Prevalence of self-reported severe periodontitis: Data from the population-based CONSTANCES cohort

Emmanuel Wiernik, Adeline Renuy, Sofiane Kab, Philippe Gabriel Steg, Marcel Goldberg, Marie Zins, Giuseppina Caligiuri, Philippe Bouchard, Maria Clotilde Carra

Received: 29 June 2023 | Revised: 12 February 2024 | Accepted: 18 February 2024

DOI: 10.1111/jcpe.13969

ORIGINAL ARTICLE

Journal of Clinical Periodontology WILEY

Prevalence of self-reported severe periodontitis: Data from the population-based CONSTANCES cohort

Emmanuel Wiernik[1] | Adeline Renuy[1] | Sofiane Kab[1] | Philippe Gabriel Steg[2,3,4,5] | Marcel Goldberg[1] | Marie Zins[1,2] | Giuseppina Caligiuri[2,3,4] | Philippe Bouchard[6,7] | Maria Clotilde Carra[1,6,8,9]

[1]UMS 011 Population-based Cohorts Unit, Université Paris Cité, Paris Saclay University, Université de Versailles Saint-Quentin-en-Yvelines, INSERM, Paris, France

[2]UFR de Médecine, Université Paris-Cité, Paris, France

[3]Cardiology Department, AP-HP, Hôpital Bichat, Paris, France

[4]Laboratory for Vascular Translational Science, INSERM U1148, Paris, France

[5]Institut Universitaire de France, Paris, France

[6]UFR of Odontology, Université Paris Cité, Paris, France

[7]URP 2496, Montrouge, France

[8]Service of Odontology, Rothschild Hospital (AP-HP) and Department of Periodontology, UFR of Odontology, Université Paris Cité, Paris, France

[9]INSERM-Sorbonne Paris Cité Epidemiology and Statistics Research Centre, Paris, France

Correspondence
Maria Clotilde Carra, Department of Periodontology, UFR d'Odontologie, Université Paris Cité, 5 rue Garancière, 75006 Paris, France.
Email: mclotildecarra@gmail.com

Funding information
Assistance Publique des Hopitaux de Paris; Agence Nationale de la Recherche, Grant/Award Number: ANR-16-RHUS-00010; Caisse nationale d'assurance maladie des travailleurs salari's; French Commissariat général à l'investissement, Grant/Award Number: ANR-11-INBS-0002

Abstract

Aim: To assess the prevalence of severe periodontitis based on the population-based CONSTANCES cohort using a validated self-reported questionnaire.

Materials and Methods: Individuals were selected from the adult population in France using a random sampling scheme. Analyses were restricted to those invited in 2013–2014 who completed the periodontal health questionnaire at the 2017 follow-up. The risk of severe periodontitis was assessed using the periodontal screening score (PESS) and weighting coefficients were applied to provide representative results in the general French population.

Results: The study included 19,859 participants (9204 men, mean age: 52.8 ± 12.6 years). Based on a PESS ≥ 5, 7106 participants were at risk of severe periodontitis, corresponding to a weighted prevalence of 31.6% (95% confidence interval: 30.6%–32.7%). This prevalence was higher among participants aged 55 and over, those with lower socio-economic status as well as current smokers, e-cigarette users and heavy drinkers. Among individuals at risk of severe periodontitis, only 18.8% (17.3%–20.4%) thought they had gum disease, although 50.5% (48.6%–52.5%) reported that their last dental visit was less than 6 months.

Conclusions: The present survey indicates that (1) self-reported severe periodontitis is highly prevalent with marked disparities between groups in the general French adult population, and (2) periodontitis could frequently be under-diagnosed given the low awareness.

KEYWORDS
epidemiology, population-based cohort, prevalence, severe periodontitis

Clinical Relevance

Scientific rationale for study: Periodontitis is a chronic, inflammatory disease highly prevalent in adult populations. Current data on the prevalence of severe periodontitis in European countries are limited.

Principal findings: Using a validated self-reported questionnaire in a large French population-based cohort, the weighted prevalence of severe periodontitis was 31.6% (95% confidence interval: 30.6%–32.7%). This prevalence was higher among participants aged 55 and over, those with lower socio-economic status as well as current smokers, e-cigarette users and heavy drinkers. Among individuals at risk of severe periodontitis, less than 20% thought they had gum disease, although half declared that their last dental visit was less than 6 months.

Practical implications: The prevalence of self-reported severe periodontitis is high in France, but with marked disparities between groups. Most participants reported having recently visited the dentist, indicating that many cases of periodontitis go unrecognized. It is important that public and professional health authorities take action to address this issue. Additionally, dental professionals should be aware of the significant number of undiagnosed patients.

1 | INTRODUCTION

Periodontitis is a chronic, inflammatory disease affecting the periodontium, the supporting apparatus of the tooth (Kinane et al., 2017). Severe periodontitis is characterized by extensive loss of the periodontium, which, if untreated, may result in tooth loss (Genco & Sanz, 2020). Moreover, untreated severe periodontitis can impact systemic health, being associated with all-cause mortality (Bond et al., 2023; Romandini et al., 2021) and several diseases, such as type-2 diabetes, cardiovascular diseases, inflammatory bowel disease, rheumatoid arthritis and adverse pregnancy outcomes (Genco & Borgnakke, 2020; Genco & Sanz, 2020; Hajishengallis & Chavakis, 2021). These oral and non-oral consequences of periodontitis may explain why the societal and economic impacts of periodontitis have been well demonstrated (The Economist Intelligence Unit Limited, 2021).

According to data from the Global Burden of Disease (GBD) Study in 2019, periodontitis is the seventh most prevalent disease worldwide, with 1.09 billion cases (Institute for Health Metrics and Evaluation [IHME], 2020). Since 1990, an increase in prevalence has been registered largely due to population growth and ageing (Chen et al., 2021). The age-standardized prevalence, which was estimated at 11.2% in 2010 (Kassebaum et al., 2014), raised to 13.1% in 2019 (Chen et al., 2021; Wu et al., 2022). However, these trends, as well as those of incidence and disease burden, differed according to sex, age and geographical region (Chen et al., 2021; Cui et al., 2023; Wu et al., 2022; Zhang et al., 2022). Data specific to the French population are scarce, but the age-standardized prevalence of severe periodontitis was estimated at 9.6% in the GBD study 2019 (Chen et al., 2021). This result is close to the 10.2% prevalence of periodontal pockets >5 mm found in the 2002–2003 National Periodontal and Systemic Examination Survey, conducted on a stratified quota sample of 2144 adults, aged 35–64 years in France (Bourgeois et al., 2007).

Clinical examination is the gold standard tool for the diagnosis of periodontal diseases (Holtfreter et al., 2015). However, it is time- and resource-consuming and hardly applicable at the population level. To overcome these limitations, self-reported questionnaires have been developed and validated in several countries as a valuable alternative to assess and monitor periodontitis in epidemiological studies (Abbood et al., 2016; Carra et al., 2018; Deng et al., 2021; Eke et al., 2020; Montero et al., 2020). Based on the validated French version of the CDC/AAP periodontal questionnaire, the periodontal screening score (PESS) has been developed to identify individuals at risk of severe periodontitis. It relies on five items of self-reported periodontal assessment, age and smoking (Table S1). PESS has shown a sensitivity of 78.9% and a specificity of 74.8% against a clinical diagnosis based on a full periodontal examination (Carra et al., 2018).

The present study aimed to assess the prevalence of severe periodontitis using this validated self-reported questionnaire in a large French population-based cohort, in order to provide an updated epidemiological estimate of the disease at the population level.

2 | METHODS

2.1 | Study population

The CONSTANCES cohort included more than 200,000 volunteers aged between 18 and 69 years from 21 departments throughout metropolitan France recruited between 2012 and 2020; these departments are close to the population of France in terms of distribution by gender, age and sectors of economic activity (Zins et al., 2015). Eligible individuals were selected from the adult population covered by the general insurance system (representing 85% of the French population) using a random sampling scheme stratified on place of residence, age, sex, occupation and socio-economic status in order to be representative of the source population. At inclusion, participants underwent a clinical interview, examination, standard biology testing and completed questionnaires including sociodemographic characteristics. Follow-up was performed through yearly self-questionnaires and linkage to the National Health Data System, which is a reimbursement database including medications and hospitalizations.

The present analyses were restricted to individuals invited to participate in 2013–2014 who had completed the 2017 follow-up questionnaire, which included the questionnaire for the evaluation of periodontal health (Carra et al., 2018). This allowed for the use of weighting coefficients (detailed below) to provide a representative sample of the general French population aged 18–69 years covered by the general insurance scheme in the selected departments of CONSTANCES.

The CONSTANCES cohort obtained the authorization of the National Data Protection Authority (Commission Nationale de l'Informatique et des Libertés, no. 910486) and was approved by the Institutional Review Board of the National Institute for Medical Research—INSERM (no. 01–011). Written informed consent was received from all participants.

2.2 | Periodontal assessment and periodontal screening score

Periodontal assessment was based on a self-reported evaluation by means of 12 questions on periodontal health mainly derived from the CDC/AAP questionnaire for the surveillance of periodontitis (Eke & Dye, 2009; Slade, 2007). They included self-perception of gum health and diseases, history of periodontal treatment, report of tooth mobility, bone loss, current abnormalities (gum swelling, pain, bad taste, etc.), gingival bleeding, food impaction, tooth loosening and gum retraction, together with the weekly frequency of inter-dental cleaning device or mouth rinse use (Carra et al., 2018). The diagnostic accuracy of the French version of the questionnaire has been tested against a clinical diagnosis and it showed a very good performance (sensitivity: 71.8% and specificity: 70.9%; area under ROC curve: 0.77). Moreover, the PESS was developed and validated to provide a user-friendly tool to screen for severe periodontitis at the population level (Carra et al., 2018). The PESS is calculated based on five items of the questionnaire, which are related to self-reported gingival health, previous treatment for gum diseases, tooth mobility, bone loss and current abnormalities, in addition to age and smoking status (Table S1). The obtained score can range between 0 and 13, with 5 as the cut-off value with the best balance between sensitivity (78.9%) and specificity (74.8%) to identify individuals with severe periodontitis against a clinical diagnosis based on a full periodontal examination (Carra et al., 2018). Thus, in the present analysis, PESS was considered as a binary variable and dichotomized as <5 or ≥5 (i.e., severe periodontitis risk). The smoking status (i.e., current smokers vs. former or never smoker) was assessed based on the latest self-reported value in the inclusion or on the follow-up questionnaire until 2017.

2.3 | Weighting coefficients

Weighted analyses were performed to provide results representative of the general population. To achieve this, two weighting coefficients were used. The product of these coefficients provided the final weight (Balagny et al., 2023). The first weight considers the survey weight and the correction for non-participation in the cohort. It uses an administrative medical database from a cohort of 400,000 non-participants drawn at random from the same sample as the participants (Santin et al., 2016). When administrative medical data were lacking because subjects denied participating or because participants' data were not available, the weighting coefficient could not be calculated. Nevertheless, the final correction factor for non-response in the CONSTANCES cohort considers the non-availability of these data. The second weight was calculated to correct, among those included in the cohort, for non-response to the 2017 follow-up (including the dental questionnaire used in the analyses). This weight, which is an estimate of the probability of having responded to the 2017 questionnaire, was based on sociodemographic variables (e.g., level of education) as well as health behaviours and health indicators (e.g., existence of a disability).

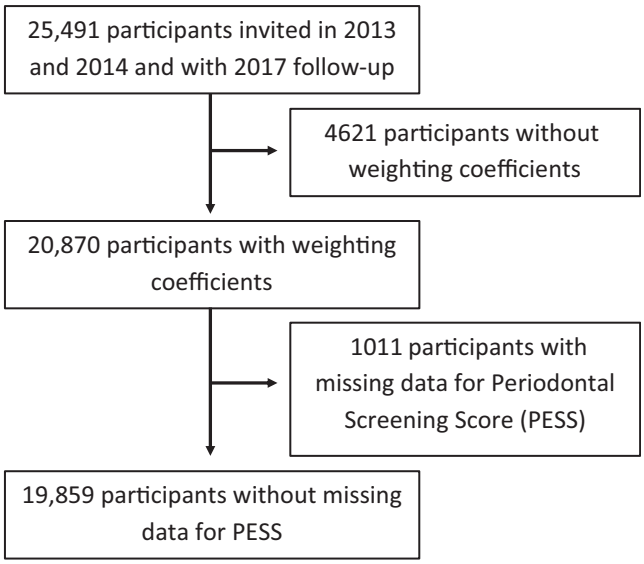

FIGURE 1 Flow chart of the study population selection.

2.4 | Covariates

The following covariates were considered: sex, age at the date of the 2017 questionnaire and occupational status in the inclusion questionnaire, collected according to the French 'Occupations and Socio-occupational Categories' [Professions et Categories Socioprofessionnelles (PCS)] classification system (INSEE, n.d.; Wiernik et al., 2018). This included the following categories: executive and higher intellectual profession, intermediate profession, employee, manual worker and other. Household monthly income was defined by the last self-reported value in the inclusion or follow-up questionnaire in 2015 and categorized into less than 1500 euros, between 1500 and 2800 euros, more than 2800 euros, and other. Educational level was self-reported in the inclusion questionnaire and was categorized into three classes: less than or equal to high school diploma, undergraduate degree and postgraduate degree. When it was considered as covariate (not questionnaire component), last known smoking status in 2017 was categorized into three classes: no smokers, former smokers and current smokers. Current e-cigarette users were identified based on the latest self-reported value in the inclusion or follow-up questionnaire until 2017. Alcohol consumption was defined based on the latest self-reported value in the inclusion or follow-up questionnaire until 2017 and categorized into three categories: no consumption, moderate consumption (i.e., less than

TABLE 1 Prevalence of periodontal screening score (PESS) and its components according to sex and age.

		Sex		Age		
	Total	Men	Women	<40 years old	40–55 years old	≥55 years old
PESS	Missing data = 0					
PESS < 5	12,753 68.3 (67.3–69.4)	5900 67.4 (65.9–68.9)	6853 69.3 (67.9–70.7)	3554 96.8 (95.8–97.6)	5567 78.7 (76.9–80.4)	3632 34.0 (32.5–35.5)
PESS ≥ 5	7106 31.6 (30.6–32.7)	3304 32.6 (31.1–34.2)	3802 31.1 (29.3–32.1)	91 3.2 (2.4–4.2)	1100 21.3 (19.6–23.1)	5915 66.0 (64.5–67.5)
Self-reported gingival health	Missing data = 165					
Excellent-to-good	13,347 66.3 (65.2–67.4)	6291 66.5 (64.9–68.1)	7056 66.1 (64.6–67.6)	2915 78.5 (76.4–80.5)	4783 67.2 (65.3–69.1)	5649 55.0 (53.4–56.7)
Fair	5137 25.8 (24.8–26.8)	2299 25.3 (23.9–26.8)	2838 26.2 (24.8–27.6)	586 17.2 (15.4–19.1)	1491 25.0 (23.3–26.7)	3060 33.8 (32.3–35.4)
Poor	1210 7.9 (7.2–8.6)	526 8.1 (7.1–9.2)	684 7.7 (6.8–8.7)	122 4.3 (3.3–5.5)	354 7.8 (6.7–9.1)	734 11.1 (9.9–12.4)
Previous treatment for gum diseases	Missing data = 223					
No	17,281 88.7 (87.9–89.3)	8139 89.9 (88.8–90.8)	9142 87.5 (86.5–88.5)	3378 92.7 (91.4–93.9)	5982 89.3 (88.0–90.4)	7921 84.5 (83.3–85.7)
Yes	2355 11.3 (10.7–12.1)	966 10.1 (9.2–11.2)	1389 12.5 (11.5–13.5)	245 7.3 (6.1–8.6)	649 10.7 (9.6–12.0)	1461 15.5 (14.3–16.7)
Tooth mobility	Missing data = 250					
No	16,406 82.9 (82.0–83.8)	7509 82.1 (80.8–83.4)	8897 83.6 (82.4–84.7)	3357 91.0 (89.5–92.3)	5811 84.3 (82.7–85.7)	7238 74.5 (73.0–76.0)
Yes	3203 17.1 (16.2–18.0)	1586 17.9 (16.6–19.2)	1617 16.4 (15.3–17.6)	267 9.0 (7.7–10.5)	824 15.7 (14.3–17.3)	2112 25.5 (24.0–27.0)
Bone loss	Missing data = 320					
No	17,686 91.5 (90.8–92.1)	8297 92.3 (91.4–93.2)	9389 90.7 (89.8–91.5)	3507 96.7 (95.7–97.5)	6152 92.1 (91.0–93.1)	8027 86.3 (85.1–87.4)
Yes	1853 8.5 (7.9–9.2)	746 7.7 (6.8–8.6)	1107 9.3 (8.5–10.2)	109 3.3 (2.5–4.3)	477 7.9 (6.9–9.0)	1267 13.7 (12.6–14.9)
Current abnormalities	Missing data = 275					
No	15,272 76.6 (75.6–77.6)	7346 79.8 (78.3–81.1)	7926 73.8 (72.3–75.2)	2857 77.8 (75.7–79.7)	5153 75.7 (73.9–77.3)	7262 76.7 (75.2–78.1)
Yes	4312 23.4 (22.4–24.4)	1370 20.2 (18.9–21.7)	2582 26.2 (24.8–27.7)	762 22.2 (20.3–24.3)	1473 24.3 (22.7–26.1)	2077 23.3 (21.9–24.8)

Note: Data are *n* and % (95% CI), and % values are weighted in order to provide results representative of the French general population aged 18–69 years old, in the selected departments of CONSTANCES, and covered by the general insurance scheme. All $p < .05$ except for PESS according to sex ($p = .75$) and for current abnormalities according to age ($p = .30$).

or equal to 3/2 drinks per day in men/women) and excessive consumption (i.e., more than 3/2 drinks per day in men/women).

2.5 | Statistical analyses

Categorical variables were described as numbers and percentages with their 95% confidence intervals (CIs). The prevalence of PESS and its periodontal components were reported in the entire study population and according to covariates (age, sex, socio-economic status and health behaviours). The other periodontal health-related variables were described in the whole population and by the presence of severe periodontitis risk (i.e., PESS ≥ 5). Groups were compared using chi-squared tests. All analyses were performed using STATA 15.1 (Statacorp College Station, Texas, USA).

3 | RESULTS

Among 25,491 participants in the CONSTANCES cohort invited in 2013–2014 who responded to the 2017 follow-up questionnaire, weighted data were available for 19,859 (77.9%) participants (Figure 1). Mean age (SD) in 2017 was 52.8 (12.6) years and 9204 (46.3%) were men. The distribution of PESS is shown in Figure S1. In this population, 7106 participants were at risk of severe periodontitis (PESS ≥ 5), corresponding to a weighted prevalence of 31.6% (30.6%–32.7%).

TABLE 2 Prevalence of periodontal screening score (PESS) and its components according to household income and educational level.

	Household income				Educational level		
	>2800 euros	1500–2800 euros	<1500 euros	Other	Postgraduate degree	Undergraduate degree	≤high school diploma
PESS	Missing data = 97				Missing data = 270		
PESS < 5	8269 72.5 (71.2–73.7)	3082 67.0 (65.0–69.0)	864 56.8 (53.3–60.3)	480 68.0 (62.7–72.8)	3661 81.1 (79.5–82.6)	4679 74.4 (72.7–75.9)	4293 58.8 (57.0–60.5)
PESS ≥ 5	4001 27.5 (26.3–28.8)	2013 33.0 (31.0–35.0)	757 43.2 (39.7–46.7)	296 32.0 (27.2–37.3)	1199 18.9 (17.4–20.5)	2197 25.6 (24.1–27.3)	3560 41.2 (39.5–43.0)
Self-reported gingival health	Missing data = 261				Missing data = 430		
Excellent-to-good	8756 71.7 (70.4–73.0)	3146 62.8 (60.7–64.9)	859 54.2 (50.6–57.8)	524 66.3 (60.5–71.6)	3706 78.1 (76.2–79.8)	4725 69.4 (67.5–71.1)	4767 59.1 (57.3–60.9)
Fair	2866 23.1 (21.9–24.3)	1532 28.4 (26.5–30.4)	518 30.4 (27.2–33.8)	192 25.7 (20.9–31.1)	942 17.4 (15.9–19.0)	1701 23.8 (22.2–25.5)	2404 30.9 (29.2–32.6)
Poor	580 5.2 (4.6–6.0)	373 8.8 (7.5–10.2)	205 15.4 (12.9–18.3)	47 8.0 (5.1–12.4)	188 4.5 (3.6–5.7)	400 6.8 (5.8–8.0)	596 10.0 (8.9–11.3)
Previous treatment for gum diseases	Missing data = 319				Missing data = 490		
No	10,764 89.8 (88.9–90.6)	4420 87.8 (86.2–89.2)	1347 86.9 (84.5–89.0)	671 88.4 (84.5–91.4)	4288 89.7 (88.4–90.9)	5988 89.0 (87.7–90.1)	6783 88.2 (87.0–89.3)
Yes	1397 10.2 (9.4–11.1)	608 12.2 (10.8–13.8)	238 13.1 (11.0–15.5)	95 11.6 (8.6–15.5)	541 10.3 (9.1–11.6)	822 11.0 (9.9–12.3)	947 11.8 (10.7–13.0)
Tooth mobility	Missing data = 346				Missing data = 516		
No	10,404 86.4 (85.4–87.4)	4082 81.6 (79.8–83.2)	1191 72.3 (68.9–75.5)	648 84.4 (79.7–88.3)	4255 89.4 (88.1–90.6)	5814 85.2 (83.7–86.6)	6129 78.3 (76.7–79.7)
Yes	1741 13.6 (12.6–14.6)	948 18.4 (16.8–20.2)	386 27.7 (24.5–31.1)	113 15.6 (11.7–20.3)	561 10.6 (9.4–11.9)	989 14.8 (13.4–16.3)	1595 21.7 (20.3–23.3)
Bone loss	Missing data = 415				Missing data = 584		
No	10,966 91.9 (91.1–92.6)	4532 91.2 (90.0–92.3)	1412 90.8 (88.6–92.6)	684 90.3 (86.6–93.0)	4374 91.7 (90.4–92.8)	6122 91.4 (90.3–92.4)	6965 91.7 (90.7–92.6)
Yes	1140 8.1 (7.4–8.9)	477 8.8 (7.7–10.0)	161 9.2 (7.4–11.4)	72 9.7 (7.0–13.4)	427 8.3 (7.2–9.6)	673 8.6 (7.6–9.7)	714 8.3 (7.4–9.3)
Current abnormalities	Missing data = 370				Missing data = 541		
No	9683 80.0 (78.8–81.1)	3759 73.4 (71.4–75.3)	1137 69.6 (66.1–72.8)	611 80.2 (75.4–84.3)	3859 80.4 (78.6–82.0)	5228 75.0 (73.2–76.7)	5981 76.0 (74.4–77.6)
Yes	2447 20.0 (18.9–21.2)	1244 26.6 (24.7–28.6)	450 30.4 (27.2–33.9)	158 19.8 (15.7–24.6)	956 19.6 (18.0–21.4)	1565 25.0 (23.3–26.8)	1729 24.0 (22.4–25.6)

Note: Data are n and % (95% CI), and % values are weighted in order to provide results representative of the French general population aged 18–69 years old, in the selected departments of CONSTANCES, and covered by the general insurance scheme. All $p < .05$ except for previous treatment for gum diseases according to educational level ($p = .19$) and for bone loss according to household income ($p = .78$) and educational level ($p = .17$).

3.1 | Prevalence of periodontitis by age and sex

The weighted prevalence of PESS and its components according to sex and age are presented in Table 1. In the total population, the majority of individuals reported excellent-to-good gingival health, with only a small percentage indicating poor gingival health (7.9% [7.2%–8.6%]) although 23.4% (22.4%–24.4%) of participants mentioned having current abnormalities. The other prevalence data were 11.3% (10.7%–12.1%), 17.1% (16.2%–18.0%) and 8.5% (7.9%–9.2%) for previous treatment, tooth mobility and bone loss, respectively. The weighted prevalence of being at risk for severe periodontitis was highest among participants in the older age group (66.0% [64.5%–67.5%]), as expected because age is used to calculate PESS. However, each periodontal component of the score, excluding current abnormalities, was also consistently higher in the older age group.

There was no significant sex difference for the PESS, but the analysis of each component showed a higher prevalence in men for poor self-reported gingival health and tooth mobility and in women for previous periodontal treatment, bone loss and current abnormalities.

TABLE 3 Prevalence of periodontal screening score (PESS) and its components according to smoking status, e-cigarette use and daily alcohol consumption.

	Smoking status			E-cigarette use		Daily alcohol consumption		
	No smokers	Ex-smokers	Current smokers	No	Yes	No	Moderate	Excessive
PESS	Missing data = 472			Missing data = 150		Missing data = 581		
PESS < 5	6542 77.2 (75.8–78.5)	4948 66.2 (64.5–67.8)	1068 53.9 (50.8–57.0)	12,355 68.9 (67.8–69.9)	338 62.2 (56.1–68.0)	2375 69.9 (67.4–72.2)	8673 71.3 (70.1–72.5)	1414 58.3 (55.2–61.3)
PESS ≥ 5	2565 22.8 (21.5–24.2)	3065 33.8 (32.2–35.5)	1199 46.1 (43.0–49.2)	6775 31.1 (30.1–32.2)	241 37.8 (32.0–43.9)	1177 30.1 (27.8–32.6)	4409 28.7 (27.5–29.9)	1230 41.7 (38.7–44.8)
Self-reported gingival health	Missing data = 633			Missing data = 313		Missing data = 724		
Excellent-to-good	6502 72.4 (70.9–73.9)	5269 65.5 (63.7–67.2)	1329 54.9 (51.7–58.0)	12,951 66.9 (65.8–68.0)	319 56.4 (50.1–62.5)	2330 63.2 (60.6–65.8)	9043 69.2 (67.9–70.5)	1663 61.7 (58.6–64.8)
Fair	2149 22.5 (21.2–23.9)	2149 26.6 (25.0–28.2)	653 30.5 (27.7–33.6)	4897 25.4 (24.4–26.5)	182 31.6 (26.2–37.9)	936 27.9 (25.5–30.3)	3251 24.2 (23.0–25.4)	765 27.6 (24.9–30.6)
Poor	395 5.1 (4.3–6.0)	539 8.0 (7.0–9.1)	241 14.6 (12.3–17.2)	1130 7.7 (7.0–8.4)	67 12.0 (8.7–16.2)	252 8.9 (7.3–10.8)	698 6.5 (5.8–7.4)	197 10.6 (8.7–13.0)
Previous treatment for gum diseases	Missing data = 674			Missing data = 369		Missing data = 787		
No	8103 90.2 (89.1–91.1)	6884 87.8 (86.7–88.9)	1921 87.6 (85.4–89.5)	16,673 88.9 (88.2–89.6)	478 83.8 (78.6–87.9)	3084 88.7 (87.0–90.3)	11,486 89.4 (88.6–90.2)	2226 85.7 (83.3–87.8)
Yes	920 9.8 (8.9–10.9)	1060 12.2 (11.1–13.3)	297 12.4 (10.5–14.6)	2250 11.1 (10.4–11.8)	89 16.2 (12.1–21.4)	432 11.3 (9.7–13.0)	1463 10.6 (9.8–11.4)	381 14.3 (12.2–16.7)
Tooth mobility	Missing data = 708			Missing data = 396		Missing data = 814		
No	7890 88.0 (86.9–89.0)	6469 81.3 (79.8–82.6)	1686 73.8 (70.9–76.6)	15,587 83.1 (82.2–84.0)	441 79.5 (74.1–84.0)	2956 83.4 (81.3–85.3)	10,967 84.3 (83.2–85.3)	2048 78.2 (75.4–80.8)
Yes	1117 12.0 (11.0–13.1)	1459 18.7 (17.4–20.2)	530 26.2 (23.4–29.1)	3043 16.9 (16.0–17.8)	122 20.5 (16.0–25.9)	554 16.6 (14.7–18.7)	1957 15.7 (14.7–16.8)	563 21.8 (19.2–24.6)
Bone loss	Missing data = 774			Missing data = 465		Missing data = 882		
No	8365 93.8 (92.9–94.5)	7009 90.2 (89.2–91.1)	1912 88.6 (86.6–90.4)	17,081 91.6 (91.0–92.2)	478 88.8 (84.8–91.9)	3192 92.3 (90.9–93.6)	11,726 91.8 (91.0–92.5)	2268 89.1 (87.1–90.8)
Yes	623 6.2 (5.5–7.1)	889 9.8 (8.9–10.8)	287 11.4 (9.6–13.4)	1755 8.4 (7.8–9.0)	80 11.2 (8.1–15.2)	311 7.7 (6.4–9.1)	1157 8.2 (7.5–9.0)	323 10.9 (9.2–12.9)
Current abnormalities	Missing data = 729			Missing data = 416		Missing data = 832		
No	7214 79.7 (78.3–81.0)	6119 76.4 (74.8–77.9)	1607 69.6 (66.6–72.5)	14,747 76.9 (75.9–77.9)	411 70.8 (64.6–76.4)	2678 75.4 (73.0–77.6)	10,228 78.2 (77.0–79.4)	1948 72.2 (69.3–75.0)
Yes	1790 20.3 (19.0–21.7)	1798 23.6 (22.1–25.2)	602 30.4 (27.5–33.4)	4130 23.1 (22.1–24.1)	155 29.2 (23.6–35.4)	836 24.6 (22.4–27.0)	2679 21.8 (20.6–23.0)	658 27.8 (25.0–30.7)

Note: Data are *n* and % (95% CI), and % values are weighted in order to provide results representative of the French general population aged 18–69 years old, in the selected departments of CONSTANCES, and covered by the general insurance scheme. All $p < 0.05$.

TABLE 4 Periodontal health characteristics in the total population and according to periodontal screening score (PESS).

	Total		PESS < 5, *N* = 12,753		PESS ≥ 5, *N* = 7106	
Time since last dental visit	***N***	**% (95% CI)**	***N***	**% (95% CI)**	***N***	**% (95% CI)**
<6 months	8899	40.9 (39.8–42.0)	5098	36.5 (35.2–37.8)	3801	50.5 (48.6–52.5)
>6 months and <1 year	4681	22.5 (21.6–23.4)	3235	24.1 (23.0–25.3)	1446	18.9 (17.5–20.4)
>1 year and <2 years	3683	19.2 (18.4–20.2)	2636	21.4 (20.3–22.5)	1047	14.6 (13.3–16.0)
>2 years and <3 years	1317	8.1 (7.5–8.8)	956	9.1 (8.3–10.0)	361	6.0 (5.1–7.1)
>3 years and <5 years	632	4.1 (3.7–4.6)	435	4.1 (3.6–4.8)	197	4.0 (3.3–5.0)
>5 years	432	3.7 (3.2–4.2)	257	3.3 (2.8–3.9)	175	4.6 (3.7–5.7)
Never been	15	0.2 (0.1–0.3)	11	0.2 (0.1–0.4)	4	0.1 (0.0–0.4)
I do not know	106	1.2 (0.9–1.6)	75	1.3 (0.9–1.8)	31	1.1 (0.7–1.8)
Missing	94		50		44	
Self-reported gum disease						
Yes	1610	8.4 (7.8–9.0)	428	3.7 (3.2–4.2)	1182	18.8 (17.3–20.4)
No	15,458	78.2 (77.2–79.1)	11,015	85.4 (84.4–86.4)	4443	62.1 (60.1–64.0)
I do not know	2321	13.5 (12.7–14.3)	1110	10.9 (10.0–11.9)	1211	19.1 (17.6–20.8)
Missing	470		200		270	
Weekly use of an inter-dental cleaning device						
0 day	10,865	61.2 (60.1–62.2)	7876	66.6 (65.3–67.9)	2989	48.9 (47.0–50.9)
1–3 days	4331	20.7 (19.8–21.6)	2719	20.2 (19.1–21.3)	1612	22.0 (20.5–23.6)
4–6 days	1532	6.9 (6.4–7.5)	784	5.4 (4.9–6.1)	748	10.1 (9.0–11.3)
Every day	2726	11.2 (10.6–11.9)	1211	7.8 (7.1–8.5)	1515	18.9 (17.5–20.5)
Missing	405		163		242	
Weekly use of a mouth rinse						
0 day	14,419	72.9 (71.9–74.0)	10,042	78.5 (77.3–79.7)	4377	60.4 (58.5–62.4)
1–3 days	3078	16.7 (15.9–17.6)	856	6.6 (6.0–7.3)	590	8.7 (7.7–9.8)
4–6 days	743	4.3 (3.8–4.8)	518	4.9 (4.3–5.6)	455	7.5 (6.4–8.7)
Every day	1109	6.0 (5.5–6.6)	482	4.1 (3.6–4.7)	627	10.4 (9.2–11.8)
Missing	510		222		288	
Gingival bleeding						
Yes	4957	27.3 (26.2–28.3)	2943	26.4 (25.2–27.7)	2014	29.1 (27.4–30.9)
No	14,505	71.6 (70.5–72.6)	9626	72.6 (71.3–73.8)	4879	69.4 (67.6–71.2)
I do not know	214	1.2 (0.9–1.4)	120	1.0 (0.8–1.3)	94	1.5 (1.1–2.1)
Missing	183		64		119	
Food impaction						
Yes	9804	46.6 (45.5–47.8)	5328	39.2 (37.8–40.5)	4476	63.0 (61.1–64.9)
No	9301	49.9 (48.8–51.0)	6982	57.4 (56.0–58.7)	2319	33.6 (31.7–35.4)
I don't know	536	3.5 (3.0–4.0)	356	3.5 (3.0–4.1)	180	3.4 (2.7–4.3)
Missing	218		87		131	
Tooth loosening						
Yes	3333	16.2 (15.4–17.0)	971	7.4 (6.7–8.1)	2362	35.6 (33.8–37.6)
No	15,496	79.4 (78.5–80.3)	11,336	89.5 (88.6–90.3)	4160	57.3 (55.3–59.2)
I don't know	789	4.4 (3.9–4.9)	358	3.1 (2.6–3.7)	431	7.1 (6.1–8.3)
Missing	241		88		153	
Gum retraction						
Yes	4661	21.1 (20.2–22.0)	2112	15.1 (14.2–16.1)	2549	34.2 (32.4–36.0)
No	13,470	70.4 (69.4–71.4)	9855	78.5 (77.3–79.6)	3615	52.7 (50.7–54.6)

(Continues)

TABLE 4 (Continued)

Time since last dental visit	Total		PESS < 5, *N* = 12,753		PESS ≥ 5, *N* = 7106	
	N	% (95% CI)	*N*	% (95% CI)	*N*	% (95% CI)
I do not know	1551	8.5 (7.9–9.2)	738	6.4 (5.7–7.2)	813	13.1 (11.8–14.6)
Missing	177					

Note: Data are *n* and % (95% CI), and % values are weighted in order to provide results representative of the French general population aged 18–69 years old, in the selected departments of CONSTANCES, and covered by the general insurance scheme. All $p < .05$.

3.2 | Prevalence of periodontitis by socio-economic status

Table 2 displays the results by household income and level of education. The highest weighted prevalence for PESS ≥ 5 was in the lowest socio-economic categories (e.g., 41.2% [39.5%–43.0%], 25.6% [24.1%–27.3%] and 18.9% [17.4%–20.5%] for the participants with no more than a high school diploma, those with an undergraduate degree and those with postgraduate degree, respectively). These gradients were similar for each component of PESS, except for bone loss and for previous periodontal treatment according to educational level, where no difference was found. In addition, the intermediate education category had the highest prevalence of current abnormalities. Prevalence data stratified by occupational status also showed results consistent with a socio-economic gradient, with the lowest prevalence in the most advantaged group, except for previous treatment for gum diseases, where no difference was found (Table S2). Furthermore, the prevalence of bone loss was lowest among employees.

3.3 | Prevalence of periodontitis by health behaviours

Table 3 shows that current smokers had a higher prevalence of severe periodontitis than ex-smokers and non-smokers (46.1% [43.0%–49.2%], 33.8% [32.2%–35.5%] and 22.8% [21.5%–24.2%], respectively). The result for smokers was expected, given that it is a component of PESS. However, the prevalence of each component of the PESS followed the same gradient. Current e-cigarette users also had the highest prevalence, as did participants with excessive daily alcohol consumption. It should be noted that for all variables except bone loss, the lowest prevalence was among moderate consumers (Table 3).

3.4 | PESS and periodontal health items

The other periodontal health characteristics in the total population and according to the presence of severe periodontitis (i.e., PESS ≥ 5) are displayed in Table 4. While more than 60% of participants reported having visited their dentist in the last year (including nearly 41% in the last 6 months), less than 10% declared that it had been more than 3 years since their last visit. The prevalence for participants with a PESS ≥ 5 was both greater for 'a visit to the dentist in the last 6 months' and also in 'more than 5 years'. Overall, 8.4% (7.8%–9.1%) reported to have gum disease, but this prevalence was 18.8% (17.3%–20.4%) in participants with severe periodontitis risk (vs. 3.7% [3.2%–4.2%] for those avec PESS < 5).

Individuals with PESS ≥ 5 used additional inter-dental cleaning devices and/or mouth rinse more frequently than those with PESS < 5. All the other variables relating to periodontal symptoms (i.e., gingival bleeding, food impaction, tooth loosening and gum retraction) were increased for participants with a PESS ≥ 5, in particular for tooth loosening where the prevalence was multiplied by almost five times.

4 | DISCUSSION

The present study allows to assess the prevalence of severe periodontitis in the French general population as estimated by calculating the PESS. Data from each participant were weighted following a modelling process that allows to extend conclusions from this study to the French general population aged 18–69 years in the selected departments of the CONSTANCES cohort. The present data show that 31.6% of individuals were at risk of severe periodontitis, with a higher prevalence among participants aged 55 and over, those with lower socio-economic status as well as current smokers, e-cigarette users and heavy drinkers.

The observed prevalence of severe periodontitis is higher than the previously published national estimates in France (Bourgeois et al., 2007; Chen et al., 2021) and from other industrialized countries (Frencken et al., 2017). Prevalence data provided by the GBD study (Chen et al., 2021; Trindade et al., 2023) are based on miscellaneous periodontal classifications and mainly rely upon the assessment of the Community Periodontal Index Treatment Needs (CPITN), whose reliability is debatable due to the use of a non-confident case definition of the disease (Trindade et al., 2023). Notwithstanding this limitation, the GBD study data show a steady trend towards an increase in the prevalence rate of severe periodontitis worldwide, in which population growth and ageing are important contributing factors. In France, the only survey assessing the prevalence of periodontitis was conducted 20 years ago and used a case definition that is now outdated (Bourgeois et al., 2007), but it already reported a prevalence of severe attachment loss (≥5 mm) of 32.31% (95% CI: 31.81–32.81), with a 26.4% of generalized forms of severe clinical attachment loss. A regional study on a representative urban population in Northern

Italy, based on a clinical examination and applying the CDC/AAP case definition for periodontitis, reported a prevalence of severe periodontitis of 34.9% (Aimetti et al., 2015), which is consistent with the present results. Finally, a recent meta-analysis of studies published between 2011 and 2020 reported a worldwide prevalence of 23.6%, but with substantial heterogeneity due in particular to the case definition used (Trindade et al., 2023).

Certain groups with the highest prevalence corresponded to known risk factors for periodontitis, such as age or smoking. While male sex was also identified in several studies as a risk factor, the higher prevalence in men was only found for some indicators. The higher frequency of periodontitis in participants with a low socio-economic status is in line with most recent reviews (Khajavi et al., 2022; Singh et al., 2019). Although the effects of e-cigarette on periodontal health are still debated (Robbins & Ali, 2022; Wasfi et al., 2022), it cannot be ruled out that the higher prevalence of severe periodontitis risk among e-cigarette users in our sample could be explained by the fact that the vast majority of adult e-cigarette users are current or former smokers. Finally, the higher prevalence of severe periodontitis in participants with excessive alcohol consumption is consistent with recent studies investigating this association (Baumeister et al., 2021). The intermediate prevalence found among non-drinkers could be explained by the presence in this group of abstainers, who probably previously quit drinking for health reasons (Balagny et al., 2023; Stockwell et al., 2016). However, in a US study based on NHANES data (Gay et al., 2018), individuals who reported no alcohol consumption were not at higher risk for periodontitis. Although the aim of this study was not to investigate the risk factors for periodontitis, it allows us to indicate in which population groups the highest prevalence is found. From a public health point of view, these results may be useful for developing information and prevention campaigns aimed at the general public and targeting specific groups at greater risk.

In addition to the results on the prevalence of severe periodontitis, this study also showed a relevant discrepancy between this prevalence, the awareness of the disease and the frequency of dental visits. Among the participants with PESS ≥5, less than 20% thought they had gum disease although half declared having visited their dentist in the past 6 months (and almost 70% in the past year), suggesting a very low awareness of the disease that is likely under-diagnosed by dental professional. This striking difference may also explain the observed high prevalence and severity of the disease at the population level.

The present study has limitations. First, the population studied was limited to people aged under 69 at inclusion, hampering the possibility of estimating the prevalence of periodontitis in older adults. Second, because the study was cross-sectional and the analyses were unadjusted, it is not possible to draw conclusions about the direction of the relationship between the variables. However, the aim of the study was primarily descriptive. Third, severe periodontitis was estimated using self-reported evaluation, and no clinical examination was performed. Thus, the available data may not reflect the clinical picture, and potential self-reported bias cannot be ruled out. Notwithstanding, previous studies have shown that validated self-reported measures are valuable tools in population-based studies and they perform even better than partial mouth periodontal examination in terms of diagnostic accuracy (Abbood et al., 2016; Eke et al., 2010; Reiniger et al., 2020). As previously mentioned, self-reported approaches are convenient tools, cheaper and easy to implement in large epidemiological cohorts and cannot be seen only as a limitation.

In addition, the estimates in the present study are based on a self-reported questionnaire that was validated on the recommended CDC/AAP case definition for periodontitis (Holtfreter et al., 2015). It should also be noted that the prevalence of clinical signs strongly associated with severe periodontitis, such as gingival bleeding, food impaction or gum recession, is much higher in the group of patients with PESS ≥ 5, which supports the validity of the score used.

Several strengths can also be acknowledged. We analysed a population-based sample constituting the CONSTANCES cohort, the large size of which enabled us to conduct analyses stratified by sociodemographic variables and health behaviours. We used weighting coefficients at inclusion and follow-up to estimate the prevalence among French adults aged between 18 and 69 years, living in the selected departments of CONSTANCES and covered by the general health insurance scheme. The current study is the latest survey conducted in France estimating the prevalence of severe periodontitis and reporting the participants' self-perception of their periodontal health in details. These data could be used by the national professional institutions to improve the screening protocols of periodontitis, and may lead to useful comparisons between countries and over time.

5 | CONCLUSIONS

Based on the present population-based cohort study and according to a validated self-reported questionnaire, almost one third of participants was at risk of severe periodontitis, with marked disparities between different sociodemographic groups and in relation to certain lifestyle habits, such as smoking and alcohol consumption. It also appears that most individuals were not aware of their disease despite regular visits to the dentist. This suggests that periodontitis is largely undiagnosed. As the global burden of periodontitis continues to increase due to population growth and ageing, screening for periodontitis and educating patients on its symptoms are likely to be the most effective ways to reduce its prevalence over time.

AUTHOR CONTRIBUTIONS

EW contributed to the design of the study, performed the statistical analyses and drafted the manuscript. AR and SK contributed to data collection, data interpretation and statistical revisions. PGS and GC contributed to study design, data interpretation and critical revisions. MG and MZ initiated the CONSTANCES cohort, contributed to data collection, data interpretation and manuscript drafting. PB and MCC contributed to study design, data collection, data interpretation, drafted the manuscript. All authors provided criticism and revised the final version of the manuscript before submission.

FUNDING INFORMATION

The present study was sponsored by AP-HP (Paris, France), supported by the Recherche Hospitalo-Universitaire iVASC grant (www.ivasc.eu)

(ANR-16-RHUS-00010) from the French National Research Agency (ANR) as part of the 'Investissements d'Avenir' programme. The CONSTANCES Cohort Study was funded by the Caisse nationale d'assurance maladie des travailleurs salariés (CNAMTS), and benefits from a grant from the French Commissariat général à l'investissement (ANR-11-INBS-0002). CONSTANCES also receives funding from MSD, AstraZeneca, Lundbeck and l'Oréal managed by INSERM-Transfert.

CONFLICT OF INTEREST STATEMENT

All authors declare no conflicts of interest in relation to the matter of this study.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ETHICS STATEMENT

The CONSTANCES cohort obtained the authorization of the National Data Protection Authority (Commission Nationale de l'Informatique et des Libertés, no. 910486) and was approved by the Institutional Review Board of the National Institute for Medical Research—INSERM (no. 01–011).

INFORMED CONSENT

Written informed consent was received from all participants.

ORCID

Emmanuel Wiernik https://orcid.org/0000-0001-8046-7919
Adeline Renuy https://orcid.org/0009-0005-4043-9784
Sofiane Kab https://orcid.org/0000-0001-6041-9602
Philippe Gabriel Steg https://orcid.org/0000-0001-6896-2941
Marcel Goldberg https://orcid.org/0000-0002-6161-5880
Marie Zins https://orcid.org/0000-0002-4540-4282
Giuseppina Caligiuri https://orcid.org/0000-0003-4973-2205
Philippe Bouchard https://orcid.org/0000-0003-2500-3219
Maria Clotilde Carra https://orcid.org/0000-0002-5717-3274

REFERENCES

Abbood, H. M., Hinz, J., Cherukara, G., & Macfarlane, T. V. (2016). Validity of self-reported periodontal disease: A systematic review and meta-analysis. *Journal of Periodontology*, *87*(12), 1474–1483.

Aimetti, M., Perotto, S., Castiglione, A., Mariani, G. M., Ferrarotti, F., & Romano, F. (2015). Prevalence of periodontitis in an adult population from an urban area in North Italy: Findings from a cross-sectional population-based epidemiological survey. *Journal of Clinical Periodontology*, *42*(7), 622–631.

Balagny, P., Vidal-Petiot, E., Renuy, A., Matta, J., Frija-Masson, J., Steg, P. G., Goldberg, M., Zins, M., d'Ortho, M. P., & Wiernik, E. (2023). Prevalence, treatment and determinants of obstructive sleep apnoea and its symptoms in a population-based French cohort. *ERJ Open Research*, *9*(3), 53–2023.

Baumeister, S. E., Freuer, D., Nolde, M., Kocher, T., Baurecht, H., Khazaei, Y., Ehmke, B., & Holtfreter, B. (2021). Testing the association between tobacco smoking, alcohol consumption, and risk of periodontitis: A Mendelian randomization study. *Journal of Clinical Periodontology*, *48*(11), 1414–1420.

Bond, J. C., McDonough, R., Alshihayb, T. S., Kaye, E. K., Garcia, R. I., & Heaton, B. (2023). Periodontitis is associated with an increased hazard of mortality in a longitudinal cohort study over 50 years. *Journal of Clinical Periodontology*, *50*(1), 71–79.

Bourgeois, D., Bouchard, P., & Mattout, C. (2007). Epidemiology of periodontal status in dentate adults in France, 2002-2003. *Journal of Periodontal Research*, *42*(3), 219–227.

Carra, M. C., Gueguen, A., Thomas, F., Pannier, B., Caligiuri, G., Steg, P. G., Zins, M., & Bouchard, P. (2018). Self-report assessment of severe periodontitis: Periodontal screening score development. *Journal of Clinical Periodontology*, *45*(7), 818–831.

Chen, M. X., Zhong, Y. J., Dong, Q. Q., Wong, H. M., & Wen, Y. F. (2021). Global, regional, and national burden of severe periodontitis, 1990-2019: An analysis of the global burden of disease study 2019. *Journal of Clinical Periodontology*, *48*(9), 1165–1188.

Cui, Y., Tian, G., Li, R., Shi, Y., Zhou, T., & Yan, Y. (2023). Epidemiological and sociodemographic transitions of severe periodontitis incidence, prevalence, and disability-adjusted life years for 21 world regions and globally from 1990 to 2019: An age-period-cohort analysis. *Journal of Periodontology*, *94*(2), 193–203.

Deng, K., Pelekos, G., Jin, L., & Tonetti, M. S. (2021). Diagnostic accuracy of self-reported measures of periodontal disease: A clinical validation study using the 2017 case definitions. *Journal of Clinical Periodontology*, *48*(8), 1037–1050.

Eke, P. I., Borgnakke, W. S., & Genco, R. J. (2020). Recent epidemiologic trends in periodontitis in the USA. *Periodontology 2000*, *82*(1), 257–267.

Eke, P. I., & Dye, B. (2009). Assessment of self-report measures for predicting population prevalence of periodontitis. *Journal of Periodontology*, *80*(9), 1371–1379.

Eke, P. I., Thornton-Evans, G. O., Wei, L., Borgnakke, W. S., & Dye, B. A. (2010). Accuracy of NHANES periodontal examination protocols. *Journal of Dental Research*, *89*(11), 1208–1213.

Frencken, J. E., Sharma, P., Stenhouse, L., Green, D., Laverty, D., & Dietrich, T. (2017). Global epidemiology of dental caries and severe periodontitis – A comprehensive review. *Journal of Clinical Periodontology*, *44*(Suppl 18), S94–S105.

Gay, I. C., Tran, D. T., & Paquette, D. W. (2018). Alcohol intake and periodontitis in adults aged ≥30 years: NHANES 2009-2012. *Journal of Periodontology*, *89*(6), 625–634.

Genco, R. J., & Borgnakke, W. S. (2020). Diabetes as a potential risk for periodontitis: Association studies. *Periodontology 2000*, *83*(1), 40–45.

Genco, R. J., & Sanz, M. (2020). Clinical and public health implications of periodontal and systemic diseases: An overview. *Periodontology 2000*, *83*(1), 7–13.

Hajishengallis, G., & Chavakis, T. (2021). Local and systemic mechanisms linking periodontal disease and inflammatory comorbidities. *Nature Reviews. Immunology*, *21*(7), 426–440.

Holtfreter, B., Albandar, J. M., Dietrich, T., Dye, B. A., Eaton, K. A., Eke, P. I., Papapanou, P. N., Kocher, T., & Joint EU/USA Periodontal Epidemiology Working Group. (2015). Standards for reporting chronic periodontitis prevalence and severity in epidemiologic studies: Proposed standards from the Joint EU/USA Periodontal Epidemiology Working Group. *Journal of Clinical Periodontology*, *42*(5), 407–412.

INSEE. (n.d.). Classification of professions and socioprofessional categories/PCS. https://www.insee.fr/en/metadonnees/definition/c1493

Institute for Health Metrics and Evaluation (IHME). (2020). GBD 2019 Cause and Risk Summary: Periodontal Diseases – Level 4 cause.

Kassebaum, N. J., Bernabé, E., Dahiya, M., Bhandari, B., Murray, C. J. L., & Marcenes, W. (2014). Global burden of severe periodontitis in 1990-2010: A systematic review and meta-regression. *Journal of Dental Research*, *93*(11), 1045–1053.

Khajavi, A., Radvar, M., & Moeintaghavi, A. (2022). Socioeconomic determinants of periodontitis. *Periodontology 2000*, *90*(1), 13–44.

Kinane, D. F., Stathopoulou, P. G., & Papapanou, P. N. (2017). Periodontal diseases. *Nature Reviews Disease Primers*, *3*, 17038.

Montero, E., la Rosa, M., Montanya, E., Calle-Pascual, A. L., Genco, R. J., Sanz, M., & Herrera, D. (2020). Validation of self-reported measures of periodontitis in a Spanish population. *Journal of Periodontal Research*, *55*(3), 400–409.

Reiniger, A. P. P., Londero, A. B., Ferreira, T. G. M., da Rocha, J. M., Moreira, C. H. C., & Kantorski, K. Z. (2020). Validity of self-reported measures for periodontitis surveillance in a rural sample. *Journal of Periodontology*, *91*(5), 617–627.

Robbins, J., & Ali, K. (2022). How do periodontal indices compare among non-smokers, tobacco and e-cigarette smokers? *Evidence-Based Dentistry*, *23*(3), 116–117.

Romandini, M., Baima, G., Antonoglou, G., Bueno, J., Figuero, E., & Sanz, M. (2021). Periodontitis, edentulism, and risk of mortality: A systematic review with meta-analyses. *Journal of Dental Research*, *100*(1), 37–49.

Santin, G., et al. (2016). Estimation of Prevalences in CONSTANCES, first explorations. *Bull Dépidémiologie Hebd*, *35*, 622–629.

Singh, A., Peres, M. A., & Watt, R. G. (2019). The relationship between income and oral health: A critical review. *Journal of Dental Research*, *98*(8), 853–860.

Slade, G. D. (2007). Interim analysis of validity of periodontitis screening questions in the Australian population. *Journal of Periodontology*, *78*(7 Suppl), 1463–1470.

Stockwell, T., Zhao, J., Panwar, S., Roemer, A., Naimi, T., & Chikritzhs, T. (2016). Do "moderate" drinkers have reduced mortality risk? A systematic review and meta-analysis of alcohol consumption and all-cause mortality. *Journal of Studies on Alcohol and Drugs*, *77*(2), 185–198.

The Economist Intelligence Unit Limited. (2021). Time to take gum disease seriously: The societal and economic impact of periodontitis. https://impact.economist.com/perspectives/sites/default/files/eiu-efp-oralb-gum-disease.pdf

Trindade, D., Carvalho, R., Machado, V., Chambrone, L., Mendes, J. J., & Botelho, J. (2023). Prevalence of periodontitis in dentate people between 2011 and 2020: A systematic review and meta-analysis of epidemiological studies. *Journal of Clinical Periodontology*, *50*, 604–626.

Wasfi, R. A., Bang, F., de Groh, M., Champagne, A., Han, A., Lang, J. J., McFaull, S. R., Melvin, A., Pipe, A. L., Saxena, S., Thompson, W., Warner, E., & Prince, S. A. (2022). Chronic health effects associated with electronic cigarette use: A systematic review. *Frontiers in Public Health*, *10*, 959622.

Wiernik, E., Meneton, P., Empana, J. P., Siemiatycki, J., Hoertel, N., Vulser, H., Nabi, H., Limosin, F., Czernichow, S., Goldberg, M., Ozguler, A., Zins, M., & Lemogne, C. (2018). Cardiovascular risk goes up as your mood goes down: Interaction of depression and socioeconomic status in determination of cardiovascular risk in the CONSTANCES cohort. *International Journal of Cardiology*, *262*, 99–105.

Wu, L., Zhang, S. Q., Zhao, L., Ren, Z. H., & Hu, C. Y. (2022). Global, regional, and national burden of periodontitis from 1990 to 2019: Results from the global burden of disease study 2019. *Journal of Periodontology*, *93*(10), 1445–1454.

Zhang, X., Wang, X., Wu, J., Wang, M., Hu, B., Qu, H., Zhang, J., & Li, Q. (2022). The global burden of periodontal diseases in 204 countries and territories from 1990 to 2019. *Oral Diseases*. https://doi.org/10.1111/odi.14436

Zins, M., Goldberg, M., & CONSTANCES Team. (2015). The French CONSTANCES population-based cohort: Design, inclusion and follow-up. *European Journal of Epidemiology*, *30*(12), 1317–1328.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Wiernik, E., Renuy, A., Kab, S., Steg, P. G., Goldberg, M., Zins, M., Caligiuri, G., Bouchard, P., & Carra, M. C. (2024). Prevalence of self-reported severe periodontitis: Data from the population-based CONSTANCES cohort. *Journal of Clinical Periodontology*, 1–11. https://doi.org/10.1111/jcpe.13969