

# ORAL HEALTH-RELATED QUALITY OF LIFE IN THE ELDERLY POPULATION RECEIVING HEALTH CARE AT THE PUBLIC HOSPITAL NETWORK IN MEDELLÍN, COLOMBIA, AND ITS RELATED FACTORS

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## ABSTRACT

*Metrosalud is the largest public hospital network in the city of Medellín and one of the most important in Colombia providing health care to the most vulnerable population. The objective of the study was to determine the Oral Health-Related Quality of Life (OHRQoL) and its related factors in the elderly population receiving health care at the public hospital network in Medellín (Colombia). A cross-sectional design was used. Men and women ≥ 65 years old were considered for this research, selected from first consultation records by the institution's statistical unit for 2011, who accepted to participate after being contacted by telephone. Sampling was performed in two stages: simple random sampling for selecting Hospital Units -HU- and Health Centers -HC- throughout the hospital network in the city, followed by random quota sampling in proportion to the number of elderly population assigned to each HU and HC. A total 342 patients (58.2% women) participated in the study. The project involved the use of a structured questionnaire and complete*

*dental examination with information on sociodemographic data, self-perceived health variables (mental, general and oral), use of oral health services, Oral Health-Related Quality of Life (OHRQoL as measured with GOHAI index), temporomandibular joint test, oral mucosa, soft tissue evaluation, periodontal, dental and prosthetic examination. Descriptive and bivariate analyses were conducted to determine statistically significant differences. Multivariate analysis was performed, using logistic regression, calculating crude and adjusted odds ratios (OR) with their 95% confidence intervals (95% CI). Impacts were found to be generated by education levels, differences in socioeconomic status and urban or rural housing conditions. The results of this research show low OHRQoL levels in the elderly population receiving health care services at the public hospital network in Medellín.*

**Key words:** *Quality of life, oral health, perception, geriatric assessment.*

## CALIDAD DE VIDA RELACIONADA CON LA SALUD BUCAL EN LA POBLACIÓN ADULTA MAYOR ATENDIDA EN LA RED HOSPITALARIA PÚBLICA DE MEDELLÍN (COLOMBIA) Y SUS FACTORES RELACIONADOS

### RESUMEN

*Metrosalud es la Empresa Social del Estado (E.S.E.) y red hospitalaria pública más grande de la ciudad de Medellín y una de las más importantes del país en materia de atención en salud a la población más vulnerable. El objetivo de este estudio fue determinar la calidad de vida relacionada con salud bucal (CVRSB) en la población adulta mayor atendida en la red hospitalaria pública de Medellín (Colombia) y sus factores relacionados. Se realizó un estudio descriptivo trasversal. La muestra fue constituida por población adulta mayor de la ESE Metrosalud. Hombres y mujeres mayores de 65 años fueron considerados para esta investigación y fueron seleccionados de los registros de consulta de la unidad de estadística de la institución (año 2011) e invitados a participar a través de contacto telefónico. Se realizó un muestreo en dos etapas, en primer lugar se seleccionaron aleatoriamente los centros y unidades hospitalarias y en segundo lugar se realizó un muestreo por cuotas teniendo en cuenta la distribución de adultos mayores, uso del Índice GOHAI, examen de articulación temporo-mandibular, mucosa bucal, evaluación de tejidos blandos, examen periodontal, dental y protésico. Se*

*realizaron análisis de 342 adultos mayores (58,2% mujeres) participaron en el estudio. El proyecto contempló la utilización de encuesta estructurada y examen odontológico completo, con información sobre datos sociodemográficos, variables de salud auto-percibida (mental, general y bucal), utilización de servicios de salud bucal, calidad de vida relacionada con la salud bucal (CVRSB). Análisis descriptivos y bivariados fueron realizados para observar diferencias estadísticamente significativas. Se realizó análisis multivariado por regresión logística, calculando odds ratios (OR) crudas y ajustadas con sus intervalos de confianza al 95% (IC 95%). Los hallazgos indican impactos en la Calidad de Vida Relacionada con la Salud Bucal -CVRSB- generados por variables como los niveles de educación, las diferencias en niveles socioeconómicos y las condiciones de la vivienda urbana o rural. Los resultados de esta investigación muestran bajos niveles de CVRSB en la población adulta mayor vinculados a los servicios de la red de pública hospitalaria en la ciudad de Medellín.*

**Palabras clave:** *Calidad de vida, salud bucal, percepción, evaluación geriátrica.*

## INTRODUCTION

Like many other countries in Latin America, Colombia has undergone a major demographic and epidemiological transition in recent decades, with rapid aging of the population<sup>1</sup>. Data from the 2012 World Health Organization (WHO) projection placed life expectancy at 79 years (76 years for men and 83 years for women)<sup>2</sup>. According to the statistics from the National Demographic and Health Survey (ENDS-2010) and the projections from the National Administrative Department of Statistics (DANE), the population older than 60 years represents 10% of the population, and those over 65 years 7% with indicators for the Department of Antioquia being quite similar to the national average<sup>3,4</sup>.

With regard to social and health diagnosis, it is clearly important to analyze certain conditions because of the challenges involved in developing policies for the elderly population. For example, among the social and health conditions reported by the ENDS-2010<sup>3</sup>, the following stand out: one third of households with elderly members have two or more unfavorable conditions, including housing and access to health services; three out of five seniors feel emotionally affected because of their health condition; 45% have high blood pressure, followed by allergies (17%), arthritis (16%), other heart diseases (16%), diabetes (11%) and lung diseases (10%). For the population aged over 65 years, the latest National Survey of Oral Health (ENSAB IV, 2013-2014) reported higher DMFT, partial tooth loss in over 95%, total tooth loss 33%, and periodontal disease in over 70%<sup>5</sup>.

These situations mean that the elderly population is an increasingly significant group, but as it is vulnerable to inequalities and social exclusion, the higher life expectancy is not accompanied by better quality of life or optimal conditions of general and oral health<sup>6</sup>.

Scientific research has increasingly been evaluating the relationship between quality of life and oral health<sup>7-10</sup>. Oral health-related quality of life is defined as *“a person’s perceived level of enjoyment regarding his/her mouth and the service it provides to his daily life, taking into account his/her past and present circumstances, involvement in care, expectations, paradigms, and of course the value system inspired by his/her sociocultural context”*<sup>11</sup>. Tools to evaluate the impact of quality of life in oral

health have been available since the early 1970s. Although the review of recent literature shows that there are many studies on the subject<sup>12-16</sup>, there has been little research in this line of work in Colombia. There are a few studies evaluating oral health conditions in specific samples<sup>17-20</sup>, but they address neither the quality of life component nor this age group.

METROSALUD is the largest public hospital network in the city of Medellín and one of the most important in Colombia providing health care to the most vulnerable population. It thus provides an interesting opportunity for studying the factors related to quality of life and their relationship to oral health in the population that receives healthcare services at the hospital’s different facilities. Scientific knowledge of these issues will provide support to decision-making for the implementation of public oral health policies for vulnerable populations.

The purpose of this study is to determine the Oral Health-Related Quality of Life (OHRQoL) and its related factors in the elderly population receiving healthcare at the public hospital network in Medellín, Colombia.

## MATERIALS AND METHODS

### *Design, data collection and setting*

A cross-sectional design was used. The study population was constituted by the elderly population receiving primary and specialized health care at the public hospital network in Medellín (E.S.E METROSALUD). Men and women  $\geq 65$  years old were considered for this research. They were selected from first consultation records by the institution’s statistical unit for 2011 and accepted to participate after being contacted by telephone. The exclusion criterion was motor disabilities preventing the subject from traveling to the healthcare facility.

An initial sample of 352 elderly persons was determined by sampling in two stages. First, simple random sampling was used to select Hospital Units -HU- and Healthcare Centers -HC- throughout the hospital network in the city. Second, random quota sampling was carried out in proportion to the number of elderly persons assigned to each HU and HC. To calculate sample size we considered prevalence of 29.1% of low quality of life, as demonstrated by other studies<sup>21, 22</sup>, 95% confidence level and 5% sampling error, plus 10% over

sampling for any possible loss of information. However, for this analysis, data from 342 seniors (58.2% female) was used, which constitutes 97% of the total sample after debugging data.

The project used a structured questionnaire and complete dental examination with information on sociodemographic data, self-perceived health variables (mental, general and oral), use of oral health care services, Oral Health-Related Quality of Life, temporomandibular joint test, oral mucosa, soft tissue evaluation, periodontal, dental and prosthetic examination. Questionnaires were administered by a fieldwork group (two examiners and 4 interviewers), who were trained and calibrated to take quality surveys (concordance >80%). A pilot test was conducted on 10 people to revise and correct the language, adapt the questions culturally and check the overall consistency of the instruments for data collection. Fieldwork was conducted between March and December 2013. Oral test standards followed the parameters defined in the Basic Methods according to parameters of the World Health Organization (WHO) for surveys of oral health<sup>23</sup>.

### **Variable Definitions**

This study considered as a principal variable the Oral Health-Related Quality of Life (OHRQoL) through the Geriatric Oral Health Assessment Index (GOHAI)<sup>6,8,21</sup>, which consists of 12 multiple-choice questions and provides a score on a scale of 0 to 60 (where zero corresponds to the worst assessment of GOHAI and 60 the best). The GOHAI scales were divided into three categories: high (57 to 60), moderate (51 to 56) and low ( $\leq 50$ ). However, for multivariate analysis this variable was dichotomized, and the moderate and high score were aggregated as good quality of life and low scores were aggregated as poor quality of life.

Sociodemographic variables considered were: sex, age (65-74,  $\geq 75$ ), level of education ( $\leq$ Primary,  $\geq$ Secondary), socioeconomic level (defined according to the classification provided for housing by the city's public services company and categorized as low -0, 1 and 2- and medium -3 and 4-), marital status (single, married, cohabiting, widowed, separated), and zone of residence (urban/rural). The Duke-UNC-11 questionnaire, validated and adapted for the purpose of this study, was used to measure social support. This self-administered instrument containing 11 items evaluates perceived functional

or qualitative social support in two dimensions: confidence (possibility of relying on others to communicate) and affective (manifestations of love, affection and empathy). Each item is scored on a frequency rating (Likert-type scale) from 1: "Much less than I would like" to 5: "As much as I would like". The score was calculated by adding up the responses to each item, with a higher score denoting greater social support. The cut-off point for low levels of social support is the 15th percentile, corresponding to a score of 32<sup>24, 25</sup>.

Several variables were selected to evaluate health and oral health status: medical treatment (Yes/No), medication use (Yes/No), presence of upper/lower denture (Yes/No), satisfaction with upper/lower denture (Satisfied/Dissatisfied), need to change upper/lower denture (Yes/No), oral mucosa (Normal/Affected), need for treatment (Yes/No), temporomandibular joint (Asymptomatic/ Symptomatic), satisfaction with dental status (Satisfied/ Dissatisfied).

### **Data Analysis**

First, the study variables were described using absolute and relative frequencies. For GOHAI, mean and median, interquartile range (IQR), minimum and maximum ranges were calculated according to sociodemographic variables and general and oral health, and chi-square tests (median, Student's t-test and Mann-Whitney) were performed to determine statistically significant differences between variables. OHRQoL categories were analyzed as high, moderate or low, according to the aforementioned variables, and Chi-square tests for frequencies were performed to determine relationships between variables. Finally, multivariate analysis was performed, using logistic regression, calculating crude and adjusted odds ratios (OR) with their 95% confidence intervals (95% CI). For these analyses, we used a model that includes all the confounders mentioned, and we show the complete adjusted models. All calculations were made using Stata10<sup>®</sup> y SPSS<sup>®</sup> 19.0.

### **Ethics**

This research followed international guidelines (Declaration of Helsinki) and the legal regulations of Colombia (Resolution N° 008430, October 4, 1993, Ministry of Health). Confidentiality was guaranteed throughout the research process and all respondents provided informed consent to

participate. Since the elderly population is considered highly sensitive, all participants and their relatives received information on the objectives of the research and were informed they could withdraw freely with no retaliation at any time if they wished to do so. In addition, they received information about the treatment they required and where they needed to go. The study protocol was approved by the Ethical Committee of the E.S.E Metrosalud (act 09-2011).

## RESULTS

The sample consisted of 342 elders with mean age 72.6 years ( $\pm 5.9$ ), and the predominant age group was 65 - 74 years (69%). The percentage of females was slightly higher (58%). Fifty-eight percent reported primary education and a higher frequency of subjects was from socioeconomic levels 1 and 2

(86%). Over 40% were married or cohabiting, 90% lived in urban areas and almost a quarter reported low social support (Table 1).

Considering the behavior of the GOHAI index according to sociodemographic variables (Table 1), a median of 46 (IR = 13) was obtained. The survey found higher Oral Health-Related Quality of Life (OHRQoL) scores for men, adults under 74, higher education, middle socioeconomic level and married, although the differences were not statistically significant. Those living in rural areas reported higher quality of life score with statistically significant difference ( $p < 0.05$ )

Regarding the health indicators selected in the study (Table 2), it was found that 86% of adults were in medical treatment and 85% used some type of medication. The variables related to oral health findings indicated that just over three-quarters of

**Table 1: Mean (SD) and median of the GOHAI test score according to sociodemographic characteristics in the target population. Medellín (Colombia), 2013. (n=342).**

Variables	Sample		GOHAI Score				p-value**
	n	%	$\bar{X}$ (SD)	Me (Q3 - Q1)*	Min	Max	
<b>Sex</b>							
Male	143	41.8	44.8 (9.6)	47 (12)	22	60	0.534
Female	199	58.2	44.3 (9.8)	46 (14)	16	60	
<b>Age (years)</b>							
65-74	235	68.7	44.9 (9.7)	47 (13)	16	60	0.085
$\geq 75$	107	31.3	43.6 (9.6)	44 (15)	22	60	
<b>Education level</b>							
$\leq$ Primary	316	92.4	44.2 (9.8)	46 (14)	16	60	0.058
$\geq$ Secondary	26	7.6	47.6 (8.0)	51 (11)	28	58	
<b>Socioeconomic level</b>							
Low (1-2)	293	85.7	44.0 (9.8)	46 (13)	16	60	0.154
Middle (3-4)	49	14.3	47.5 (8.3)	49 (10)	24	60	
<b>Marital status</b>							
Single	75	21.9	44.1 (10.9)	46 (15)	19	60	0.453
Married	127	37.1	45.5 (8.8)	48 (11)	16	60	
Cohabiting	21	6.1	45.8 (9.5)	46 (8)	23	60	
Widowed	90	26.3	43.2 (10.0)	44 (15)	22	60	
Separated	29	8.5	44.3 (9.4)	47 (14)	22	57	
<b>Zone of residence</b>							
Urban	306	89.5	44.0 (9.8)	46 (14)	16	60	0.007
Rural	36	10.5	48.5 (7.3)	50 (6)	27	60	
<b>Social support (Duke-11)</b>							
Normal	261	76.3	45.1 (9.5)	48 (12)	16	60	0.056
Low	81	23.7	42.4 (10.0)	44 (17)	20	60	
<b>Total (All)</b>	<b>342</b>	<b>100</b>	<b>44.5 (9.7)</b>	<b>46 (13.3)</b>	<b>16</b>	<b>60</b>	<b>--</b>

\* Median (Interquartile range (Quartile 3- Quartile 1) \*\* Chi square median tests for independent samples

the elders were using upper dentures, of whom 63% were dissatisfied and 70% needed change according to clinical criteria; slightly less than half (46%) used lower dentures, of whom 82% were dissatisfied and 58% needed change. Affected oral mucosa was observed in two thirds of the examinees. A little over 40% presented subjective symptoms in

Temporomandibular Joint (TMJ). Overall, nearly half the respondents were satisfied with the state of their teeth and structures of the oral cavity.

For clinical variables, highest scores according to GOHAI index were achieved by those not receiving medical treatment, taking medication, with upper and lower dentures, and without need for dental

**Table 2: Mean (SD) and median of the GOHAI test score according to selected general health and oral health indicators in the target population. Medellín (Colombia), 2013. (n=342).**

Variables	Sample		GOHAI Score				p-value**
	n	%	X (SD)	Me(Q3-Q1)*	Min	Max	
<i>Medical treatment</i>							
Yes	293	85.7	44.3 (9.6)	46 (14)	16	60	0.217
No	49	14.3	45.8 (10.2)	48 (13)	20	60	
<i>Medication use</i>							
Yes	290	84.8	44.3 (9.6)	46 (14)	16	60	0.344
No	52	15.2	45.4 (10.4)	48 (13.5)	20	60	
<i>Presence of upper denture</i>							
Yes	79	23.1	44.6 (9.8)	47 (14)	23	60	0.604
No	263	76.9	44.2 (9.3)	45 (11)	16	60	
<i>Presence of lower denture</i>							
Yes	184	53.8	44.4 (10.1)	46.5 (15)	22	60	0.878
No	158	46.2	44.5 (9.4)	46 (11)	16	60	
<i>Satisfaction with upper denture</i>							
Satisfied	126	36.8	47.4 (8.9)	50 (13)	16	60	<0.001
Dissatisfied	216	63.2	42.8 (9.8)	45 (14)	19	60	
<i>Satisfaction with lower denture</i>							
Satisfied	63	18.4	48.7 (9.1)	52(9)	16	60	<0.001
Dissatisfied	279	81.6	43.5 (9.6)	46 (15)	19	60	
<i>Need to change upper denture</i>							
Yes	102	29.8	43.6 (10.0)	46 (15)	24	60	0.017
No	240	70.2	46.5 (8.6)	48 (11)	16	60	
<i>Need to change lower denture</i>							
Yes	145	42.4	43.4 (10.2)	45 (15)	22	60	0.020
No	197	57.6	46.0 (8.8)	48 (11)	16	60	
<i>Oral mucosa</i>							
Normal	115	33.6	46.7 (8.9)	49 (12)	22	60	0.002
Affected	227	66.4	43.4 (9.9)	45 (15)	16	60	
<i>Need for dental treatment</i>							
No	10	2.9	44.0 (11.1)	48.5 (20)	26	56	0.984
Yes	332	97.1	44.5 (9.7)	46 (13)	16	60	
<i>Temporomandibular joint</i>							
Asymptomatic	192	56.1	46.8 (8.9)	49.5 (12)	19	60	<0.001
Symptomatic	150	43.9	41.6 (9.9)	43 (15)	16	60	
<i>Satisfaction with dental status</i>							
Satisfied	167	48.8	48.6 (8.1)	50 (9)	16	60	<0.001
Dissatisfied	170	49.7	40.3 (9.4)	42 (16)	19	56	

\* Median -Interquartile range (Quartile 3- Quartile 1)- \*\* Mann Whitney U tests

treatment (differences between groups were not statistically significant). Higher scores were achieved by the groups satisfied with their prostheses (both lower and upper), those that do not need to change their prostheses, those with normal oral mucosa, those without TMJ symptoms and those who are satisfied with their dental status; these findings being statistically significant (Table 2).

The reclassification of the GOHAI score overall showed that 68% had a low level of OHRQoL (Table 3). No statistically significant difference ( $p < 0.05$ ) was found according to sociodemographic characteristics. It is worth highlighting that women, adults over 74 years old, subjects with high school and college education, subjects with low socioeconomic

level, the widowed, urban dwellers, and people with low social support all reported low OHRQoL.

The analysis of the GOHAI index categories according to general and oral health variables (Table 4) shows lower OHRQoL in those who are in medical treatment and take medication (69% in both cases), those with upper and lower prosthesis (70% in both cases), those who need to change their prostheses, both upper and lower (60% and 64% respectively), although no statistically significant difference was found ( $p < 0.05$ ). In contrast, statistically significant differences ( $p < 0.001$ ) were found for those who perceived lower OHRQoL, those dissatisfied with their upper and lower prosthesis (76% and 73% respectively), those with

**Table 3: Test GOHAI categories (Oral health-related quality of life) according to sociodemographic categories in the target population. Medellín (Colombia), 2013. (n=342).**

Variables	GOHAI categories (Oral-health related quality of life)						p-value**
	High		Moderate		Low		
	n	%	n	%	n	%	
<b>Sex</b>							
Male	11	5.5	55	27.6	133	66.8	0.509
Female	11	7.7	33	23.1	99	69.2	
<b>Age (years)</b>							
65-74	15	6.4	65	27.7	155	66.0	0.477
≥ 75	7	6.5	23	21.5	77	72.0	
<b>Education level</b>							
≤ Primary	21	6.6	76	24.1	219	69.6	0.046
≥ Secondary	1	4.5	12	46.2	13	50.0	
<b>Socioeconomic level</b>							
Low (1-2)	17	5.8	73	24.9	203	69.3	0.297
Middle (3-4)	5	10.2	15	30.6	29	59.2	
<b>Marital status</b>							
Single	6	8.0	21	28.0	48	64.0	0.946
Married	6	4.7	34	26.8	87	68.5	
Cohabiting	2	9.5	6	28.6	13	61.9	
Widowed	6	6.7	19	21.1	65	72.2	
Separated	2	6.9	8	27.6	19	65.5	
<b>Zone of residence</b>							
Urban	17	5.6	78	25.5	211	69.0	0.130
Rural	5	13.9	10	27.8	21	58.3	
<b>Social support (Duke-11)</b>							
Normal	20	7.7	69	26.4	172	65.9	0.181
Low	2	2.5	19	23.5	60	74.1	
<b>Total (All)</b>	22	6.4	88	25.7	232	67.8	---

\* Chi square tests

Temporomandibular Joint symptoms (81%) and those who said they were dissatisfied with their oral health status (85%).

Table 5 shows the multivariate model for poor quality of life related to oral health adjusted for

sociodemographic variables (model 1), clinical conditions (model 2) and all variables together (model 3). Overall, the significant variables that best explained poor quality of oral health were the presence of Temporomandibular Joint symptoms

**Table 4: Mean (SD) and median of the GOHAI test score according to selected general health and oral health indicators in the target population. Medellin (Colombia), 2013. (n=342).**

Variables	GOHAI categories (Oral-health related quality of life)						p-value**
	High		Moderate		Low		
	n	%	n	%	n	%	
<i>Medical treatment</i>							
Yes	17	5.8	73	24.9	203	69.3	0.297
No	5	10.2	15	30.6	29	59.2	
<i>Medication use</i>							
Yes	16	5.5	75	25.9	199	68.6	0.263
No	6	11.5	13	25.0	33	63.5	
<i>Presence of upper denture</i>							
Yes	4	5.1	20	25.3	55	69.6	0.838
No	18	6.8	68	25.9	177	67.3	
<i>Presence of lower denture</i>							
Yes	10	5.4	46	25.0	128	69.6	0.646
No	12	7.6	42	26.6	104	65.8	
<i>Satisfaction with upper denture</i>							
Satisfied	13	10.3	45	35.7	68	54.0	<0,001
Dissatisfied	9	4.2	43	19.9	164	75.9	
<i>Satisfaction with lower denture</i>							
Satisfied	8	12.7	27	42.9	28	44.4	<0,001
Dissatisfied	14	5.0	61	21.9	204	73.1	
<i>Need to change upper denture</i>							
Yes	7	6.9	34	33.3	61	59.8	0.096
No	15	6.3	54	22.5	171	71.3	
<i>Need to change lower denture</i>							
Yes	10	6.9	42	29.0	93	64.1	0.446
No	12	6.1	46	23.4	139	70.6	
<i>Oral mucosa</i>							
Normal	9	7.8	38	33.0	68	59.1	0.048
Affected	13	5.7	50	22.0	164	72.2	
<i>Need for dental treatment</i>							
No	0	0.0	3	30.0	7	70.0	0.690
Yes	22	6.6	85	25.6	225	67.8	
<i>Temporomandibular joint</i>							
Asymptomatic	16	8.3	65	33.9	111	57.8	<0,001
Symptomatic	6	4.0	23	15.3	121	80.7	
<i>Satisfaction with dental status</i>							
Satisfied	21	12.6	60	35.9	86	51.5	<0,001
Dissatisfied	0	0.0	26	15.3	144	84.7	

\* Chi square tests

**Table 5: Multivariate model by logistic regression for low oral health-related quality of life according to selected sociodemographic and oral health indicators in the target population. Medellín (Colombia), 2013. (n=342).**

Variables	Low quality of life					
	Model 1		Model 2		Model 3	
	OR	95% CI	OR	95% CI	OR	95% CI
<i>Age (years)</i>						
65-74	1.00	---			1.00	---
≥ 75	1.32	0.79- 2.21			1.37	0.76- 2.46
<i>Education level</i>						
≤ Primary	2.29	0.99- 5.13			2.48	0.98- 6.93
≥ Secondary	1.00	---			1.00	---
<i>Socioeconomic level</i>						
Low (1-2)	1.56	0.82- 2.96			1.72	0.83- 3.58
Middle (3-4)	1.00	---			1.00	---
<i>Zone of residence</i>						
Urban	1.69	0.82- 3.49			2.11	0.87- 5.13
Rural	1.00	---			1.00	---
<i>Social support (Duke-11 )</i>						
Normal	1.00	---			1.00	---
Low	1.50	0.84- 2.65			1.16	0.61- 2.22
<i>Medical treatment</i>						
Yes			1.24	0.60-2.55	1.06	0.50- 2.27
No			1.00	---	1.00	---
<i>Satisfaction with upper denture</i>						
Satisfied			1.00	---	1.00	---
Dissatisfied			1.48	0.77- 2.85	1.52	0.77- 2.99
<i>Satisfaction with lower denture</i>						
Satisfied			1.00	---	1.00	---
Dissatisfied			1.45	0.66- 3.18	1.58	0.71- 3.53
<i>Need to change upper denture</i>						
Yes			1.27	0.65- 2.50	1.26	0.64- 2.52
No			1.00	---	1.00	---
<i>Need to change lower denture</i>						
Yes			1.30	0.68- 2.48	1.33	0.69- 2.57
No			1.00	---	1.00	---
<i>Oral mucosa</i>						
Normal			1.00	---	1.00	---
Affected			1.40	0.82- 5.37	1.36	0.77- 2.41
<i>Temporomandibular joint</i>						
Asymptomatic			1.00	---	1.00	---
Symptomatic			3.09	1.77- 5.37	3.17	1.80- 5.70
<i>Satisfaction with dental status</i>						
Satisfied			1.00	---	1.00	---
Dissatisfied			4.36	2.47- 7.71	4.31	2.40- 7.77

\*The reference category for oral health related quality of life according to the GOHAI score is moderate or high (<50).

Model 1: Adjusted for sociodemographic variables, Model 2: Adjusted for health indicators,

Model 3: Adjusted for sociodemographic and health variables.

and satisfaction with dental status. People who reported Temporomandibular Joint symptoms (OR 3.17; 95% CI: 1.80- 5.70) and satisfaction with their dental status (OR 4.31, 95% CI 2.40- 7.77) were more likely to report poor oral health-related quality of life.

## DISCUSSION

This study aims to explain factors related to OHRQoL in the elderly population receiving health care at the public hospital network in Medellín. Overall, men and women perceived a low level of their Oral Quality of Life. Educational level, dissatisfaction with current dental prosthesis and the need to change these prostheses, state of oral mucosa, state of TMJ and self-perception of the status of dental and oral health, appear as factors associated to OHRQoL in the bivariate analysis. The multivariate analysis shows that after adjusting sociodemographic and clinical variables, elders that referred presence of symptoms in Temporomandibular Joint and dissatisfaction with their dental status were more likely to report poor oral health-related quality of life with statistically significant differences. To the best of our knowledge, this is one of few studies in Colombia focusing on elderly population including oral health-related quality of life and its relationship with sociodemographic and clinical conditions.

These findings on the status of low oral health-related quality of life according to the model provided by the GOHAI index reveal aspects that should be taken into consideration, particularly the impacts generated by education levels, socioeconomic differences and urban or rural housing condition. They reveal the situation of vulnerability expressed by these indicators and perceived quality of life, suggesting that efforts should be sustained, particularly when users of the public health care network are from middle and low socioeconomic classes. Likewise, findings related to clinical indicators are relevant, highlighting the positive impact associated with positive clinical conditions and satisfaction of subjects assessed. This information should be taken into account because health care providers should appraise how decisive health care actions have a positive impact on the perceptions of the population over 65 years of age.

The main results of this study are consistent with research conducted in recent years. The first study that provided data on the OHRQoL in the elderly

with use of the GOHAI index was performed by Atchison and Dolan<sup>21</sup>, who found a GOHAI index value of 52.5 points for a sample of people older than 65 years. The German version of GOHAI index by Alexander Hassel et al.<sup>26</sup> found an average of 56 points for people reporting satisfaction with their oral status and an average of 44 points for those who were not satisfied. In France, Tubert-Jeanninet al.<sup>27</sup> reported an average value of GOHAI index of 46 points, being lower (38 points) for those with worse oral health status and much higher (52 points) for those with better conditions .

The GOHAI index, has also been applied in China, reporting 48.9 points on average, with 55.9 for people with good oral health and 40.4 for people with poor oral health<sup>28</sup>. In Japan, Naito et al.<sup>29</sup> studied 175 participants of average age 70 years, finding a GOHAI index of 57.9 among those who rated their oral health as very good, and 38.7 among those who rated their oral health the lowest. Pinzon and Zunzunegui<sup>30</sup> validated GOHAI index in Spain and published a study on oral health care needs in an institutionalized geriatric population comprising 100 individuals. They found that 68% had scores below 57 points with moderate and low levels; while the rest had higher scores and were defined as having high oral health-related quality of life.

Dias da Silva et al.<sup>31</sup> conducted a study at the University of Campinas, finding an average GOHAI index of 33.61 points. Another study conducted in Taubaté, Brazil on institutionalized and non-institutionalized subjects found an average of GOHAI index of 33.45 points for the former and 32.66 points for the latter<sup>32</sup>. Similar OHRQoL results are reported for France, China, Brazil, Spain, Malaysia and Saudi Arabia. In Colombia, a study conducted on adults treated at dental clinics at the University of Cartagena reported that most of them show high impact on OHRQoL<sup>33</sup>.

Results such as those presented by the University of Cartagena show an association between the existence of oral problems and their impact on quality of life in older adults. Likewise, other studies indicate a positive impact of dental treatment and rehabilitation primarily based on findings based on the GOHAI<sup>34</sup>. The study in China reported a GOHAI of 53 points for toothless patients and 49.1 points for partial denture wearers. It concluded that the loss of teeth and use of dentures do not have great impact on quality of life; however, partial denture users

experienced a negative impact, perhaps due to lower satisfaction with denture and the presence of teeth with advanced support problems. Wong and MacMillan<sup>35</sup> report a tendency to better oral health-related quality of life in subjects who do not wear dentures. The study conducted at the University of Clermont-Ferrand, France, by Veyrune et al.<sup>36</sup>, shows the impact of new dentures through evaluations made when a new prosthesis was first used and after 6 and 12 months, concluding that GOHAI index improved after 12 months of wearing the new prosthesis.

It is important to discuss the strengths and limitations of our study. As far as we know, it is one of the first studies to address the research topic in Medellín city. There was a sufficiently representative sample of older adults from the Hospital Units and Health Care Centers in the public health service provider network in Medellín city to enable visualization of oral health status in a large segment of special social vulnerability. Likewise, the use of previously validated instruments (self-perception/clinical) enabled international comparisons to be made. Quality control performed on the questionnaires increases reliability. Finally, including

health variables enables new perspectives for epidemiological analysis. However, the results of this study should be interpreted with caution in view of its limitations. It should be mentioned that the cross-sectional nature of the study does not allow causality to be established among the relationships and associations found. However, the results show the need to establish methods for monitoring and surveillance, in view of the fact that the study population has an institutional allocation responsible for providing health care services.

## CONCLUSION

The results of this research show low levels of OHRQoL in the senior population receiving health care services at the public hospital network in Medellín. They also provide evidence of sociodemographic and general and oral health factors that should be taken into account for formulating strategies and social policies, while working together to ensure that this sensitive and socially vulnerable population segment has more opportunities to receive health care, in order to contribute to improving its quality of life.

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