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Ticiane de Góes Mário

**ASPECTOS METODOLÓGICOS DE UM LEVANTAMENTO
EPIDEMIOLÓGICO RURAL E DESCRIÇÃO DAS CONDIÇÕES
PERIODONTAIS EM AMOSTRA REPRESENTATIVA**

Santa Maria, RS
2017

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Tese apresentada ao Curso de Doutorado do Programa de Pós-Graduação em Ciências Odontológicas, Área de Concentração em Odontologia, ênfase em Periodontia, da Universidade Federal de Santa Maria (UFSM, RS), como requisito parcial para obtenção do grau de **Doutora em Ciências Odontológicas**.

Orientador: Prof. Dr Carlos Heitor Cunha Moreira

Santa Maria, RS
2017

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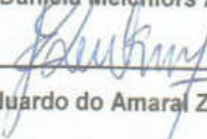
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“Quem sabe concentrar-se numa coisa e
insistir nela como único objetivo,
obtem, ao fim e ao cabo,
a capacidade de
fazer qualquer coisa.”

(Mahatma Gandhi)

RESUMO

ASPECTOS METODOLÓGICOS DE UM LEVANTAMENTO EPIDEMIOLÓGICO RURAL E DESCRIÇÃO DAS CONDIÇÕES PERIODONTAIS EM AMOSTRA REPRESENTATIVA

AUTORA: Ticiane de Góes Mário
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As doenças bucais têm alta prevalência mundial e são um problema de saúde pública, porém necessitam ser priorizadas nos sistemas de saúde universais e no desenvolvimento de políticas de saúde. Pesquisas epidemiológicas permitem a investigação da condição de saúde das populações e são consideradas fundamentais para que as metas de saúde bucal sejam atingidas e para a formulação de políticas de saúde efetivas, desde que apresentem qualidade metodológica. Apesar da importância, poucas pesquisas de base populacional e com metodologias adequadas têm sido realizadas para investigar as condições bucais. Assim, a presente tese objetiva apresentar dois artigos provenientes de um levantamento epidemiológico realizado na área rural de Rosário do Sul, RS, Brasil. O primeiro artigo descreve a metodologia empregada para a coleta de dados, desde o planejamento e a seleção dos participantes, para obtenção de uma amostra representativa (indivíduos ≥ 15 anos) da região, até a descrição das avaliações realizadas (exames bucais, clínicos e radiográficos; medidas antropométricas; coletas de fluido crevicular gengival, biofilme subgengival, saliva não estimulada e sangue; questionários demográfico, econômico, médico, comportamental, sobre ingestão de bebidas alcoólicas, estresse percebido, ruminação, autopercepção de doença periodontal e perfil de impacto da saúde bucal). O segundo artigo descreve a condição periodontal da amostra representativa, seguindo padrões de apresentação de dados recentemente sugeridos, para a melhor comparação das estimativas de doença periodontal entre as diferentes populações e conseqüente melhor entendimento dos seus indicadores de risco. A taxa de resposta foi considerada alta (63,3%) com 688 indivíduos examinados. A representatividade da amostra foi validada através da comparação com dados demográficos do último censo nacional do Instituto Brasileiro de Geografia e Estatística (2010). Doença periodontal acometeu aproximadamente 86% dos indivíduos, sendo que quase metade da amostra apresentou a forma moderada da doença, de acordo com os critérios dos Centros para Controle e Prevenção de Doenças, em parceria com a Academia Americana de Periodontia. A cada 50 indivíduos, 49 apresentaram pelo menos um sítio com perda de inserção (PI) ≥ 3 mm e 74% apresentaram PI ≥ 5 mm. Essa pesquisa foi realizada com rigor metodológico, buscando superar as deficiências de trabalhos anteriores sobre o tema e fornecendo estimativas confiáveis de doença periodontal. Por conseguinte, além de contribuir para o conhecimento das condições periodontais da área rural de Rosário do Sul, e de possibilitar a discussão de estratégias para a melhoria da saúde dessa população e para o desenvolvimento de políticas de saúde, essa tese forneceu dados para a investigação das estimativas globais da doença periodontal.

Palavras-chave: Condição bucal. Epidemiologia. Metodologia. Periodontite. População rural.

ABSTRACT

METHODOLOGICAL ASPECT OF A RURAL EPIDEMIOLOGY SURVEY AND DESCRIPTION OF PERIODONTAL STATUS IN A REPRESENTATIVE SAMPLE

AUTHOR: Ticiane de Góes Mário
ADVISOR: Carlos Heitor Cunha Moreira

The oral diseases have a high global prevalence and are a public health problem; however, universal health systems and health policies development need to prioritize them. The epidemiological surveys allow the investigation of the populations' health status. These studies are considered pivotal to target the oral health goals and to elaborate effective health policies since they present methodological quality. Despite its importance, few population-based surveys with adequate methodologies have been performed to investigate the oral conditions. Thus, this thesis aims to present two articles from an epidemiological study carried out in the rural area of Rosário do Sul, RS, Brazil. The first article describes the methodology used for data collection. It approaches the planning and the participant's selection to obtain a representative sample (subjects ≥ 15 years) of the region. Additionally, it describes all evaluations performed (oral, clinical, and radiographic examinations; anthropometric measures; gingival crevicular fluid, subgingival biofilm, unstimulated saliva, and blood collections; demographic, economic, medical, and behavioral questionnaires; other questionnaires about alcohol intake, perceived stress, rumination, self-perception of periodontal disease, and oral health impact profile). The second article describes the periodontal status of the representative sample, following recently suggested standards of data reporting. These criteria allow comparisons of the periodontal estimates among different populations and consequently a better understanding of their risk indicators. The response rate was high since 688 individuals (63.3%) were examined. The comparisons with demographic data of the last national census of the Brazilian Institute of Geography and Statistics (2010) validated the sample representativeness. The periodontal disease affected approximately 86% of the individuals, and almost half of the sample presented the moderate form according to the criteria of the Centers for Disease Control and Prevention, in partnership with the American Academy of Periodontology. Forty-nine of 50 people had at least one site with clinical attachment loss (CAL) ≥ 3 mm, and 74% had CAL ≥ 5 mm. This survey was carried out with rigorous methodology, aiming to overcome the deficiencies of previous studies, and it provided reliable estimates of periodontal disease. Therefore, it contributed to the knowledge of the periodontal status of a rural area of Rosário do Sul, and it may be used to discuss strategies to improve the health of this population as well as for the development of the health policies. Besides these aspects, this thesis provided data for the global periodontal disease estimates.

Keywords: Epidemiology. Methodology. Oral condition. Periodontitis. Rural population

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1 INTRODUÇÃO

1.1 LEVANTAMENTOS EPIDEMIOLÓGICOS

Levantamentos ou inquéritos epidemiológicos investigam informações sobre a situação de saúde e/ou necessidades de tratamento, em um determinado tempo e local (DYE, 2017; PERES; PERES, 2013; RONCALLI; DE SOUZA, 2013). Sendo de temática ampla ou voltada para um assunto específico (BARROS, 2008), os principais objetivos de um levantamento epidemiológico são: conhecer as prevalências e severidades das doenças de interesse, e as necessidades de tratamento associadas a elas; permitir analisar o comportamento das doenças investigadas ao longo do tempo e documentar a distribuição dessas doenças, possibilitando comparações com estudos posteriores; permitir o planejamento de políticas de saúde mais adequadas à realidade epidemiológica local e subsidiar, de maneira indireta, a avaliação de serviços (PERES; PERES, 2013). Os dados coletados a partir desses inquéritos são usados para construir indicadores associados à saúde, e não apenas às doenças, aos fatores de risco (VIACAVA, 2002) e aos determinantes sociais do processo saúde/doença (BARROS, 2008; VIACAVA, 2002; WALDMAN *et al.*, 2008). Portanto, esses estudos são importantes para definição, implementação e avaliação de ações coletivas e individuais, preventivas e assistenciais (PERES; PERES, 2013); vigilância em saúde (RONCALLI; DE SOUZA, 2013); formulação das políticas públicas e avaliação dessas políticas (VIACAVA, 2002; WALDMAN *et al.*, 2008) e do desempenho dos sistemas de saúde (BARROS, 2008). Para a Organização Mundial da Saúde (OMS), a vigilância em saúde objetiva assistir aos governos, autoridades e profissionais da saúde a formular políticas e programas para a prevenção de doenças, e é uma medida de progresso, impacto e eficácia dos esforços para controlar doenças prevalentes e restaurar qualidade de vida (WHO, 2013). Adicionalmente, levantamentos epidemiológicos têm grande valor na formação de pesquisadores, propiciando enorme experiência de aprendizado, teórico e prático, e possibilitando unir ensino e pesquisa (WALDMAN *et al.*, 2008).

Os levantamentos em saúde bucal, por sua vez, objetivam conhecer a magnitude dos problemas odontológicos e monitorar mudanças nos níveis e padrões das doenças ao longo do tempo (WHO, 2013). No Brasil, os inquéritos nacionais de saúde bucal iniciaram em 1986 (BRAZIL, 1988) e a última versão foi realizada em

2010 com o Projeto SBBrasil (BRAZIL, 2011). Tal projeto é considerado a principal estratégia de vigilância em saúde bucal, contribuindo para a construção de uma política nacional de saúde bucal pautada em modelos assistenciais de base epidemiológica (RONCALLI; DE SOUZA, 2013). Apesar de sua importância para subsidiar a formulação de políticas a nível nacional, as informações dos inquéritos nacionais podem não servir para subsidiar ações nos estados e municípios, tendo em vista o caráter descentralizado do sistema nacional de saúde (WALDMAN *et al.*, 2008). Esse fato salienta a necessidade de realização de levantamentos epidemiológicos de qualidade em outros níveis, como o municipal, para contribuírem mais efetivamente no melhoramento das condições de saúde e das políticas de saúde pública locais. Além disso, muitos aspectos teóricos e metodológicos dos inquéritos populacionais somente serão melhorados na medida em que a experiência e a reflexão sobre a realização dos mesmos forem acumuladas e compartilhadas pela comunidade científica (WALDMAN *et al.*, 2008).

Convém ressaltar que apenas em 2003 ocorreu o primeiro estudo [SBBrasil 2003 (BRAZIL, 2004)] com amostra representativa do Brasil sobre as condições periodontais. Salienta-se também que tanto o SBBrasil 2003 quanto o de 2010 avaliaram a doença periodontal através do Índice Periodontal Comunitário (IPC), que apesar de ser recomendado pela OMS, tem limitações importantes. O IPC é um protocolo parcial de exame (registro da condição por sextante) que pode enviesar as estimativas periodontais (KINGMAN *et al.*, 2008; TRAN *et al.*, 2013), e utiliza uma sonda com extremidade esférica, sem marcações milímetro a milímetro, que podem diminuir a acurácia e dificultar o arredondamento das medidas, respectivamente.

A importância dos levantamentos epidemiológicos, a ineficiência dos inquéritos nacionais para a realização de inferências locais e as limitações desses inquéritos na abordagem das doenças periodontais justificam a realização de um estudo de base populacional a nível municipal, como o que é descrito nessa tese.

1.2 DOENÇA PERIODONTAL EM ÁREAS URBANAS

Doença periodontal é um grupo de condições infectoinflamatórias que afetam o periodonto de proteção (gingivite) e o de inserção (periodontite), podendo, em casos severos, causar perdas dentárias. Seus sinais clínicos são resultantes de interações complexas entre biofilme bacteriano e resposta imunoinflamatória de um

hospedeiro susceptível (PAGE *et al.*, 1997). A prevalência de doença periodontal é bastante variável entre as populações mundiais e cerca de 7% da população global é afetada pela forma severa da doença (KASSEBAUM *et al.*, 2017). A seguir, serão apresentados alguns estudos que demonstram a diversidade das estimativas periodontais entre as diferentes populações.

Na Europa, dados epidemiológicos sobre as doenças periodontais são escassos e não homogêneos. König *et al.* (2010) revisaram estudos epidemiológicos realizados nesse continente e apontaram uma prevalência de perda de inserção (PI) ≥ 4 mm variando entre 20% e quase 84%, em indivíduos de 35 a 44 anos. A Alemanha foi o país com maior prevalência de doença ($> 53\%$) nessa faixa etária e também na população idosa, de 65 a 74 anos ($> 89\%$) (KONIG *et al.*, 2010). Dois estudos recentes investigaram as condições periodontais de populações da Itália (AIMETTI *et al.*, 2015) e da Noruega (HOLDE *et al.*, 2017), utilizando a definição de caso dos Centros para Controle e Prevenção de Doenças (*Centers for Disease Control and Prevention*, CDC), em parceria com a Academia Americana de Periodontia (AAP). Na Itália, a periodontite moderada afetou 41% dos adultos e a forma severa, 35% deles (AIMETTI *et al.*, 2015). Quase metade dos noruegueses avaliados apresentaram doença periodontal e a periodontite severa acometeu 9% deles (HOLDE *et al.*, 2017).

Corbet e Leung (2011) realizaram uma detalhada revisão de literatura sobre a epidemiologia da periodontite na Ásia e na Oceania, regiões que comportam cerca de 60% da população mundial. Segundo esses autores, apenas três pesquisas nacionais realizaram mensurações periodontais desde o ano de 2002, nas quais a prevalência de doença periodontal variou de 13% a 39%, na faixa etária de 35 a 44 anos (CORBET; LEUNG, 2011). Utilizando dados epidemiológicos representativos, Do *et al.* (2008) classificaram aproximadamente 23% da população adulta da Austrália como tendo periodontite de moderada a severa (DO *et al.*, 2008). Uma investigação nacional de doenças crônicas na China, avaliou a condição bucal de indivíduos maiores de 18 anos através do IPC e observou que 24% deles apresentavam periodontite moderada e apenas 2% foram afetados pela forma severa da doença (ZHANG *et al.*, 2014).

Até 2002, a prevalência de PI ≥ 4 mm foi maior que 80% na maioria dos estudos que avaliaram as populações africanas (BAELUM; SCHEUTZ, 2002). Estudos posteriores, na Jordânia e na Nigéria, observaram menores prevalências investigando amostras de conveniência. Na Jordânia, 31% de periodontite [≥ 4 dentes com um ou mais sítios apresentando profundidade de sondagem (PS) ≥ 4 mm e PI ≥ 3 mm] foi

encontrada entre acompanhantes, de 18 a 70 anos, de pacientes de um hospital universitário (KHADER *et al.*, 2009). Na Nigéria, a amostra também foi obtida a partir de um hospital universitário, entretanto foram avaliados os funcionários (20 anos ou mais), exceto médicos, e a prevalência de periodontite foi de 49% (IPC, códigos 3 ou 4) (UMEIZUDIKE *et al.*, 2016). Ressalta-se que ainda faltam dados epidemiológicos atuais de amostras representativas das populações africanas (AL-HARTHI *et al.*, 2013).

Em uma amostra representativa da população adulta (≥ 30 anos) dos Estados Unidos, a prevalência de periodontite foi aproximadamente 46%, sendo que 8,9% dos indivíduos apresentavam a forma severa da doença de acordo com a definição de caso do CDC/AAP (EKE *et al.*, 2012). Nesse estudo, as prevalências de PI ≥ 3 mm, ≥ 4 mm e ≥ 5 mm foram 88%, 61% e 41%, respectivamente (EKE *et al.*, 2015). Na América Latina, há variabilidade nas estimativas de doença periodontal, que pode ser explicada, em parte, pela falta de estudos de base populacional com metodologias adequadas. Até 2015, amostras representativas nacionais somente eram disponíveis para Chile e Brasil (OPPERMANN *et al.*, 2015). Dados da primeira pesquisa nacional de saúde do Uruguai foram recentemente publicados, apesar de a investigação ter sido realizada entre 2010 e 2011 (LORENZO *et al.*, 2015). De acordo com a pesquisa nacional chilena de exame dental, conduzida em 2007, mais da metade (58,3%) da população de 35 a 44 anos tem PI ≥ 5 mm e 38,6% desses indivíduos têm um sítio com PI ≥ 6 mm (GAMONAL *et al.*, 2010). No Brasil, o último levantamento nacional de saúde bucal – SB Brasil 2010 – encontrou alta prevalência de sangramento (45,8%) nos adultos, de 35 a 44 anos, e aproximadamente metade deles (51,3%) tinha até 3 mm de PI, sendo que 18,2% apresentavam PI ≥ 4 mm (BRAZIL, 2011). A análise mais minuciosa de dados provenientes desse levantamento apontou 15,3% de prevalência de periodontite moderada a severa (presença de pelo menos um sextante com PS ≥ 4 mm e pelo menos um sextante com PI ≥ 4 mm) (VETTORE *et al.*, 2013). Recentemente, Kassebaum *et al.* (2014), em uma revisão sistemática e metaregressão, apontaram 18,5% de prevalência de periodontite crônica severa no Brasil (KASSEBAUM *et al.*, 2014). A pesquisa uruguaia utilizou a mesma metodologia do levantamento nacional brasileiro e observou 22% de periodontite moderada a severa entre adultos (35 a 44 anos) e idosos (65 a 74 anos), sendo que 41% deles apresentou sangramento à sondagem (LORENZO *et al.*, 2015).

No Rio Grande do Sul, tem-se o conhecimento de apenas dois grupos de pesquisa que investigaram as condições periodontais em base populacional, um na região metropolitana de Porto Alegre e outro em Pelotas. Susin et al. (2004) constataram que aproximadamente 85% dos indivíduos entre 30 e 39 anos apresentavam PI ≥ 4 mm (SUSIN *et al.*, 2004). Entre os indivíduos de 14 a 29 anos dessa amostra, mais de 50% apresentaram PI ≥ 3 mm e 17% deles, PI ≥ 5 mm (SUSIN *et al.*, 2011). Já De Castilhos et al. (2012) não avaliaram PI, e observaram 3,3% de bolsas periodontais (PS ≥ 4 mm) em adultos de 24 anos da coorte de nascidos em Pelotas no ano de 1982 (DE CASTILHOS *et al.*, 2012).

Constatamos que a condição periodontal das populações urbanas, nas primeiras décadas do século XXI, não é conhecida de forma global (DYE, 2012). Existe, ainda, grande variação entre as definições de doença e os protocolos de exames, que dificultam as comparações das estimativas periodontais entre os estudos (SAVAGE *et al.*, 2009). Poucas pesquisas nacionais ou regionais de saúde bucal têm incluído avaliações periodontais e a maioria tem sido realizada no mundo desenvolvido (DYE, 2012). Além disso, estudos representativos das diferentes regiões brasileiras e mundiais, com mensurações periodontais completas e emprego de sondas periodontais adequadas, são escassos. O trabalho de Susin et al. (SUSIN *et al.*, 2004), por exemplo, é um dos poucos estudos nacionais que fizeram exame periodontal completo, em seis sítios por dente, em amostra representativa de uma determinada área populacional.

Estimativas baseadas em amostras de conveniência são sabidamente de alto risco de viés e devem ser interpretadas com cautela (OPPERMANN *et al.*, 2015). Enquanto medidas realizadas em toda a boca (*full-mouth*) fornecem ótima avaliação das condições periodontais (SAVAGE *et al.*, 2009; LEROY *et al.*, 2010), a utilização de protocolos de exames parciais subestima a verdadeira carga (prevalência e severidade) de periodontite, uma vez que essa doença não é distribuída uniformemente entre os sítios dentários. Os vieses das estimativas dependem da distribuição da doença na população-alvo, do tipo de sítio, número de sítios por dente e número de quadrantes incluídos nos protocolos parciais (KINGMAN *et al.*, 2008; OPPERMANN *et al.*, 2015). O uso de sonda periodontal inadequada também é capaz de enviesar as medidas de PS e nível de inserção clínica (NIC)/ PI (LEROY *et al.*, 2010), uma vez que o diâmetro da parte ativa da sonda influencia a extensão de sua inserção apical na bolsa/sulco periodontal (GARNICK; SILVERSTEIN, 2000).

Adicionalmente, sondas com graduação fina e marcações milímetro (mm) a mm, como as CP15 UNC, são recomendadas para estudos epidemiológicos, pois permitem maior acurácia e facilitam o arredondamento matemático das medidas periodontais (HOLTFRETER *et al.*, 2015).

Por conseguinte, o presente estudo acrescentará evidências à literatura, tanto pelo tipo de avaliação quanto pela magnitude populacional. O mesmo abordou exame periodontal completo, em seis sítios dentários, incluindo verificações de lesões de furca, e utilizou sonda periodontal adequada (CP15 UNC) em uma parcela representativa de uma população sul-brasileira. Atendendo, portanto, a requisitos metodológicos importantes para o avanço do conhecimento epidemiológico das doenças periodontais no Rio Grande Sul e, conseqüentemente, no Brasil e na América Latina, onde os estudos são escassos e muitas vezes inapropriados em suas metodologias.

1.3 DOENÇA PERIODONTAL EM ÁREAS RURAIS

As pesquisas referentes às condições periodontais em áreas rurais também apontam estimativas e definições de doença variáveis, serão mostrados aqui alguns exemplos. Estudos no Nepal (Ásia) e em Gâmbia (África), avaliaram populações que habitam lugares extremamente distantes dos serviços de saúde bucal, com grande dificuldade ou sem acesso aos mesmos (DAVID *et al.*, 2011; JORDAN *et al.*, 2011). Ambos apontaram alta prevalência, 81% (DAVID *et al.*, 2011) e 78% (JORDAN *et al.*, 2011), de bolsas periodontais de 4 a 5 mm em adultos de diferentes idades (de 33 a 97 anos e de 20 a 54 anos, respectivamente). Awuti *et al.* (2012) observaram aproximadamente 47% de casos de periodontite, avaliando uma amostra de conveniência de 962 indivíduos Uyghur adultos, na China (AWUTI *et al.*, 2012). No mesmo país, Wang *et al.* (2007) encontraram 49% dos indivíduos com PI ≥ 3 mm e demonstraram que todos os índices periodontais avaliados foram maiores em moradores da zona rural, quando comparados aos da região urbana (WANG *et al.*, 2007). Numa população da Grécia, 34% dos adultos (de 35 a 44 anos) apresentaram bolsas periodontais de 4 a 5 mm e maiores escores de IPC foram também vinculados a moradores rurais (MAMAI-HOMATA *et al.*, 2010). Recentemente, Sekhon *et al.* (2015) avaliaram 1680 adultos da Índia e observaram que metade (49%) da amostra de 30 a 44 anos apresentou bolsas com PS 4-5mm, verificadas pelo índice periodontal

comunitário para as necessidades de tratamento (*Community Periodontal Index of Treatment Needs*, CPITN) (SEKHON *et al.*, 2015). Em outra população indiana, prevalência de PS ≥ 4 mm foi verificada em 30% dos indivíduos (35 a 54 anos) e PI ≥ 5 mm afetou cerca de 40% deles (BHAT *et al.*, 2015).

Na América Latina, existem poucos estudos que avaliaram a condição periodontal em habitantes da zona rural. No Brasil, os estudos disponíveis foram realizados em amostras de conveniência (DE MACEDO *et al.*, 2006; MOIMAZ *et al.*, 2009) ou em populações isoladas (CORRAINI *et al.*, 2008b; a). Um censo de uma população (n=172) na Bahia apontou prevalência de periodontite de aproximadamente 47% em indivíduos de 41 a 50 anos (DE MACEDO *et al.*, 2006). Moimaz *et al.* (2009) observaram que 14% dos indivíduos (35 a 66 anos) que utilizavam centros de saúde rurais, no interior de São Paulo, tinham PI de 4 a 8 mm e 35% deles apresentavam PS ≥ 4 mm (MOIMAZ *et al.*, 2009). Em uma comunidade isolada de pescadores, Corraini *et al.* (2008) observaram que todos os indivíduos, de 30 a 39 anos, tinham PI ≥ 3 mm e 70% deles apresentavam PI ≥ 5 mm (CORRAINI *et al.*, 2008a). Na mesma amostra, foram verificados 75% dos indivíduos com PS ≥ 4 mm e 20% com PS ≥ 6 mm (CORRAINI *et al.*, 2008b). Não foram encontrados estudos sobre as condições periodontais em populações do Rio Grande do Sul.

Semelhantemente ao que se encontra para populações urbanas, estudos que avaliem condição periodontal em áreas rurais são escassos, especialmente na América Latina e no Brasil, onde existem grandes extensões territoriais rurais e parcela considerável da população vivendo nessas áreas. Ainda, a maioria dos estudos recentes que avaliaram periodontalmente populações rurais foram realizados em países asiáticos e africanos (AWUTI *et al.*, 2012; BHAT *et al.*, 2015; DAVID *et al.*, 2011; JORDAN *et al.*, 2011; SEKHON *et al.*, 2015), enfatizando a necessidade de estudos adicionais sobre esse tema em outras regiões do mundo.

Salienta-se que a investigação das condições bucais de habitantes da zona rural é necessária, principalmente devido à dificuldade de acesso aos centros de atendimento médico e odontológico dessa população (SKILLMAN *et al.*, 2010). Disparidades de saúde bucal persistem entre residentes dessas áreas (AHN *et al.*, 2011), sendo que piores condições periodontais (MAMAI-HOMATA *et al.*, 2010; WANG *et al.*, 2007) e maior chance de periodontite severa tem sido associadas a viver na zona rural (ZHANG *et al.*, 2014). A melhoria nas condições da boca está fortemente associada ao melhor acesso aos cuidados de saúde (AHN *et al.*, 2011), o qual é

amplamente determinado pelo local de residência (INTERNATIONAL LABOUR OFFICE, 2015). Recente documento da Organização Internacional do Trabalho, pertencente a Organização das Nações Unidas (OIT/ONU), relatou que 56% das pessoas que vivem em áreas rurais em todo o mundo continuam a ser privadas de acesso a saúde (INTERNATIONAL LABOUR OFFICE, 2015), ressaltando a importância de pesquisas, para o conhecimento das condições de saúde dessas populações. Assim, descrição do padrão periodontal de uma população rural, como o que propõe o presente trabalho, auxiliaria a proposição e a implementação de políticas públicas, que visem melhorar o acesso aos serviços odontológicos desses indivíduos, enfatizando sua relevância não somente para o conhecimento científico, mas também para a saúde pública.

Na presente tese serão apresentados dois artigos. O primeiro artigo relata a metodologia empregada em todo o levantamento epidemiológico da área rural de Rosário do Sul, detalhando a seleção da amostra e a estratégia de recrutamento dos participantes. O segundo artigo descreve a condição periodontal observada na amostra representativa do referido município, utilizando padrões sugeridos recentemente para a apresentação dos dados em pesquisas epidemiológicas.

2 ARTIGO 1 – METODOLOGIA E ESTRATÉGIA DE RECRUTAMENTO DA AMOSTRA DE UM LEVANTAMENTO EPIDEMIOLÓGICO EM UMA EXTENSA ÁREA RURAL DO SUL DO BRASIL

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Methodology and sample recruitment strategy of an epidemiological survey in a large rural area of the South Region of Brazil

Short title: Methods of epidemiological survey in rural area

Field: Methodological Issues

Keywords: Epidemiology; Rural population; Public health; Oral health.

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T. de G. Mário participated in study design and coordination, data collect, data analysis, and drafted this manuscript. J. M. da Rocha, T. M. Ardenghi, and C. H. C. Moreira participated in study design and coordination, and in drafting this manuscript. S. C. de David, J. Boligon, M. Casarin, A. P. Grellmann, and J. Marin participated in data collect and in drafting this manuscript.

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Abstract

This paper describes the methodology of an epidemiological survey performed in Rosário do Sul, Rio Grande do Sul state, Brazil. It is included process details of the multistage probability sampling. A representative sample of individuals living in the rural area of the municipality with 15 years old or more was evaluated. The participants answered questionnaires (medical, socio-demographic, about habit, alcohol use, quality of life, stress, rumination and self-perceived of periodontal diseases), received clinical oral examinations, and anthropometric measurements. The oral evaluation comprehended a complete periodontal exam at six sites per tooth, including furcation involvement; dental abrasion; Decayed, Missing and Filled Surfaces Index; O'Brien Index; gingival abrasion; oral cavity and lip lesions; complete periapical radiographic exam and prostheses use. Besides this oral clinical approach, subgingival plaque, crevicular gingival fluid, saliva and blood samples were collected. The examiners were trained and/or calibrated previous all evaluations. A pilot study allowed adjustments in the logistic of the exams performed. Of the 1087 eligible individuals, 688 were examined (63.3%). Age, gender, and race data were compared to the last demographic census (2010) of Brazilian Institute of Geography and Statistic (IBGE) data, validating the sampling strategy for obtaining the representativeness of the sample. The careful methods used in this study ensure the quality of the estimates obtained and allow that these estimates can be used for oral health surveillance and health policies improvements.

Introduction

Oral disorders remained highly prevalent affecting 3.5 billion people worldwide¹, and almost 50% of the world population suffering disability from oral conditions². The most prevalent oral illness is untreated caries in permanent teeth², which increased 14.5% between 2005 and 2015¹. In the same period, periodontal disease, edentulism/severe tooth loss, and lip/oral cavity cancer had an increase of 25.4%, 27.3%, and 38.6% respectively¹. The numbers are more disturbing when the years of “healthy life” lost due to premature disability (disability-adjusted life years, DALYs) are considered. The major cause of DALYs related to oral conditions is the tooth loss (7.6 million DALYs), followed by severe chronic periodontitis (3.5 million DALYs) and untreated caries (1.7 million DALYs)².

Oral conditions impact on health-related quality of life³, and oral health is an important public health problem however, it needs to be included as a priority on the universal health coverage debate and policy development⁴. The policies formulation and oral health goals may be more effective if based on descriptive epidemiology of good quality^{2, 5}. Nevertheless, this kind of research, with a representative population-based sample, is lacking in some regions as rural areas, especially in Latin America⁶. To evaluate the population living in these regions, some recruitment approaches could be different from the ones required to the urban areas, and there are lack of methodological articles describing these issues. The investigation of health conditions of rural inhabitants is necessary principally due to the difficult access to medical and oral care of these populations⁷, once the improvement of oral conditions is strongly associated with better reach to the health care⁸. Additionally, more researches are needed to evaluate the impact of oral diseases and to explore the determinants of oral health inequalities⁴.

Considering the need for more studies addressing the oral conditions, the importance of methodological quality on the oral health estimates, and the lack of the detailed description of recruitment strategies of rural people, this paper aimed to describe the methodology of an epidemiological survey, which investigated the oral health conditions of a rural population in the South Region of Brazil.

Materials and methods

Study design

This study was a cross-sectional population-based survey. The target population was individuals aged 15 years and older of a rural area of Rosário do Sul.

Rosário do Sul is a city localized at west border region (geographic coordinates 30° 15' 28" S, 54° 54' 50" W) of the Brazilian state of Rio Grande do Sul, located in the southern part of Brazil, neighboring Argentina and Uruguay. This city has approximately 4.4 thousand km² and 40000 inhabitants, of which 4776 live at rural area⁹. The rural demographic density of Rosário do Sul is around one inhabitant per kilometer square [unofficial data provided by Santana do Livramento – Brazilian Institute of Geography and Statistic (IBGE) office, which is the responsible for Rosário do Sul census], highlighting its small number of individuals in relation to the territorial extension and the difficultness for accessing this population. The majority of the rural areas are distant of the urban center and the rural roads generally are in precarious conditions. Characteristics that could hamper the access to the city and, consequently, could restrict the use of urban services, like health care, of the population living in this countryside.

Sampling procedures/ recruitment strategies

The representative sample of the individuals aged 15 years and older living in the rural area of Rosário do Sul was obtained using a multistage probability sampling method. IBGE and the prefecture provided the information for sampling procedures. The IBGE subdivides total area into administrative regions, which are the districts, and smaller territorial units of cadastral control for data collecting that are termed census sectors. These sectors are defined according to household number (Hn). In the rural area, the majority of census sectors comprehends from 150 to 250 households.

Rosário do Sul has six districts and 36 rural census sectors (RCS), which are variable in area size (0.0831 – 338.034 km²) and Hn [median of 46 (1 – 189)]. IBGE did not show data about individuals aged ≥ 15 years of six sectors having less than five permanent households, to protect census informers¹⁰. These territorial units were not included in the study sampling. The remaining 30 sectors were divided into three strata (small, medium and large), according to tertiles of Hn. Three randomized sequences were generated in Research Randomizer program¹¹ to select 17 sectors [56.7% (three small, seven medium and seven large), Figure 1] and it enabled to include all six districts. The numbers of households and subjects to be evaluated per sector were weighted in relation to the total Hn and individuals, which, respectively, lived in each sector according to IBGE (Figure 2). After the steps showed in Figure 2, the percentage of each RCS for sampling (%RCS) was calculated by “(Hn in each RCS * 100)/ Hn of each sectors stratum”, and Hn to be evaluated per RCS (Hn/S) by “(Hn to be evaluated in each sectors stratum * %RCS)/ 100”. The minimal number of individuals to be invited to participate

(eligible) in the study was established multiplying the Hn/S per three (population density rounding), resulting in 999 individuals.

Seven randomized sectors (41.18% of evaluated sectors) had community health workers, which had local household lists, allowing random selection¹¹ of eligible households. In the others sectors, the most densely populated area was established through houses clusters viewed on maps (kmz format, viewed with Google Earth program) provided by IBGE¹², and this region was confirmed locally by researchers to be the starting point for the selection of households. Since the starting point, all households from the right and from the left, consecutively, in a straight line within sector area, were eligible, until the pre-specified number of households or subjects were obtained. First, households at right were accessed and, if necessary, the team went back at the starting point to go to the left direction. After the establishment of the direction, all households at right and left of the road were considered eligible. When the household numbers necessary for the sample were not obtained with these strategies, secondary roads were accessed until the distance of five kilometers (radius) at right or left of the major road.

All individuals 15 years and older living at eligible households were considered eligible to the study. Exclusion criteria were presence of systemic disease/condition that contraindicates clinical examination or requirement of a prophylactic regimen of antibiotics before it, diagnosis/family report of psychiatric or mental problems, and alcohol or drug intoxication.

Operational procedures

A group of six dentists performed the data collection between March of 2015 and May of 2016. This group was divided according to the function: two interviewers (TGM and SCD), two clinical examiners (MC and JB), one physic examiner (APG) and one who performed dental radiographies [four examiners (JM, CASB, CFW, and FBC) that substituted each other during the modules of fieldwork].

Clinical and radiographic examinations were performed in a mobile unit that consisted of a trailer equipped with a complete dental unit (dental chair, artificial light, compressor, dental x-ray machine, and others basic amenities). The unit was moved to a central point in each RCS according to survey schedule. A team of dentists previously visited the households, explaining the aims of the study and inviting subjects to participate. Individuals who agreed to participate were scheduled for the examination. In the first visit, dentists collected telephone number and numbers of residents in each household. Contact information was asked for a neighbor when there was nobody at home. Individuals who did not attend with examination appointment or the

ones that not were at home received new home visits or callings to encourage participation. It was established that a minimum of three visits and five calls were performed to households without any individuals at first visit. In RCS with community health workers, they were responsible for scheduling the examinations according to a list of randomly selected households, and the study aims were provided at examination visit.

Sample size

The OpenEpi program¹³ was used to calculate sample size considering a rural population aged 15 years and older of approximately 4000 inhabitants⁹, and the “worst case scenario” of the main outcome, periodontal disease (i.e. 50% prevalence). It was used a 4% precision level and a 1.3 design effect for the 95% confidence interval. The sample size calculation was adjusted for finite populations using a standard formula [$n_{\text{adjusted}} = \frac{n}{1+(n/N)}$; “n” is the calculated size, “N” is the population size], and it was estimated that 580 individuals were needed. The sample was increased by 15% (to 667 individuals) to account for non-response.

Non-response data

A questionnaire was applied to non-responders containing information about gender, age, education, skin color, family income, tobacco use, and the number of teeth present in the mouth.

Interviews

Trained dentists using structured questionnaires performed the interviews individually, face to face. The interviews comprised sociodemographic, economic, medical, behavioral, alcohol intake¹⁴⁻¹⁶, oral health impact on quality of life (OHIP – 14¹⁷), stress (PSS¹⁸, RRQ¹⁹), and periodontal disease perception²⁰ data (Figure 3).

Oral clinical examination

Clinical examination started with the record of prostheses use (yes or not), and of the soft tissues of the oral cavity and lip lesions, including a description of its localization and probable clinical diagnosis. The presence of third molars was registered subsequently, and tooth count (all teeth present in the mouth) was obtained from the addition of those and the teeth included in the periodontal examination.

Complete periodontal exam was performed next, with the presence of plaque on tooth surfaces assessed by Visible Plaque Index (VPI²¹). Retentive plaque factors were identified (presence of supragingival calculus, caries cavitated lesions, restoration with excess or lack of restorative material, and residual roots with restorative possibility), and the presence of bleeding after probing on marginal gingiva was evaluated with Gingival Bleeding Index (GBI²¹). Pocket probing depth (PPD) was measured from free gingival margin to the bottom of the pocket/sulcus. Bleeding and suppuration on probing were registered dichotomously after PPD measurement. Clinical attachment loss (CAL) was defined as the distance from cemento-enamel junction (CEJ) to the bottom of the pocket/sulcus. Measurements were made in mm and were rounded to nearest whole mm. Gingival recession was calculated as the subtraction of the CAL and PPD during data analysis and was assigned a negative signal if the gingival margin was located coronally to the CEJ. All these periodontal parameters were evaluated at six sites per tooth present in the mouth, excluding third molars, with a UNC-15 probe (Neumar®, São Paulo, Brazil) and dental mirror. Periodontal destruction on furcation area of multirrooted teeth was classified in three degrees according to Hamp et al. (1975)²² using a 2N-Nabers colors probe (Millennium/ Golgran®, São Paulo, Brazil).

After the periodontal assessment, examiners collected crevicular gingival fluid and subgingival plaque. The presence of dental abrasion was evaluated on cervical surfaces next. Dental caries was assessed according to the Decayed, Missing and Filled Surfaces (DMFS) Index²³ which represents lifetime dental caries experience in permanent teeth, using a Community Periodontal Index (CPI) probe (Millennium/ Golgran®, São Paulo, Brazil). Dental trauma was evaluated by O'Brien Index²⁴. Gingival abrasion was evaluated on soft tissues underlying teeth, except third molars, using Danser et al.²⁵ method, which discloses gingiva by two-tone solution (Disclosing solution 2Tone, Young Dental Manufacturing, USA) to better visualization of damaged areas.

In edentulous individuals, only evaluation of oral cavity and lip lesions and gingival abrasion were performed.

Biological sample collection

Samples of blood, crevicular gingival fluid (CGF), subgingival plaque (subP) and unstimulated saliva (UnS) were collected.

Blood samples were collected in ≥ 18 -year-old individuals, by accredited laboratory of the prefecture of Rosário do Sul, according to WHO guidelines on drawing blood (2010)²⁶. The collected quantity and the storage followed laboratory rules. Besides complete blood count,

high-sensitivity C-reactive protein, glycated hemoglobin and creatinine exams, the blood samples provided material for DNA extraction, and serum and plasm. These last two components were stored for future analyses at -80°C .

The CGF and subP were collected from the same sites (four sites per individual). Two shallower and two deeper sites from buccal surfaces (mesio, mid, and distal) were selected from a random selection table previously printed. SubP was collected after CGF; if bleeding was present, it was suppressed before the collection. Before the CGF and subP collections, the sites were isolated with cotton roll and sucker, and supragingival plaque was removed with sterile gauze. For CGF, the site was dried with air jet for five seconds, and a paper cone (number 30; Tanari®, Amazonas, Brazil) was inserted until reaching resistance of the sulcus/pocket for 30 seconds. Contaminated cones with blood were discarded and new collection was performed at the same site. After collecting, each cone was put on 1.5ml microtubule, maintained stored at -30°C in the rural area, and posteriorly at -80°C until analysis. The subP were collected with minifive Gracey curettes (Millennium/ Golgran®, São Paulo, Brazil) inserted into sulcus/pocket until reaching resistance. It was used one side of curette per site and, consequently, two instrumentals per individual. Microbiologic samples were put on 1.5ml microtubules containing 150 μl of trisEDTA tampon (TE: 10 mM of Tris HCl, 1 mM of EDTA, pH 7.6). Following this procedure, 150 μl of 0.5M NaOH was added to microtubule, the solution was homogenized and stored at 4°C .

UnS was collected according to Foglio-Bonda et al.²⁷, with the addition of the oral cavity clean by rinsing with water²⁸ and by using sterile specimen collection bottle instead of a plastic funnel. After collection, salivary samples were weighed with a precision balance (ACCULAB VIC-511. Sartorius Group. New York, USA), separated by a minimum of four 300-400 μl aliquots (put on 1.5ml microtubules), maintained at -30°C (rural area), and posteriorly stored at -80°C until analysis.

Radiographic exam

The complete periapical radiographic exam was done for each individual with ≥ 18 years old. One periapical radiography per dental group (incisives, canines, premolars, and molars) was taken with a digital sensor (RVG #1/ 5100 – Carestream Dental, Atlanta, GA, USA) linked to the radiographic positioner, by parallelism technique. The XCP-DS periapical positioner (Dentsply Rinn, York, PA, USA) was used to stabilize the RVG #1 sensor, and *Kodak Dental Imaging Software – KDIS* version 6 (Carestream Dental, Atlanta, GA, USA) to visualize the radiographic images.

Anthropometric measurements

The anthropometric exam included blood pressure (BPr), height, weight, abdominal and waist circumferences. The BPr was taken from the left arm with an automatic appliance (LA 250/ G·TECH, Living Science Co. Ltd., Jiangsu, China) and weight was measured with a digital scale (Glass 200) of the same hallmark (G·TECH). Height was measured with a portable stadiometer and the circumferences with an inelastic measuring tape (Seca 201, seca gmbh & co. kg, Hamburg, Germany). All measurements were taken twice and followed the anthropometry manuals of IBGE²⁹ and NHANES³⁰. Body Mass Index was calculated as weight (kilograms) divided by height (meters) squared.

Training and calibration

The examiners were trained for conducting all evaluations. The training comprehended definitions of clinical and physic parameters, measuring instruments, correct measuring techniques, and clinical photographs. The team also received a manual containing instructions about data collection and instruments management for use in the fieldwork. First, the examiners received theoretical training that was divided into four one-hour sessions. Each session was used to discuss the indexes and variables that would be evaluated and to define diagnostic criteria. In the second stage, the team participated in practical and clinical activities. The examiners practiced the physic measurements (anthropometric and saliva collection) and questionnaires application among themselves. A Radiology professor trained the examiners who executed the radiographic exam for digital sensor, positioner, and software use from complete periapical radiographs of three individuals. The practical training for gingival abrasion and O'Brien index was performed with clinical photographs. VPI, GBI, BoP and furcation degrees were trained in five individuals, with the presence of an experienced examiner.

Calibration for PPD and CAL was performed previously to the data collection and during the study. The reproducibility (intra- and inter-examiners) was tested from repeated measurements with a minimal interval of one hour and ≥ 1000 sites, which corresponded to approximately seven individuals. In the previous calibration, one experienced examiner was considered the gold standard (TGM) and she examined 14 individuals (full-mouth). Each other examiners (MC and JB) evaluated two quadrants crossover of the same subjects (n=14) to obtain the minimal number of sites necessary. During the study, the calibration was performed just between the two examiners (MC and JB) who collected the study clinical data. Calibration

for DMFS was performed prior to carrying out fieldwork in twenty extracted teeth (five surfaces/tooth). The second evaluation of DMFS was taken with a two days interval for the intra-examiners test, and it was considered a gold standard examiner (BE) for the inter-examiners reproducibility. The intra- and inter- examiners agreements for PPD and CAL was verified with the Intra-class Correlation Coefficient (ICC), and for DMFS with Kappa Coefficient. A satisfactory reproducibility was considered ICC/Kappa >0.80.

Pilot Study

Besides the training and calibration process, the study team participated in a pilot data collection. This pilot was performed in a RCS non-randomized for sample and carried-out for one day. The researchers decided the starting local for data collection and parked the mobile unit and invited participants from the near area. The evaluations were performed on 15 individuals. This period was very important to decide the functions of each member of the group and to verify the sequence of evaluations that was most effective.

Ethical considerations

The study was performed in accordance with Declaration of Helsinki (1964, revised in 1975, 1983, 1989, 1996, and 2000) and approved by the Ethics Committee in Research of Federal University of Santa Maria (CAAE: 37862414.5.0000.5346). Subjects who agreed to participate signed an informed consent form (ICF). Individuals <18 years old needed the authorization of their responsible person, through signature in a specific ICF. All participants received a written report detailing their oral status and they were referred to treatment if any health alteration was presented.

Data analysis

Descriptive analysis were performed with counts and frequency distributions, adjusted for the complex sample. All analysis used the IBM® SPSS® Statistics software, version 21. Skin color, gender and age categories data were compared to IBGE census data of 2010, which are available on the institutional website³¹.

Results

The ICC values for intra-examiner reproducibility varied between 0.89 and 0.93 for PPD, and between 0.88 and 0.99 for CAL. The inter-examiner ICC values range between 0.89

and 0.96 (PPD) and between 0.84 and 0.97 (CAL). The kappa statistic for DMFS (intra- and inter-examiners) varied between 0.81 and 0.88.

The flowchart of the study was presented in figure 4. From almost 4000 individuals ≥ 15 years old living in rural area, a total of 1092 were initially accessed for eligibility criteria. Five individuals were excluded and 399 did not participate of the study (both reasons shown in the figure 4). The principal reason of non-participation was the refusal. Then, 688 (63.3%) were clinically examined, of which 581 had their blood collected (Figure 4). Among non-responders, 66 (16.5%) refused to answer the specific questionnaire and others 40 individuals (10.0%) did not complete all information (at least one question was not answer).

Table 1 shows the demographic characteristics among study sample, eligible individuals, non-responders and IBGE data of the eligible RCS. The majority of individuals (the examined and the eligible as well as the ones evaluated by IBGE) reported having white skin color. Fifty percent of non-responders were white race and 20.6% of them did not answer this information. There was a slight predominance of male gender on IBGE data and on eligible individuals. In the study sample, half of each gender was examined, however, the analysis of the non-response showed more than 60% of men. Approximately 70% of the individuals were between 25 and 64 years old and the extremes of age categories represented fewer percentages, according to IBGE, information of eligible people and examined sample.

Discussion

This paper presented methodological issues of an epidemiological survey with the oral health emphasis in a representative sample of a large rural area of the South Region of Brazil. The latest update² on global oral health shows the burden of untreated dental caries, severe periodontitis, and edentulism. The oral conditions affect 3.5 billion of people worldwide and pose a public health challenge to policy makers, indicating the need for greater efforts and different approaches in order to modify this scenario until 2020². Accurate epidemiological surveys, like this study, provide a reliable support for assessing the current oral health status of a population and its future needs for care^{5, 23}. Then, the present study could be one of these necessary approaches to improve oral health, because it allows the identification of healthy and disease cases in a population-based sample. Data on oral health status are important for surveillance of disease patterns²³ and then, for definition, implementation, and evaluation of public health actions, collectives and individuals, preventives and of care^{23, 32}.

The careful methods used, highlighting representativeness of the sample, sampling procedure or recruitment strategies, training/ calibration of examiners, and the full mouth

exams, ensure the data and estimates quality provided by this study, and its utility for health surveillance. It is well known that properly surveillance studies assist governments, health authorities and health professionals in formulating policies and programs for diseases prevention and to measure the efficacy of efforts to control prevalent illness and restore quality of life²³.

The recruitment strategy used in the study was considered the most feasible for Rosário do Sul due to its huge territorial extension, which is the seventh largest area of Rio Grande do Sul State³³, and its low rural demographic density. In addition to the last one, the poor roads conditions hampered the access to the individuals. The comparisons between the study data and IBGE aimed to validate the strategy used for getting the representativeness of sample in this rural area. The proportions of the compared characteristics among examined sample, eligible individuals, and IBGE data are very similar. There is predominance of the white race for the three subgroups mentioned above. The slightly greater proportion of white on IBGE data could be explained partly by the quantity of information not reported for this variable on non-responders. This study used the same options of skin color used by IBGE census, however, several individuals related doubts about this question. In these cases, the interviewers explained each option until the complete understanding of the participant and waited for their answer, without considering the interviewer's concepts of skin color. We are not sure if IBGE census interviewers used this same approach, and it could also explain the different proportions for the white race. According to IBGE data, there are somewhat more men than women living in rural area, and the examined sample showed the same gender proportion. This result could be justified by a greater quantity of male gender on non-responders. As Rosário do Sul is a city practically agricultural, and male gender are more involved in these activities³⁴, a big proportion of men were not exempt of the rural work to participate in the study. Considering the age, the slight difference between IBGE and sample or eligible individuals in the first category (until 24 years old) could be due to the rural exodus and a census data lag. There is a decline of the young population on Brazilian rural areas, especially for ≤ 25 years individuals³⁵. Additionally, the data collection of this study started five years after the last IBGE census (2010), which was used for the comparisons, making possible the lag of population estimates.

The two clinical examiners got the minimum value (0.80) previously established for calibration intra- and inter- raters of PPD, CAL, and DMFS. The reproducibility values were excellent considering the cut-off points established in the literature: Kappa values between 0.81 and 1.00 represent a strength of agreement almost perfect³⁶; the ICC between 0.75 and 0.90 indicates good reliability and values greater than 0.90 depicts excellent reliability³⁷.

Due to its multidisciplinary character, this survey allowed a complete health investigation and a health status report was delivered to the participants. Additionally, copies of these reports will be delivered to the health services department with suggestion and strategies for the management of the major health problems observed. The summary of study results will be available to the general population through a local radio program, which reach urban and rural area. Apart from the scientific papers resulting from this study, it is believed that these procedures can help on the development of health care programs.

References

1. GBD2015, Disease, Incidence I, Prevalence, Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet*. 2016 Oct 08;388(10053):1545-602.
2. Kassebaum NJ, Smith AGC, Bernabé E, Fleming TD, Reynolds AE, Vos T, et al. Global, Regional, and National Prevalence, Incidence, and Disability-Adjusted Life Years for Oral Conditions for 195 Countries, 1990–2015: A Systematic Analysis for the Global Burden of Diseases, Injuries, and Risk Factors. *J Dent Res*. 2017;96(4):380-7.
3. Haag DG, Peres KG, Balasubramanian M, Brennan DS. Oral Conditions and Health-Related Quality of Life: A Systematic Review. *J Dent Res*. 2017 Jul;96(8):864-74.
4. Mathur MR, Williams DM, Reddy KS, Watt RG. Universal health coverage: a unique policy opportunity for oral health. *J Dent Res*. 2015 Mar;94(3 Suppl):3S-5S.
5. Leroy R, Eaton KA, Savage A. Methodological issues in epidemiological studies of periodontitis--how can it be improved? *BMC Oral Health*. 2010 Apr 21;10:8.
6. Oppermann RV, Haas AN, Rosing CK, Susin C. Epidemiology of periodontal diseases in adults from Latin America. *Periodontol*. 2000. 2015 Feb;67(1):13-33.
7. Skillman SM, Doescher MP, Mouradian WE, Brunson DK. The challenge to delivering oral health services in rural America. *J Public Health Dent*. 2010 Jun;70 (Suppl 1):S49-57.
8. Ahn S, Burdine JN, Smith ML, Ory MG, Phillips CD. Residential rurality and oral health disparities: influences of contextual and individual factors. *J Prim Prev*. 2011 Feb;32(1):29-41.
9. IBGE. Instituto Brasileiro de Geografia e Estatística. Censo demográfico 2010: resultados da amostra, características da população, Rosário do Sul-RS. IBGE site; [cited 2016 Oct 25]. Available from: <http://cidades.ibge.gov.br/xtras/temas.php?lang=&codmun=431640&idtema=90&seasea=rio-grande-do-sul|rosario-do-sul|censo-demografico-2010:-resultados-da-amostra-caracteristicas-da-populacao>. Portuguese.
10. IBGE. Instituto Brasileiro de Geografia e Estatística. Base de informações do censo demográfico 2010: Resultados do universo por setor censitário. Rio de Janeiro; 2011 [cited 2014]. Available from: http://downloads.ibge.gov.br/downloads_estatisticas.htm. Portuguese.
11. Urbaniak GC, Plous S. Research Randomizer (Version 4.0) [Computer software]. 2015 [updated 2015; cited 2014]. Available from: <http://www.randomizer.org/>.

12. IBGE. Instituto Brasileiro de Geografia e Estatística. Organização do território - Malhas territoriais - Censo 2010, setores censitários. [cited 2014]. Available from: http://downloads.ibge.gov.br/downloads_geociencias.htm. Portuguese.
13. Dean AG, Sullivan KM, Soe MM. OpenEpi: Open Source Epidemiologic Statistics for Public Health, Version 3.01. 2013/04/06 [updated 2013 Apr 06; cited 2014 Aug 08]. Available from: http://www.openepi.com/Menu/OE_Menu.htm.
14. Sobell LC, Sobell MC. Alcohol Consumption Measures: National Institute on Alcohol Abuse and Alcoholism. Journal [serial on the Internet]. 2004. Available from: <https://pubs.niaaa.nih.gov/publications/assessingalcohol/measures.htm>.
15. Ewing JA. Detecting alcoholism. The CAGE questionnaire. JAMA. 1984 Oct 12;252(14):1905-7.
16. Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption--II. Addiction. 1993 Jun;88(6):791-804.
17. Slade GD. Derivation and validation of a short-form oral health impact profile. Community Dent Oral Epidemiol. 1997 Aug;25(4):284-90.
18. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. J Health Soc Behav. 1983 Dec;24(4):385-96.
19. Trapnell PD, Campbell JD. Private self-consciousness and the five-factor model of personality: distinguishing rumination from reflection. J Pers and Soc Psychol. 1999 Feb;76(2):284-304.
20. Cyrino RM, Miranda Cota LO, Pereira Lages EJ, Bastos Lages EM, Costa FO. Evaluation of self-reported measures for prediction of periodontitis in a sample of Brazilians. J Periodontol. 2011 Dec;82(12):1693-704.
21. Ainamo J, Bay I. Problems and proposals for recording gingivitis and plaque. Int Dent J. 1975 Dec;25(4):229-35.
22. Hamp SE, Nyman S, Lindhe J. Periodontal treatment of multirooted teeth. Results after 5 years. J Clin Periodontol. 1975 Aug;2(3):126-35.
23. WHO. World Health Organization. Oral health surveys: basic methods - 5th ed.; 2013 [cited 2014]. Available from: http://www.who.int/oral_health/publications/9789241548649/en/.

24. O'Brien M. Children's dental health in the United Kingdom 1993. London: Her Majesty's Stationery Office; 1994.
25. Danser MM, Timmerman MF, Y IJ, Bulthuis H, van der Velden U, van der Weijden GA. Evaluation of the incidence of gingival abrasion as a result of toothbrushing. *J Clin Periodontol*. 1998 Sep;25(9):701-6.
26. WHO. WHO guidelines on drawing blood: best practices in phlebotomy. 2010 [cited 2015]. Available from: http://www.who.int/infection-prevention/publications/drawing_blood_best/en/.
27. Foglio-Bonda PL, Migliario M, Rocchetti V, Pattarino F, Foglio-Bonda A. Daily and annually variation of unstimulated whole saliva flow rate and pH and their relation with body profile in healthy young adults. *Eur Rev Med Pharmacol Sci*. 2013 Sep;17(18):2538-45.
28. Yoshizawa JM, Schafer CA, Schafer JJ, Farrell JJ, Paster BJ, Wong DT. Salivary biomarkers: toward future clinical and diagnostic utilities. *Clinical microbiology reviews*. 2013 Oct;26(4):781-91.
29. IBGE. Instituto Brasileiro de Geografia e Estatística. Manual de antropometria. Pesquisa Nacional de Saúde. Rio de Janeiro; 2013 [cited 2015]. Available from: <http://www.pns.icict.fiocruz.br/arquivos/Novos/Manual%20de%20Antropometria%20PDF.pdf>. Portuguese.
30. CDC. Centers for Disease Control and Prevention. National Health and Nutrition Examination Survey (NHANES). Anthropometry procedures manual. 2007 [cited 2015]. Available from: https://www.cdc.gov/nchs/data/nhanes/nhanes_07_08/manual_an.pdf
31. IBGE. Instituto Brasileiro de Geografia e Estatística. Censos - Censo Demográfico 2010 - Resultados do Universo - Agregados por setores censitários, RS. [cited 2014]. Available from: https://downloads.ibge.gov.br/downloads_estatisticas.htm. Portuguese.
32. Peres MA, Peres KG. Levantamentos epidemiológicos em saúde bucal – Recomendações para os serviços de saúde. In: Antunes JLF, Peres MA, editors. Fundamentos de Odontologia – Epidemiologia da Saúde Bucal Coordenador da série Oswaldo Crivello Junior. 2nd ed. São Paulo: Santos; 2013. p. 31-49. Portuguese.
33. FEE. Fundação de Economia e Estatística. FEEdados. 2015 [updated 2015; cited 2017 Jun 07]. Available from: <http://feedados.fee.tche.br/feedados/>. Portuguese.
34. IBGE. Instituto Brasileiro de Geografia e Estatística. Censo agropecuário 2006. Rosário do Sul. [cited 2017]. Available from: <https://cidades.ibge.gov.br/v4/brasil/rs/rosario-do-sul/pesquisa/24/27745?detalhes=true>. Portuguese

35. Maia AG, Buainain AM. The new map of Brazil's rural population. *Confins* [Online]. 2015;25. Portuguese.
36. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics*. 1977 Mar;33(1):159-74.
37. Koo TK, Li MY. A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. *J Chiropr Med.* 2016 Jun;15(2):155-63.

Illustrations

Figure 1

Title: The 30 eligible and the 17 randomized (gray color) rural census sectors.

Figure 2

Title: Sampling strategy.

Legend: a) The total number of households (Hn) in each RCS stratum was obtained since IBGE data. The percentages (black rectangles) of sectors strata were calculated by the formula: $(\text{total Hn in each stratum} * 100) / 1142$. b) The estimated Hn for the 17 randomized RCS were calculated using the sample size and the population density of these sectors. The Hn for each stratum was obtained since the previously calculated percentages (black rectangles), which mean the representability of each stratum for the sampling.

Figure 3

Title: Questionnaires scheme.

Legend: £ Typical beverage of Brazilian state of Rio Grande do Sul, also termed chimarrão.

QF: Quantity Frequency; CAGE: Cut-down, Annoyed, Guilty, Eyeopener; AUDIT: Alcohol Use Disorders Identification Test; PSS: Perceived Stress Scale; RRQ: Rumination – Reflection Questionnaire; OHIP: Oral Health Impact Profile

Figure 4

Title: Study flowchart.

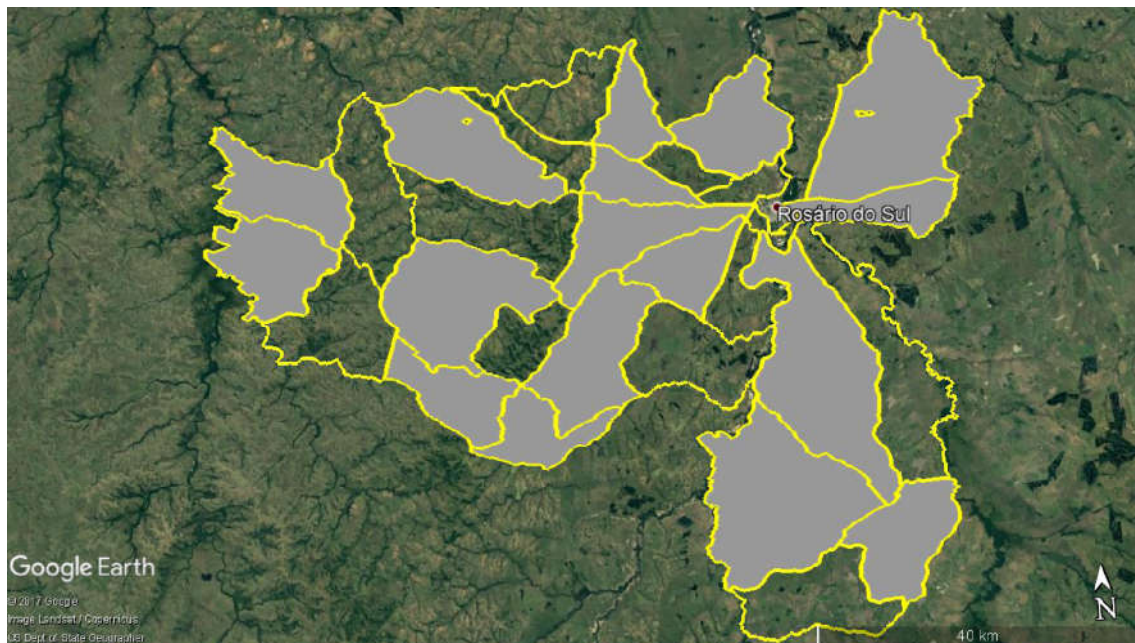


Figure 1

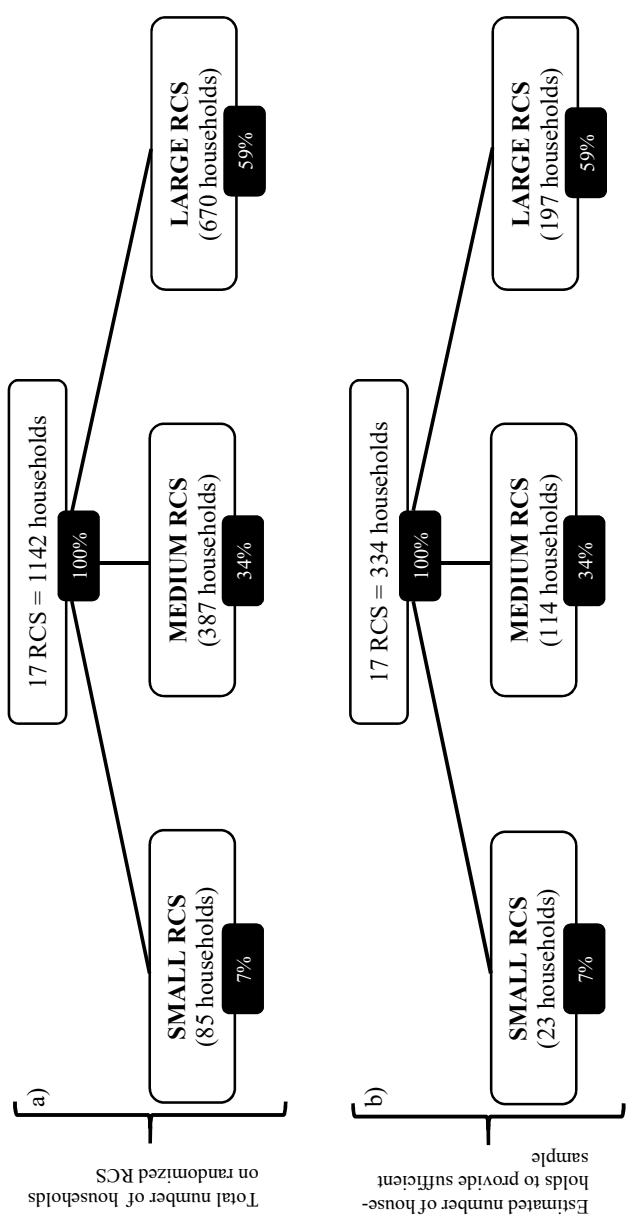


Figure 2

Demographic/ Economic Questionnaires	Medical Questionnaire	Behavioral Questionnaire
<p>Skin color or race Family income/ month Number of individuals/ household Study years/ Scholaryity</p>	<p>Medication use Systemic health status History of bone fracture Vitamin supplement Pregnancy/ Menstruation Hormonal reposition</p>	<p>Frequency of toothbrushing/ day Toothbrushing time Toothbrush type Toothbrush replacement time Toothpaste quantity Interproximal devices use Mouthwash use Dental sensitivity Dental visits Smoking habit</p>
Other Questionnaires		
<p>Alcoholic beverages consumption (QF¹⁴, CAGE¹⁵, AUDIT¹⁶) PSS¹⁸ RRQ¹⁹ OHIP – 14¹⁷ Self-reported periodontal measures²⁰ Mate-tea[†] intake and frequency</p>		

Figure 3

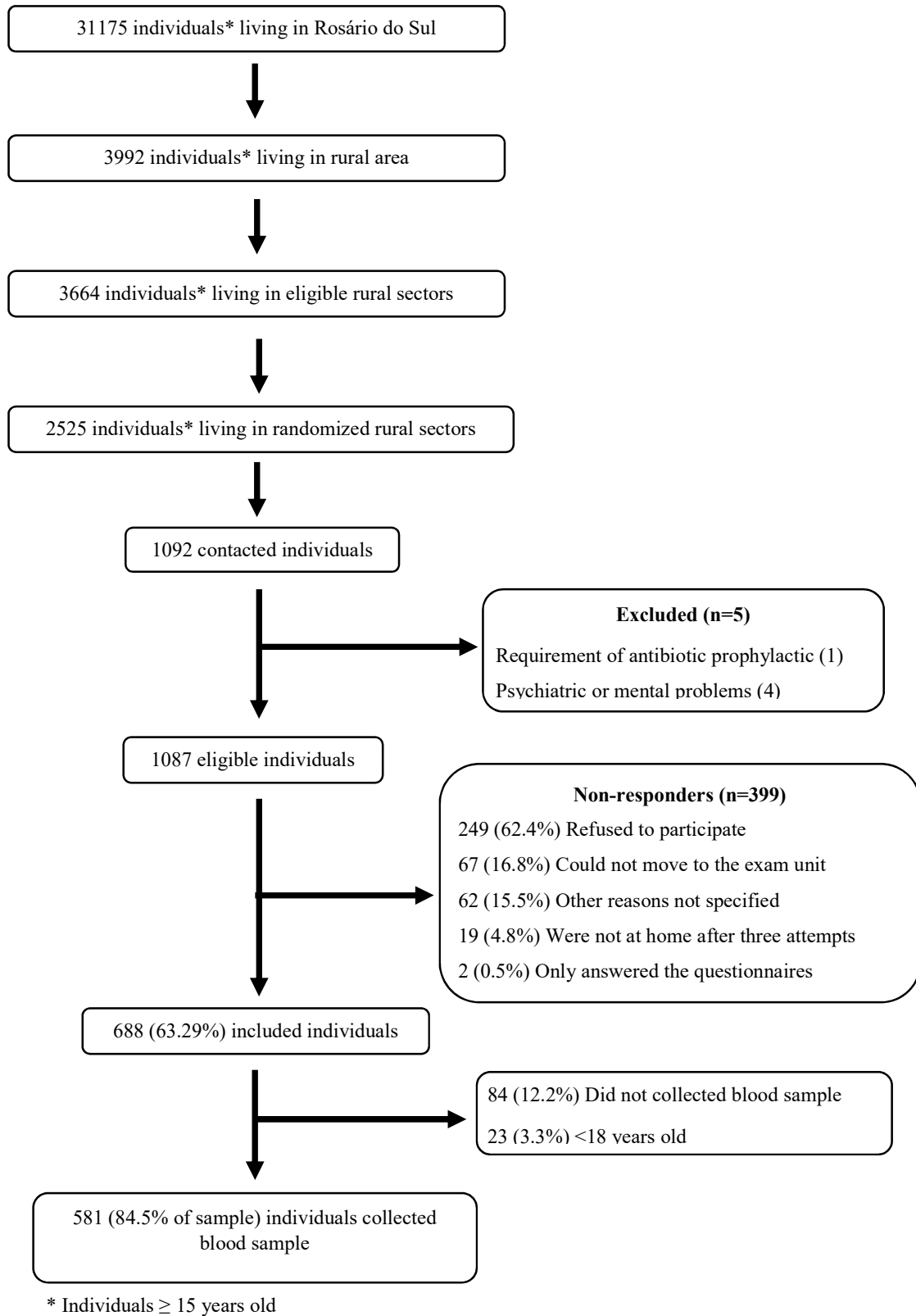


Figure 4

Table 1: Demographic characteristics of sample, eligible individuals, non-responders (NR) and IBGE data.

	SAMPLE n (%)	NR n (%)	ELIGIBLE n (%)	Valid %	IBGE n (%)
Skin color					
White	473 (67.5%)	200 (50.1%)	673 (61.9%)	67.0%	3032 (82.8%)
Non-White	215 (32.5%)	117 (29.3%)	332 (30.5%)	33.0%	632 (17.2%)
Skin color not reported	0 (0%)	82 (20.6%)	82 (7.5%)	-	0 (0%)
Gender					
Male	339 (49.6%)	244 (61.2%)	583 (53.6%)	-	2070 (56.5%)
Female	349 (50.4%)	155 (38.8%)	504 (46.4%)	-	1594 (43.5%)
Age, years					
-24	67 (9.6%)	38 (9.5%)	105 (9.7%)	10.3%	561 (15.3%)
25-34	94 (13.0%)	42 (10.5%)	136 (12.5%)	13.3%	561 (15.3%)
35-44	115 (16.7%)	59 (14.8%)	174 (16.0%)	17.0%	684 (18.7%)
45-54	154 (22.5%)	61 (15.3%)	215 (19.8%)	21.1%	691 (18.9%)
55-64	133 (20.0%)	50 (12.5%)	183 (16.8%)	17.9%	575 (15.7%)
65-74	84 (12.4%)	50 (12.5%)	134 (12.3%)	13.1%	392 (10.7%)
75+	41 (5.7%)	33 (8.3%)	74 (6.8%)	7.2%	200 (5.5%)
Age not reported	0 (0%)	66 (16.5%)	66 (6.1%)	-	0 (0%)
Total	688	399	1087		3664

IBGE: Brazilian Institute of Geography and Statistic (2010)

Valid %: excluding data not reported

3 ARTIGO 2 – CONDIÇÃO PERIODONTAL DE UMA POPULAÇÃO RURAL DO SUL DO BRASIL

Esse artigo será submetido ao periódico *Journal of Clinical Periodontology*, ISSN 1600-051X, Qualis A1.

Periodontal status of a rural population of South Region Brazil

Running title: Periodontal status in rural population

Key words: Cross-Sectional Studies, Dental Health Surveys, Epidemiology, Periodontal Attachment Loss, Periodontal Diseases.

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Clinical relevance

Scientific rationale for study: There are not enough based-population studies using full-mouth periodontal exam to provide the current estimates of periodontitis.

Principal findings: Based on CDC/AAP case definition, periodontitis affected a huge proportion of ≥ 15 -year-old individuals. Half of individuals were affected by moderate periodontitis, and 75% had at least one site with CAL ≥ 5 mm.

Practical implications: The use of recently proposed standards for reporting periodontitis allow better comparisons of the periodontal estimates across countries. The CAL magnitude may indicate the need for health programs targeting the disadvantaged populations.

Abstract:

Aim: To describe the periodontal status, applying the recently recommended standards for periodontitis reporting.

Materials and methods: A population-based representative sample of the individuals (≥ 15 years old) living in a rural area of Southern Brazil was investigated. 688 individuals received full-mouth examination at six sites/tooth. The following parameters were registered: visible plaque index, supragingival calculus, gingival bleeding index, probing pocket deep, bleeding on probing, and clinical attachment loss (CAL). Questionnaires were applied to get demographic, economic, and behavioral data.

Results: According to CDC/AAP case definition, periodontitis affected 85.7% of the individuals, and the moderate form was the most prevalent (approximately 50%). The CAL ≥ 3 mm was observed in almost the entire sample. Three of four individuals had CAL ≥ 5 mm, and a considerable proportion of teeth per individual was affected by this magnitude of attachment loss. The older age categories presented higher estimates of CAL.

Conclusions: Periodontal disease was highly prevalent in this population. The observed CAL magnitude may indicate the lack of adequate periodontal treatment and future tooth loss for a high number of individuals.

Introduction

The prevalence of periodontal disease is high, and considerable worldwide variation has been described (Demmer and Papapanou, 2010, Dye, 2012, Kassebaum et al., 2014). The chronic periodontitis can be diagnostic between 13% and 89% of individuals with a similar age range (Konig et al., 2010, Corbet and Leung, 2011, Al-Harhi et al., 2013, Oppermann et al., 2015, Eke et al., 2015). Severe periodontitis affects more than 500 million of people in the world, and it is one of the most prevalent conditions to cause disabilities (Kassebaum et al., 2017). Besides the high prevalence, the periodontal diseases have aesthetic, functional (Singh and Brennan, 2012), systemic (Genco and Borgnakke, 2013, Leng et al., 2015), and social (Haag et al., 2017a, Haag et al., 2017b, Kaur et al., 2017, Buset et al., 2016) repercussions related to its infectious-inflammatory nature and the consequences of its advance. The last Global Burden of Oral Disease study (Kassebaum et al., 2017) showed severe periodontitis is the cause of 1.7 million DALYs (disability-adjusted life years), an attempt to measure the impact of the disability resulting from periodontal disease through the number of “healthy life” years lost since it is diagnosed/ established.

Several methodological aspects influence the periodontal disease estimates making it difficult to do inferences regarding its global variation since the comparisons among populations are hampered (Holtfreter et al., 2015). Among these factors are the heterogeneity of case definitions, the different periodontal recording protocols (Holtfreter et al., 2014, Kingman and Albandar, 2002, Oppermann et al., 2015) and units of analysis (Oppermann et al., 2015), the choice of periodontal probe (Holtfreter et al., 2014), and the variability in the prevalence and patterns of risk factors or indicators (Holtfreter et al., 2015). In 2015, Holtfreter et al. suggested some principles to report periodontitis as a proposal to improve the quality of epidemiological studies, to standardize the estimates, and to provide better insights into the determinants of global disease variation (Holtfreter et al., 2015). In the same year, Oppermann et al. highlighted the lack of population-based studies with appropriated methodology to access the distribution and risk factors for periodontal disease in Latin America (Oppermann et al., 2015).

Besides the deficit of quality studies about periodontal disease, the data are scarce or inexistent for some regions or populations (GBD2015 et al., 2016) such as the rural areas. The periodontal estimates of rural populations may differ from the

urban ones. This fact may be due to the divergences in the health care access (Skillman et al., 2010), the exposure to different environmental and behavioral risk factors, and other contextual factors (Ahn et al., 2011) that highlights the importance of investigating the periodontal status of individuals who live in these areas.

The majority of recent studies that evaluated the periodontal status of rural populations were performed in Asian countries (Awuti et al., 2012, Bhat et al., 2015, Sekhon et al., 2015, Ramoji Rao et al., 2016). In Latin America, there is not sufficient data regarding the periodontal diseases from adequate methodologies and representative samples (Oppermann et al., 2015). In Brazil, the studies in rural areas (Corraini et al., 2008b, Corraini et al., 2008a, de Macedo et al., 2006, Moimaz et al., 2009, Bonifacio et al., 2011) that we have knowledge are in its majority with convenience samples, or they have some methodological deficiency that can influence the periodontal estimates. In the Rio Grande do Sul, where there are numerous rural areas inhabited by considerable population (IBGE, 2010), we believe that it is the first study with a representative rural sample and full-mouth periodontal examination. Considering the neediness of evidence, the necessity of quality estimates about the periodontal disease, and the standards proposed by Holtfreter et al. (Holtfreter et al., 2015), this study aimed to describe the periodontal status in a representative sample of a rural population of South Brazil.

Materials and methods

Study design and sample

This cross-sectional study was part of a larger epidemiological survey whose target population was ≥ 15 years individuals living in the rural area of Rosário do Sul; the Rio Grande do Sul State, Brazil (Mário et al., 2017). Briefly, the survey included 17 census rural sectors (RCS) where there were approximately 2.5 thousand individuals with age established for the study (IBGE, 2010). This population-based survey used a multistage probability sample with the primary sampling units (RCS) randomly selected. Individuals with psychiatric conditions and the ones requiring prophylactic medication were not included.

The sample size calculation showed the need for a minimum of 667 individuals to be examined (Mário et al., 2017). Table 1 describes the study sample ($n=688$) according to age categories and gender. The overall response rate was 63.3%.

Interview and clinical examination

Two trained dentists performed the interviews, individually for each participant, to gather demographic, socioeconomic, smoking status, oral habits, and dental visits data. Clinical examination was conducted in a mobile unit equipped with a complete dental unit (dental chair, artificial light, and others basic amenities) by two trained and calibrated periodontists.

All permanent fully erupted teeth (six sites per tooth: mesiobuccal, mid-buccal, distobuccal, distolingual, mid-lingual and mesiolingual), excluding third molars, were examined with a manual periodontal probe (UNC-15, Neumar®, São Paulo, Brazil) coded millimeter (mm) to mm until 15 mm. The following parameters were assessed: visible plaque index [VPI, (Ainamo and Bay, 1975)], marginal gingival bleeding index [GBI, (Ainamo and Bay, 1975)], retentive plaque factors (RPF), pocket probing depth (PPD), bleeding on probing (BoP) and clinical attachment loss (CAL). PPD was measured from free gingival margin to the bottom of the pocket/sulcus. CAL was defined as the distance from cemento-enamel junction to the bottom of the pocket/sulcus. Measurements were made in mm and were rounded to nearest whole mm.

Measurement of reproducibility

The examiners were trained and calibrated in performing the clinical evaluations, before and during the study. Measurements reproducibility was assessed using replicated periodontal measures in ≥ 1000 sites, and it has been thoroughly reported elsewhere (Mário et al., 2017). The values of intra- and inter-class correlation coefficients ranged between 0.89 and 0.96 for PPD, and it ranged between 0.84 and 0.99 for CAL.

Physical measurement and blood collecting

The physical exam consisted of height and weight measurements performed according to the anthropometry manuals of IBGE (IBGE, 2013) and NHANES (CDC, 2007) by a trained examiner. Height was measured with a portable stadiometer, coded cm to cm until 2 meters, and weight with a digital scale (Glass 200, LA 250/ G·TECH, Living Science Co. Ltd., Jiangsu, China). Pregnant women and the ones who had delivered child six months previous were not evaluated for weight. Height and weight

were taken twice, and the mean of these two measurements was used to calculate the body mass index (BMI).

The ≥ 18 -year-old individuals had the blood collected by a credentialed laboratory of the prefecture of Rosário do Sul, according to WHO guidelines on drawing blood (2010). From this collect, glycated hemoglobin (HbA1c) measure was obtained by the immunoturbidimetry method and was used as diabetes mellitus data.

Ethical considerations

The study was approved by the Ethics Committee in Research of Federal University of Santa Maria (CAAE: 37862414.5.0000.5346) and was performed following the Declaration of Helsinki. Subjects who agreed to participate signed an informed consent form (ICF). Individuals < 18 years old needed the authorization of responsible, through signature in a specific ICF. All participants received a written report detailing their oral status, and they were advised to seek treatment if presented any health alteration.

Data analysis

Descriptive analysis with counts, frequency distributions, means and standard errors were performed considering the plan for complex samples. The design variable was the RCS, and the sampling weight was calculated by division of the total number of individuals living in each RCS for the number of examined people in the respective RCS. The planned and net sample sizes and the response rate were presented by gender (Table 1).

The skin color was scored as white or non-white. Monthly family income was collected in reais (Brazilian coin), it was converted to American dollar (USD) and scored in three strata considering the percentiles 25% and 75%. Individuals were classified by their self-report of smoking habits into three groups: never smokers, former smokers, and current smokers. BMI was obtained dividing the weight (kilograms) by height (meters) squared, and it was categorized as healthy weight (< 25 kg/m²), overweight (25-29.99 kg/m²) and obese (≥ 30 kg/m²) (WHO 2017). Diabetes mellitus data were based on HbA1c percentages and were scored as no diabetes ($< 5.7\%$), pre diabetes or increased risk for diabetes (5.7% - 6.4%) and diabetes diagnosis ($\geq 6.5\%$) (American Diabetes, 2014). Tooth brushing frequency was scored as less than two times/day and ≥ 2 times/day, and the use of inter-dental care devices

was dichotomized (yes/no). The dental visit frequency was scored as less than one time per year or ≥ 1 time/year. Edentulism, tooth count and tooth count on dentates were analyzed including and excluding third molars, separately.

The prevalence and extent of periodontitis were defined for two thresholds: PPD ≥ 4 mm and ≥ 6 mm; CAL ≥ 3 mm and ≥ 5 mm. The prevalence considered the number of individuals that have at least one site with each threshold. The extent estimates assessed the site and tooth levels by the individual. The periodontitis severity was defined by the criteria developed by Centers for Disease Control and Prevention and the American Academy of Periodontology (CDC/AAP) (Eke et al., 2012). The percentages of sites per individual with VPI, GBI, supragingival calculus, and BoP were calculated considering the number of sites with the presence of each variable and the total number of sites within the individual. All data were presented by age categories and total sample, and it followed the standards for reporting periodontitis in epidemiologic studies proposed by Holtfreter et al. (Holtfreter et al., 2015). The statistical analysis was performed with IBM® SPSS® Statistics software, version 21.

Results

Table 2 showed the characteristics of the total sample and according to age groups. The higher number of examined individuals were between 45 and 64 years old. The gender distribution was similar, however, in the 25-34 and 35-44 age groups, there were about 10% more women. The majority of individuals were white and never smokers, except for the 55-64 age and older groups, with the predominance of former smokers. About half of youngest (≤ 34 years) had a family income between 229 and 457 USD. The percentage of the individuals between the 35 and 54 years old was similarly distributed among the income strata, and the majority of ≥ 55 years individuals had a family income ≥ 457 USD. The schooling was, in mean, six years with the higher means between younger individuals. About one-third of the population could be considered obese, and diabetes mellitus was diagnosed only in a small percentage of individuals. The majority of the individuals did not regularly visit the dentist, although they have used some inter-dental care device and have brushed their teeth two or more times per day. Ten percent were edentulous. The dentate individuals lost, in mean, eight and seven teeth, excluding and including third molars respectively.

Almost all individuals, three-quarters of teeth and half of sites had CAL ≥ 3 mm. When CAL ≥ 5 mm was evaluated, these proportions were approximately 74% of the individuals, 38% of the teeth and 22% of the sites (Table 3). All CAL measures increased with the increase of age categories. Approximately 80% of individuals had at least one site with PPD ≥ 4 mm and 30% of them with PPD ≥ 6 mm. The proportions of sites and teeth with both PPD cut-offs peaked between 45 and 64 years old. Considerable alterations on PPD mean were not observed through age categories (Table 3). Greater percentages of sites with visible plaque, gingival bleeding, calculus, and BoP were found in CAL ≥ 5 mm sites when compared to the CAL ≥ 3 mm sites (Figure 1).

According to the CDC/AAP case definition, 85.7% of individuals have had some degree of periodontitis and half of them have had the moderate form. Severe periodontitis affected one-third of the individuals. The 71 edentulous were not included in this case definition, and four individuals did not meet the criterion for inclusion because they had less than two teeth (Table 4). More percentages of sites and teeth with CAL ≥ 3 mm and CAL ≥ 5 mm were present in the moderate and severe cases. Severe cases showed approximately 80% of sites with CAL ≥ 3 mm in 95% of teeth and half of the sites with CAL ≥ 5 mm in three-quarters of teeth. The cases diagnosed with no or mild periodontitis showed a minimal percentage of teeth (0.56 and 0.73, respectively) with CAL ≥ 5 mm (Figure 2).

Discussion

Almost the totality of the ≥ 15 -year-old individuals exhibited at least one CAL ≥ 3 mm site. The CAL ≥ 5 mm was observed in more than 80% of adults with ≥ 45 -year-old. Six of seven individuals had periodontitis according to the CDC/AAP criteria (Eke et al., 2012), and the moderate periodontitis affected the higher percentage of the individuals. These results represent a high prevalence of periodontal disease in this rural population, which has had difficulty in accessing health services.

The place of residence largely determines the access to health care and more than half of the rural people have not had health coverage (ILO, 2015). Furthermore, to live in the countryside has been associated with two times more chance to have severe periodontitis when compared to reside in urban areas (Zhang et al., 2014). There is an inequitable resource sharing between rural and urban areas, which results

in socioeconomic differences. The informality and self-employment, common in the evaluated rural area, could aggravate the situation because they cannot generate sufficient income to afford basic goods and services such as health (ILO, 2015). The mean of study years (± 6 years) was lower than the Brazilian and the Rio Grande do Sul State averages (between 7.5 and 9.1 years). The majority of individuals could be classified as low income (≤ 132.85 USD monthly per capita) or being next to the poverty line according to their family incomes (IBGE, 2012). This mean of study years and the income characterized the low socioeconomic status of the present sample. The low socioeconomic status impacts on health (Braveman and Gottlieb, 2014), and it has been associated with worse periodontal status (Susin et al., 2004, Susin et al., 2011). Put together, all previous considerations related to the local of residence, the difficult health access, and the socioeconomic factors can explain, in part, the high periodontal disease estimates observed.

Besides the high prevalence of the individuals with CAL ≥ 5 mm, the proportion of teeth affected at each individual was elevated. The individuals with 55 years or more (about 40% of the sample) have had two-thirds of teeth with this extent of attachment loss. These finds and the reduced tooth count (≤ 16 teeth) in the age categories above may indicate considerable functional impairment (Johansson et al., 2006, Singh and Brennan, 2012, Ikebe et al., 2011). The high prevalence of BoP in both CAL ≥ 3 mm and ≥ 5 mm sites highlights the inflammation presence (Greenstein et al., 1981) and the possibility of future attachment loss (Claffey et al., 1990). The calculus has also been associated with periodontal attachment loss, and a high percentage of supragingival calculus was observed in the two CAL cuts-off sites, demonstrating a long-exposure to dental plaque (Oppermann et al., 2015). The BoP and calculus presence associated with the large extent of CAL ≥ 5 mm may suggest disease progression, which can be responsible for tooth loss. The tooth loss due to the age advance and the periodontal disease progression (Loe et al., 1986) is a possible consequence of the absence of periodontal treatment that is expected for these individuals, considering their difficultness to access health care and their low socioeconomic status (Hosseinpoor et al., 2012). The high prevalence and magnitude of periodontitis observed in this sample can also be a consequence of the natural progression of the disease. Since the sample mentioned above characteristics, it is possible that the majority of the individuals have never received adequate periodontal

treatment; consequently, the clinical course of the periodontal disease was not modified.

Recently, Holde et al. (Holde et al., 2017) used the CDC/AAP case definition to report the estimates of periodontal disease in Norwegian circumpolar communities. Despite their sample had been only 23.7% of rural inhabitants and had many other important differences, the presentation of the data according to the recently suggested standards allow a better comparison with the present study. Some characteristics of the examined individuals were very similar in both studies as the percentages of diabetics and current smokers [recognized risk factors for periodontal diseases (Chapple et al., 2017)], the gender proportion, the age mean, and the tooth brushing frequencies [possible risk indicators (Susin et al., 2004, Aimetti et al., 2015, Lorenzo et al., 2015)]. On the other hand, the differences in the periodontal disease prevalence for the same definition criteria were notably large (49.5% versus 85.7%). The distinct periodontal estimates may be explained by the different measures of CAL (radiographic bone loss at proximal sites versus clinical evaluation at six sites per tooth) and by environmental aspects. Among these environmental characteristics, the education (42% with university level education versus a mean of six study years), the behavior (due to geographic or cultural differences), and the health care access (the majority of urban versus rural individuals) can be emphasized. A study in China (Zhang et al., 2014), with approximately 50% of the sample from rural inhabitants, observed the lower prevalence of periodontal disease than this study, about 26%. The differences between the estimates may be due to the index used for examination (Community Periodontal Index) besides the other factors already cited. Periodontitis affected 47% of an entirely rural sample of Indian individuals (Bhat et al., 2015) and, in this case, the age range evaluated could explain the difference to the present Brazilian rural sample. Bhat et al. (Bhat et al., 2015) examined only individuals between 35 and 54 years old, and the older age categories are affected by more disease, increasing the total prevalence of periodontitis. Aimetti et al. (Aimetti et al., 2015) and Holtfreter et al. (Holtfreter et al., 2010) observed periodontal estimates more similar to the present study for urban populations from Italy and German, respectively. The first study showed that moderated and severe periodontitis affected 76% of adults (between 20 and 75 years old) of an industrialized and business city whose sample had a predominance of middle and high education levels (versus 81% of the same degrees of disease in this rural sample of low educational status) (Aimetti et al., 2015).

The second authors' group estimated 71% and 87% of severe and moderated periodontitis for two age cohorts (35-44 years adults and 65-74 years seniors, respectively) (Holtfreter et al., 2010). Holtfreter et al. (Holtfreter et al., 2010) also reported the prevalence according to the CAL ≥ 3 mm (35-44 years: 95% and 65-74 years: 62%) and ≥ 5 mm (35-44 years: 99% and 65-74 years: 89%) cut-offs, which are similar to the estimates observed in this study for the same age categories. Considering these CAL cut-offs, it was possible to verify similarities with the Susin et al. study (Susin et al., 2004) that evaluated a representative sample of an urban area of the same Brazilian state. These authors observed CAL ≥ 3 mm in 97% of the individuals (≥ 30 years) and 79% of them had CAL ≥ 5 mm. The observations as mentioned earlier reinforce the importance of the evaluating the periodontal diseases in more regions as it is possible and of the standardization of the data reporting. Thereby, it will be feasible to investigate the potential risk indicators related to the differences in the periodontal estimates across populations such as the weight of behavior, socioeconomic and other factors that can be associated with disease patterns. Furthermore, the knowledge of the distribution of periodontal disease may reduce the economic costs of prevention and treatment programs, determine eligibility and coverage for insurance programs, and may assist in the development of adequate designs for clinical trials in Periodontology (Kingman and Albandar, 2002).

This paper approaches a representative sample that ensures an accurate estimate of periodontal diseases (magnitude and distribution) for the reference population (Kingman and Albandar, 2002) and reduces the risk of bias associated with the convenience samples (Oppermann et al., 2015). The full mouth examination protocol avoids the over- or underestimations of periodontitis. The partial recording protocols are known sources of bias to disease estimates (Kingman et al., 2008, Tran et al., 2013), whose amount depends on the disease distribution in the target population and the number and location of teeth and sites examined by the protocol (Susin et al., 2005, Oppermann et al., 2015). The use of the standards proposed by Holtfreter et al. (Holtfreter et al., 2015) for presenting the periodontal estimates of this study will contribute to improve the reporting quality and the comparability between studies.

In summary, there is a high prevalence of periodontal diseases in this rural population of South Brazil, which is represented by a high percentage of individuals with moderate periodontitis and high proportions of teeth per individual affected with

CAL \geq 5 mm. This CAL magnitude may indicate the lack of adequate periodontal treatment and future tooth loss for several individuals. The high periodontal estimates may be attributed principally to the low socioeconomic status and the difficultness of health care access. Then, there is the need to improve the health programs aiming to ensure the access to oral health care as well as the awareness about the oral status in disadvantaged populations. It is believed that this paper can contribute to this aim and to improve the Rio Grande do Sul periodontal estimates due to the population-based sample, with the solid recruitment strategy, and the quality of the general methodology regarding exam protocol, reproducibility of examiners, and case definition of periodontal disease. Several of these premises were not used in previous epidemiologic studies of periodontal diseases. Future papers should use the standards proposed by Holtfreter et al. (Holtfreter et al., 2015) to ensure the comparability of disease estimates and allow the investigations about risk indicators capable of explaining the divergences among populations and countries.

References

- Ahn, S., Burdine, J. N., Smith, M. L., Ory, M. G. & Phillips, C. D. (2011) Residential rurality and oral health disparities: influences of contextual and individual factors. *J Prim Prev* **32**, 29-41. doi:10.1007/s10935-011-0233-0.
- 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. *J Clin Periodontol* **42**, 622-631. doi:10.1111/jcpe.12420.
- Ainamo, J. & Bay, I. (1975) Problems and proposals for recording gingivitis and plaque. *Int Dent J* **25**, 229-235.
- Al-Harhi, L. S., Cullinan, M. P., Leichter, J. W. & Thomson, W. M. (2013) Periodontitis among adult populations in the Arab World. *Int Dent J* **63**, 7-11. doi:10.1111/idj.12002.
- American Diabetes, A. (2014) Diagnosis and classification of diabetes mellitus. *Diabetes Care* **37 Suppl 1**, S81-90. doi:10.2337/dc14-S081.
- Awuti, G., Younusi, K., Li, L., Upur, H. & Ren, J. (2012) Epidemiological Survey on the Prevalence of Periodontitis and Diabetes Mellitus in Uyghur Adults from Rural Hotan Area in Xinjiang. *Exp Diabetes Res* **2012**, 7. doi:10.1155/2012/758921.
- Bhat, M., Roberts-Thomson, K. & Do, L. G. (2015) Clustering of risk indicators for periodontal disease: A population-based study. *Community Dent Health* **32**, 158-162.
- Bonifacio, J. D., Aquino, D. R., Franco, G. C., Cortelli, S. C., Cogo, K., Guimaraes dos Santos, J., Costa, F. O. & Cortelli, J. R. (2011) Prevalence of periodontopathogens in a black Brazilian secluded community matched with a black urban population. *Community Dent Health* **28**, 301-304.
- Braveman, P. & Gottlieb, L. (2014) The social determinants of health: it's time to consider the causes of the causes. *Public Health Rep* **129 Suppl 2**, 19-31. doi:10.1177/00333549141291S206.
- Buset, S. L., Walter, C., Friedmann, A., Weiger, R., Borgnakke, W. S. & Zitzmann, N. U. (2016) Are periodontal diseases really silent? A systematic review of their effect on quality of life. *J Clin Periodontol* **43**, 333-344. doi:10.1111/jcpe.12517.
- CDC (2007) Centers for Disease Control and Prevention. National Health and Nutrition Examination Survey (NHANES). Anthropometry procedures manual.
- Chapple, I. L., Bouchard, P., Cagetti, M. G., Campus, G., Carra, M. C., Cocco, F., Nibali, L., Hujoel, P., Laine, M. L., Lingstrom, P., Manton, D. J., Montero, E., Pitts, N., Range, H., Schlueter, N., Teughels, W., Twetman, S., Van Loveren, C., Van der Weijden, F., Vieira, A. R. & Schulte, A. G. (2017) Interaction of lifestyle, behaviour or systemic diseases with dental caries and periodontal diseases: consensus report of group 2 of the joint EFP/ORCA workshop on the boundaries between caries and periodontal diseases. *J Clin Periodontol* **44 Suppl 18**, S39-S51. doi:10.1111/jcpe.12685.
- Claffey, N., Nylund, K., Kiger, R., Garrett, S. & Egelberg, J. (1990) Diagnostic predictability of scores of plaque, bleeding, suppuration and probing depth for probing attachment loss. 3 1/2 years of observation following initial periodontal therapy. *J Clin Periodontol* **17**, 108-114.
- Corbet, E. F. & Leung, W. K. (2011) Epidemiology of periodontitis in the Asia and Oceania regions. *Periodontol 2000* **56**, 25-64. doi:10.1111/j.1600-0757.2010.00362.x.

- Corraini, P., Baelum, V., Pannuti, C. M., Pustiglioni, A. N., Romito, G. A. & Pustiglioni, F. E. (2008a) Periodontal attachment loss in an untreated isolated population of Brazil. *J Periodontol* **79**, 610-620. doi:10.1902/jop.2008.070294.
- Corraini, P., Baelum, V., Pannuti, C. M., Pustiglioni, A. N., Romito, G. A. & Pustiglioni, F. E. (2008b) Risk indicators for increased probing depth in an isolated population in Brazil. *J Periodontol* **79**, 1726-1734. doi:10.1902/jop.2008.070586.
- de Macedo, T. C., Costa, M. d. C., Gomes-Filho, I. S., Vianna, M. I. & Santos, C. T. (2006) Factors related to periodontal disease in a rural population. *Braz Oral Res* **20**, 257-262.
- Demmer, R. T. & Papapanou, P. N. (2010) Epidemiologic patterns of chronic and aggressive periodontitis. *Periodontol 2000* **53**, 28-44. doi:10.1111/j.1600-0757.2009.00326.x.
- Dye, B. A. (2012) Global periodontal disease epidemiology. *Periodontol 2000* **58**, 10-25. doi:10.1111/j.1600-0757.2011.00413.x.
- Eke, P. I., Dye, B. A., Wei, L., Slade, G. D., Thornton-Evans, G. O., Borgnakke, W. S., Taylor, G. W., Page, R. C., Beck, J. D. & Genco, R. J. (2015) Update on Prevalence of Periodontitis in Adults in the United States: NHANES 2009 to 2012. *J Periodontol* **86**, 611-622. doi:10.1902/jop.2015.140520.
- Eke, P. I., Page, R. C., Wei, L., Thornton-Evans, G. & Genco, R. J. (2012) Update of the case definitions for population-based surveillance of periodontitis. *J Periodontol* **83**, 1449-1454. doi:10.1902/jop.2012.110664.
- GBD2015, Disease, Incidence, I., Prevalence & Collaborators (2016) Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet* **388**, 1545-1602. doi:10.1016/S0140-6736(16)31678-6.
- Genco, R. J. & Borgnakke, W. S. (2013) Risk factors for periodontal disease. *Periodontol 2000* **62**, 59-94. doi:10.1111/j.1600-0757.2012.00457.x.
- Greenstein, G., Caton, J. & Polson, A. M. (1981) Histologic characteristics associated with bleeding after probing and visual signs of inflammation. *J Periodontol* **52**, 420-425. doi:10.1902/jop.1981.52.8.420.
- Haag, D. G., Peres, K. G., Balasubramanian, M. & Brennan, D. S. (2017a) Oral Conditions and Health-Related Quality of Life: A Systematic Review. *J Dent Res* **96**, 864-874. doi:10.1177/0022034517709737.
- Haag, D. G., Peres, K. G. & Brennan, D. S. (2017b) Tooth loss and general quality of life in dentate adults from Southern Brazil. *Qual Life Res*. doi:10.1007/s11136-017-1587-4.
- Holde, G. E., Oscarson, N., Trovik, T. A., Tillberg, A. & Jonsson, B. (2017) Periodontitis Prevalence and Severity in Adults: A Cross-Sectional Study in Norwegian Circumpolar Communities. *J Periodontol*, 1-17. doi:10.1902/jop.2017.170164.
- Holtfreter, B., Albandar, J. M., Dietrich, T., Dye, B. A., Eaton, K. A., Eke, P. I., Papapanou, P. N., Kocher, T. & Joint, E. U. U. S. A. P. E. W. G. (2015) 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* **42**, 407-412. doi:10.1111/jcpe.12392.
- 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.x.
- Holtfreter, B., Schützhold, S. & Kocher, T. (2014) Is Periodontitis Prevalence Declining? A Review of the Current Literature. *Current Oral Health Reports* **1**, 251-261. doi:10.1007/s40496-014-0032-9.
- Hosseinpour, A. R., Itani, L. & Petersen, P. E. (2012) Socio-economic inequality in oral healthcare coverage: results from the World Health Survey. *J Dent Res* **91**, 275-281. doi:10.1177/0022034511432341.
- IBGE Instituto Brasileiro de Geografia e Estatística. Censo demográfico 2010: resultados da amostra, características da população, Rosário do Sul-RS. IBGE site.
- IBGE (2010) Instituto Brasileiro de Geografia e Estatística. Censo 2010. IBGE site.
- IBGE (2012) Instituto Brasileiro de Geografia e Estatística. Síntese de Indicadores Sociais: Uma análise das condições de vida da população brasileira 2012. pp. 293. Rio de Janeiro.
- IBGE (2013) Instituto Brasileiro de Geografia e Estatística. Manual de antropometria. Pesquisa Nacional de Saúde. Rio de Janeiro.
- Ikebe, K., Matsuda, K., Kagawa, R., Enoki, K., Yoshida, M., Maeda, Y. & Nokubi, T. (2011) Association of masticatory performance with age, gender, number of teeth, occlusal force and salivary flow in Japanese older adults: is ageing a risk factor for masticatory dysfunction? *Arch Oral Biol* **56**, 991-996. doi:10.1016/j.archoralbio.2011.03.019.
- ILO (2015) Global evidence on inequities in rural health protection: new data on rural deficits in health coverage for 174 countries/ Xenia Scheil-Adlung (ed.) S. P. Department. Geneva: International Labour Office
- Johansson, A. S., Svensson, K. G. & Trulsson, M. (2006) Impaired masticatory behavior in subjects with reduced periodontal tissue support. *J Periodontol* **77**, 1491-1497. doi:10.1902/jop.2006.050355.
- Kassebaum, N. J., Bernabe, E., Dahiya, M., Bhandari, B., Murray, C. J. & Marcenes, W. (2014) Global burden of severe periodontitis in 1990-2010: a systematic review and meta-regression. *J Dent Res* **93**, 1045-1053. doi:10.1177/0022034514552491.
- Kassebaum, N. J., Smith, A. G. C., Bernabé, E., Fleming, T. D., Reynolds, A. E., Vos, T., Murray, C. J. L., Marcenes, W. & Collaborators, G. O. H. (2017) Global, Regional, and National Prevalence, Incidence, and Disability-Adjusted Life Years for Oral Conditions for 195 Countries, 1990–2015: A Systematic Analysis for the Global Burden of Diseases, Injuries, and Risk Factors. *J Dent Res* **96**, 380-387. doi:10.1177/0022034517693.
- Kaur, P., Singh, S., Mathur, A., Makkar, D. K., Aggarwal, V. P., Batra, M., Sharma, A. & Goyal, N. (2017) Impact of Dental Disorders and its Influence on Self Esteem Levels among Adolescents. *J Clin Diagn Res* **11**, ZC05-ZC08. doi:10.7860/JCDR/2017/23362.9515.
- Kingman, A. & Albandar, J. M. (2002) Methodological aspects of epidemiological studies of periodontal diseases. *Periodontol 2000* **29**, 11-30.
- Kingman, A., Susin, C. & Albandar, J. M. (2008) Effect of partial recording protocols on severity estimates of periodontal disease. *J Clin Periodontol* **35**, 659-667. doi:10.1111/j.1600-051X.2008.01243.x.
- Konig, J., Holtfreter, B. & Kocher, T. (2010) Periodontal health in Europe: future trends based on treatment needs and the provision of periodontal services--position

- paper 1. *Eur J Dent Educ* **14 Suppl 1**, 4-24. doi:10.1111/j.1600-0579.2010.00620.x.
- Leng, W. D., Zeng, X. T., Kwong, J. S. & Hua, X. P. (2015) Periodontal disease and risk of coronary heart disease: An updated meta-analysis of prospective cohort studies. *Int J Cardiol* **201**, 469-472. doi:10.1016/j.ijcard.2015.07.087.
- Loe, H., Anerud, A., Boysen, H. & Morrison, E. (1986) Natural history of periodontal disease in man. Rapid, moderate and no loss of attachment in Sri Lankan laborers 14 to 46 years of age. *J Clin Periodontol* **13**, 431-445.
- Lorenzo, S. M., Alvarez, R., Andrade, E., Piccardo, V., Francia, A., Massa, F., Correa, M. B. & Peres, M. A. (2015) Periodontal conditions and associated factors among adults and the elderly: findings from the first National Oral Health Survey in Uruguay. *Cad Saude Publica* **31**, 2425-2436. doi:10.1590/0102-311X00012115.
- Mário, T. G., da Rocha, J. M., de David, S. C., Boligon, J., Casarin, M., Grellmann, A. P., Ardenghi, T. M., Marin, J. & Moreira, C. H. C. (2017) Article 1: Methodology and sample recruitment strategy of an epidemiological survey in a large rural area of the South Region of Brazil. In: *Post-Graduation in Dentistry Science Program*. Santa Maria - RS: Federal University of Santa Maria.
- Moimaz, S. A., Zina, L. G., Saliba, O. & Garbin, C. A. (2009) Smoking and periodontal disease: clinical evidence for an association. *Oral Health Prev Dent* **7**, 369-376.
- Oppermann, R. V., Haas, A. N., Rosing, C. K. & Susin, C. (2015) Epidemiology of periodontal diseases in adults from Latin America. *Periodontol 2000* **67**, 13-33. doi:10.1111/prd.12061.
- Ramoji Rao, M. V., Katari, P. K., Vegi, L., Bypureddy, T. T., Prabhakara Rao, K. S. & Tejaswi, K. S. (2016) Prevalence of periodontal diseases among rural population of Mustabad, Krishna District. *J Int Soc Prev Community Dent* **6**, S59-63. doi:10.4103/2231-0762.181169.
- Sekhon, T. S., Grewal, S. & Gambhir, R. S. (2015) Periodontal health status and treatment needs of the rural population of India: A cross-sectional study. *J Nat Sci Biol Med* **6**, 111-115. doi:10.4103/0976-9668.149102.
- Singh, K. A. & Brennan, D. S. (2012) Chewing disability in older adults attributable to tooth loss and other oral conditions. *Gerodontology* **29**, 106-110. doi:10.1111/j.1741-2358.2010.00412.x.
- Skillman, S. M., Doescher, M. P., Mouradian, W. E. & Brunson, D. K. (2010) The challenge to delivering oral health services in rural America. *J Public Health Dent* **70** S49-57.
- Susin, C., Dalla Vecchia, C. F., Oppermann, R. V., Haugejorden, O. & Albandar, J. M. (2004) Periodontal attachment loss in an urban population of Brazilian adults: effect of demographic, behavioral, and environmental risk indicators. *J Periodontol* **75**, 1033-1041. doi:10.1902/jop.2004.75.7.1033.
- Susin, C., Haas, A. N., Valle, P. M., Oppermann, R. V. & Albandar, J. M. (2011) Prevalence and risk indicators for chronic periodontitis in adolescents and young adults in south Brazil. *J Clin Periodontol* **38**, 326-333. doi:10.1111/j.1600-051X.2011.01699.x.
- Susin, C., Kingman, A. & Albandar, J. M. (2005) 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.
- Tran, D. T., Gay, I., Du, X. L., Fu, Y., Bebermeyer, R. D., Neumann, A. S., Streckfus, C., Chan, W. & Walji, M. F. (2013) Assessing periodontitis in populations: a

- systematic review of the validity of partial-mouth examination protocols. *J Clin Periodontol* **40**, 1064-1071. doi:10.1111/jcpe.12165.
- WHO. WHO guidelines on drawing blood: best practices in phlebotomy. 2010 [cited 2015]. Available from: http://www.who.int/infection-prevention/publications/drawing_blood_best/en/.
- WHO. Global strategy on diet, physical activity and health. What is overweight and obesity? 2017 [cited 2017]. Available from: http://www.who.int/dietphysicalactivity/childhood_what/en/
- Zhang, Q., Li, Z., Wang, C., Shen, T., Yang, Y., Chotivichien, S. & Wang, L. (2014) Prevalence and predictors for periodontitis among adults in China, 2010. *Glob Health Action* **7**, 24503. doi:10.3402/gha.v7.24503.

Illustrations

Table 1. Description of the study sample

Age, years	Sample size (n=1087)		Net sample size (n=688)		Response Rate (%) *	
	Females	Males	Females	Males	Females	Males
- 24	45	60	29 (45.2%)	38 (54.8%)	64.4%	63.3%
25-34	75	61	59 (60.8%)	35 (39.2%)	78.7%	57.4%
35-44	89	85	67 (59.0%)	48 (41.0%)	75.3%	56.5%
45-54	90	125	77 (51.2%)	77 (48.8%)	85.6%	61.6%
55-64	85	98	63 (46.1%)	70 (53.9%)	74.1%	71.4%
65-74	65	69	39 (41.3%)	45 (58.7%)	60.0%	65.2%
75+	31	43	15 (41.8%)	26 (58.2%)	48.4%	60.5%
Age not reported	24	42	-	-	0%	0%
Total	504	583	349 (50.4%)	339 (49.6%)	69.2%	58.1%

n (%)

* Not adjusted for complex sample plan

Table 2. Characteristics of study subjects with clinical examinations

	Age group, years							Total
	-24	25-34	35-44	45-54	55-64	65-74	75+	
Number of subjects	67 (9.6%)	94 (13.0%)	115 (16.7%)	154 (22.5%)	133 (20.0%)	84 (12.4%)	41 (5.7%)	688 (100%)
Age, years	19.11 (0.40)	30.17 (0.21)	39.81 (0.25)	49.70 (0.29)	58.70 (0.38)	69.19 (0.32)	81.18 (0.61)	48.57 (1.32)
Male gender	38 (54.8%)	35 (39.2%)	48 (41.0%)	77 (48.8%)	70 (53.9%)	45 (58.7%)	26 (58.2%)	339 (49.6%)
Skin Color								
White	43 (63.3%)	59 (58.0%)	83 (67.1%)	110 (71.0%)	92 (69.5%)	61 (74.3%)	25 (61.8%)	473 (67.5%)
Non-White	24 (36.7%)	35 (42.0%)	32 (32.9%)	44 (29%)	41 (30.5%)	23 (25.7%)	16 (38.2%)	215 (32.5%)
Smoking status								
Never smokers	53 (77.7%)	59 (58.6%)	70 (59.4%)	67 (46.0%)	46 (35.8%)	25 (29.2%)	14 (37.8%)	334 (48.3%)
Former smokers	5 (8.3%)	21 (25.6%)	27 (24.2%)	57 (32.3%)	64 (44.3%)	49 (59.1%)	20 (51.8%)	243 (34.6%)
Current smokers	8 (14.1%)	14 (15.8%)	18 (16.5%)	30 (21.7%)	23 (19.9%)	10 (11.7%)	5 (10.4%)	108 (17.1%)
Income								
≤ 228.60 USD	15 (20.6%)	26 (27.3%)	39 (33.7%)	52 (34.4%)	35 (30.7%)	11 (14.2%)	6 (15.2%)	184 (27.7%)
> 228.60 and <457.20 USD	33 (52.0%)	46 (51.0%)	38 (32.5%)	49 (31.4%)	31 (22.0%)	15 (14.6%)	9 (20.0%)	221 (31.4%)
≥ 457.20 USD	17 (27.4%)	21 (21.8%)	38 (33.8%)	52 (34.2%)	66 (47.3%)	58 (71.2%)	25 (64.9%)	277 (40.9%)
Study, years	8.18 (0.34)	7.45 (0.41)	7.11 (0.34)	6.0 (0.47)	4.68 (0.27)	4.0 (0.27)	2.37 (0.33)	5.87 (0.14)
Body Mass Index								
<25 kg/m ²	37 (57.4%)	34 (35.2%)	28 (23.1%)	39 (25.5%)	29 (23.4%)	31 (37.6%)	16 (41.9%)	214 (31.4%)
25-30 kg/m ²	18 (25.0%)	29 (30.2%)	42 (37.7%)	59 (36.9%)	55 (40.8%)	24 (28.2%)	16 (41.2%)	243 (34.9%)
>30 kg/m ²	12 (17.7%)	31 (34.6%)	44 (39.2%)	55 (37.7%)	49 (35.8%)	28 (34.2%)	7 (17.0%)	226 (33.6%)
Diabetes mellitus								
<5.7%	30 (88.9%)	62 (78.8%)	60 (63.0%)	70 (54.9%)	50 (49.1%)	21 (32.1%)	17 (48.0%)	310 (56.9%)
5.7-6.4 %	5 (11.1%)	17 (18.2%)	35 (33.1%)	64 (40.7%)	55 (43.0%)	42 (56.2%)	18 (45.5%)	236 (37.4%)
≥ 6.5 %	0 (0%)	3 (3.0%)	4 (3.9%)	7 (4.4%)	9 (7.9%)	10 (11.7%)	2 (6.5%)	35 (5.7%)
Tooth brushing frequency								
<2 times/day	5 (6.5%)	6 (4.8%)	5 (4.5%)	8 (5.9%)	7 (4.8%)	5 (7.4%)	4 (8.5%)	40 (5.7%)
≥2 times/day	62 (93.5%)	88 (95.2%)	110 (95.5%)	146 (94.1%)	126 (95.2%)	77 (92.6%)	35 (91.5%)	644 (94.3%)

Table 2. (Continued)

Use of inter-dental care devices								
No	8 (13.0%)	11 (12.2%)	13 (11.6%)	25 (16.0%)	18 (14.9%)	12 (17.4%)	2 (6.9%)	89 (13.9%)
Yes	59 (87.0%)	83 (87.8%)	102 (88.4%)	124 (84.0%)	92 (85.1%)	47 (82.6%)	22 (93.1%)	529 (86.1%)
Dental visit frequency								
<1 time/year	33 (52.3%)	47 (52.4%)	50 (46.6%)	81 (54.4%)	91 (71.3%)	67 (76.5%)	32 (77.1%)	401 (60.0%)
≥1 time/year	34 (47.7%)	47 (47.6%)	65 (53.4%)	73 (45.6%)	40 (28.7%)	17 (23.5%)	8 (22.9%)	284 (40.0%)
Edentulism, %*	0 (0%)	0 (0%)	0 (0%)	6 (3.9%)	25 (18.2%)	24 (27.2%)	16 (38.5%)	71 (10.1%)
Tooth count*	26.87 (0.13)	25.10 (0.27)	22.90 (0.51)	17.28 (0.71)	12.21 (0.91)	8.67 (1.02)	7.33 (1.15)	17.51 (0.53)
Tooth count in dentates*	26.87 (0.13)	25.10 (0.27)	22.90 (0.51)	17.98 (0.60)	14.93 (0.67)	11.92 (0.87)	11.92 (0.96)	19.48 (0.34)
Edentulism, %†	0 (0%)	0 (0%)	0 (0%)	6 (3.9%)	24 (17.7%)	24 (27.2%)	16 (38.5%)	70 (10.0%)
Tooth count†	28.25 (0.14)	27.60 (0.33)	25.12 (0.62)	18.82 (0.79)	13.29 (0.98)	9.25 (1.10)	8.11 (1.31)	19.02 (0.55)
Tooth count in dentates†	28.25 (0.14)	27.60 (0.33)	25.12 (0.62)	19.59 (0.67)	16.15 (0.77)	12.71 (0.97)	13.18 (1.13)	21.13 (0.35)

Data are presented as numbers (percentages) or means (standard errors – SE).

* Excluding Third molars.

† Including Third molars.

Table 3. Prevalence of at least one affected site and extent (proportion) 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

Measure of periodontitis	Age group, years							Total
	-24	25-34	35-44	45-54	55-64	65-74	75+	
CAL measures								
Prevalence CAL ≥ 3 mm	86.40% (4.10)	98.90% (1.20)	100% (0.0)	100% (0.0)	100% (0.0)	100% (0.0)	100% (0.0)	98.40% (0.60)
Prevalence CAL ≥ 5 mm	26.20% (5.40)	51.10% (7.30)	67.60% (4.70)	87.10% (3.30)	95.70% (1.90)	93.40% (3.40)	96.80% (3.20)	74.30% (2.90)
Proportion of sites/mouth CAL ≥ 3 mm (%)	16.02 (4.20)	31.91 (4.43)	38.81 (2.15)	59.08 (4.01)	71.52 (2.79)	72.74 (3.39)	75.90 (3.06)	51.06 (2.23)
Proportion of sites/mouth CAL ≥ 5 mm (%)	2.10 (1.10)	7.61 (2.25)	10.75 (1.90)	27.53 (2.92)	39.07 (3.70)	37.12 (5.31)	43.39 (3.78)	22.49 (1.58)
Proportion of teeth/mouth CAL ≥ 3 mm (%)	32.46 (5.87)	58.30 (4.88)	67.68 (1.79)	82.69 (3.44)	92.48 (1.38)	94.37 (1.77)	93.84 (1.77)	74.39 (2.28)
Proportion of teeth/mouth CAL ≥ 5 mm (%)	6.45 (2.98)	15.65 (4.44)	21.13 (2.74)	45.95 (4.09)	60.04 (3.92)	60.66 (6.80)	66.92 (4.12)	37.58 (2.22)
Mean CAL (mm)	1.46 \pm 0.14	2.14 (0.16)	2.55 (0.11)	3.58 (0.19)	4.22 (0.19)	4.12 (0.28)	4.38 (0.17)	3.16 (0.10)
PPD measures								
Prevalence PPD ≥ 4 mm	75.10% (4.10)	86.70% (5.70)	80.10% (2.50)	82.50% (4.20)	82.10% (2.40)	56.60% (10.80)	65.00% (8.70)	78.50% (2.10)
Prevalence PPD ≥ 6 mm	16.20% (6.10)	28.60% (8.70)	22.90% (4.00)	33.10% (5.20)	41.40% (4.00)	35.10% (7.00)	20.20% (4.40)	30.0% (3.00)
Proportion of sites/mouth PPD ≥ 4 mm (%)	7.11 (1.79)	10.64 (2.32)	7.48 (0.87)	13.97 (1.62)	15.69 (1.83)	11.34 (2.40)	8.89 (2.52)	11.40 (0.81)
Proportion of sites/mouth PPD ≥ 6 mm (%)	0.57 (0.28)	1.27 (0.53)	0.92 (0.27)	3.22 (0.37)	3.11 (0.87)	2.64 (0.73)	1.79 (1.11)	2.09 (0.23)
Proportion of teeth/mouth PPD ≥ 4 mm (%)	21.40 (3.96)	29.16 (4.78)	21.35 (2.11)	35.10 (3.86)	38.90 (3.01)	27.22 (5.56)	23.48 (2.98)	29.43 (1.98)
Proportion of teeth/mouth PPD ≥ 6 mm (%)	2.34 (1.21)	5.13 (1.97)	3.94 (0.95)	9.30 (1.20)	9.89 (1.93)	9.22 (2.23)	4.78 (2.32)	6.88 (0.63)
Mean PPD (mm)	2.16 (0.07)	2.31 (0.12)	2.21 (0.04)	2.49 (0.07)	2.53 (0.07)	2.33 (0.10)	2.24 (0.11)	2.36 (0.03)

Data are presented as percentages (Standard Errors (SE)) or means (SE).

Table 4. Distribution of subjects according to the CDC/AAP case definition (Eke et al., 2012) in total and according to age.

Degree of periodontitis	Age group, years							Total
	-24	25-34	35-44	45-54	55-64	65-74	75+	
No	33 (51.60%)	15 (13.80%)	18 (18.50%)	9 (8.60%)	5 (4.30%)	2 (4.10%)	0 (0%)	82 (14.30%)
Mild	9 (11.40%)	11 (13.10%)	7 (5.20%)	3 (1.80%)	0 (0%)	0 (0%)	0 (0%)	30 (4.50%)
Moderate	20 (28.20%)	51 (54.10%)	63 (59.90%)	70 (49.50%)	44 (30.40%)	30 (54.70%)	15 (64.40%)	293 (47.90%)
Severe	5 (8.80%)	17 (19.00%)	27 (22.40%)	65 (40.10%)	59 (56.40%)	26 (41.30%)	9 (35.60%)	208 (33.30%)

Data are presented as numbers (percentages).

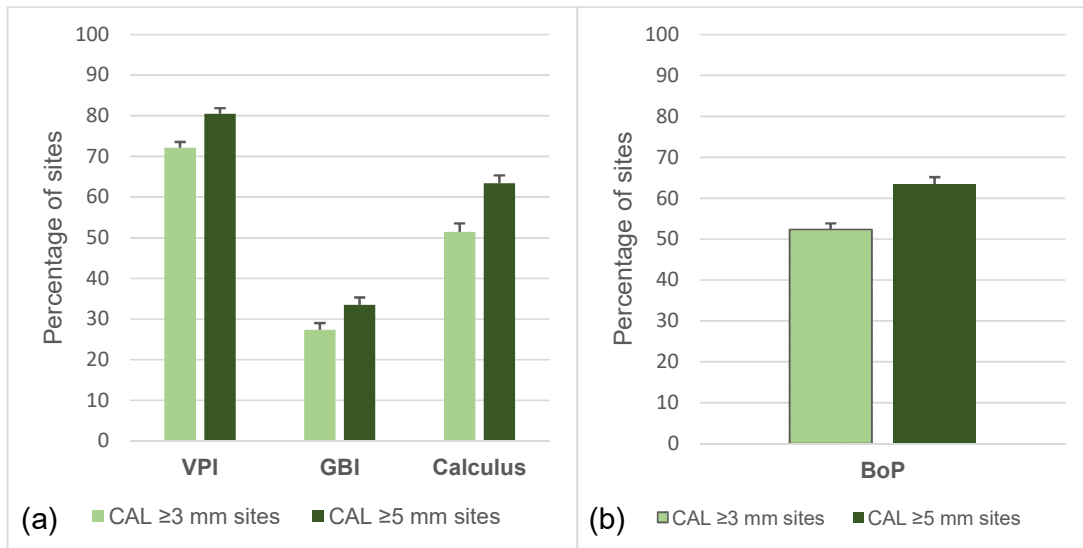


Figure 1. Percentages of sites with visible plaque (VPI), marginal gingival bleeding (GBI), and supragingival calculus (a), and with bleeding on probing (b) according to the CAL cut-offs [Means and Standard Errors (SE, vertical bars)].

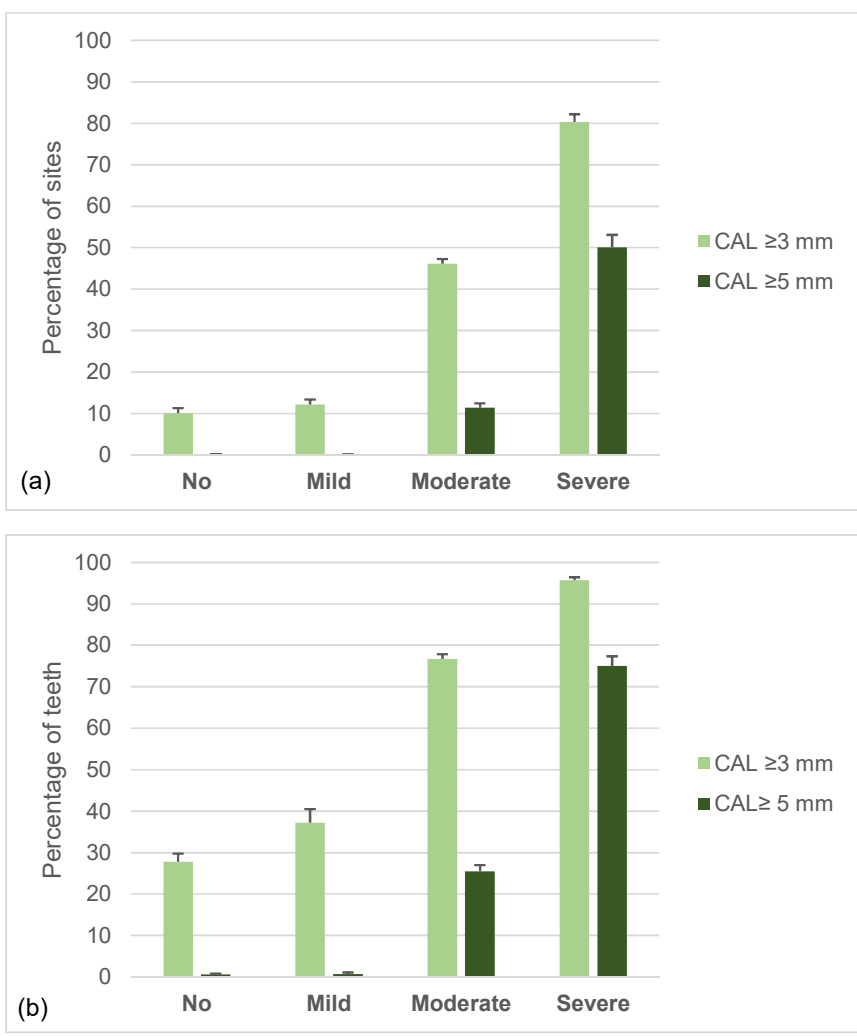


Figure 2. Percentages of sites (a) and teeth (b) considering CAL cut-offs and CDC/AAP case definition (Eke et al. 2012) [Means and Standard Errors (SE, vertical bars)].

4 DISCUSSÃO

Essa tese apresentou a metodologia de um levantamento epidemiológico realizado na área rural de Rosário do Sul, RS, Brasil e a condição periodontal da amostra representativa dos residentes de 15 anos ou mais. Uma investigação de saúde geral foi realizada nessa população, enfatizando as condições bucais e, especialmente, as doenças periodontais. A metodologia empregada foi criteriosa, visando superar deficiências observadas em outras pesquisas epidemiológicas relacionadas a Periodontia e apontadas em estudos recentes (LEROY *et al.*, 2010; OPPERMANN *et al.*, 2015). O primeiro critério foi a abordagem de uma amostra representativa da população-alvo, planejada com cálculo de tamanho amostral prévio e cuidadosa estratégia de recrutamento dos participantes. Essa característica visou aumentar a validade externa, minimizar os vieses associados às amostras de conveniência (OPPERMANN *et al.*, 2015), permitir o conhecimento da condição periodontal dessa população e fornecer informações para os administradores locais de saúde pública. Os examinadores foram treinados e/ou calibrados, reduzindo o viés de aferição e permitindo maior precisão das avaliações. Para os exames de PS e nível de inserção clínica, os valores de reprodutibilidade foram considerados de ótima concordância. O exame periodontal realizado, em seis sítios por dente presente em boca, é o padrão-ouro para a avaliação clínica (KINGMAN; SUSIN; ALBANDAR, 2008) e ele foi associado ao uso de uma sonda periodontal com marcações equidistantes (CP15UNC), que é o tipo recomendado para estudos epidemiológicos por permitir maior acurácia (VAN DER ZEE *et al.*, 1991) e facilitar o arredondamento matemático das medidas.

A falta de consenso nas definições de doença e a variação dos valores de desfecho (SAVAGE *et al.*, 2009) são problemas metodológicos reconhecidos por influenciar as estimativas periodontais (ALBANDAR, 2011), dificultar as comparações entre as diferentes populações e as inferências sobre as variações globais de periodontite (HOLTFRETER *et al.*, 2015). Nessa tese, buscou-se utilizar padrões recentemente propostos para relatar as estimativas de periodontite e possibilitar a comparabilidade entre os estudos (HOLTFRETER *et al.*, 2015), como forma de contornar essas deficiências. A doença periodontal foi categorizada em leve, moderada ou severa, além do estrato de indivíduos saudáveis, para permitir melhor descrição de sua prevalência geral (EKE *et al.*, 2012). Foram utilizados desfechos a

nível de indivíduos, dentes e sítios, e dois pontos de corte tanto para PS (≥ 4 mm e ≥ 6 mm) quanto para PI (≥ 3 mm e ≥ 5 mm). O uso desses desfechos aliados à descrição de todas as estimativas periodontais por categorias de idade, com variação de dez anos, e para a população total, buscam facilitar a detecção de variações de doença entre os grupos etários (HOLTFRETER *et al.*, 2015).

Considerando o emprego dessas características metodológicas, observou-se alta prevalência de periodontite, uma vez que mais de 85% da amostra apresentaram algum grau da doença. Essa estimativa pode estar associada a fatores socioeconômicos e contextuais. A amostra foi considerada de baixo nível socioeconômico, com rendas familiares mensais menores de mil e quinhentos reais, e baixa escolaridade, em média seis anos. Estudos tem apontado maiores estimativas de doença periodontal em indivíduos com esse perfil socioeconômico (BASTOS *et al.*, 2011; FIGUEIREDO *et al.*, 2017; PERES *et al.*, 2007; SUSIN *et al.*, 2004). Dentre os fatores contextuais que podem ter influenciado as estimativas periodontais, destaca-se a dificuldade de acesso aos locais de atendimento à saúde (AHN *et al.*, 2011). Além da distância entre os centros urbanos e as comunidades rurais (SKILLMAN *et al.*, 2010), barreiras estruturais, como as péssimas condições das estradas municipais, contribuem para que as populações rurais tenham maior dificuldade para cuidar da saúde. Moradores de áreas rurais apresentam maiores disparidades de saúde bucal, em grande parte vinculadas ao atraso do cuidado odontológico (AHN *et al.*, 2011). Outra explicação para a alta prevalência de periodontite observada é a possibilidade de ter ocorrido progressão natural da doença periodontal para uma parcela considerável dessa população. Um centro de especialidades odontológicas (CEO) somente foi inaugurado em 2013 (RS-SAÚDE, 2013) e, até então, a cidade não realizava o serviço de Periodontia pelo Sistema Único de Saúde. Esse fato aliado ao baixo nível socioeconômico da amostra podem indicar que a maioria dos indivíduos nunca recebeu adequado tratamento periodontal, permitindo o curso clínico natural da periodontite (LOE *et al.*, 1986). A grande proporção de dentes acometidos por PI ≥ 5 mm pode indicar um elevado número de indivíduos, especialmente os maiores de 55 anos, com futuras perdas dentárias. Essa magnitude de PI associada ao reduzido número de dentes remanescentes pode adicionalmente refletir em prejuízos funcionais (JOHANSSON *et al.*, 2006; SINGH e BRENNAN, 2012).

Da mesma maneira que a definição de casos, a incorporação das sugestões de padronização dos estudos a respeito da periodontite é uma questão difícil, a ser

gradualmente implementada. Dois anos após a publicação do trabalho de Holtfreter et al. (2015), sugerindo criteriosos padrões para o relato de periodontite em estudos epidemiológicos (HOLTFRETER *et al.*, 2015), temos o conhecimento de apenas um estudo (HOLDE *et al.*, 2017) que os utilizaram para reportar a maioria dos seus dados. Por conseguinte, esse é o segundo estudo de base populacional a reportar as estimativas de periodontite conforme sugerido. Estudos futuros devem seguir esses padrões para que, a longo prazo, tenhamos estimativas de doença periodontal mais comparáveis e que possibilitem observar as variações globais e entre diferentes períodos de tempo.

5 CONCLUSÃO

Levantamentos epidemiológicos são uma estratégia importante para a investigação das condições de saúde de uma população, especialmente naquelas que têm dificuldade de acesso aos centros de atendimento médico e odontológico. Através desses estudos, os casos doentes podem ser identificados e encaminhados para tratamento; além de as estimativas resultantes servirem como guias para a discussão e a implementação de políticas que visem melhorias de saúde. Nesse sentido, a descrição da elevada prevalência de doença periodontal na área rural de Rosário do Sul deve servir como alerta para os gestores de saúde do município. Essa população é carente de serviços de saúde de forma geral e as necessidades de tratamento periodontal refletem essa carência. Acreditamos que a primeira etapa para a melhoria dos serviços, a investigação da atual condição de saúde da população, foi obtida a partir desse trabalho. A seguir, as estratégias de tratamento e prevenção poderão ser discutidas e, posteriormente, implementadas.

REFERÊNCIAS

- AHN, S. et al. Residential rurality and oral health disparities: influences of contextual and individual factors. **J Prim Prev**, v. 32, n. 1, p. 29-41, Feb 2011. ISSN 1573-6547 (Electronic) 0278-095X (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/21249452> >.
- AIMETTI, M. et al. Prevalence of periodontitis in an adult population from an urban area in North Italy: findings from a cross-sectional population-based epidemiological survey. **J Clin Periodontol**, v. 42, n. 7, p. 622-31, Jul 2015. ISSN 1600-051X (Electronic) 0303-6979 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/25970460> >.
- AL-HARTHI, L. S. et al. Periodontitis among adult populations in the Arab World. **Int Dent J**, v. 63, n. 1, p. 7-11, Feb 2013. ISSN 0020-6539 (Print) 0020-6539 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/23410016> >.
- ALBANDAR, J. M. Underestimation of periodontitis in NHANES surveys. **J Periodontol**, v. 82, n. 3, p. 337-41, Mar 2011. ISSN 1943-3670 (Electronic) 0022-3492 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/21214340> >.
- AWUTI, G. et al. Epidemiological survey on the prevalence of periodontitis and diabetes mellitus in Uyghur adults from rural Hotan area in Xinjiang. **Experimental Diabetes Research**, v. 2012, p. 7 pages, 2012. ISSN 1687-5214.
- BAELUM, V.; SCHEUTZ, F. Periodontal diseases in Africa. **Periodontol 2000**, v. 29, p. 79-103, 2002. ISSN 0906-6713 (Print) 0906-6713 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/12102704> >.
- BARROS, M. B. A. Inquéritos domiciliares de saúde: potencialidades e desafios. **Rev Bras Epidemiol [online]**, v. 11, n. Suppl 1, p. 6-19, 2008. ISSN 1415-790X.
- BASTOS, J. L. et al. Periodontal outcomes and social, racial and gender inequalities in Brazil: a systematic review of the literature between 1999 and 2008. **Cad Saude Publica**, v. 27 Suppl 2, p. S141-53, 2011. ISSN 1678-4464 (Electronic) 0102-311X (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/21789408> >.
- BHAT, M.; ROBERTS-THOMSON, K.; DO, L. G. Clustering of risk indicators for periodontal disease: A population-based study. **Community Dent Health**, v. 32, n. 3, p. 158-62, Sep 2015. ISSN 0265-539X (Print) 0265-539X (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/26513851> >.

BRAZIL. **Epidemiologic survey in oral health: Brazil, urban area. 1986 . Series C: Studies and projects, 4.** DIVISION, O. H. N. Brasília, DF: Health's Ministry: 137 p. 1988.

_____. **SB Brazil 2003 Project: Oral health conditions of the Brazilian population, 2002-2003: main results.** CARE, P. Brasília, DF: Health's Ministry 2004.

_____. **SB Brazil Project 2010. Oral health conditions in the Brazilian population. Main results.** CARE, P. Brasília, DF: Health's Ministry 2011.

CORBET, E. F.; LEUNG, W. K. Epidemiology of periodontitis in the Asia and Oceania regions. **Periodontology 2000**, v. 56, n. 1, p. 25-64, Jun 2011. ISSN 1600-0757 (Electronic) 0906-6713 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/21501236> >.

CORRAINI, P. et al. Periodontal attachment loss in an untreated isolated population of Brazil. **J Periodontol**, v. 79, n. 4, p. 610-20, Apr 2008a. ISSN 0022-3492 (Print) 0022-3492 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/18380553> >.

_____. Risk indicators for increased probing depth in an isolated population in Brazil. **J Periodontol**, v. 79, n. 9, p. 1726-34, Sep 2008b. ISSN 0022-3492 (Print) 0022-3492 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/18771375> >.

DAVID, J.; YEE, R.; LAMA, D. The periodontal health of adult Nepalese. **Oral Health Prev Dent**, v. 9, n. 1, p. 67-81, 2011. ISSN 1602-1622 (Print) 1602-1622 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/21594209> >.

DE CASTILHOS, E. D. et al. Association between obesity and periodontal disease in young adults: a population-based birth cohort. **J Clin Periodontol**, v. 39, n. 8, p. 717-24, Aug 2012. ISSN 1600-051X (Electronic) 0303-6979 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/22671969> >.

DE MACEDO, T. C. et al. Factors related to periodontal disease in a rural population. **Braz Oral Res**, v. 20, n. 3, p. 257-62, Jul-Sep 2006. ISSN 1806-8324 (Print) 1806-8324 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/17119710> >.

DO, L. G. et al. Smoking-attributable periodontal disease in the Australian adult population. **J Clin Periodontol**, v. 35, n. 5, p. 398-404, May 2008. ISSN 1600-051X (Electronic) 0303-6979 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/18433383> >.

DYE, B. A. Global periodontal disease epidemiology. **Periodontol 2000**, v. 58, n. 1, p. 10-25, Feb 2012. ISSN 1600-0757 (Electronic)

0906-6713 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/22133364> >.

_____. The Global Burden of Oral Disease: Research and Public Health Significance. **J Dent Res**, v. 96, n. 4, p. 361-363, Apr 2017. ISSN 1544-0591 (Electronic) 0022-0345 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/28318392> >.

EKE, P. I. et al. Update on Prevalence of Periodontitis in Adults in the United States: NHANES 2009 to 2012. **J Periodontol**, v. 86, n. 5, p. 611-22, May 2015. ISSN 1943-3670 (Electronic) 0022-3492 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/25688694> >.

EKE, P. I. et al. Update of the case definitions for population-based surveillance of periodontitis. **J Periodontol**, v. 83, n. 12, p. 1449-54, Dec 2012. ISSN 1943-3670 (Electronic) 0022-3492 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/22420873> >.

FIGUEIREDO, D. R.; BASTOS, J. L.; PERES, K. G. Association of adverse oral health outcomes with socioeconomic inequalities and dental needs in Brazilian adolescents. **Cad Saude Publica**, v. 33, n. 5, p. e00165415, Jun 05 2017. ISSN 1678-4464 (Electronic) 0102-311X (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/28640329> >.

GAMONAL, J. et al. Clinical attachment loss in Chilean adult population: First Chilean National Dental Examination Survey. **Journal of Periodontology**, v. 81, n. 10, p. 1403-1410, Oct 2010. ISSN 1943-3670 (Electronic) 0022-3492 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/20629544> >.

GARNICK, J. J.; SILVERSTEIN, L. Periodontal probing: probe tip diameter. **J Periodontol**, v. 71, n. 1, p. 96-103, Jan 2000. ISSN 0022-3492 (Print) 0022-3492 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/10695944> >.

HOLDE, G. E. et al. Periodontitis Prevalence and Severity in Adults: A Cross-Sectional Study in Norwegian Circumpolar Communities. **J Periodontol**, p. 1-17, Jul 03 2017. ISSN 1943-3670 (Electronic) 0022-3492 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/28671509> >.

HOLTFRETER, B. et al. 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**, v. 42, n. 5, p. 407-12, May 2015. ISSN 1600-051X (Electronic) 0303-6979 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/25808877> >.

INTERNATIONAL LABOUR OFFICE, S. P. D. **Global evidence on inequities in rural health protection: new data on rural deficits in health coverage for 174 countries.** Geneva: Xenia Scheild-Adlung 2015.

JOHANSSON, A. S.; SVENSSON, K. G.; TRULSSON, M. Impaired masticatory behavior in subjects with reduced periodontal tissue support. **J Periodontol**, v. 77, n. 9, p. 1491-7, Sep 2006. ISSN 0022-3492 (Print) 0022-3492 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/16945024> >.

JORDAN, R. A. et al. Pilot pathfinder survey of oral hygiene and periodontal conditions in the rural population of The Gambia (West Africa). **Int J Dent Hyg**, v. 9, n. 1, p. 53-9, Feb 2011. ISSN 1601-5037 (Electronic) 1601-5029 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/21226851> >.

KASSEBAUM, N. J. et al. Global burden of severe periodontitis in 1990-2010: a systematic review and meta-regression. **J Dent Res**, v. 93, n. 11, p. 1045-53, Nov 2014. ISSN 1544-0591 (Electronic) 0022-0345 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/25261053> >.

KASSEBAUM, N. J. et al. Global, Regional, and National Prevalence, Incidence, and Disability-Adjusted Life Years for Oral Conditions for 195 Countries, 1990–2015: A Systematic Analysis for the Global Burden of Diseases, Injuries, and Risk Factors. **Journal of Dental Research**, v. 96, n. 4, p. 380-387, 2017. ISSN 1544-0591.

KHADER, Y. S. et al. The association between periodontal disease and obesity among adults in Jordan. **J Clin Periodontol**, v. 36, n. 1, p. 18-24, Jan 2009. ISSN 1600-051X (Electronic) 0303-6979 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/19046327> >.

KINGMAN, A.; SUSIN, C.; ALBANDAR, J. M. Effect of partial recording protocols on severity estimates of periodontal disease. **J Clin Periodontol**, v. 35, n. 8, p. 659-67, Aug 2008. ISSN 1600-051X (Electronic) 0303-6979 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/18513337> >.

KONIG, J.; HOLTFRETER, B.; KOCHER, T. Periodontal health in Europe: future trends based on treatment needs and the provision of periodontal services--position paper 1. **European Journal of Dental Education**, v. 14 n. Suppl 1, p. 4-24, May 2010. ISSN 1600-0579 (Electronic) 1396-5883 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/20415972> >.

LEROY, R.; EATON, K. A.; SAVAGE, A. Methodological issues in epidemiological studies of periodontitis--how can it be improved? **BMC Oral Health**, v. 10, p. 8, Apr 21 2010. ISSN 1472-6831 (Electronic)

1472-6831 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/20409298> >.

LOE, H. et al. Natural history of periodontal disease in man. Rapid, moderate and no loss of attachment in Sri Lankan laborers 14 to 46 years of age. **J Clin Periodontol**, v. 13, n. 5, p. 431-45, May 1986. ISSN 0303-6979 (Print)
0303-6979 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/3487557> >.

LORENZO, S. M. et al. Periodontal conditions and associated factors among adults and the elderly: findings from the first National Oral Health Survey in Uruguay. **Cad Saude Publica**, v. 31, n. 11, p. 2425-36, Nov 2015. ISSN 1678-4464 (Electronic)
0102-311X (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/26840821> >.

MAMAI-HOMATA, E. et al. Periodontal diseases in Greek adults between 1985 and 2005--risk indicators. **Int Dent J**, v. 60, n. 4, p. 293-9, Aug 2010. ISSN 0020-6539 (Print)
0020-6539 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/20949761> >.

MOIMAZ, S. A. et al. Smoking and periodontal disease: clinical evidence for an association. **Oral Health Prev Dent**, v. 7, n. 4, p. 369-76, 2009. ISSN 1602-1622 (Print)
1602-1622 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/20011755> >.

OPPERMANN, R. V. et al. Epidemiology of periodontal diseases in adults from Latin America. **Periodontol 2000**, v. 67, n. 1, p. 13-33, Feb 2015. ISSN 1600-0757 (Electronic)
0906-6713 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/25494596> >.

PAGE, R. C. et al. Advances in the pathogenesis of periodontitis: summary of developments, clinical implications and future directions. **Periodontology 2000**, v. 14, p. 216-248, Jun 1997. ISSN 0906-6713 (Print)
0906-6713 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/9567973> >.

PERES, M. A. et al. Skin colour is associated with periodontal disease in Brazilian adults: a population-based oral health survey. **J Clin Periodontol**, v. 34, n. 3, p. 196-201, Mar 2007. ISSN 0303-6979 (Print)
0303-6979 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/17257159> >.

PERES, M. A.; PERES, K. G. Levantamentos epidemiológicos em saúde bucal – Recomendações para os serviços de saúde. In: ANTUNES, J. L. F. e PERES, M. A. (Ed.). **Fundamentos de Odontologia – Epidemiologia da Saúde Bucal. Coordenador da série Oswaldo Crivello Junior**. 2nd. São Paulo: Santos, 2013. cap. 2, p.31-49.

RONCALLI, A. G.; DE SOUZA, T. M. S. Levantamentos epidemiológicos em saúde bucal no Brasil. In: ANTUNES, J. L. F. E. P., MARCO AURELIO (Ed.). **Fundamentos de Odontologia – Epidemiologia da saúde bucal. Coordenação Oswaldo Crivello Júnior**. 2nd. São Paulo: Santos, 2013. cap. 3, p.51-69.

RS-SAÚDE, S. D. Governo do estado do Rio Grande do Sul. Inauguração de novos serviços e repasses marcam roteiro da Saúde na Região da Campanha. 2013. Disponível em: < <http://www.saude.rs.gov.br/inauguracao-de-novos-servicos-e-repasses-marcam-roteiro-da-saude-na-regiao-da-campanha> >. Acesso em: 27/07/2017.

SAVAGE, A. et al. A systematic review of definitions of periodontitis and methods that have been used to identify this disease. **J Clin Periodontol**, v. 36, n. 6, p. 458-67, Jun 2009. ISSN 1600-051X (Electronic) 0303-6979 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/19508246> >.

SEKHON, T. S.; GREWAL, S.; GAMBHIR, R. S. Periodontal health status and treatment needs of the rural population of India: A cross-sectional study. **J Nat Sci Biol Med**, v. 6, n. 1, p. 111-5, Jan-Jun 2015. ISSN 0976-9668 (Print) 0976-9668 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/25810646> >.

SINGH, K. A.; BRENNAN, D. S. Chewing disability in older adults attributable to tooth loss and other oral conditions. **Gerodontology**, v. 29, n. 2, p. 106-10, Jun 2012. ISSN 1741-2358 (Electronic) 0734-0664 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/22356168> >.

SKILLMAN, S. M. et al. The challenge to delivering oral health services in rural America. **J Public Health Dent**, v. 70 n. Suppl 1, p. S49-57, Jun 2010. ISSN 0022-4006 (Print) 0022-4006 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/20806475> >.

SUSIN, C. et al. Periodontal attachment loss in an urban population of Brazilian adults: effect of demographic, behavioral, and environmental risk indicators. **J Periodontol**, v. 75, n. 7, p. 1033-41, Jul 2004. ISSN 0022-3492 (Print) 0022-3492 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/15341364> >.

SUSIN, C. et al. Prevalence and risk indicators for chronic periodontitis in adolescents and young adults in south Brazil. **J Clin Periodontol**, v. 38, n. 4, p. 326-33, Apr 2011. ISSN 1600-051X (Electronic) 0303-6979 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/21299588> >.

TRAN, D. T. et al. Assessing periodontitis in populations: a systematic review of the validity of partial-mouth examination protocols. **J Clin Periodontol**, v. 40, n. 12, p. 1064-71, Dec 2013. ISSN 1600-051X (Electronic) 0303-6979 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/24192071> >.

UMEIZUDIKE, K. A. et al. Periodontal status and its association with self-reported hypertension in non-medical staff in a university teaching hospital in Nigeria. **Odontostomatol Trop**, v. 39, n. 153, p. 47-55, Mar 2016. ISSN 0251-172X (Print) 0251-172X (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/27434919> >.

VAN DER ZEE, E.; DAVIES, E. H.; NEWMAN, H. N. Marking width, calibration from tip and tine diameter of periodontal probes. **J Clin Periodontol**, v. 18, n. 7, p. 516-20, Aug 1991. ISSN 0303-6979 (Print) 0303-6979 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/1894745> >.

VETTORE, M. V.; MARQUES, R. A.; PERES, M. A. [Social inequalities and periodontal disease: multilevel approach in SBBrasil 2010 survey]. **Rev Saude Publica**, v. 47 Suppl 3, p. 29-39, Dec 2013. ISSN 1518-8787 (Electronic) 0034-8910 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/24626579> >.

VIACAVA, F. Informações em saúde: a importância dos inquéritos populacionais. **Ciênc Saúde Coletiva**, v. 7, n. 4, p. 607-621, 2002. ISSN 1413-8123.

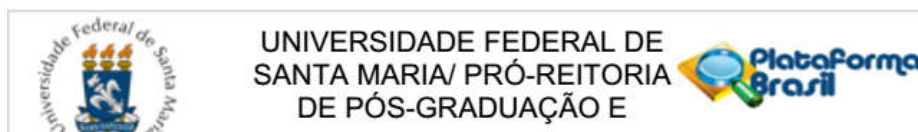
WALDMAN, E. A. et al. Inquéritos populacionais: aspectos metodológicos, operacionais e éticos. **Rev Bras Epidemiol [online]**, v. 11, n. Suppl 1, p. 168-179, 2008. ISSN 1415-790X.

WANG, Q. T. et al. Epidemiology and preventive direction of periodontology in China. **J Clin Periodontol**, v. 34, n. 11, p. 946-51, Nov 2007. ISSN 0303-6979 (Print) 0303-6979 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/17877744> >.

WHO. **World Health Organization. Oral health surveys: basic methods - 5th ed.:** 125 p. 2013.

ZHANG, Q. et al. Prevalence and predictors for periodontitis among adults in China, 2010. **Glob Health Action**, v. 7, n. 1, p. 24503, Dec 2014. ISSN 1654-9880 (Electronic) 1654-9880 (Linking). Disponível em: < <http://www.ncbi.nlm.nih.gov/pubmed/28672514> >.

ANEXO A - PARECER CONSUBSTANCIADO DO COMITÊ DE ÉTICA EM PESQUISA



PARECER CONSUBSTANCIADO DO CEP

DADOS DA EMENDA

Título da Pesquisa: LEVANTAMENTO EPIDEMIOLÓGICO NA ÁREA RURAL DE ROSÁRIO DO SUL/RS

Pesquisador: CARLOS HEITOR CUNHA MOREIRA

Área Temática:

Versão: 4

CAAE: 37862414.5.0000.5346

Instituição Proponente: Universidade Federal de Santa Maria/ Pró-Reitoria de Pós-Graduação e

Patrocinador Principal: Financiamento Próprio
Universidade Federal de Santa Maria/ Pró-Reitoria de Pós-Graduação e Pesquisa

DADOS DO PARECER

Número do Parecer: 1.500.519

Apresentação do Projeto:

Pela emenda o proponente solicita alteração no orçamento do projeto original. O mesmo informa que "o projeto apresentado inicialmente descreve e detalha, de uma maneira ampla, os materiais e orçamentos referentes à coleta. A partir do momento no qual se iniciam as análises dos dados, mais especificamente a análise microbiológica, será necessário adquirir alguns materiais referentes ao processamento das amostras. Estes de fundamental importância por serem os reagentes utilizados no processamento. O recurso para a compra dos mesmos já está disponível."

Pelo que foi apresentado, entende-se que a solicitação pode ser aprovada.

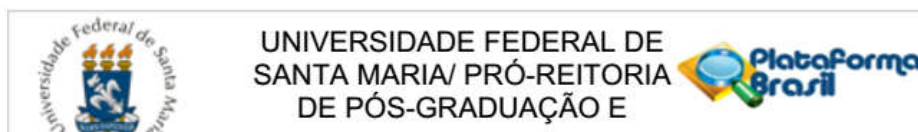
Objetivo da Pesquisa:

.

Avaliação dos Riscos e Benefícios:

.

Endereço: Av. Roraima, 1000 - prédio da Reitoria - 2º andar
Bairro: Camobi **CEP:** 97.105-970
UF: RS **Município:** SANTA MARIA
Telefone: (55)3220-9362 **E-mail:** cep.ufsm@gmail.com



Continuação do Parecer: 1.500.519

Comentários e Considerações sobre a Pesquisa:

.

Considerações sobre os Termos de apresentação obrigatória:

.

Recomendações:

Veja no site do CEP - <http://w3.ufsm.br/nucleodecomites/index.php/cep> - na aba "orientações gerais", modelos e orientações para apresentação dos documentos. ACOMPANHE AS ORIENTAÇÕES DISPONÍVEIS, EVITE PENDÊNCIAS E AGILIZE A TRAMITAÇÃO DO SEU PROJETO.

Conclusões ou Pendências e Lista de Inadequações:

.

Considerações Finais a critério do CEP:

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

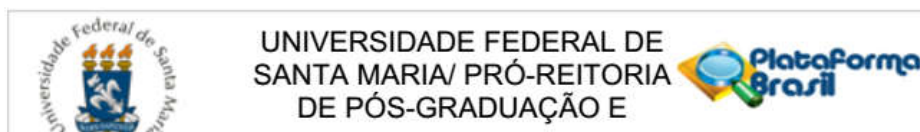
Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_695043E3.pdf	09/04/2016 23:39:25		Aceito
Orçamento	ORCAMENTO_1.pdf	09/04/2016 23:24:52	CARLOS HEITOR CUNHA MOREIRA	Aceito
Outros	emenda_orcamento.pdf	09/04/2016 23:20:42	CARLOS HEITOR CUNHA MOREIRA	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	Assentimento. escolas urbanas.pdf	03/08/2015 16:29:52		Aceito
Outros	emenda. escolares urbanos.pdf	03/08/2015 16:29:24		Aceito
Outros	QRR.pdf	13/02/2015 15:18:39		Aceito
Outros	AUTOPERCEPÇÃO DE DP.pdf	12/02/2015 21:08:27		Aceito
Outros	ESTRESSE PERCEBIDO.pdf	12/02/2015 21:07:04		Aceito

Endereço: Av. Roraima, 1000 - prédio da Reitoria - 2º andar

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DE PÓS-GRADUAÇÃO E

Continuação do Parecer: 1.500.519

TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE_10 a 14 anos.pdf	12/02/2015 21:06:26		Aceito
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TCLE / Termos de Assentimento / Justificativa de Ausência	emenda TCLE maior de 18anos.pdf	12/02/2015 21:05:51		Aceito
Projeto Detalhado / Brochura Investigador	EMENDA CONDIÇÃO ENDODÔNTICA.pdf	12/02/2015 21:05:28		Aceito
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Declaração de Pesquisadores	Projetos na Integra. SIE.pdf	22/10/2014 14:33:13		Aceito
Outros	Termo de Confidencialidade.levantamento.pdf	22/10/2014 14:31:11		Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE maior de 18 anos.pdf	21/10/2014 21:41:15		Aceito
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Outros	AUTORIZAÇÃO para execução.pdf	21/10/2014 20:46:06		Aceito
Projeto Detalhado / Brochura Investigador	PROJETO. 21.10.14.pdf	21/10/2014 20:42:20		Aceito

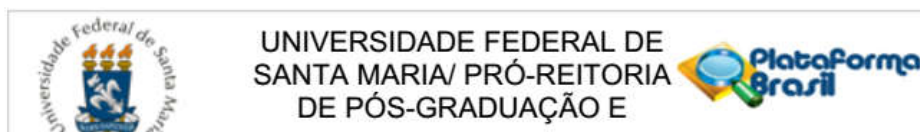
Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

Endereço: Av. Roraima, 1000 - prédio da Reitoria - 2º andar
 Bairro: Camobi CEP: 97.105-970
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Continuação do Parecer: 1.500.519

SANTA MARIA, 14 de Abril de 2016

Assinado por:
CLAUDEMIR DE QUADROS
(Coordenador)

Endereço: Av. Roraima, 1000 - prédio da Reitoria - 2º andar
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