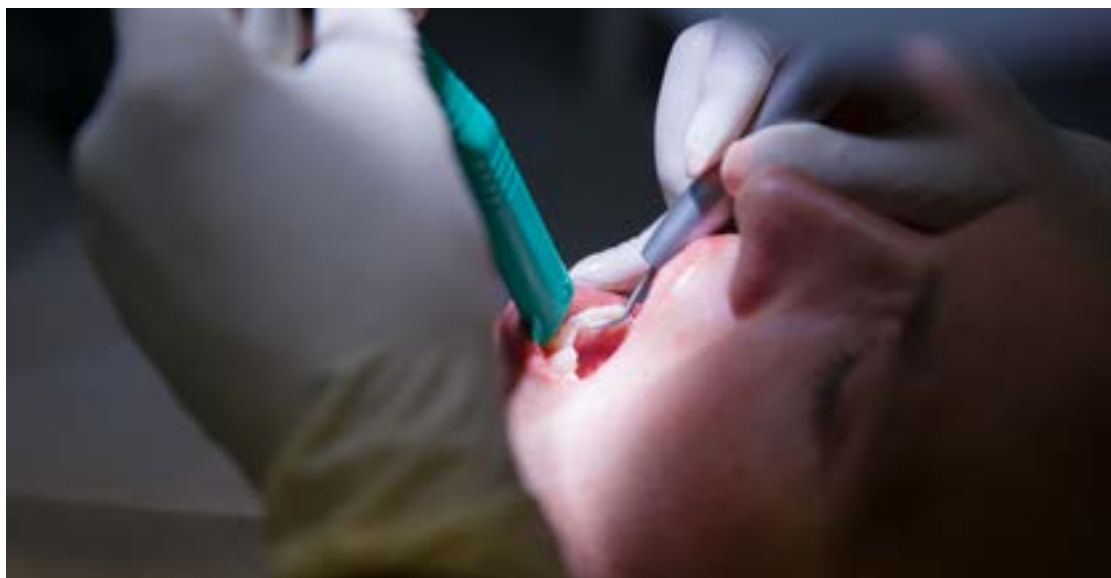
To solve this challenge, an application was developed to classify gum health status based on the Modified Gingival Index score using dental selfies. This app uses automated machine learning to diagnose oral health. The app can inform both the user and care provider whether the patient is suffering from gingivitis, as well as alerting them to any deterioration in gum health over time. This information can easily be used by the periodontist for recommending the best next steps to improve or maintain gum health.<sup>110,111</sup>

# Conclusion: Next steps— acting against gum disease

Fighting gum disease among US adults will require a range of approaches and the involvement of diverse stakeholders. The clear call to action must be for this broad range of stakeholders to pursue a joined-up approach that acknowledges that a focus on prevention is required, and that success in improving prevention will be dependent on driving awareness among individuals, healthcare workers (both within and outside of dental care) and policymakers. Gum disease is extremely preventable, and otherwise has broad impacts

that span far beyond dental health into other health areas, as well as practical and economic ones. Better care, home prevention, and better links with broader health services and far more equitable access are vital.

Below are key points to consider regarding how policymakers, patient advocacy groups, oral health providers and non-dental health practitioners can collectively improve gum health in the US. All of these points emerged from our interviews with experts on the subject.



## Policy

### *Federal:*

- Medicare should expand to ensure that all states are offering at least the minimum oral healthcare coverage
- Medicare should expand to include dental coverage
- Interstate portability for dental practitioners should be expanded at the federal level to ensure that dental practitioners can be licensed with ease in multiple states
- Shift to value-based models
- Policymakers should function as “connecting dots” between patients, providers, and decision makers
- Dental service coverage should be expanded
- Gaps in dental coverage for those aged around 20 years old and 65 years old should be closed
- Steps must be taken to ensure that the population is getting information about how to enact self-care, including accurate online information about disease information
- Providers who improve dental benefits coverage should be rewarded or incentivized
- Modify service delivery to reflect a changing and aging population

### *State:*

- Create preventive benefits as a part of state-insurance plans

## Patient Advocacy Groups

- Advocacy groups should center impact on patient level
- Frame oral health issues in a way that is easily understandable
- Create coalitions with shared goals and work together to reach those goals
- Ensure information is accessible
- Use social media platforms for public-facing outreach to teach the importance of brushing and flossing
- Increase awareness among policymakers about the importance of gum disease

## Oral Health Providers (Dentists, Hygienists, Periodontists And Others)

- Make “preventistry” the standard—help dentists understand risk factors across patient populations and shift the overall model to a preventive approach
- Provide timely updates on epidemiology of disease
- Focus practice on preventive care as much as is possible
- Use approaches (such as a charting system with gum measurements to show bleeding points) that allow patients to track progress

- Employ all skills of dental hygienists; create a working environment that is collaborative and encourages broad perspectives on prevention
- Engagement more broadly with medical and allied health professionals (such as dental hygienist, dental assistants etc.)
- Increase awareness among general dentists of the significance of treating gingivitis to prevent periodontitis, starting in dental school
- Emphasize the importance of understanding different levels of organized dentistry

#### **Non-Dental Health Practitioners**

- Seek the integration of oral health and primary care
- Implement codes to require all providers to use the ICD-10 diagnostic code system
- Create a medical-dental interface through education and training of providers, both medical and dental
- Adopt an integrated cloud system through which dental providers and medical providers appear in the same chart; lots of universities around the US do this
- Encourage collaboration between patients and health systems
- Establish oral health practices in hospitals
- Utilize public health approach
- Make patients a part of the solution by ensuring that they are always involved in discussions and decision-making—“no decision about me without me”, as a UK health-service mantra states

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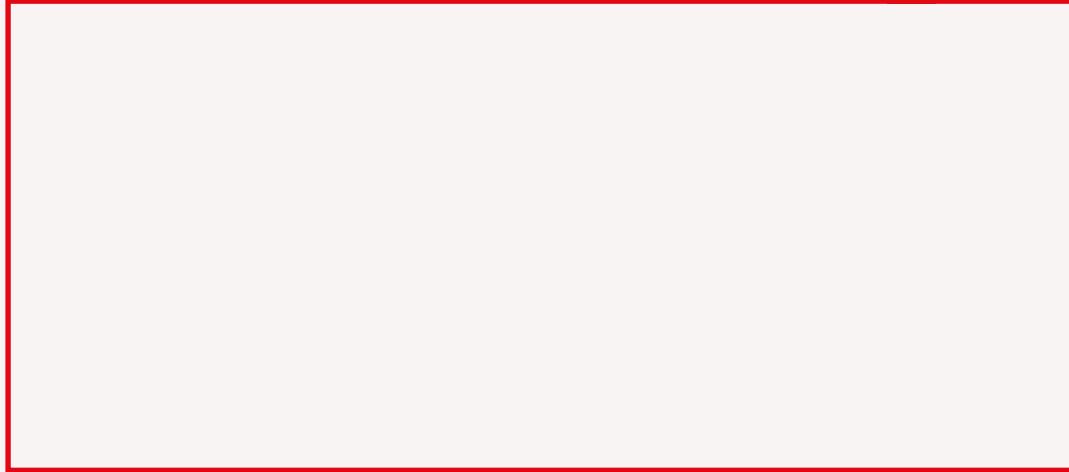
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