

Oral health-related quality of life in older adults in a health program in Envigado, Colombia, 2018

Calidad de vida relacionada con salud bucal en adultos mayores de un programa en Envigado, Colombia, 2018

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Abstract

Introduction: the population of Envigado, Colombia, is currently aging, a situation that prompted the creation of the "Comprehensive Care Network" program ["Red de cuidado integral"]. In 2018, a baseline study was carried out to gather information on the older adults participating in the program, including sociodemographic variables and the general and oral health situation of participants, but the obtained information was not thoroughly analyzed. Therefore, the aim of the present study was to find the association of oral health-related quality of life (OHRQoL) and the demographic, social and health factors of the older adults participating in the program in Envigado in 2018, in order to provide information to facilitate intervention strategies.

Methods: an observational cross-sectional study was conducted using secondary information sources, carrying out a census of the target population. Descriptive and bivariate analysis were made to determinate the associations, and a binary multiple logistic regression model was run, calculating prevalence ratio (PR) with 95% confidence intervals (CI). **Results:** the study showed that 54.2% of the program participants had a poor to bad OHRQoL. The conditions that most explain OHRQoL are multimorbidity and overall health status perception.

Conclusions: the findings of this study suggest that promotion of health and prevention of chronic diseases strategies should be continued to avoid multimorbidity and improve the perception of general health in the elderly population.

Keywords: aging, health status, oral health, quality of life

Resumen

Introducción: en el municipio de Envigado, Colombia, se presenta el fenómeno de envejecimiento poblacional, por lo cual se cuenta con el programa "Red de cuidado integral". En el 2018 se realizó un estudio que recolectó información sobre variables demográficas, sociales y situación de salud general y bucal de los beneficiarios, pero no se analizó profundamente dicha información. Debido a esto, el objetivo del presente estudio consistió en determinar la asociación de la autopercepción de calidad de vida relacionada con salud bucal (OHRQOL) con los factores demográficos, sociales y situación de salud de beneficiarios del programa en Envigado, en el 2018, con el fin de aportar información para facilitar propuestas de intervención. **Metodología:** estudio trasversal, con fuente de información secundaria, donde se hizo un censo de la población beneficiaria del programa. Se realizó un análisis descriptivo y bivariado para establecer asociaciones y un modelo de regresión logística binaria múltiple calculando razón de prevalencias (RP) e intervalos de confianza (IC) al 95%. **Resultados:** se determinó que el 54,2% de los beneficiarios presentaron una regular o mala OHRQOL. Las condiciones que más explican esta son la multimorbilidad y la percepción del estado de salud general. **Conclusiones:** de acuerdo con lo encontrado en este estudio, se debe continuar con las estrategias de promoción de la salud y prevención de enfermedades crónicas para evitar la multimorbilidad y mejorar la percepción del estado de salud en la población adulta mayor.

Palabras claves: calidad de vida, envejecimiento, estado de salud, salud bucal

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INTRODUCTION

The quality of life of the elderly is influenced by factors like social support, socioeconomic variables, schooling, and health status, with functional abilities and the capacity to participate in their self-care and in social and family life being important to them.¹ But not only does general health have an influence on quality of life; oral health also has an impact on the different spheres of the individual's development,^{2,3} in addition to being an indicator of equity, as diseases of the oral cavity remain prevalent among the most disadvantaged.⁴

The oral cavity reflects a person's health and well-being; however, many older adults experience poor oral health.^{2,5} Although most oral pathologies do not compromise life, these pathologies can affect quality of life.^{1,3,5}

One of the tools used to evaluate oral health-related quality of life (OHRQoL) is the Geriatric Oral Health Assessment Index (GOHAI), whose validity and reliability have been proven in various studies, and was specifically validated in Colombia by Daz-Cardenas and Simancas-Pallas.⁶ This instrument is a simple, practical tool that, unlike other questionnaires, was initially created to be applied in older adults. It offers five answer options (always/often/sometimes/rarely/never) for each question, with the respondent answering according to the frequency in which each situation happens.^{3,6}

In Envigado (Colombia), the municipality has a program called "Comprehensive Care Network" ("Red de cuidado integral"), aimed at people in care dependency. In 2018, a macro study was carried out to learn about the characteristics of the older

adults participating in the program, with the participation of the authors of the present article. The product was a database with the records of those participants.⁷

In order to advance in the research project, this study aimed to determine the association of OHRQoL (established through GOHAI) with the demographic, social and health factors of the older adults affiliated to the program in the municipality of Envigado in 2018, in order to provide information that facilitates intervention programs according to the population's health situation.

METHODS

A cross-sectional study was carried out, with the study population being the older adults benefitting from the program. It relied on a secondary data source using the database of the previously conducted macro study, with information on the sociodemographic, economic, social, overall health and oral health factors of the participants in the program, in addition to the results of the GOHAI test.

A census was conducted, including all records of active beneficiaries as of September 2018, excluding records in which the participants did not pass the Mini-Mental State Examination. The final sample had 59 records.

OHRQoL was determined through the GOHAI test, with a score between 57 and 60 points considered as "good" and a score of 56 or lower as "poor/bad".

A descriptive analysis was performed, followed by a bivariate analysis, re-categorizing the quantitative variables and using the Chi square test to obtain the

prevalence ratio (PR) association measures with a 95% confidence interval. Finally, a multivariate analysis was conducted using multiple binary logistic regression. The database was initially created in Excel and then exported to SPSS version 21 for Windows, for data processing.

This project was considered as a risk-free study according to Resolution 8430 of 1993, as it abides by statutory law 1581 of 2012, which regulates the information contained in the databases and the way such information is used. This project was approved by the Research and Innovation Committee of the Universidad CES' School of Medicine (Minutes 206-2018) and endorsed by the Institutional Committee on Ethics for Research in Human Beings of the same university (Minutes 131-2019).

RESULTS

The participants' average age was 77.5 years (± 8.8) and 42.4% of them (n = 25) were single. 70% (n = 41) had no occupation, but 72.9% had received some income during the previous month from different sources.

Regarding health status, 39.0% (n = 23) considered that their health was excellent or good, 50.8% (n = 30) perceived it as average and 10.2% (n = 6) reported it as bad.

The most prevalent self-reported diseases were high blood pressure (HBP), high cholesterol/triglyceride levels, and urinary incontinence (Table 1). Multimorbidity, taken in this study as 3 or more self-reported diseases, had a prevalence of 47.5% (n = 28).

Table 1. Diseases self-reported by the older adults participating in the study. Envigado, 2018

Disease	Male % (n)	Female % (n)	Total % (n)
High Blood Pressure			
Yes	36.4(4)	36.4 (29)	55.9 (33)
No	63.6 (7)	63.6 (19)	44.1 (26)
Diabetes (n=58)			
Yes	27.3 (3)	31.9(15)	31.0 (18)
No	72.7 (8)	68.1 (32)	69.0 (40)
Cancer (n=58)			
Yes	36.4 (4)	27.7 (13)	29.3 (17)
No	63.6 (7)	72.3 (34)	70.7 (41)
Chronic Obstructive Pulmonary Disease			
Yes	36.4 (4)	31.2 (15)	32.2 (19)
No	63.6 (4)	68.8 (33)	67.8 (40)
Heart Disease			
Yes	18.2 (2)	33.3 (16)	30.5 (18)
No	81.8 (9)	66.7 (32)	69.5 (41)
Arthritis			
Yes	18.2 (2)	35.4 (17)	32.2 (19)
No	81.8 (9)	64.6 (31)	67.8 (40)
Osteoporosis			
Yes	9.1 (1)	37.5 (18)	32.2 (19)
No	90.9 ^o	62.5 (30)	67.8 (40)
Increased cholesterol/triglyceride levels			
Yes	54.5 (6)	43.8 (21)	45.8 (27)
No	45.5 (5)	56.2 (27)	54.2 (32)
Mental disease			
Yes	27.3 (3)	18.75 (9)	20.3 (12)
No	72.7 (8)	81.25 (39)	79.7 (47)
Urinary incontinence (n=58)			
Yes	54.5 (6)	38.3 (18)	41.4 (24)
No	45.5 (5)	61.7 (29)	58.6 (34)

Source: by the authors

Regarding oral health, 52.6% (n = 30) had one or more natural dental parts, but despite this 87.5% (n = 49) missed at least one tooth. 39% (n = 23) had full prosthesis and 52.6% (n = 30) had partial prosthesis. In terms of hygiene and oral care habits, 50.8% (n = 30) brush their teeth 2 or less times a day, and 66.15% (n = 39) do not use dental floss. As for dental

consultation, 25.4% (n = 15) has seen a dentist over the past year, 54.2% (n = 32) more than one year ago, and 20.3% (n = 12) did not remember their last time there (Table 2).

Table 2. Proportional distribution of oral health variables in the study population

Variable	n	%
Natural dental parts n = 57		
Yes	30.0	52.6
No	27.0	47.4
Total	57.0	100.0
Full prosthesis		
Yes	23.0	39.0
No	36.0	61.0
Total	59.0	100.0
Partial prosthesis n = 57		
Yes	30.0	52.6
No	27.0	47.4
Total	57.0	100.0
Absence of teeth n = 56		
Yes	49.0	87.5
No	7.0	12.5
Total	56.0	100.0
Daily brushing		
2 times or less	30.0	50.8

Variable	n	%
3 times or more	29.0	49.2
Total	59.0	100.0
Use of dental floss a day		
1 time	10.0	16.9
2 or more times	10.0	16.9
Doesn't use	39.0	66.1
Total	59.0	100.0
Last visit to the dentist		
Less than a year	15.0	25.4
More than a year	32.0	54.2
Doesn't remember	12.0	20.3
Total	56.0	100.0

Source: by the authors

Questions 1, 4 (corresponding to the physical dimension) and 11 (corresponding to the psychosocial dimension) of the GOHAI test were the most frequently answered in the “always” or “often” categories. In general, the responses of the “always” category are below 11% and the ones for “often” are below 15% (Table 3). It was determined that 54.2% of respondents had a poor or bad OHRQoL.

Table 3. Percentage distribution of GOHAI responses in the study population. Envigado, 2018

Dimension/Question	1	2	3	4	5
	Always	Often	Sometimes	Rarely	Never
	% (n)	% (n)	% (n)	% (n)	% (n)
Physical function					
1. How often did you limit the kinds or amounts of food you eat because of problems with your teeth or dentures?	8.5 (5)	10.2 (6)	10.2 (6)	8.5 (5)	62.7 (37)
2. How often could you not swallow well or comfortably?	5.1(3)	5.1(3)	8.5 (5)	6.8 (4)	74.6 (44)
3. How often have your teeth or dentures prevented you from speaking the way you wanted?	1 (1.7)	5.1(3)	10.2 (6)	6.8 (4)	76.3 (45)
4. How often did you feel discomfort trying to eat what you wanted?	10.2 (6)	13.6 (8)	13.6 (8)	15.3 (9)	47.5 (28)
Psychosocial function					
5. How often did you limit contacts with people because of the condition of your teeth or dentures?	0 (0)	3.4 (2)	5.1(3)	11.9 (7)	79.7 (47)
6. How often were you displeased or unhappy with the looks of your teeth, gums, or dentures?	6.8 (4)	3.4 (2)	6.8 (4)	6.8 (4)	76.3 (45)
7. How often were you worried or concerned about problems with your teeth, gums, or dentures?	3.4 (2)	6.8 (4)	10.2 (6)	11.9 (7)	67.8 (40)

Dimension/Question	1	2	3	4	5
	Always	Often	Sometimes	Rarely	Never
	% (n)	% (n)	% (n)	% (n)	% (n)
8. How often did you feel nervous or self-conscious because of problems with your teeth, gums, or dentures?	1.7 (1)	6.8 (4)	3.4 (2)	6.8 (4)	48 (81.4)
9. How often did you feel uncomfortable eating in front of people because of problems with your teeth, gums, or dentures?	6.8 (4)	6.8 (4)	11.9 (7)	3.4 (2)	71.2 (42)
10. How often did you avoid laughing or smiling because of unattractive teeth or gums?	3.4 (2)	3.4 (2)	15.3 (9)	1.7 (1)	76.3 (45)
Pain and discomfort					
11. How often have you had pain or discomfort around your mouth?	1.7 (1)	13.6 (8)	16.9 (10)	11.9 (7)	55.9 (33)
12. How often were your teeth or gums sensitive to hot, cold, or sweet foods?	1.7 (1)	8.5 (5)	10.2 (6)	3.4 (2)	76.3 (45)

Source: by the authors

The bivariate analysis showed that the variables that had statistically significant association with OHRQoL were economic satisfaction ($p = 0.026$), health status perception ($p = 0.017$), satisfaction with health status ($p = 0.017$), hearing disability ($p = 0.00$), 049), visual disability ($p = 0.016$), chronic multimorbidity ($p = 0.000$), comprehension capacity and language ($p = 0.048$), having natural teeth ($p = 0.044$), and having full prosthesis ($p = 0.015$). Similarly, the multivariate analysis considered the variables that met the Hosmer-Lemeshow criteria: occupation ($p = 0.204$), close persons ($p = 0.088$), type of housing ($p = 0.185$),

mobility ($p = 0.154$), mobility and ambulation ($p = 0.220$) sight and hearing ($p = 0.069$), cardiorespiratory apparatus alterations ($p = 0.127$), neurological alteration ($p = 0.176$), flossing ($p = 0.116$) and feelings concerning quality of life ($p = 0.197$).

Multiple binary logistic regression was conducted, concluding that the variables of health perception (adjusted PR=22.32. 95%CI: 1.50; 332.11) and multimorbidity (adjusted PR=99.40). 95%CI: 3.83; 2576.12) explain the OHRQoL, as these were the variables that remained significant once the model was run. (Table 4 and 5).

Table 4. Oral health-related quality of life (OHRQoL) associated with general health variables of the study's older adults

General health variables	OHRQoL		Total	Chi ² (p-value)	PR (95% CI)
	Poor/bad	Good			
	n (%)	n (%)			
Perception of health status					
Excellent or good	8 (25.0%)	15 (55.6%)	23	5.748 (0.017)	1.00
Poor or bad	24 (75.0%)	12 (44.4%)	36		1.92 (1.05; 3.51)
Chronic multimorbidity					
2 diseases or less	9 (28.1%)	22 (81.5%)	31	16.719 (0.000)	1.00
3 diseases or more	23 (71.9%)	5 (18.5%)	28		2.83 (1.59; 5.04)

Source: by the authors

Table 5. Economic, social, housing variables, overall health situation, oral health situation and quality of life, which contribute the most to the explanation of the poor/bad OHRQoL in a group of elderly adults from Envigado in 2018

Variables	Crude PR	95% CI		Adjusted PR	95% CI	
		LL	UP		LL	UP
Economic variables						
Occupation						
No occupation	1.00	-	-	1.00	-	-
With occupation	1.37	0.87	2.15	3.79	0.49	29.28
Economic satisfaction						
Good or very good	1.00	-	-	1.00	-	-
Neither good nor bad	2.50	0.97	6.44	1.10	0.09	13.50
Bad or very bad	1.80	0.60	5.37	1.58	0.09	27.75
Social variables						
Close persons						
More than 5 people	1.00	-	-	1.00	-	-
5 people or less	1.56	0.92	2.64	2.12	0.33	13.87
Housing variables						
Adequate housing and needs						
Adequate	1.00	-	-	1.00	-	-
Not adequate	1.37	0.88	2.15	0.19	0.02	2.01
General health variables						
Perception of health status						
Excellent or good	1.00	-	-	1.00	-	-
Poor or bad	1.92	1.05	3.51	22.33	1.50	332.11
Satisfaction with health status						
Good or very good	1.00	-	-	1.00	-	-
Poor or bad	1.92	1.05	3.51	0.11	0.01	2.26
Hearing disability						
No	1.00	-	-	1.00	-	-
Yes	1.60	1.02	2.49	5.33	0.49	58.02
Visual disability						
No	1.00	-	-	1.00	-	-
Yes	2.06	1.02	4.14	0.389	0.05	2.95
Chronic multimorbidity						
2 diseases or less	1.00	-	-	1.00	-	-
3 diseases or more	2.83	1.59	5.04	99.41	3.84	2576.13
Mobility						
Needs help	1.00	-	-	1.00	-	-
Autonomous	1.41	0.90	2.21	2.02	0.13	31.79
Mobility and ambulation						
Needs help	1.00	-	-	1.00	-	-
Autonomous	1.46	0.94	2.28	1.84	0.11	31.61
Vision and hearing						
Normal or corrected	1.00	-	-	1.00	-	-
Unrectified alteration	1.54	0.97	2.45	0.98	0.10	10.97

Variables	Crude PR	95% CI		Adjusted PR	95% CI	
		LL	UP		LL	UP
Cardiorespiratory system						
No alterations	1.00	-	-	1.00	-	-
Dyspnea in any degree of severity	1.44	0.90	2.29	0.49	0.10	3.12
Understanding and language						
Some difficulty	1.00	-	-	1.00	-	-
Normal for age	2.47	0.90	6.75	0.14	0.02	1.03
Neurological impairment (tremor)						
No alterations	1.00	-	-	1	-	-
Tremor in any degree of severity	1.38	0.88	2.18	0.52	0.09	2.95
Oral health variables						
Natural teeth						
Yes	1.00	-	-	1.00	-	-
No	1.67	1.00	2.78	0.38	0.02	9.06
Full prosthesis						
No	1.00	-	-	1.00	-	-
Yes	1.774	1.12	2.80	2.286	0.14	37.99
Flossing						
Yes	1.00	-	-	1.00	-	-
No	1.54	0.85	2.78	0.44	0.05	3.64
Quality of Life Variables (QL)						
How you feel concerning your QL						
Good	1.00	-	-	1.00	-	-
Not so good or bad	1.36	0.86	2.16	0.68	0.08	5.90

*LL: Lower Limit – UP: Upper Limit

Source: by the authors

DISCUSSION

According to projections made by Colombia’s DANE (Departamento Administrativo Nacional de Estadística), life expectancy for the Colombian population for the years 2015-2020 is 76.16 years, being a bit higher for the department of Antioquia (where Envigado is located), projected at 76.26 years.⁸ In this study, the average age of respondents was 77.46 years, exceeding the life expectancy projected by DANE at the national and departmental levels, which may be related to the phenomenon of po-

pulation aging, which is most common in the most developed departments within the territory;^{9,10} it may also be linked to the fact that the program is intended for older adults who require care due to their health status.

This study found that the conditions that best explain poor/bad OHRQoL are health status perception and multimorbidity. This validates the literature reports, which show a relationship between general health status and OHRQoL.^{3,11}

A study conducted in Germany found that the variables that had statistically significant

association with OHRQoL were level of care, denture type, and oral health status. The authors also found that the OHRQoL score was lower than that reported in other studies, linking this to the characteristics of the study population—one with long-standing multimorbidity.³

Researchers in Mexico¹² found that better self-perception of oral and general health is associated with good OHRQoL. A study in Japan¹³ also states that scores were lower in participants with low perception of oral health and overall health. These results are similar to those found in this study, where poor/bad OHRQoL is significantly associated with health status perception.

In addition, the results of the present study agree with the municipality of Envigado's health situation analysis, which states that the first cause of external consultation among this population is HBP.¹⁴ At the dental level, HBP is related to xerostomy and periodontitis,^{15,16} oral pathologies that can lead to tooth loss and affect quality of life. In Cartagena, HBP was related to bad OHRQoL.¹⁷

The participants in this study had a poor/bad OHRQoL in 54.2%, while 45.8% had good OHRQoL. In comparison, a study in Peru² found out that 77.4% of the sample had a bad OHRQoL. For their part, Hernández and Fernández¹⁸ reported that 92.7% of the surveyed older adults had a GOHAI test score below 57 points, that is, a poor or bad OHRQoL; finally, Daz-Cardenas and Simancas-Pallares⁶ show that the total GOHAI score was 29.1 ± 9.4 , corresponding to a bad OHRQoL.

These results suggest that older adults from this study have a better OHRQoL compared to older adults in the cited studies. However,

less than half had a good OHRQoL, so this aspect should not be overlooked.

Regarding the individual analysis of GOHAI test questions, it was observed that oral health status in older adults has the greatest impact on physical function, specifically in food consumption-related questions, similar to the findings in Brazil and Mexico,^{18,19} followed by psychosocial function and pain. In Cartagena, on the other hand, the researchers found that the psychosocial dimension was the most impacted.¹⁷

As a result, it is possible to identify an important factor in the quality of life of older adults: their diet. People with masticatory problems tend to replace foods with those that are easier to prepare and/or eat foods that are usually high in saturated fats and cholesterol,^{5,11} which can lead to decreased intake of some minerals and vitamins. A poor diet can predispose older adults to other diseases,¹¹ like the ones most frequently found in this study: HBP and increased cholesterol and/or triglycerides, suggesting a connection as well as a field of action.

It has been reported that tooth loss increases with age, affecting function and aesthetics in older adults. A study conducted in Barcelona²⁰ according to the Geriatric Oral Health Assessment Index (GOHAI) found that functional edentulism and the need for upper full prosthesis are associated with poor OHRQoL. Other studies^{2,3,11,13,19,21} report similar results in terms of edentulism and the use of a prosthesis. The study by Hernández and Fernández¹⁸ also found that patients with rehabilitation needs and fewer teeth scored lower on the GOHAI test.

Similar variables (full prosthesis, partial prosthesis, presence of natural teeth and absence of teeth) were evaluated in

the present study, finding no statistically significant association of any variable with OHRQoL. This may be due to the absence of dental parts, and therefore dental diseases, such as cavities or pulpitis, are not present and do not trigger a low-scoring response when included in the test.

In the study conducted in Mexico,¹⁸ the authors found that the last visit to the dentist was significantly associated with OHRQoL, with worse OHRQoL scores among those participants who had not seen a dentist in the last 12 months. The present study found no association between the last visit to the dentist and OHRQoL, but it showed that those who had not seen a dentist had a 46% higher chances of poor/bad OHRQoL than those with dental appointments in the same period.

While it is clear that oral diseases do not put life at risk, oral health is an important factor to consider as oral diseases have an impact on function, the psychosocial dimension, and is a source of pain and disability in older adults, affecting their OHRQoL.

Some kind of interdisciplinary work is needed, since a dental approach alone is not enough to improve OHRQoL, as might be assumed, but a coordinated work between general physician and dentist is necessary to ensure good overall patient health, producing a positive impact on quality of life in general.

Considering that the pathologies in older adults are preventable for the most part, in both general health and oral health, working with the younger population is highly important^{5,22} to ensure quality aging.

Intervention and improvement strategies under the "Comprehensive Care Network"

program should aim at improving overall health, and it is suggested for such strategies to address the functional dimension, especially food-related aspects.

This study has limitations in terms of the oral health component, since the data were collected for a general health analysis, and therefore the oral health component was not thoroughly evaluated. The lost data on some oral health variables may have affected the lack of significant association between these variables and OHRQoL.

Another limitation of this study is sample size, because although a census was conducted, the census size is small and could influence the confidence intervals in the multivariate analysis.

The GOHAI test is limited to those who have some degree of cognitive impairment,²¹ and therefore the obtained responses would not be reliable, so the records were filtered through Minimental, which affected the sample size. This might have affected the results and there could be other conditions that explain OHRQoL but could not be identified in this study. Also, since OHRQoL could not be determined in those with cognitive impairment, they become a population with no available information.

Due to the limitations of the study, one should be cautious when extrapolating its results, as they should be applied to the studied population only.

CONCLUSIONS

This study found out that the factors that most explain OHRQoL in the studied population are multimorbidity and health status perception.

From a public health approach, these results validate the need for projects in health promotion and prevention of chronic diseases. Similarly, understanding disease as the result of inequities and social factors provides a more effective approach to ensure a good OHRQoL in older adults, impacting the social determinants of health.

Colombia's population is undoubtedly aging, so this type of research projects is highly important, since they serve as a reference for public policies seeking to improve the quality of life of older adults.

AUTHORSHIP STATEMENTS

Author Manuela Torres Vanegas participated in all stages of the research process, including the selection of the subject matter, approach to the problem, literature review, research design in the entire methodological component, data collection, data analysis, reporting of results, presentation of final report, and writing of the scientific article.

Author Doris Cardona served as a consultant in all stages of the research process (problem

approach, literature review, research design in the entire methodological component, data collection, data analysis, results reporting, final reporting) thanks to her prior knowledge, and she contributed to the writing in form and substance.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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REFERENCES

1. Velázquez-Olmedo LB, Ortiz-Barrios LB, Cervantes-Velázquez A, Cárdenas-Bahena , García-Peña C, Sánchez-García S. Quality of life related to oral health in older people. *Evaluation instruments. Rev Med Inst Mex Seguro Soc.* 2014; 52(4): 448-46.
2. Schultz AG, Picasso Pozo MA, Castillo NH, Avalos Marquez JC. Calidad de vida relacionada con la salud oral en adultos mayores de una población peruana. *Rev Kiru.* 2013; 10(2): 45-50.
3. Zentgraf A, Rammelsberg P, Cabrera T, Schöder J, Hassel AJ. Determinants of oral health-related quality of life of the institutionalized elderly. *Psychogeriatrics.* 2014; 14(4): 247-54. DOI: <https://doi.org/10.1111/psyg.12077>
4. Rocha-Buelvas A. Análisis sobre el acceso a los servicios de la salud bucal: un indicador de equidad. *Rev Gerenc Polit Salud.* 2013; 12(25): 96-112.

5. Griffin SO, Jones JA, Brunson D, Griffin PM, Bailey WD. Burden of Oral Disease Among Older Adults and Implications for Public Health Priorities. *Am J Public Health.* 2012; 102(3): 411-18. DOI: <https://dx.doi.org/10.2105%2FAJPH.2011.300362>
6. Díaz-Cardenas S, Simancas-Pallares M, Universidad de Cartagena. Propiedades Psicométricas de la Versión en Español del Índice General De Valoración de Salud Bucal [GOHAI] en Pacientes Adultos de Cartagena, Colombia. *Salud Uninorte.* 2017; 33(3): 393-404. DOI: <http://dx.doi.org/10.14482/sun.33.3.10887>
7. Gómez Serna LM, Uribe Montoya JJ, Torres Vanegas M. Situación de salud física de beneficiarios del programa Red de Cuidado Integral del Adulto Mayor [Internet]. Medellín: CES; 2018.
8. Departamento Administrativo Nacional de Estadística (DANE). Proyecciones nacionales y departamentales de la población 2005-2020. Bogotá: DANE; 2012.
9. Sánchez González D. Ambiente físico-social y envejecimiento de la población desde la gerontología ambiental y geográfica: implicaciones socioespaciales en América Latina. *Rev geogr Norte Gd.* 2015; (60): 97-114. DOI: <http://dx.doi.org/10.4067/S0718-34022015000100006>
10. Flórez CE, Villar L, Puerta N, Berrocal L. El proceso de envejecimiento de la población en Colombia: 1985-2050. Colombia: Editorial Fundación Saldarriaga Concha; 2015.
11. Rajaraman V, Ariga P, Dhanraj M, Jain AR. Effect of edentulism on general health and quality of life. *Drug Invention Today.* 2018; 10(4): 549-53.
12. Sánchez-García S, Heredia-Ponce E, Juárez-Cedillo T, Gallegos-Carrillo K, Espinel-Bermúdez C, de la Fuente-Hernández J et al. Psychometric properties of the general oral health assessment index (GOHAI) and dental status of an elderly Mexican population. *J Public Health Dent.* 2010; 70(4): 300-7. DOI: <https://doi.org/10.1111/j.1752-7325.2010.00187.x>
13. Naito M, Suzukamo Y, Nakayama T, Hamajima N, Fukuhara S. Linguistic adaptation and validation of the general oral health assessment index (GOHAI) in an elderly Japanese population. *J Public Health Dent.* 2006; 66(4): 273-5. DOI: <https://doi.org/10.1111/j.1752-7325.2006.tb04081.x>
14. Envigado. Secretaría de salud. Situación de salud 2016 del municipio de Envigado. Edición No.13. Envigado: Alcaldía de Envigado; 2017.
15. Ibáñez Mancera NG, Piña Libien YB, Aguilar Díaz N, Partida Rodríguez E. Xerostomía (hiposalivación) secundaria al tratamiento farmacológico de la hipertensión arterial. *Revista ADM.* 2011; 68(6): 283-89.
16. López-Ilis Stigui A, Ilis Stigui-Ortueta Z, Pérez-Borrego A. Asociación entre hipertensión arterial y periodontitis. *Revista Kiru.* 2017; 14(2): 109-14. DOI: <http://doi.org/10.24265/kiru.2017.v14n2.1>
17. Díaz Cardenas S, Arrieta Vergara K, Ramos Martínez K. Impacto de la salud oral en la calidad de vida de adultos mayores. *Rev Clin Med Fam.* 2012; 5(1): 9-16. DOI: <http://dx.doi.org/10.4321/S1699-695X2012000100003>
18. Hernández Esquivel RI, Jiménez F, Pérez J. Necesidades de atención odontológica en adultos mayores mediante la aplicación del GOHAI. *Rev ADM.* 2010; 67 (3): 127-32.
19. Souza JG, Costa Oliveira BE, Martins AM. Contextual and individual determinants of oral health-related quality of life in older Brazilians. *Qual Life Res.* 2017; 26(5): 1295-1302. DOI: <https://doi.org/10.1007/s11136-016-1447-7>
20. Cornejo M, Pérez G, de Lima KC, Casals-Pedro E, Borrell C. Oral health-related quality of life in institutionalized elderly in Barcelona (Spain). *Med Oral Patol Oral Cir Bucal.* 2013; 18(2): e285-92. DOI: <https://doi.org/10.4317/medoral.18280>

21. Arlette Pinzón S, Zunzunegui Pastor MV, Arlette S. Detección de necesidades de atención bucodental en ancianos mediante la autopercepción de la salud oral. *Rev Multidiscip de Gerontol.* 1999; 9(4):216-224
22. Duque Duque VE, Tamayo Castrillón J, Echeverri Cadavid PA, Gutiérrez Osorio AY, Sepúlveda Correa D, Giraldo Ramírez O et al. Calidad de vida relacionada con la salud bucal en adultos mayores que consultan a la IPS Universitaria de Medellín y sus factores asociados. *CES Odontol.* 2013; 26(1): 10-23.