

Is the prevalence of periodontitis declining or not?

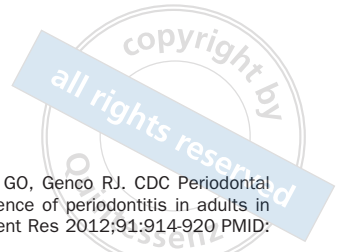
Trend studies are necessary for health planners to monitor the status of a given population and what treatment needs may come up in the future. Furthermore, they may help to dissect the impact of different determinants such as healthcare, behavioral, social, and economic changes on trends in population health over periods of time.

In 2014, Kassebaum et al⁶ published their landmark paper about the global burden of severe periodontitis. While presenting estimates of current prevalences of severe periodontitis, they also described its change over a 20-year period from 1990 to 2010 by applying complex statistical modelling. To aggregate these data, Kassebaum and colleagues defined subjects as being severely diseased if they had a Community Periodontal Index (CPI) of 4, at least one site with clinical attachment loss > 6 mm or at least one site with a probing depth > 5 mm. In total, they included 72 studies in their analyses. They found that worldwide the prevalence of severe periodontitis was around 11% in 2010 and that it was static over the last 20 years. Restricting their analyses to Europe or the US did not change their conclusion that prevalence of severe periodontitis remained unchanged over the last 20 years.

Their conclusion is in contrast to recently published reports. In the US, the prevalence of moderate or severe periodontitis according to CDC/AAP criteria⁹ did not show a consistent trend during the two-decade interval.¹¹ Using equalized recording protocols (mesiobuccal sites, two randomly selected quadrants), prevalences of moderate or severe periodontitis were 13.1% in 1988-1994, 7.6% in 1999-2004, and 15.7% in 2009-2012. In Germany, the prevalence of severe periodontitis according to CDC/AAP classification decreased markedly from 17.4% to 8.2% in adults aged 35-44 years³ and from 44.1% to 19.8% in seniors aged 65-74 years⁷ between 2007 and 2014. Reported prevalences from the regional Study of Health in Pomerania (SHIP) confirmed these trends.¹² In adults aged 20-83 years, the prevalence of severe periodontitis decreased from 18.3% to 15.7% between 1997-2001 and 2008-2012. When stratified according to 10-year age groups, results were consistent. In the repeatedly conducted cross-sectional studies in Jönköping, Sweden,⁸ the percentage

of subjects with no marginal bone loss increased from 8% in 1973 to 45% in 2013. While the percentage of subjects with moderate severity of periodontal disease experience decreased from 47% in 1973 to 22% in 2013, the percentage of subjects with advanced periodontitis, though at a low level, was unchanged.⁷ In an attempt to summarize the putative change of the prevalence of periodontitis, we performed a narrative review based on ten repeated cross-sectional studies in the US or Europe. We concluded that the prevalence of periodontitis has decreased and the number of retained teeth has increased in industrialized countries.⁵ However, because partial recording protocols might not result in a “consistent degree of bias across different levels of extent and severity or across age groups,”¹⁰ trends derived from repeatedly estimated prevalences of periodontitis based on partial recording protocols might still be biased (despite being assessed within the same catchment area using the same partial recording protocol and the same periodontitis definition).

How can these different observations be explained? The first issue to understand is that periodontal recording protocols have a great impact on prevalence rates. NHANES is an excellent example for the change of presumed prevalences due to changes in the periodontal recording protocol. To estimate the magnitude of bias associated with the use of different periodontal recording protocols, Eke et al² compared the prevalence of severe periodontitis according to the CDC/AAP classification for three different recording protocols using the same study population. The prevalence changed from 1.6% (NHANES III protocol: mesio- and midbuccal sites, two quadrants) to 3.1% (NHANES 2001-04 protocol: mid-, mesio- and distobuccal sites, two quadrants) to 8.9% (NHANES 2009-12 protocol: six sites, all teeth).² In contrast, the Global Burden of Disease study⁶ did not consider whether periodontal assessments had been replicated using the same recording protocol and whether the study was performed in the same catchment area as 20 years earlier. They simply aggregated studies conducted 20 years apart, irrespective of several factors that might have biased prevalence estimates, such as the periodontal recording protocol, the periodontal probe, the accuracy of dental examiners, the applied periodontitis definition, age range and catchment area.



From our point of view, only repeated cross-sectional studies which have been performed within the same catchment area using the same age range and have used the same periodontal recording protocol and the same disease definitions should be considered to answer the question of a potential periodontitis decline. The lack of a universally accepted case definition of chronic periodontitis further complicates population comparisons or inferences regarding the true global and time variation in periodontitis prevalence. It is difficult or may be even meaningless to interpret aggregated data with different periodontal recording protocols or case definitions. In our view, it is difficult to ascertain the precise magnitude of the decline due to the high variability in periodontal disease definitions. Thus, one should be cautious about drawing conclusions on any global trends.

To be sure, if the prevalence of periodontitis really declines, we need more repeated cross-sectional data and their reporting should not just rely on prevalence data, but also include severity (mean probing depth, mean clinical attachment levels) and extent data (number or percentage of sites/teeth with probing depths or clinical attachment levels of ≥ 3 , ..., 6 mm).⁴ To understand the impact of periodontitis on oral health, edentulism rates and the number of teeth in dentates has to be reported as well. We assume that improved periodontal health goes along with more retained teeth, but it is unclear whether a higher tooth retention rate results in more periodontally diseased teeth needing treatment or in more periodontally healthy teeth. Thus, to better understand interrelations between tooth retention, periodontal health and periodontal treatment needs, comprehensive reporting of periodontal conditions in repeated cross-sectional studies within the same catchment area using identical periodontal recording protocols is needed.

REFERENCES

1. Eke PI, Dye BA, Wei L, Thornton-Evans GO, Genco RJ. CDC Periodontal Disease Surveillance workgroup. Prevalence of periodontitis in adults in the United States: 2009 and 2010. *J Dent Res* 2012;91:914-920 PMID: 22935673
2. Eke PI, Dye BA, Wei L, Slade GD, Thornton-Evans GO, Borgnakke WS, Taylor GW, Page RC, Beck JD, Genco RJ. Update on prevalence of periodontitis in adults in the United States: NHANES 2009 to 2012. *J Periodontol* 2015;86:611-622.
3. Hoffmann T, Schützhold S. Krankheits- und Versorgungsprävalenzen bei Jüngeren Erwachsenen (35-bis 44-Jährige). In: Jordan AR, Micheelis W (eds). Fünfte Deutsche Mundgesundheitsstudie (DMS V). Köln: Deutscher Ärzteverlag (DÄV), 2016.
4. Holtfreter B, Albandar JM, Dietrich T, Dye BA, Eaton KA, Eke PI, Papapanou PN, Kocher T. Standards for reporting chronic periodontitis prevalence and severity in epidemiologic studies: Proposed standards from the Joint EU/USA Periodontal Epidemiology Working Group. *J Clin Periodontol* 2015;42:407-412.
5. Holtfreter B, Schützhold S, Kocher T. Is periodontitis prevalence declining? A review of the current literature. *Curr Oral Health Rep* 2014;1: 251-261.
6. Kassebaum NJ, Bernabe E, Dahiya M, Bhandari B, Murray CJ, Marcenes W. Global burden of severe periodontitis in 1990-2010: a systematic review and meta-regression. *J Dent Res* 2014;93:1045-1053.
7. Kocher T, Holtfreter B. (2016) Krankheits- und Versorgungsprävalenzen bei Jüngeren Senioren (65-bis 74-Jährige). In: Jordan AR, Micheelis W (eds). Fünfte Deutsche Mundgesundheitsstudie (DMS V). Köln: Deutscher Ärzteverlag (DÄV), 2016.
8. Norderyd O, Koch G, Papias A, Kohler AA, Helkimo AN, Brahm CO, Lindmark U, Lindfors N, Mattsson A, Rolander B, Ullbro C, Gerdin EW, Frisk F. Oral health of individuals aged 3-80 years in Jonköping, Sweden during 40 years (1973-2013). II. Review of clinical and radiographic findings. *Swed Dent J* 2015;39:69-86.
9. Page RC, Eke PI. (2007) Case definitions for use in population-based surveillance of periodontitis. *J Periodontol* 2007;78:1387-1399.
10. Papapanou PN. The prevalence of periodontitis in the US: forget what you were told. *J Dent Res* 2012;91:907-908.
11. Rozier RG, White BA, Slade GD. Trends in Oral Diseases in the U.S. Population. *J Dent Educ* 2017;81:eS97-eS109. doi:81/8/eS97 [pii]10.21815/JDE.017.016.
12. Schutzhold S, Kocher T, Biffar R, Hoffmann T, Schmidt CO, Micheelis W, Jordan R, Holtfreter B. Changes in prevalence of periodontitis in two German population-based studies. *J Clin Periodontol* 2015;42:121-130.

Thomas Kocher

Thomas Kocher
Tel: +49-3834-867172;
Email: kocher@uni-greifswald.de

Birte Holtfreter

Birte Holtfreter

University Medicine Greifswald,
Department of Restorative Dentistry, Periodontology,
Endodontology, and Preventive and Pediatric Dentistry,
Unit of Periodontology,
Fleischmannstr. 42, 17475 Greifswald, Germany.