# Edentulism and its relationship with self-rated health: secondary analysis of the SABE Ecuador 2009 Study

Miguel Germán Borda[1,2,3], Nicolás Castellanos-Perilla[1], JudyAndrea Patiño[2], Sandra Castelblanco[2], Carlos Alberto Cano[1,2,3], Diego Chavarro-Carvajal[1,2,3], Mario U Pérez-Zepeda[1, 4]

*1 Semillero de Neurociencias y Envejecimiento, Facultad de Medicina, Pontificia Universidad Javeriana, Bogotá, Colombia*

*2 Unidad de Geriatría, Hospital Universitario San Ignacio, Bogotá, Colombia*

*3 Instituto de Envejecimiento, Pontificia Universidad Javeriana, Bogotá, Colombia*

*4 Departamento de Investigación en Epidemiología Geriátrica, Instituto Nacional de Geriatría, Ciudad de México, México.*

***ABSTRACT***

*Edentulism is related to a number of conditions in older adults, impacting their overall health status and thus their quality of life and relationship with the environment. At the same time, self-rated health has been shown to be an accurate marker of overall health status. However there is little information on how edentulism relates to self-rated health in older adults of Hispanic origin.*

*The aim of this study was to evaluate the impact of edentulism on self-rated health in older adults.*

*We analyzed data from SABE Ecuador 2009, a cross-sectional study that included a probabilistic representative sample of 5,235 community-dwelling older adults aged 60 years or older. The dependent variable was self-rated health and the independent variable was edentulism, with age, sex and comorbidities as confounding variables.In order to test the independent association of edentulism with self-rated health, a logistic regression model was fitted.*

*Out of the whole sample,77.13% of older adults reported having fair/poor self-rated health. We found an independent association between edentulism and self-rated health with incremental risk according to number of missingteeth,ranging from OR 1.35 (CI 95% 0.75 - 2.43) p 0.32 for less than 4 missing teeth to OR 1.88(1.06 - 3.32) p 0.029 for more than half of teeth missing.*

*Even though oral health has long been considered separately from the rest of the body and mind, it is clear from our results that oral health is a very important component of global health status in the elderly.*

***Keywords:*** *Oral health, edentulous, health status, dental care, aging.*

## Relación del edentulismo con la autoevaluación del estado de la salud: un análisis secundario del estudio SABE Ecuador 2009

***RESUMEN***

*El edentulismo se ha asociado con una gran variedad de condiciones en los adultos mayores afectando el estado general de su salud. Por lo tanto, afecta la calidad de vida de la persona y su relación con el medio ambiente. Por otro lado, la autoevaluación de la salud ha demostrado ser un marcador preciso del estado general de la salud. Sin embargo, hay escasa información sobre cómo estas dos condiciones se relacionan entre sí en adultos mayores de origen hispano.*

*El objetivo de este estudio fue evaluar el impacto del edentulismo en la autoevaluación de la salud en adultos mayores.*

*Se analizaron los datos de SABE Ecuador 2009, un estudio transversal que incluyó una muestra probabilística y representativa de 5.235 personas de 60 años de edad o más. La variable dependiente fue la salud autoevaluada y edentulismo fue la variable independiente, teniendo edad, sexo y comorbilidades como variables de confusión. Con el fin de probar la asociación independiente de edentulismo con la auto-evaluación de la salud un modelo de regresión logística se ajustó.*

*De la muestra entera, un 77,13% de los adultos mayores reportaron tener salud auto-evaluada regular / pobre. Se encontró una asociación independiente entre edentulismo y salud autoevaluada con un riesgo incremental dependiendo del número de dientes ausentes de OR 1,35 (IC 95% 0,75 - 2,43) p 0,32, en adultos mayores con menos de 4 dientes ausentes hasta OR 1,88 (1,06 - 3,32) p 0,029, con más de la mitad de dientes ausentes.*

*La salud oral se ha considerado de forma independiente del resto del cuerpo y la mente, es claro por nuestros resultados que la salud oral es un componente muy importante del estado de salud global en las personas mayores.*

***Palabras clave:*** *Salud oral, edentulismo, estado de salud, cuidado dental , envejecimiento.*

## INTRODUCTION

Oral health is an indicator of general health condition in older adults[1]. It is estimated that older age brings a higher risk of losing teeth[2], which leads to nutritional alterations, swallowing disorders, variations in language modulation, low self-esteem, poor performance of the individual in society, infections,and changes in physical and mental state. In short, it affects theperson's quality of life (QOL) and relationship with the environment[2-5].

Edentulism is defined as partial or total non-traumatic loss of teeth[6], usually due to infectious pathologies (e.g.dental caries, parotitis and periodontal disease) chronic exposure to toxic substances, smoking, medications (e.g. antihistamines, diuretics, antipsychotics and antidepressants), metabolic factors (e.g. malnutrition, Paget's bone disease or osteoporosis with maxillary involvement) and anatomical/functional alterations such as bruxism[7]. However, asedentulism commonly occurs in older adults, it has multifactorial etiology.

Progressive loss of teeth has been considered part of normal aging because of the high prevalence of tooth loss in older adults[3,8]. However, this idea is inaccurate and several studies have related tooth loss to etiological factors such as chronic disease, rural residence, functional dependence, neurocognitive disorder, low educational level, poverty, poor access to health services, limited access to cultural property and inadequate hygiene habits. In other words, losing teeth is not a part of aging but a consequence of negative conditions existing since childhood, a time when it is important to establish oral health strategies that should continue throughout life[9-11].Edentulism has been documented and found to exert significant effect on individual performance, functionality and well-being[4,12,13].

Self-rated health (SRH) is the summary of all available information oncurrent health status including clinical, mental and social characteristics, according to the patient's circumstances. In recent years, SRH has become an important research target as it is a useful marker for a comprehensive approach to the geriatric patient[14,15].

Positive correlations have been found between objective and subjective health assessments among older adults, mostly in those with disability,[16] chronic diseases[17] or depression[18,19].

Although there are studies on the impact of oral health on SRH in the elderly, the current study goes further and looks at the impact of edentulism on their subjective assessment of their health. The aim of this study was to evaluate the impact of edentulism on SRH in the elderly, in a secondary analysis of the SABE Ecuador study.

## MATERIALS AND METHODS

We analyzed data from the SABE (*Salud, Bienestar y Envejecimiento*) Study conducted between June and August 2009in Ecuador. SABE was a cross-sectional study that included 5,235 subjects aged 60 years or more living in rural and urban areas of Ecuador (except Amazon and Galápagos). It was conducted by the*Instituto Nacional de Estadistica y Censos (INEC)*, Department of Socio-demographic Statistics. Funding was provided by the Ministry of Social and Economic Inclusion of Ecuador. The University of San Francisco de Quito, the National Institute of Statistics and Census, the Ministry of Public Health, and the Society of Geriatrics implemented and supported the study.

The instrument used in the SABE Ecuador study was derived from the international instrument designed for the original SABE study conducted in 5 Latin American capital cities[20]. Probabilistic sampling by clusters (housing segments) and block stratification represented 15 continental provinces, according to the Costa and Sierra Regions, urban and rural areas, Quito and Guayaquil. The sample included 10,368 households: 5,100 in the Sierra Region and 5,268 in the Costa Region, including 864 sectors altogether. Of the sample, 85.8% corresponded to subjects with complete data, who were included for analysis[21,22].

Field staff was carefully selected and trained to gather high-quality data.The instruments (handbook and form) and the cartography used were managed efficiently.Inter and intra-observer reliability tests were performed, as well as test-retest using simple correlations.The survey included questions on socio-demographic characteristics (age, sex, education, social support, work/income history), cognitive status, health(cognitive and physical function status, number of medications, services), social networkand family support, work and income history, housing conditions, physical performance and exposure to violence and abuse.

SRHwas evaluated by the question "Do you consider your health status to be excellent, very good, good, fair and poor?" Answers were subsequently dichotomized into good (very good & good) and bad (fair & poor).

Edentulism was used as the independent variable. It was defined as absence of teeth (total or one tooth) and evaluated by the question: "Now, I would like to ask some questions about your mouth and your teeth. Please tell me whether any of your teeth are missing using the following response options: No- I have all my teeth; Yes- a few (up to four); Yes- quite a few (more than four but less than half); Yes- most of them (more than half) or Yes- all missing.
Age was classified as 60-69, 70-79 and ≥80.
Depression was evaluated on the Yesavage Scale for screening depression in older adults, where scores 0-5 indicate normal and 6-15 indicate depression[23,24].
Medical conditions were assessed by asking participants whether they had been diagnosed by a physician with diabetes mellitus (DM), chronic obstructive pulmonary disease (COPD) or arthritis. Pain was evaluated with the question: "Do you have any pain in your back?", "Do you ever have headache?", "Do you feel any pain in your joints?"[25]. For the analysis, answers were dichotomized (Yes/No).
Initially, we used univariate analyses to explore extreme values and a normal distribution to adjust and categorize variables. For descriptive statistics, categorical variables are presented using frequencies (absolute and relative), while means and standard deviations (SD) are used for continuous variables. Bivariate analysis was applied subsequently to contrast SRH differences between groups. Chi-square tests were used for categorical variables and t-tests for continuous variables. Finally, multivariate analysis logistic regression models were fitted in order to obtain the odds ratio (OR) with 95% confidence intervals(95% CI). Estimates are presented before and after adjustment by sex, age and depression. Statistical level of significance was set at $p < 0.05$. Data were analyzed employing STATA 12®.
This study was approved by the Ethics and Scientific Committee of the Ageing Institute at Hospital Universitario San Ignacio and by the Ethics Committee of the Pontificia Universidad Xaveriana. It was conducted in accordance with the ethical standards set forth in the 1964 Declaration of Helsinki and its amendments. Details that might disclose the identity of the subjects under study have been omitted.

## RESULTS

Out of the total sample, 77.13% older adults reported having poor/fair SRH (80.59% of women and 73.26% of men). For edentulism, the higher the frequency of poor/fair SRH, the higher the number of missing teeth. Prevalence of poor/fair SRH was 62.30% in persons who had complete dentures,

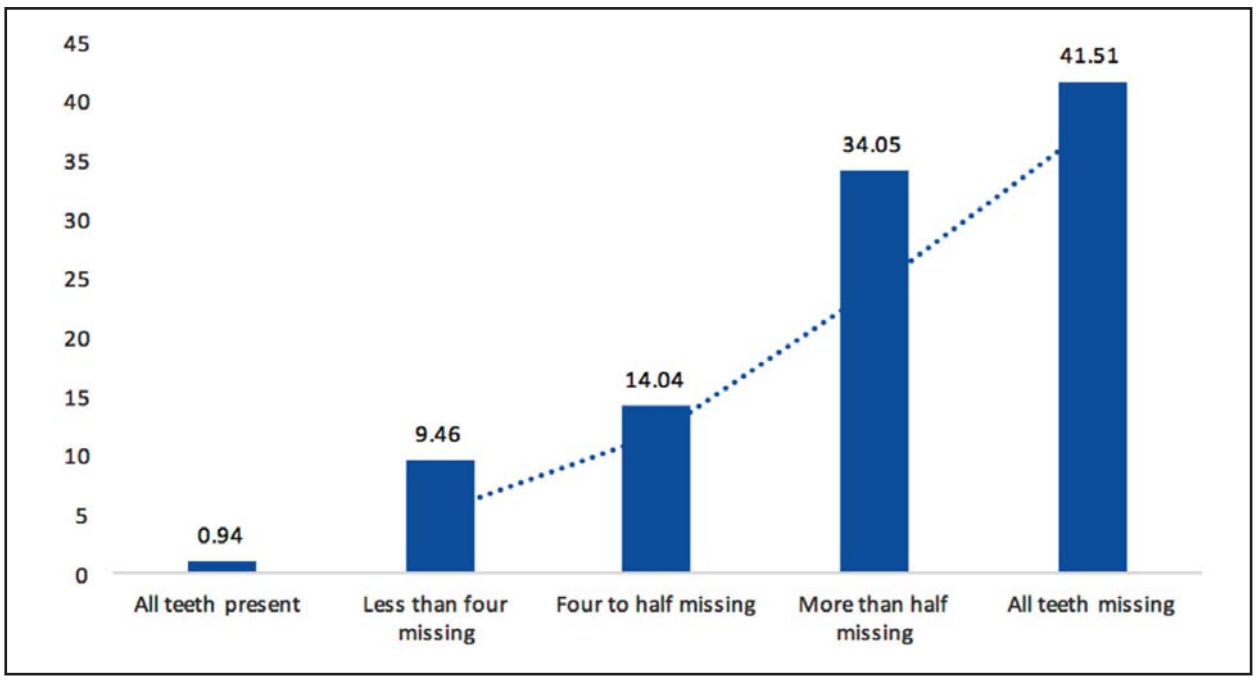


*Fig. 1: Percentage of poor self-rated health status according to number of teeth present.*

**Table 1: Self-Rated Health and Edentulism.**

| Self-Rated Health | Total 5235 (100) | Poor 4038 (77.13) | Good 1197 (22.87) | P value |
|---|---|---|---|---|
| | N (%) or mean ± SD | N (%) or mean ± SD | N (%) or mean ± SD | |
| Edentulism | | | | <0.001 |
| Complete denture | 61 (100) | 38 (62.30) | 23 (37.70) | |
| Lost up to 4 teeth | 553 (100) | 382 (69.08) | 171 (30.92) | |
| Lost up to half of teeth | 774 (100) | 567 (73.26) | 207 (26.74) | |
| Lost more than half of teeth | 1752 (100) | 1375 (78.48) | 377 (21.52) | |
| Complete absence of teeth | 2095 (100) | 419 (80) | 419 (20.00) | |
| Sex | | | | <0.001 |
| Male | 2468 (100) | 1808 (73.26) | 660 (26.74) | |
| Female | 2767 (100) | 2230 (80.59) | 547 (19.41) | |
| Age (YO) | | | | 0.004 |
| 60-69 | 1094 (100) | 803 (73.40) | 291 (26.60) | |
| 70-79 | 780 (100) | 612 (78.04) | 168 (21.54) | |
| >80 | 3361 (100) | 2623 (78.04) | 738 (21.96) | |
| Depression | | | | <0.001 |
| Yes | 2080 (100) | 1853 (89.09) | 227 (10.91) | |
| DM | | | | <0.001 |
| Yes | 662 (100) | 556 (83.99) | 106 (16.01) | |
| No | 4573 (100) | 3482 (76.14) | 1091 (23.86) | |
| COPD | | | | <0.001 |
| Yes | 413 (100) | 364 (88.14) | 49 (11.86) | |
| No | 4822 (100) | 3674 (76.19) | 1148 (23.81) | |
| Arthropathy | | | | <0.001 |
| Yes | 1651 (100) | 1421 (86.07) | 230 (13.93) | |
| No | 3584 (100) | 2617 (73.02) | 967 (26.98) | |
| Head ache | | | | <0.001 |
| Yes | 2126 (100) | 1885 (88.66) | 241 (11.34) | |
| No | 3109 (100) | 2153 (69.25) | 956 (30.75) | |
| Back pain | | | | <0.001 |
| Yes | 2609 (49.84) | 2186 (83.79) | 423 (16.21) | |
| No | 2626 (100) | 1.852 (70.53) | 774 (29.47) | |
| Joint pain | | | | <0.001 |
| Yes | 1449 (27.68) | 1265 (87.30) | 184 (12.70) | |
| No | 3786 (100) | 2773 (73.24) | 1013 (26.76) | |

78.48% in those with more than half their teeth missing, and highest (80%) in those with total absence of teeth (p <0.001) (Fig. 1).

Other conditions also had high prevalence of poor/fairSRH, such as higher age,depression (89%), diabetes (83.99%), COPD (88.14%), arthropathies (86.07%), headache (88.66%), back pain (83.7%) and joint pain (87%). All of the above were statistically significant with a p value of less than 0.001 (Table1). Multivariate analysis showed that there was independent association between edentulism and SRH, with incremental OR. For <4 teeth, OR was 1.35 (95% CI 0.75-2.43) p 0.32, and for all teeth absent, OR was 1.88 (95% CI 1.06-3.32) p 0.029 (Table 2).

**Table 2: Edentulism multivariate regression and SRH unadjusted and adjusted.**

| | Self-rated health OR (IC95%) P value | |
|---|---|---|
| | Unadjusted | Adjusted |
| Edentulism | | |
| Lost up to 4 teeth | 1.35 (0.78-2.33) 0.281 | 1.35 (0.75 - 2.43) 0.32 |
| Lost up to half of teeth | 1.65 (0.96-2.84) 0.067 | 1.51 (0.84 - 2.70) 0.16 |
| Lost more than half of teeth | 2.20 (1.29-3.75) 0.003 | 1.88 (1.07 - 3.33) 0.03 |
| Complete absence of teeth | 2.42 (1.29-4.10) 0.001 | 1.88(1.06 - 3.32) 0.029 |
| Male sex | | 0.94 (0.81-1.09) 0.43 |
| Age | | |
| 70-89 | | 1.14 (0.91 - 1.45) 0.24 |
| >=80 | | 1.19 (1.00 - 1.41) 0.039 |
| Depression | | 2.60 (2.20 - 3.06) <0.001 |
| DM | | 1.49 (1.18 - 1.88) 0.001 |
| COPD | | 1.70 (1.23 - 2.35) 0.001 |
| Arthropathy | | 1.26 (0.88 - 1.80) 0.001 |
| Head ache | | 2.47 (2.10 - 2.91) <0.001 |
| Back | | 1.45 (0.96 - 2.06) 1.76 |
| Joint pain | | 1.46 (1.26 - 1.68) 0.079 |

## DISCUSSION

We found an incremental and independent risk association between poor/fair SRH and increasing loss of teeth. Older adults have special needs, particularly in contexts where there is little information on how health variables relate to each other in this particular age group[26]. This is of particular concern in countries where the population is aging rapidly and expected to continue to do so due to demographic transition[13,27]. The frequency of older adults with all teeth present was 1.17%, with the rest of the older adults having at least one missing tooth. Compared to other populations, this number would be considered rather high. Prevalence of edentulismin the general population is 20-65%, depending on geographical location and characteristics of the population evaluated[4,7,10,28]. Few studies in Latin America deal with edentulism in older adults[23,29]. Onesimilar study found a prevalence of 1.7% of non-edentulous older adults and showed linear improvement in SRH using the EQ-VAS as number of teeth increased[4,30]. The incremental association with poor SRH reflects overall poor health; however, the type of study does not enable direct cause-effect to be inferred. Nonetheless, the results do provide an opportunity to determine what complex relations lead to impaired oral health. In addition to the complex interactions of oral health with the rest of the body, specific conditions such as periodontal disease, dental caries and chewing issues increase the risk of losing teeth[13].

This association means that having fewer teeth puts older people at greater risk of having poor SRH, and therefore poor health in general, reflecting the impact of oral health on their health status in general. The fact that the more teeth the older patient has lost, the higher his/her risk of a poor SRH strengthens the association.

Our study has some limitations. First, it is a cross-sectional study and therefore causality cannot be determined. Secondly, self-reported health is used as the outcome variable so recall bias could play an important role in our results. Nevertheless, it reports prevalence rates in a representative sample of older adults in Ecuador, and good agreement between self-reported diseases and clinical diagnoses has been documented.

Oral diseases are some of the most prevalent disorders among the elderly[4,7]. They affect QOL, reduce self-esteem, cause functional impairment and recurrent infections, chewing difficulties, and social and communicational issues. This leads to an increase in the impact of current comorbidities and

new conditions such as malnutrition and frailty[13], which in turn lead topoor oral health in older adults, constituting a public health issue[14,26].

SRH is areflection of objective health status,[17,18] and edentulism is a condition associated with poor SRH. The determinants of poor oral health in the elderly need to be identified in order to reduce its burden and consequences on them[27]. Studies like ours are important to show the relevance of oral health in a population. Further research on oral health is needed, particularly in developing countries, where there are impediments to access to healthcare services, and pain or malaise added to the absence of adequate treatment often lead to tooth extraction. Policy-makers need to address the pubic issue of oral health[26].

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**CORRESPONDENCE**

Dr. Miguel Germán Borda
Carrera 7 N. 40-62. Hospital San Ignacio, Piso 8,
Facultad de Medicina
Bogota, Colombia
mmborda@gmail.com

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