Published in final edited form as:

J Clin Periodontol. 2015 May ; 42(5): 407–412. doi:10.1111/jcpe.12392.

Standards for reporting chronic periodontitis prevalence and severity in epidemiologic studies:

Proposed standards from the Joint EU/USA Periodontal Epidemiology Working Group

Birte Holtfreter[1], **J. M. Albandar**[2], **Thomas Dietrich**[3], **Bruce A. Dye**[4], **Kenneth A. Eaton**[5,6,7], **Paul I. Eke**[8], **Panos N. Papapanou**[9], **Thomas Kocher**[1]

[1]Unit of Periodontology, Department of Restorative Dentistry, Periodontology, and Endodontology, University Medicine Greifswald, Ernst Moritz Arndt University Greifswald, Greifswald, Germany

[2]Department of Periodontology and Oral Implantology, Temple University School of Dentistry, Philadelphia, United States

[3]Periodontal Research Group, School of Dentistry, College of Medical and Dental Sciences, University of Birmingham, Birmingham, United Kingdom

[4]Division of Health and Nutrition Examination Surveys, National Center for Health Statistics, Centers for Disease Control and Prevention (CDC), Hyattsville, MD, United States

[5]University College London, Eastman Dental Institute, London, United Kingdom

[6]King's College London Dental Institute, London, United Kingdom

[7]University of Kent, Centre for Professional Practice, Kent, United Kingdom

[8]Division of Population Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, Georgia, United States

[9]Section of Oral and Diagnostics Sciences, Division of Periodontics, College of Dental Medicine, Columbia University, New York, NY, USA

Introduction

Periodontal diseases are highly prevalent with varying patterns in different populations (Demmer and Papapanou, 2010). The prevalence estimates are influenced by the employed methodology, including case definitions of periodontal diseases and recording protocols (Albandar, 2011). Various combinations of clinical attachment loss (CAL), pocket probing depth (PPD), and bleeding on probing (BOP) have been used in the assessment of periodontal status in epidemiologic studies (Savage et al., 2009). The lack of consensus on

Corresponding author Dr. rer. nat. Birte Holtfreter, Unit of Periodontology, Department of Restorative Dentistry, Periodontology, and Endodontology, University Medicine Greifswald, Ernst Moritz Arndt University Greifswald, Rotgerberstr. 8, 17475 Greifswald, Germany, Tel.: +49-3834-867397, Fax: +49-3834-867171, birte.holtfreter@uni-greifswald.de.

Conflict of interest and Sources of Funding Statement

The authors declare that there are no conflicts of interest in this study.

the case definitions of chronic periodontitis, the variation in clinical periodontal examination protocols, and differences in dental status may complicate population comparisons or make inferences regarding the true global variation in periodontitis prevalence difficult. Moreover, the lack of concomitant presentation of exposures profiles (diabetes mellitus, smoking status, education, health care availability, oral hygiene behaviours, etc.) (Savage et al., 2009) impedes a better understanding of the reasons for prevalence variation (Holtfreter et al., 2012). Evaluating inter-study differences in the distributions of these variables may help explain the potential differences in prevalence, extent and severity of periodontal diseases between studies.

In this commentary, we suggest standardized principles for the reporting of the prevalence and severity of periodontal diseases in epidemiological studies in compliance with the reporting guidelines for observational studies (Simera, 2014, von Elm et al., 2007), which endorse transparent reporting of research. We list subject-related, dental, and periodontal data that should be presented either within the main text of a publication or in an Online Supplement. Consistent implementation of these guidelines in future studies could improve reporting quality, facilitate meaningful comparisons of the prevalence, extent and severity of periodontal diseases across populations and countries and provide a better insight into the determinants of variation in periodontitis prevalence and severity worldwide.

Reporting study design and conduct

Study design, reasons for drop-out, and weighting—Reporting key information pertaining to how the study population was selected is critical to comparing study results. For example, it is important to document if the study participants are sampled from the general population or if specific inclusion criteria have been employed, such as institutionalized, or independently living (non-institutionalized). Likewise, it is important to report whether the study was regional, national, or some other construct. Any claims with regard to representativeness of the study should be explained and well founded. In addition, the study period needs to be documented because comparisons between studies with different study periods are hampered by the influence of (region-specific) cohort and period effects.

To describe the study design accurately, information on sampling and recruitment strategies (random sampling, cluster sampling, etc.) needs to be reported. The planned sample size, the number of eligible subjects, the net sample size (subjects included in the study) with the respective response rate should be provided (see Table 1). Information on whether, how many and why subjects were excluded from analyses at different stages is important. For example, information should be provided regarding reasons for non-eligibility (persons deceased, moved, or unable to participate due to various reasons), non-participation (refusal to participate, medical reasons, etc.) or lack of response. If possible, non-response analyses should be provided.

For complex sample designs, final sampling weights and design variables (if appropriate) need to be considered during analyses to produce unbiased total estimates. Design variables identify strata and clusters, and account for finite population corrections at sampling stages.

The design effect equals the quotient of variances without and with accounting for sampling weights and design.

Assessment of periodontal measurements and recording protocols

Probing of periodontal pockets is the most commonly used method to assess periodontal status or to measure changes in periodontal status over time in clinical and epidemiological studies (Listgarten, 1980, Hefti, 1997). Probing pocket depth (PPD), distance of the gingival margin to the cemento-enamel junction (CEJ)/recession, and clinical attachment level (CAL) are assessed at fully erupted teeth, while only PPD is assessed at dental implants.

A full-mouth recording, which includes periodontal measurement at six sites per tooth on 28 teeth, excluding wisdom teeth, is currently regarded as the gold standard for clinical examinations (Kingman et al., 2008). Whenever all 32 teeth are periodontally scored, comprehensive reporting of periodontal data based on 28 and 32 teeth is recommended. Because of limited financial and time resources, epidemiological surveys are often restricted to partial-mouth recording protocols (PRP). However, PRPs provide biased estimates of the prevalence and severity of periodontal diseases (Susin et al., 2005a, Kingman et al., 2008). Detailed reporting of the PRP used is important to allow conclusions regarding under- or overestimation of prevalence and extent and severity estimates.

To estimate and adjust for the bias associated with use of PRPs, “correction factors” should ideally be computed to enable comparison with other studies (Susin et al., 2005b). These can be generated by examining at least a random 10% of the total study sample using a full-mouth approach and comparing the full-mouth scores to those generated by the PRP. However, for the calculation of correction factors within specific subgroups, 10% of the subsample (e.g. 10% of 100) might not be sufficient to robustly estimate subgroup-specific correction factors.

Periodontal probe

Inter-and intra-examiner variability of periodontal measurements can be affected by the choice of the periodontal probe. Furthermore, different probes may have different validity of measuring periodontal disease. Periodontal probes with fine graduation, such as those with single millimetre markings (e.g. UNC-15 probe), are recommended for epidemiological and clinical studies (Leroy et al., 2010). Probes with a fine and equidistant scale allow higher accuracy (Van der Zee et al., 1991) and thus facilitate correct mathematical rounding of periodontal measurements (Tibbetts, 1969). When observational studies are periodically conducted within the same population, use of the same periodontal probe at all-time points is desirable to reduce potential measurement bias. However, when transitioning to a different periodontal probe, understanding the impact of instrument change is important when making inferences on time trends.

Examiner reliability

When multiple examiners are involved in data collection, assessments for inter- and intra-examiner reliability should be presented. Reporting kappa statistics for categorical variables and inter/intra-class correlation coefficients for continuous measures facilitate the

interpretation of data reliability. Although data reliability can be assessed at the subject level or the tooth level, the calculation of reliability measures at the site level for PPD and CAL is considered most useful.

Reporting periodontal studies

Characteristics of study subjects—Differences in the rates and patterns of exposures may provide information on possible factors influencing the variations in periodontal disease status between studies. Thus, it is recommended that studies present a detailed description of the characteristics of study subjects according to periodontal risk factors pooled for the whole study population, as well as according to major age strata to allow descriptive analyses of the subjects' risk profile.

Periodontal risk factors include socioeconomic and behavioural factors as well as dental hygiene habits and utilisation of dental health care services (see Table 2). Among these, age, gender, smoking status (at minimum: never, former, current), education level, and diabetes status should preferentially be reported. If financial and time resources are still available, data on tooth brushing frequency, use of interdental care devices and dental visits should be collected. For all of these variables, which can easily be collected in interviews or questionnaires, careful reporting of sources of data, details of methods of assessment (measurement), and variable definitions is important.

Tooth loss is considered a significant outcome of periodontal diseases in subjects aged 40+ years (Reich and Hiller, 1993, Glockmann et al., 2011, Albandar, 2005). Teeth that have been lost due to periodontal diseases are no longer available for assessment. When periodontal disease experience, i.e. CAL, is the outcome of interest, the potential for bias increases as tooth loss increases (Albandar, 2011). Accordingly, the numbers of teeth present (including *and* excluding third molars) and the proportion of edentulous subjects should be reported according to age strata. Because of the increasing occurrence of dental implants, the prevalence of dental implants on the subject level and the number of dental implants per subject should additionally be reported.

Report of prevalence and severity of periodontal diseases

In epidemiological studies, periodontal status is mainly described by the use of PPD and CAL assessments. We recommend presenting detailed information on prevalence and extent estimates for thresholds of ≥4 and ≥6 mm for PD and ≥3 and ≥5 mm for CAL. Using these thresholds, prevalence estimates generally do not converge towards 0 or 100% even in younger or older cohorts so that variation across age groups can be detected.

Although prevalence estimates allow a first insight into disease distribution between populations, they are insufficient in providing a meaningful comparison of periodontal status as they fail to reflect the extent of the disease (i.e., the percentage of sites affected at a given level of severity). In addition, they are sensitive to measurement bias. Prevalence estimates should be reported in total and stratified according to 10-year age groups (Table 3).

Extent and severity measures (Table 3) should include the i) extent estimates based on site or tooth level assessments exceeding defined thresholds (PD: ≥4 mm and ≥6 mm; CAL: ≥3 mm and ≥5 mm) and ii) mean values computed over all periodontally assessed sites.

Periodontal case definitions

Periodontal case definitions can provide dichotomous assessments of periodontal status or a classification involving different levels of extent and severity of periodontitis (for example, no, mild, moderate, or severe periodontal disease). However, no universally accepted 'case definition' has been established so far. This lack of a universal periodontal disease case definition has received considerable attention over the past several years (Savage et al., 2009). Recently, several proposals for periodontitis case definitions have been made (Eke et al., 2012b, Page and Eke, 2007, Baelum and Lopez, 2012, Van der Velden, 2000, van der Velden, 2005, Roberts-Thomson and Do, 2007, Demmer and Papapanou, 2010, Albandar, 2007, Albandar et al., 1999). These case definitions either focused on using one or a combination of the key clinical parameters (such as CAL, PPD, and BOP), or proposed using age-specific definitions in the assessment of aggressive forms of periodontitis (Demmer and Papapanou, 2010). While a consensus is desirable, it appears unlikely that a single 'case definition' will suit all purposes (including estimates of prevalence, severity, treatment needs, identification of risk factors and disease activity). Therefore, it is prudent that epidemiological surveys provide data of sufficient detail that these various case definitions may be readily reconstructed and presented based on the available data.

Given the current absence of a universally accepted definition of chronic periodontitis, it is suggested to include a report of periodontal findings using the case definitions developed by the Centers for Disease Control and Prevention and the American Academy of Periodontology (CDC/AAP) (Table 4). The intent of these definitions is to provide 'standardized clinical case definitions for population-based studies of periodontitis' (Page and Eke, 2007, Page et al., 2012) and, so far, have been implemented in a number of epidemiological studies (Holtfreter et al., 2009, Holtfreter et al., 2010, Dye et al., 2007, Eke et al., 2012a). Data reporting based on standardized case definitions will facilitate comparison of periodontal prevalence estimates worldwide in the absence of a universally acceptable periodontitis case definition. Nonetheless, further advancements in the understanding of chronic periodontal disease and its sequelae may put forward new or adapted proposals for periodontitis case definitions (Albandar, 2007), which might necessitate reconsidering these proposed reporting standards.

Gingival inflammation

To assess gingival inflammation, presence of either bleeding on probing (BoP), which is the simplest way to assess inflammation of the periodontal tissue, or another gingival bleeding index should be measured. BoP is a dichotomous assessment (yes or no; 0/1); therefore, the average BoP per subject also reflects the percentage of positive sites per mouth. Mean BoP values (with standard deviation) should be presented. For gingival indices, the percentage distribution across categories should be displayed. Ideally, these variables should be recorded at the same sites and teeth as PPD and CAL, including implants. For reporting, all results should be presented for the total population and according to age.

Summary

To help researchers, epidemiologists, and other health data users synthesize the published information better, we have suggested a number of key items (Box 1) that should be presented either within the main text of a publication or in an Online Supplement. Nevertheless, these suggested standards should be considered “ideal” and may be subjected to constraints and limitations of the available data source. Use of these “standards” could improve reporting quality and facilitate the comparison of the distributions of periodontal diseases across populations and countries. Improving our understanding of the determinants of periodontitis prevalence and severity will help in devising initiatives that could help reduce the burden of periodontitis worldwide.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

References

Albandar JM (2005) Epidemiology and risk factors of periodontal diseases. Dent Clin North Am 49, 517–532, v-vi. [PubMed: 15978239]

Albandar JM (2007) Periodontal disease surveillance. J Periodontol 78, 1179–1181. doi:10.1902/jop.2007.070166. [PubMed: 17608570]

Albandar JM (2011) Underestimation of periodontitis in NHANES surveys. J Periodontol 82, 337–341. doi:10.1902/jop.2011.100638. [PubMed: 21214340]

Albandar JM, Brunelle JA & Kingman A (1999) Destructive periodontal disease in adults 30 years of age and older in the United States, 1988–1994. J Periodontol 70, 13–29. doi:10.1902/jop.1999.70.1.13. [PubMed: 10052767]

Baelum V & Lopez R (2012) Defining a periodontitis case: analysis of a never-treated adult population. J Clin Periodontol 39, 10–19. doi:10.1111/j.1600-051X.2011.01812.x. [PubMed: 22093052]

Demmer RT & Papapanou PN (2010) Epidemiologic patterns of chronic and aggressive periodontitis. Periodontol 2000 53, 28–44. doi:10.1111/j.1600-0757.2009.00326.xPRD326 [pii].

Dye BA, Tan S, Smith V, Lewis BG, Barker LK, Thornton-Evans G, Eke PI, Beltran-Aguilar ED, Horowitz AM & Li CH (2007) Trends in oral health status: United States, 1988–1994 and 1999–2004. Vital Health Stat 11, 1–92.

Eke PI, Dye BA, Wei L, Thornton-Evans GO & Genco RJ (2012a) Prevalence of Periodontitis in Adults in the United States: 2009 and 2010. J Dent Res. doi:0022034512457373 [pii] 10.1177/0022034512457373.

Eke PI, Page RC, Wei L, Thornton-Evans G & Genco RJ (2012b) Update of the Case Definitions for Population-Based Surveillance of Periodontitis. J Periodontol. doi:10.1902/jop.2012.110664.

Glockmann E, Panzner K-D, Huhn P, Sigusch BW & Glockmann K (2011) Ursachen des Zahnverlustes in Deutschland. – Dokumentation einer bundesweiten Erhebung (2007) [WWW document]. URL http://www.idz-koeln.de/index.htm?www3.idz-koeln.de/idzpubl3.nsf/(aktuell-D-N)/4DE6A13830AE2B15C125785C00345ABB [accessed on May 16th, 2011]

Hefti AF (1997) Periodontal probing. Crit Rev Oral Biol Med 8, 336–356. [PubMed: 9260047]

Holtfreter B, Demmer RT, Bernhardt O, Papapanou PN, Schwahn C, Kocher T & Desvarieux M (2012) A comparison of periodontal status in the two regional, population-based studies of SHIP and INVEST. submitted to J Clin Periodontol.

Holtfreter B, Kocher T, Hoffmann T, Desvarieux M & Micheelis W (2010) Prevalence of periodontal disease and treatment demands based on a German dental survey (DMS IV). J Clin Periodontol 37, 211–219. doi:10.1111/j.1600-051X.2009.01517.xCPE1517 [pii]. [PubMed: 20070861]

Holtfreter B, Schwahn C, Biffar R & Kocher T (2009) Epidemiology of periodontal diseases in the Study of Health in Pomerania. *J Clin Periodontol* 36, 114–123. doi:10.1111/j.1600-051X.2008.01361.x CPE1361 [pii]. [PubMed: 19207886]

Kingman A, Susin C & Albandar JM (2008) Effect of partial recording protocols on severity estimates of periodontal disease. J Clin Periodontol 35, 659–667. doi:CPE1243 [pii] 10.1111/j.1600-051X.2008.01243.x. [PubMed: 18513337]

Leroy R, Eaton KA & Savage A (2010) Methodological issues in epidemiological studies of periodontitis--how can it be improved? BMC Oral Health 10, 8. doi:1472-6831-10-8 [pii] 10.1186/1472-6831-10-8. [PubMed: 20409298]

Listgarten MA (1980) Periodontal probing: what does it mean? J Clin Periodontol 7, 165–176. [PubMed: 7000852]

Page RC & Eke PI (2007) Case definitions for use in population-based surveillance of periodontitis. J Periodontol 78, 1387–1399. doi:10.1902/jop.2007.060264.

Page WF, Chubb M, Feng X, Fan LY, Li Y, Weber NS, Levin LI & Niebuhr DW (2012) National estimates of seroincidence and seroprevalence for herpes simplex virus type 1 and type 2 among US military adults aged 18 to 29 years. Sex Transm Dis 39, 241–250. doi:10.1097/OLQ.0b013e3182401a17 00007435-201204000-00001 [pii]. [PubMed: 22421688]

Reich E & Hiller KA (1993) Reasons for tooth extraction in the western states of Germany. Community Dentistry and Oral Epidemiology 21, 379–383. [PubMed: 8306617]

Roberts-Thomson KF & Do L (2007) Oral health status In: Australia's dental generations. The national survey of adult oral health 2004–2006, (eds.) Slade GD, Spencer AJ & Roberts-Thomson KF, pp. 81–142. Canberra: Australian Institute of Health and Welfare.

Savage A, Eaton KA, Moles DR & Needleman I (2009) A systematic review of definitions of periodontitis and methods that have been used to identify this disease. J Clin Periodontol 36, 458–467. doi:CPE1408 [pii] 10.1111/j.1600-051X.2009.01408.x. [PubMed: 19508246]

Simera I (2014) Enhancing the QUAlity and Transparency Of health Research. Oxford: EQUATOR Network.

Susin C, Kingman A & Albandar JM (2005a) Effect of partial recording protocols on estimates of prevalence of periodontal disease. J Periodontol 76, 262–267. doi:10.1902/jop.2005.76.2.262. [PubMed: 15974851]

Susin C, Valle P, Oppermann RV, Haugejorden O & Albandar JM (2005b) Occurrence and risk indicators of increased probing depth in an adult Brazilian population. J Clin Periodontol 32, 123–129. doi:CPE637 [pii] 10.1111/j.1600-051X.2005.00637.x. [PubMed: 15691340]

Tibbetts LS Jr. (1969) Use of diagnostic probes for detection of periodontal disease. J Am Dent Assoc 78, 549–555. [PubMed: 5249926]

Van der Velden U (2000) Diagnosis of periodontitis. J Clin Periodontol 27, 960–961. [PubMed: 11140565]

van der Velden U (2005) Purpose and problems of periodontal disease classification. Periodontol 2000 39, 13–21. doi:PRD127 [pii] 10.1111/j.1600-0757.2005.00127.x.

Van der Zee E, Davies EH & Newman HN (1991) Marking width, calibration from tip and tine diameter of periodontal probes. J Clin Periodontol 18, 516–520. [PubMed: 1894745]

von Elm E, Altman DG, Egger M, Pocock SJ, Gotzsche PC & Vandenbroucke JP (2007) The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. Prev Med 45, 247–251. doi:S0091-7435(07)00374-X [pii] 10.1016/j.ypmed.2007.08.012. [PubMed: 17950122]

Box 1.

It is recommended to report several items, addressing study design, periodontal examination protocol, characteristics of study subjects, periodontal disease definitions, and other periodontal conditions in total and stratified by age group. Please provide detailed information on:

Study design:

- **I.** Study and sampling design, study period and region
- **II.** Sample size, net sample size, final sample size, and response rate
- **III.** Nonresponse analyses

Periodontal recording protocol:

- **I.** Which sites at which teeth were examined
- **II.** The periodontal probe: probing pressure, thickness and graduation
- **III.** Rounding scheme

Characteristics of study subjects:

- **I.** Age
- **II.** Gender
- **III.** Smoking status
- **IV.** Education level/Socioeconomic status
- **V.** Body Mass Index
- **VI.** Diabetes mellitus
- **VII.** Oral hygiene and oral care utilisation
- **VIII.** Number of teeth, including and excluding third molars
- **IX.** Prevalence and number of dental implants per subject
- **X.** Number of edentulous subjects, included or excluded

Periodontal items addressing periodontal prevalence and severity:

- **I.** Prevalence of CAL/PD on subject level, equalling the percentage of subjects showing a certain condition on at least one site
- **II.** Mean CAL/PD
- **III.** Extent of CAL/PD on site level, equalling the percentage of sites per mouth showing a certain condition
- **IV.** Extent of CAL/PD on tooth level, equalling the percentage of teeth per mouth showing a certain condition
- **V.** CDC/AAP case definition

Gingival inflammation, evaluating the percentage of positive sites per mouth for:

I. Bleeding on probing

Table 1.

Description of the study sample.

	Sample size		Net sample size		Response rate (%)	
Age, years	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
25–34	N	N	N (%)	N (%)	%	%
35–44	N	N	N (%)	N (%)	%	%
45–54	N	N	N (%)	N (%)	%	%
55–64	N	N	N (%)	N (%)	%	%
65–74	N	N	N (%)	N (%)	%	%
75+	N	N	N (%)	N (%)	%	%
Total	N	N	N (%)	N (%)	%	%

Table 2.

Characteristics of study subjects with periodontal examinations.

	Age group, years						
	25–34	**35–44**	**45–54**	**55–64**	**65–74**	**75+**	**Total**
Number of subjects	N	N	N	N	N	N	N
Age, years	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Male gender	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Smoking status							
Never smokers	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Former smokers	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Current smokers	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Education level							
Low	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Middle	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
High	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Body Mass index							
<25 kg/m^2	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
25–30 kg/m^2	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
>30 kg/m^2	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Diabetes mellitus	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Tooth brushing frequency							
<2 times/day	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
≥2 times/day	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Use of interdental care devices							
No	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Yes	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Last dental visit							
within last 12 months	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
less often	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Edentulism, % *	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Tooth count *	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Tooth count in dentates *	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Edentulism, % **	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Tooth count **	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Tooth count in dentates **	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Prevalence of dental implants	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Number of dental implants per subject	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD

*excluding third molars;

**including third molars

Data are presented as numbers (percentages) or Means (standard deviation, SD).

Table 3.

Prevalence and extent expressed as the percentage of affected sites and teeth per mouth by degree of clinical attachment loss (CAL, cut-offs ≥3 and 5 mm) or pocket probing depth (PPD, cut-offs ≥4 and 6 mm) and Mean in total and according to age.

Degree	Age, years	CAL	PPD
Prevalence ≥3 / ≥4 mm	25–34	% (SE)	% (SE)
	35–44	% (SE)	% (SE)
	45–54	% (SE)	% (SE)
	55–64	% (SE)	% (SE)
	65–74	% (SE)	% (SE)
	75+	% (SE)	% (SE)
	Total	% (SE)	% (SE)
Prevalence ≥5 / ≥6 mm	25–34	% (SE)	% (SE)
	35–44	% (SE)	% (SE)
	45–54	% (SE)	% (SE)
	55–64	% (SE)	% (SE)
	65–74	% (SE)	% (SE)
	75+	% (SE)	% (SE)
	Total	% (SE)	% (SE)
Percentage of sites/mouth ≥3 / ≥4 mm (%)	25–34	Mean (SE)	Mean (SE)
	35–44	Mean (SE)	Mean (SE)
	45–54	Mean (SE)	Mean (SE)
	55–64	Mean (SE)	Mean (SE)
	65–74	Mean (SE)	Mean (SE)
	75+	Mean (SE)	Mean (SE)
	Total	Mean (SE)	Mean (SE)
Percentage of sites/mouth ≥5 / ≥6 mm (%)	25–34	Mean (SE)	Mean (SE)
	35–44	Mean (SE)	Mean (SE)
	45–54	Mean (SE)	Mean (SE)
	55–64	Mean (SE)	Mean (SE)
	65–74	Mean (SE)	Mean (SE)
	75+	Mean (SE)	Mean (SE)
	Total	Mean (SE)	Mean (SE)
Percentage of teeth/mouth ≥3 / ≥4 mm (%)	25–34	Mean (SE)	Mean (SE)
	35–44	Mean (SE)	Mean (SE)
	45–54	Mean (SE)	Mean (SE)
	55–64	Mean (SE)	Mean (SE)
	65–74	Mean (SE)	Mean (SE)
	75+	Mean (SE)	Mean (SE)
	Total	Mean (SE)	Mean (SE)
Percentage of teeth/mouth ≥5 / ≥6 mm (%)	25–34	Mean (SE)	Mean (SE)
	35–44	Mean (SE)	Mean (SE)

Degree	Age, years	CAL	PPD
	45–54	Mean (SE)	Mean (SE)
	55–64	Mean (SE)	Mean (SE)
	65–74	Mean (SE)	Mean (SE)
	75+	Mean (SE)	Mean (SE)
	Total	Mean (SE)	Mean (SE)
Mean (mm)	25–34	Mean (SE)	Mean (SE)
	35–44	Mean (SE)	Mean (SE)
	45–54	Mean (SE)	Mean (SE)
	55–64	Mean (SE)	Mean (SE)
	65–74	Mean (SE)	Mean (SE)
	75+	Mean (SE)	Mean (SE)
	Total	Mean (SE)	Mean (SE)

CAL, Clinical attachment loss. PPD, pocket probing depth.

Table 4.

Distribution of subjects according to the CDC/AAP case definition (Eke et al., 2012b) in total and according to age.

	Age, years						
Degree of periodontitis	**25–34**	**35–44**	**45–54**	**55–64**	**65–74**	**75+**	**Total**
No	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Mild	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Moderate	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Severe	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)