



CLINICAL RESEARCH:

Analysis of Self-Perceived Prosthetic Needs and Social Interaction Issues in Older Adults: A Cross-Sectional Study

Análisis de la autopercepción de las necesidades protésicas y las dificultades de interacción social en adultos mayores colombianos: un estudio transversal

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ABSTRACT: Oral factors, such as tooth loss and the quality of dental prostheses, have been identified as potential determinants of healthy aging in older adults. These factors significantly impact their overall quality of life. To investigate the variables associated with health and well-being of individuals over the age of 60 that may influence self-perceived prosthetic needs and social interaction issues related to the use of dental prostheses in the Colombian population. A cross-sectional analysis was conducted with secondary data provided by the National Study of Health, Well-Being, and Aging (SABE). SABE study carried out 23.694 surveys with 1.665 variables of which 37 were analyzed and considered of interest for this research corresponding to a subsample analyzed of 1.442 surveys. As main dependent variables were chosen: Self-perceived dental prosthetic needs and Dental prosthesis-related social interaction problems. Sociodemographic, general and oral health conditions were considered as independent variables. Descriptive, bivariate, and multivariate analyses were used to estimate the influence of independent variables on the main outcomes. The perceived necessity of a new dental prosthesis was associated with fair/poor general health, no mandibular prosthesis, time of prosthesis use ≥ 5 years, dental prosthesis dissatisfaction and prosthesis-related social interaction problems. On the other hand, social interactions problems related to dental prosthesis were associated with living in rural areas, oral dryness, using a prosthesis for < 5 years, self-perceived prosthesis needs, prosthesis-related speech problems and expressing dissatisfaction with their prosthesis. Differences in main outcomes were observed according to the sociodemographic, general, and oral health characteristics that suggest social inequalities in the aged population in Colombia.



KEYWORDS: Aged; Oral health; Dental care for aged; Dental prosthesis; Cross-sectional studies; Colombia.

RESUMEN: Factores bucales como la pérdida dentaria y la calidad de las prótesis dentales se han identificado como posibles determinantes del envejecimiento saludable en adultos mayores, debido a su impacto en la calidad de vida y la interacción social. Investigar las variables asociadas con la salud y el bienestar de personas mayores de 60 años que influyen en la autopercepción de las necesidades protésicas y en los problemas de interacción social relacionados con el uso de prótesis dentales en la población colombiana. Se realizó un estudio transversal basado en datos secundarios del Estudio Nacional de Salud, Bienestar y Envejecimiento (SABE). De 23.694 encuestas con 1.665 variables disponibles, se seleccionaron 37 variables de interés correspondientes a una submuestra de 1.442 participantes. Las variables dependientes fueron la autopercepción de necesidad de prótesis dental y los problemas de interacción social asociados a su uso. Las variables sociodemográficas, generales y de salud bucal se consideraron independientes. Se aplicaron análisis descriptivos, bivariados y multivariados para evaluar asociaciones. La percepción de necesidad de una nueva prótesis se asoció con salud general regular o mala, ausencia de prótesis mandibular, tiempo de uso ≥ 5 años, insatisfacción con la prótesis y problemas de interacción social. Los problemas de interacción social se relacionaron con residencia rural, sequedad bucal, uso de prótesis < 5 años, percepción de necesidad protésica, dificultades del habla e insatisfacción protésica. Los resultados evidencian diferencias según características sociodemográficas, generales y de salud bucal, sugiriendo la presencia de desigualdades sociales que influyen en la salud oral y el bienestar de los adultos mayores en Colombia.

PALABRAS CLAVE: Adulto mayor; Salud bucal; Atención odontológica para adultos mayores; Prótesis dental; Estudios transversales; Colombia.

INTRODUCTION

Human aging has undergone notable changes in recent decades, largely driven by increased life expectancy. As a result, the global demographic profile has shifted toward older age groups. According to projections from the World Health Organization, by 2030 nearly one in six individuals worldwide will be aged 60 years or older, with most residing in low- and middle-income countries (1). This demographic transition presents significant challenges for healthcare systems, as older adults have diverse health needs that directly influence their quality of life.

Patient-reported outcomes provide valuable insight into individuals' experiences, perceptions,

and functional status following healthcare interventions. In the field of oral health, physiological changes associated with aging and tooth loss include decreased muscle tone, reduced salivary flow, and diminished skeletal and mucosal support. These alterations can affect self-perception, appearance, and self-confidence (2-4). Additionally, tooth loss has been associated with impaired masticatory function, nutritional deficiencies, and increased risk of depression among older adults (5-7). Overall, both physiological and pathological consequences of tooth loss negatively affect quality of life and self-esteem.

In Colombia, approximately 98.9% of adults aged 65 to 79 have experienced tooth loss, following a clear age-related pattern (8). Nearly two-thirds

use dental prostheses, with greater prevalence among those with lower socioeconomic status. Although fixed and removable prostheses aim to restore stomatognathic function, improve nutritional status, and enhance perceived oral health (9), clinical outcomes may be modulated by systemic conditions, access to care, educational attainment, and income level (9-12). In recent years, oral-health-related quality of life has gained prominence, as poor dental status has been associated with functional, psychological, and social limitations (13). Notably, research conducted in Bogotá reported that prosthesis use did not improve quality of life among edentulous individuals, underscoring the importance of assessing patient perspectives (14).

Existing Colombian research has primarily examined tooth loss, edentulism, and associated sociodemographic and behavioral variables. Findings indicate that health literacy influences treatment outcomes and prosthetic rehabilitation success. Moreover, advanced analytical approaches, including machine learning, have identified dyslipidemia, low socioeconomic status, and smoking as key predictors of unfavorable oral health, with edentulism particularly prevalent among individuals exposed to these risk factors (15-18). These results highlight the need for comprehensive strategies that integrate social determinants of health, improve access to dental services, and incorporate patient-centered assessments to enhance oral health outcomes in Colombian older adults.

Given that most available evidence arises from studies conducted in high-income countries and that population-specific data on prosthesis use and related experiences among Colombian older adults remain limited, drawing definitive conclusions is challenging. Patient-reported outcomes are essential to evaluate the success of oral-health interventions from the individual's perspective and to inform clinical, research, and policy-level decisions. Therefore, this study aims to analyze factors related to health and well-being in

adults aged 60 years and older that may influence self-perceived prosthetic needs and social interaction issues associated with dental prosthesis use in Colombia.

METHODS

DESIGN AND POPULATION SAMPLE

This cross-sectional study involved a secondary analysis of data from the National Study of Health, Well-Being, and Aging (SABE). Conducted in 2015, SABE Colombia aimed to assess the situation of the elderly population in Colombia, using the framework of the Determinants of Active Aging and the Social Determinants of Health model. The study employed a national cross-sectional design with a quantitative methodological approach and a master sample scheme. It was regionally representative, covering both large cities and rural areas, with multistage urban/rural stratification (19).

The inclusion criteria for this study were people over 60 years old and took into account the ability to autonomously answer the questions of the participants based on the results obtained in the cognitive assessment of the Abbreviated Mini-Mental State Examination (AMMSE), (exclusive for people aged 60 or older) with 6 questions and maximal score of 19. If the score was equal to or greater than 13, the older adult was appropriate to provide the information, if the score was equal to or less than 12, an interview to the PROXI or substitute informant was done.

For that case the Abbreviated Mini-Mental State Examination (AMMSE) (Exclusively for the accompanying person or PROXI aged 60 or over) was done; it included 6 questions with a maximum score of 19 points. If the score is equal to or greater than 13, the older adult (PROXI) was appropriate to provide the information, if the score is equal to or less than 12, the older neither the PROXI were appropriate to participate in SABE (20).

This test was part of the design of the instruments in section 6 of the methodology, corresponding to cognition and affect, that allows a rapid assessment of cognitive function in adults and therefore allows early detection of cognitive impairment. In this way, pollsters could predict cases ranging from a mild decrease in cognitive function to more serious cases, such as dementia, thereby discarding responses that could generate significant biases in the results obtained. With the use of 23,694 (77%) population surveys in households in urban and rural areas of 246 municipalities in Colombia, general information on older adults was recorded in relation to socioeconomic variables, the physical and social environment, behavior, cognition and affection, functionality, mental well-being, medical conditions and health, and the use and access to health services. Weight, height, waist circumference, calf circumference, arm circumference, height of knee, gait speed, and static balance were among the 1,665 different variables measured anthropometrically and functionally during the information gathering process and at the conclusion of the application of the questionnaire. 37 variables of interest were found from this sample, leaving out 1,628 of the totals, and which allowed the analysis of 1,442 surveys and discarding 22,252 due to lack of information representing 6,1% of the surveys since if only one of the variables of interest did not present a response, it was excluded from the sample (Figure 1). Since the objective of this study was to establish relationships between the dependent and independent variables, this subsample is considered appropriate in methodological terms. Other analyses that have been carried out with data from the SABE survey, using a larger sample size, present results similar to those presented in this study, evidencing the vulnerable situation of older adults (21).

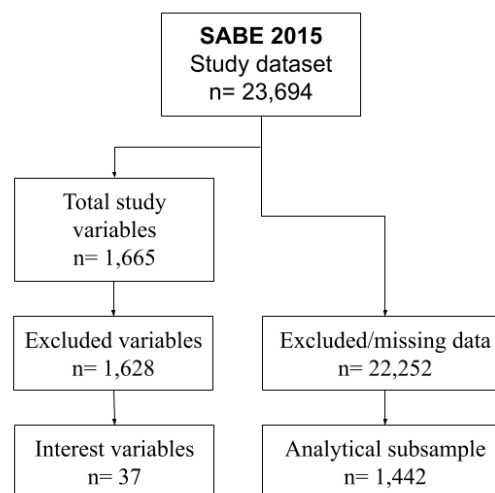


Figure 1. Variables and participants (surveys) selection flowchart.

VARIABLES

The following variables associated with health and well-being were considered: 1) As a main outcome two dependent variables were considered: (i) Self-perceived dental prosthetic needs: this variable was obtained from question P861 of the general questionnaire of SABE survey (available upon reasonable request) -Regardless of whether you have it or not (referring to a dental prosthesis), do you think you need a dental prosthesis?- the variable was categorized in Yes/No; (ii) dental prosthesis-related social interaction problems: this is a combined variable obtained from the questions P865 (The dentures or prostheses did not allow you to speak well), P867 (You have limited your ability to interact or have contact with people due to the condition of his teeth or prosthesis), P871 (You felt shy or self-conscious because of problems with your dentures or prosthetics), and P872 (you have been uncomfortable eating in front of other people due to problems with your teeth or prosthesis). The combined variable was categorized in always/almost; always/often; Never/almost never. It seems important to mention that this combined

variable was obtained from the GOHAI instrument in the version used by the SABE survey. The justification made by the research team was focused on the importance of establishing the factors influencing oral health and wellbeing in this vulnerable population (Supplementary Table 1).

As independent variables: 2) Sociodemographic: Sex, age, place of residence, socio-economic status, marital status, living situation, employment situation, health insurance, educational level, monthly income, sufficiency of income to cover basic needs, last month alcohol consumption, smoking habit; 3) Health conditions: Self-perception of

aging, self-perception of nutritional status, life satisfaction, self-perception of helplessness, self-perception of usefulness, tranquility feeling, feeding autonomy, bathing disability, mobility impairment, physical activity, self-reported general health status, hypertension, diabetes, concurrent hypertension and diabetes, neuropsychiatric disorders; 4) Oral health indicators: Oral dryness feeling, type of maxillary prostheses, type of mandibular prostheses, time of prosthesis use, self-perceived dental prosthetic needs, prosthesis-related speech problems, prosthesis-related eating discomfort, dental prosthesis satisfaction, dental prosthesis-related social interaction problems (Table 1).

Table 1. Variables of interest.

		Independent variables		
		Sociodemographic	Health status	Oral health
Dependent variables	Self-perceived dental prosthetic needs	1. Sex	1. Self-perception of aging	1. Oral dryness feeling
		2. Age (years)	2. Self-perception of nutritional status	2. Type of maxillary dental prostheses
		3. Place of residence	3. Life satisfaction	3. Type of mandibular dental prostheses
		4. Socio-economic status	4. Self-perception of helplessness	4. Time of dental prosthesis use
		5. Marital status	5. Self-perception of usefulness	5. Self-perceived dental prosthetic needs
		6. Living situation	6. Tranquility feeling	6. Dental prosthesis-related speech problems
	Dental prosthesis-related social interaction problems	7. Employment situation	7. Feeding autonomy	7. Dental prosthesis-related eating discomfort
		8. Health insurance	8. Bathing disability	8. Dental prosthesis satisfaction
		9. Educational level	9. Mobility impairment	9. Dental prosthesis-related social interaction problems
		10. Monthly income	10. Physical activity	
		11. Sufficiency of income to cover basic needs	11. Self-reported general health	
		12. Last month alcohol consumption	12. Hypertension	
		13. Smoking habit	13. Diabetes	
	14. Concurrent hypertension and diabetes			
	15. Neuropsychiatric disorders			

STATISTICAL ANALYSIS

SPSS software version 22.0-IBM® was used to carry out all of the analyses. Weighted analyses were not applied because the study sample represented only 6.1% of the total population, which limits statistical representativeness. Therefore, results should be interpreted as valid for the analyzed sample only and not generalized to the entire population. First, absolute and relative frequencies were calculated considering the type

of sample and adjusted by the characteristics of the subsample containing the interest variables. Secondly, bivariate analyses with tests of statistical significance (Chi-square test for the distribution of frequencies for categorical variables) were carried out to observe differences among socio-demographic, general and oral health variables with the main outcomes (self-perceived prosthetic needs and prosthesis-related social interaction problems). Finally, two multivariate analyses by means of logistic regression models were develo-

ped to estimate the association among the main outcomes and the selected variables. For each model, we included the variables according to the Hosmer-Lemeshow criterion (those variables with p -value ≤ 0.25 and considering biological plausibility were included in the logistic regression models). We estimated the Odds Ratios (OR) with confidence intervals of 95% and later they were converted to Prevalence Ratios (PR) by using the mathematical formula proposed by Miettinen (25).

$$RP = \frac{OR}{[1 + p1 * (OR - 1)]} \quad IC95\% = OR^{(1 \pm \frac{1.96}{Z})}$$

This conversion was carried out on the basis that OR tends to overestimate the strength of association with prevalence rates higher than 10%. In both cases (OR-PR), the statistical significance and the magnitude of the associations was checked.

ETHICS

This study involved a secondary analysis of the original 2015 dataset from the SABE survey, which was conducted in accordance with guidelines outlined in Resolution 8430 of 1993 and international standards established by the Council for International Organizations of Medical Sciences (CIOMS) in collaboration with the World Health Organization (WHO) regarding the protection and custody of data. The use and analysis of the data was conducted with confidentiality and security in file custody by the principal investigator. Furthermore, this study was approved by the Bioethics Research.

RESULTS

SABE study carried out 23.694 surveys with 1.665 variables of which 37 were analyzed and considered of interest for this research corresponding to a subsample analyzed of 1442 surveys. The frequency of the main research outcomes

(Self-perceived dental prosthetic needs and dental prosthesis-related social interaction problems) according to the study's sociodemographic variables is presented in Table 2. For both outcomes, statistically significant differences ($p < 0.05$) were observed regarding the variables: place of residence ($>$ prevalence of self-perceived need and social interaction problems for individuals living in rural areas), socio-economic stratum ($>$ prevalence of these outcomes in a negative way for respondents of low socio-economic status), and health insurance ($>$ prevalence of self-perceived need and social interaction problems for individuals of the subsidized regime). Similarly, individuals reporting \leq one minimum wage income perceived more frequently dental prosthetic needs, and the study participants reporting insufficient income to cover basic needs reported more frequently dental prosthetic needs and dental prosthesis-related social interaction problems (all cases with statistically significant differences $p < 0.05$).

Regarding the frequencies of the analyzed outcomes (self-perceived dental prosthetic needs and dental prosthesis-related social interaction problems) according to the health variables (Table 3), statistically significant differences for both outcomes ($p < 0.05$) were observed for individuals that were perceived as malnourished and untranquil and those that perceived their general health as fair/poor. The presence of self-perceived prosthetic need was more frequently observed for people perceived as physically inactive and those reporting neuropsychiatric disorders (in both cases, statistically significant differences were found, $p < 0.05$). Individuals with a positive self-perception of aging reported more frequent dental prosthesis-related social interaction problems ($p < 0.05$).

The bivariate relationships among the analyzed outcomes and the study oral health variables are shown in Table 4. Individuals who reported having no mandibular prosthesis and those who reported being unsatisfied with their dental prosthesis perceived

more frequently prosthetic needs and prosthesis-related social interaction problems, and statistically significant differences were found ($p < 0.05$). In this same Table, individuals who reported oral dryness and did not have maxillary prostheses who perceived prosthesis-related speech problems reported more frequent prosthesis-related social interaction problems ($p < 0.05$). There is a statistically significant relationship between both analyzed outcomes (self-perceived dental prosthetic needs and dental prosthesis-related social interaction problems), since people who reported dental prosthetic needs perceived more prosthesis-related social interaction problems and vice versa.

Finally, Table 4 and Table 5 show the multivariate models showing the different associations among the analyzed outcomes and the included variables for both models according to the logistic regression logistic processes. With regard to the outcome of self-perceived prosthetic needs (Table 5), individuals living in low socioeconomic strata (aPR 1.09; 95%CI 1.00-1.19), those perceived as malnourished (aPR 1.06; 95%CI 1.00-1.13),

those reporting their general health as fair/poor (aPR 1.11; 95%CI 1.05-1.18), those reporting no reporting mandibular prosthesis (aPR 1.24; 95%CI 1.00-1.53), those reporting a time of prosthesis use ≥ 5 years (aPR 1.08; 95%CI 1.00-1.17), those perceiving dental prosthesis dissatisfaction (aPR 1.12; 95%CI 1.08-1.17) and those reporting prosthesis-related social interaction problems (aPR 1.10; 95%CI 1.04-1.15) were more likely to perceive prosthetic needs.

With regard to the outcome prosthesis-related social interaction problems (Table 6), individuals living in rural areas (aPR 1.25; 95%CI 1.00-1.56), reporting oral dryness feeling (aPR 1.23; 95%CI 1.01-1.48), those reporting a time of prosthesis use < 5 years (aPR 1.31; 95%CI 1.02-1.69), those having self-perceived prosthetic needs (aPR 1.48; 95%CI 1.20-1.83), those reporting prosthesis-related speech problems (aPR 1.67; 95%CI 1.47-1.90), and those unsatisfied with their prosthesis (aPR 1.98; 95%CI 1.63-1.83) were more likely to perceived prosthesis-related social interaction problems).

Table 2. Self-perception about dental prosthetic needs and dental prosthesis-related social interaction problems according to sociodemographic variables. SABE-2015 Survey (n=1442).

Variables	Self-perceived dental prosthetic needs			P*	Dental prosthesis-related social interaction problems		P*
	Sample	Yes	No		Always/ almost always/often	Never/ almost never	
	n= 1442	n = 960	n = 482		n = 334	n = 1108	
Sex							
Male	68 (4.7)	45 (66.2)	23 (33.8)	0.943	22 (32.4)	46 (67.6)	0.066 ^c
Female	1442 (97.3)	915 (66.6)	459 (33.4)		312 (22.7)	1062 (77.3)	
Age (years)							
≤ 70	731 (50.7)	502 (68.7)	229 (31.3)	0.087	168 (23.0)	563 (77.0)	0.869
≥ 71	711 (49.3)	960 (64.4)	482 (35.6)		166 (23.3)	545 (76.7)	
Place of residence							
Urban	1057 (73.3)	688 (65.1)	369 (34.9)	0.048	229 (21.7)	828 (78.3)	0.026
Rural	385 (26.7)	272 (70.6)	113 (29.4)		105 (27.3)	580 (72.7)	
Socio-economic status							
Low (1 to 2)	1171 (81.2)	804 (68.7)	367 (31.3)	<0.001	284 (24.3)	887 (75.7)	0.041
High (3 to 6)	271 (18.8)	156 (57.6)	115 (42.4)		50 (18.5)	221 (81.5)	
Marital status							
Married/with a partner	711 (49.3)	478 (67.2)	233 (32.8)	0.603	166 (23.3)	545 (76.7)	0.869
Separated/widower/single	731 (50.7)	482 (65.9)	249 (34.1)		168 (23.0)	563 (77.0)	
Living situation							
Alone	1332 (92.4)	886 (66.5)	446 (33.5)	0.872	314 (23.6)	1018 (76.4)	0.198
Accompanied	110 (7.6)	74 (67.3)	36 (32.7)		20 (18.2)	90 (81.8)	
Employment situation							
Employed	96 (6.7)	73 (76.0)	23 (24.0)	0.075	27 (28.1)	69 (71.9)	0.440
Retired/Pensioned	76 (5.3)	46 (60.5)	30 (39.5)		19 (25.0)	57 (75.0)	
Unemployed	1270 (88.1)	841 (66.2)	429 (33.8)		288 (22.7)	982 (77.3)	
Health insurance							
Contributory	514 (35.6)	310 (60.3)	204 (39.7)	<0.001	95 (18.5)	419 (81.5)	
Subsidized	910 (63.1)	641 (70.4)	269 (29.6)		235 (25.8)	675 (74.2)	0.007
Non-affiliated	18 (1.2)	9 (50.0)	9 (50.0)		4 (22.2)	14 (77.8)	
Educational level							
Low (high school or less)	1427 (99.0)	953 (66.8)	474 (33.2)	0.100	329 (23.1)	1098 (76.9)	0.348
High (technical, college or higher)	15 (1.0)	7 (46.7)	8 (53.3)		5 (33.3)	10 (66.7)	
Monthly income							
≤ one minimum wage	1339 (92.9)	906 (67.7)	433 (32.3)	0.002	315 (23.5)	1024 (76.5)	0.239
> one minimum wage	103 (7.1)	54 (52.4)	49 (47.6)		19 (18.4)	84 (81.6)	
Sufficiency of income to cover basic needs							
Sufficient income	461 (32.0)	283 (61.4)	178 (38.6)	0.004	81 (17.6)	380 (82.4)	0.001
Insufficient income	981 (68.0)	677 (69.0)	304 (31.0)		253 (25.8)	728 (74.2)	
Last month alcohol consumption							
Consumer	63 (4.4)	45 (71.4)	18 (28.6)	0.404	20 (31.7)	43 (68.3)	0.099
Non-consumer	1379 (95.6)	915 (66.4)	464 (33.6)		314 (22.8)	1065 (77.2)	
Smoking habit							
Current/former	450 (31.2)	301 (66.9)	149 (33.1)	0.865	113 (25.1)	337 (74.9)	0.237
Non-consumer	992 (68.8)	659 (66.4)	333 (33.6)		221 (22.3)	771 (77.7)	
All	1442 (100.0)	960 (66.6)	482 (33.4)	---	334 (23.2)	1108 (76.8)	---

*Chi squared test for the distribution for qualitative variables.
Percentages in parentheses.

Table 3. Self-perception about dental prosthetic needs and dental prosthesis-related social interaction problems according to health status variables. SABE-2015 Survey (n=1442).

Variables	Self-perceived dental prosthetic needs			P*	Dental prosthesis-related social interaction problems		P*
	Sample	Yes	No		Always/ almost always/often	Never/ almost never	
	n= 1442	n = 960	n = 482		n = 334	n = 1108	
Self-perception of aging							
Yes	661 (45.8)	455 (68.8)	206 (31.2)	0.094	176 (26.6)	485 (73.4)	<0.004
No	781 (54.2)	505 (64.7)	276 (35.3)		158 (20.2)	623 (79.8)	
Self-perception of nutritional status							
Well-nourished	1053 (73.0)	663 (63.0)	393 (37.0)	<0.001	208 (19.8)	845 (80.2)	<0.001
Malnourished	389 (27.0)	297 (76.3)	92 (23.7)		126 (32.4)	263 (67.6)	
Life satisfaction							
Satisfied	1398 (96.9)	932 (66.7)	466 (33.3)	0.675	323 (23.1)	1075 (76.9)	0.769 ^a
Unsatisfied	44 (3.1)	28 (63.6)	16 (36.4)		11 (25.0)	33 (75.0)	
Self-perception of helplessness							
Yes	827 (57.4)	535 (64.7)	292 (35.3)	0.079	185 (22.4)	642 (77.6)	0.408
No	615 (42.6)	425 (69.1)	190 (30.9)		149 (24.2)	466 (75.8)	
Self-perception of usefulness							
Useful	505 (35.0)	332 (65.7)	173 (34.3)	0.623	119 (23.6)	386 (76.4)	0.790
Useless	937 (65.0)	628 (67.0)	309 (33.0)		215 (22.9)	722 (77.1)	
Tranquility feeling							
Tranquil	1021 (70.8)	653 (64.0)	368 (36.0)	0.001	203 (19.9)	818 (80.1)	<0.001
Untranquil	421 (29.2)	307 (72.9)	114 (27.1)		131 (31.1)	290 (68.9)	
Feeding autonomy							
Dependent	6 (0.4)	5 (83.3)	1 (16.7)	0.383	3 (50.0)	3 (50.0)	0.118
Self-dependent	1436 (99.6)	955 (65.5)	481 (33.5)		331 (23.1)	1105 (76.9)	
Bathing disability							
Dependent	22 (1.5)	12 (54.5)	10 (45.5)	0.228	5 (22.7)	17 (77.3)	0.961
Self-dependent	1420 (98.5)	948 (66.8)	472 (33.2)		329 (23.2)	1091 (76.8)	
Mobility impairment							
Adequate mobility	1328 (92.1)	889 (66.9)	439 (33.1)	0.311	307 (23.1)	1021 (76.9)	0.891
Impaired Mobility	114 (7.9)	71 (62.3)	43 (37.7)		27 (23.7)	87 (76.3)	
Physical activity							
Physically active	211 (14.6)	127 (60.2)	84 (39.8)	0.033	43 (20.4)	168 (79.6)	0.300
Physically inactive	1231 (85.4)	833 (67.7)	398 (32.3)		291 (23.6)	940 (76.4)	
Self-reported general health status							
Good/very good	597 (41.4)	345 (57.8)	252 (42.2)	<0.001	108 (18.1)	489 (81.9)	<0.001
Fair/poor	845 (58.6)	615 (72.8)	230 (27.2)		226 (26.7)	619 (73.3)	
Hypertension							
Yes	873 (60.5)	589 (67.5)	284 (32.5)	0.373	212 (24.3)	661 (75.7)	0.211
No	569 (39.5)	371 (65.2)	198 (34.8)		122 (21.4)	447 (78.6)	
Diabetes							
Yes	266 (18.4)	181 (68.0)	85 (32.0)	0.573	66 (24.8)	200 (75.2)	0.480
No	1176 (81.6)	779 (66.2)	397 (33.8)		268 (22.8)	908 (77.2)	

Variables	Self-perceived dental prosthetic needs			P*	Dental prosthesis-related social interaction problems		P*
	Sample	Yes	No		Always/ almost always/often	Never/ almost never	
	n= 1442	n = 960	n = 482		n = 334	n = 1108	
Concurrent hypertension and diabetes							
Yes	206 (14.3)	140 (68.0)	66 (32.0)	0.649	51 (24.8)	155 (75.2)	0.558
No	1236 (85.7)	820 (66.3)	416 (33.7)		283 (22.9)	953 (77.1)	
Neuropsychiatric disorders							
Yes	130 (9.0)	99 (76.2)	31 (23.8)	0.015	36 (27.7)	94 (72.3)	0.199
No	1312 (91.0)	861 (65.6)	451 (34.4)		298 (22.7)	1014 (77.3)	

*Chi squared test for the distribution for qualitative variables.
Percentages in parentheses.

Table 4. Self-perception about dental prosthetic needs and dental prosthesis-related social interaction problems according to oral health variables. SABE-2015 Survey (n=1442).

Parameter	Self-perceived prosthetic needs			P*	Prosthesis-related social interaction problems		P*
	Sample	Yes	No		Always/ almost always/ often	Never/ almost never	
	n= 1442	n = 960	n = 482		n = 334	n = 1108	
Oral dryness feeling							
Yes	522 (36.2)	361 (69.2)	161 (30.8)	0.117	152 (29.1)	370 (70.9)	<0.001
No	920 (63.8)	599 (65.1)	321 (34.9)		182 (19.8)	738 (80.2)	
Type of maxillary dental prostheses							
Fixed (Tooth-Implant supported)	34 (2.4)	20 (58.8)	14 (41.2)	0.328	8 (23.5)	26 (76.5)	
Removable (Partial-Total)	1102 (76.4)	744 (67.5)	358 (32.5)		226 (20.5)	876 (79.5)	<0.001
None	306 (21.2)	196 (64.1)	110 (35.9)		100 (32.7)	206 (67.3)	
Type of mandibular dental prostheses							
Fixed (Tooth-Implant supported)	24 (1.7)	12 (50.0)	12 (50.0)	0.003	4 (16.7)	20 (83.3)	
Removable (Partial-Total)	696 (48.3)	439 (63.1)	257 (36.9)		137 (19.7)	559 (80.3)	0.005
None	722 (50.1)	509 (70.5)	213 (29.5)		193 (26.7)	529 (73.3)	
Time of dental prosthesis use							
<5 years	317 (22.0)	198 (62.5)	119 (37.5)	0.059	74 (23.3)	243 (76.7)	
≥5 years	834 (57.8)	576 (69.1)	258 (30.9)		168 (20.1)	666 (79.9)	<0.001
Not applicable (If answered NONE to type of max-man prosthesis)	291 (20.2)	105 (63.9)	186 (36.1)		92 (31.6)	199 (68.8)	
Self-perceived dental prosthetic needs							
Yes	960 (66.6)	---	---	---	268 (27.9)	692 (72.1)	<0.001
No	482 (33.4)	---	---		66 (13.7)	416 (86.3)	
Dental prosthesis-related speech problems							
Never/almost never	1028 (71.3)	670 (65.2)	358 (34.8)	0.076	168 (16.3)	860 (83.7)	<0.001
Always/almost always/often	414 (28.7)	290 (70.0)	124 (30.0)		166 (40.1)	248 (59.9)	
Dental prosthesis-related eating discomfort							
Never/almost never	89 (6.2)	56 (62.9)	33 (37.1)	0.451	22 (24.7)	67 (75.3)	0.719
Always/almost always/often	1353 (93.8)	904 (66.8)	449 (33.2)		312 (23.1)	1041 (76.9)	
Dental prosthesis satisfaction							
Satisfied	1133 (78.6)	706 (62.3)	427 (37.7)	<0.001	200 (17.7)	933 (82.3)	<0.001
Unsatisfied	309 (21.4)	254 (82.2)	55 (17.8)		134 (43.4)	175 (56.6)	
Dental prosthesis-related social interaction problems							
Never/almost never	1108 (76.8)	692 (62.5)	416 (37.5)	<0.001	---	---	---
Always/almost always/often	334 (23.2)	66 (80.2)	268 (19.8)		---	---	

*Chi squared test for the distribution for qualitative variables. Percentages in parentheses.

Table 5. Multivariate model for the association among the presence of self-perceived dental prosthetic needs and the sociodemographic, general, and oral health variables. SABE-2015 Survey (n=1442).

Parameter	Self-perceived dental prosthetic needs (Yes)			
	Crude model		Adjusted model*	
	PR	95%CI	aPR*	95%CI
Sociodemographic variables				
Age (years)				
≥ 71	1.00	---	1.00	---
≤ 70	1.06	0.99- 1.13	1.05	0.97- 1.13
Place of residence				
Urban	1.00	---	1.00	---
Rural	1.07	1.00- 1.15	1.02	0.93- 1.12
Socio-economic stratum				
High (3 to 6)	1.00	---	1.00	---
Low (1 to 2)	1.14	1.06- 1.23	1.09	1.00- 1.19
Employment situation				
Employed	1.00	---	1.00	---
Retired/Pensioned	0.70	0.51- 0.97	0.78	0.49- 1.24
Unemployed	0.83	0.69- 1.00	0.86	0.71- 1.04
Health insurance				
Contributory	1.00	---	1.00	---
Subsidized/Non-affiliated	1.12	1.05- 1.18	1.06	0.97- 1.15
Monthly income				
> one minimum wage	1.00	---	1.00	---
≤ one minimum wage	1.18	1.06- 1.31	1.12	0.98- 1.27
Sufficiency of income to cover basic needs				
Sufficient income	1.00	---	1.00	---
Insufficient income	1.10	1.03- 1.17	1.00	0.93- 1.08
Health status variables				
Self-perception of aging				
Yes	1.06	0.99- 1.13	1.00	---
No	1.00	---	1.00	---
Self-perception of nutritional status				
Well-nourished	1.00	---	1.00	---
Malnourished	1.13	1.07- 1.18	1.06	1.00- 1.13
Self-perception of helplessness				
No	1.00	---	1.00	---
Yes	0.93	0.85- 1.01	0.96	0.89- 1.03
Tranquility feeling				
Tranquil	1.00	---	1.00	---
Untranquil	1.10	1.04- 1.17	1.05	0.98- 1.13
Bathing disability				
Self-dependent	1.00	---	1.00	---
Dependent	0.77	0.50- 1.19	0.62	0.37- 1.05

Parameter	Self-perceived dental prosthetic needs (Yes)			
	Crude model		Adjusted model*	
	PR	95%CI	aPR*	95%CI
Physical activity				
Physically active	1.00	---	1.00	---
Physically inactive	1.10	1.01- 1.20	1.09	0.99- 1.20
Self-reported general health status				
Good/very good	1.00	---	1.00	---
Fair/poor	1.15	1.10- 1.21	1.11	1.05- 1.18
Neuropsychiatric disorders				
No	1.00	---	1.00	---
Yes	1.11	1.02- 1.20	1.08	0.98- 1.18
Oral health variables				
Oral dryness feeling				
No	1.00	---	1.00	---
Yes	1.05	0.99- 1.13	0.99	0.92- 1.06
Type of maxillary dental prostheses				
Fixed (Tooth-Implanted supported)	1.00	---	1.00	---
Removable (Partial-Total)	1.11	0.91- 1.35	1.05	0.83- 1.33
None	1.10	0.80- 1.51	0.60	0.23- 1.60
Type of mandibular dental prostheses				
Fixed (Tooth-Implanted supported)	1.00	---	1.00	---
Removable (Partial-Total)	1.18	0.92- 1.52	1.06	0.70- 1.60
None	1.21	1.01- 1.44	1.24	1.00-1.53
Time of dental prosthesis use				
<5 years	1.00	---	1.00	---
≥5 years	1.09	1.01- 1.12	1.08	1.00- 1.17
Not applicable (If answered NONE to type of max-man prosthesis)	1.02	0.90- 1.16	---	---
Dental prosthesis-related speech problems				
Never/almost never	1.00	---	1.00	---
Always/almost always/often	1.06	0.99- 1.14	1.02	0.94- 1.11
Dental prosthesis satisfaction				
Satisfied	1.00	---	1.00	---
Unsatisfied	1.13	1.09- 1.17	1.12	1.08- 1.17
Dental prosthesis-related social interaction problems				
Never/almost never	1.00	---	1.00	---
Always/almost always/often	1.13	1.09- 1.18	1.10	1.04- 1.15

Abbreviations: PR, Prevalence ratio; aPR, Adjusted Prevalence ratio; 95%CI, 95% confidence interval.

*Adjusted PR for the rest of the selected variables.

Table 6. Multivariate model for the association among the presence of prosthesis-related social interaction problems and the sociodemographic, general, and oral health variables. SABE-2015 Survey (n=1442).

Parameter	Prosthesis-related social interaction problems (Always/almost always/often)			
	Crude model		Adjusted model*	
	PR	95%CI	aPR*	95%CI
Sociodemographic variables				
Sex*				
Male	1.35	0.98- 1.87	1.24	0.84- 1.85
Female	1.00	---	1.00	---
Place of residence				
Urban	1.00	---	1.00	---
Rural	1.24	1.03- 1.50	1.25	1.00- 1.56
Socio-economic stratum				
Low (1 to 2)	1.31	1.01- 1.69	1.00	---
High (3 to 6)	1.00	---	1.00	---
Living situation				
Alone	1.27	0.88- 1.84	1.32	0.88- 1.96
Accompanied	1.00	---	1.00	---
Health insurance				
Contributory	1.00	---	1.00	---
Subsidized/Non-affiliated	1.35	1.12- 1.62	1.14	0.89- 1.46
Monthly income				
≤ one minimum wage	1.25	0.86- 1.83	0.91	0.58- 1.44
> one minimum wage	1.00	---	1.00	---
Sufficiency of income to cover basic needs				
Sufficient income	1.00	---	1.00	---
Insufficient income	1.40	1.16- 1.70	1.16	0.91- 1.49
Last month alcohol consumption				
Consumer	1.33	0.95- 1.88	1.40	0.95- 2.05
Non-consumer	1.00	---	1.00	---
Smoking habit				
Current/former	1.12	0.93- 1.36	1.09	0.89- 1.35
Non-consumer	1.00	---	1.00	---
Health status variables				
Self-perception of aging				
Yes	1.28	1.08- 1.52	1.17	0.96- 1.42
No	1.00	---	1.00	---
Self-perception of nutritional status				
Well-nourished	1.00	---	1.00	---
Malnourished	1.49	1.28- 1.74	1.18	0.97- 1.45
Tranquility feeling				
Tranquil	1.00	---	1.00	---
Untranquil	1.45	1.24- 1.70	1.20	0.98- 1.47

Parameter	Prosthesis-related social interaction problems (Always/almost always/often)			
	Crude model		Adjusted model*	
	PR	95%CI	aPR*	95%CI
Feeding autonomy				
Dependent	2.17	0.77- 6.08	1.46	0.69- 3.08
Self-dependent	1.00	---	1.00	---
Self-reported general health status				
Good/very good	1.00	---	1.00	---
Fair/poor	1.41	1.18- 1.68	1.09	0.87- 1.37
Hypertension				
Yes	1.13	0.93- 1.37	1.19	0.97- 1.47
No	1.00	---	1.00	---
Neuropsychiatric disorders				
Yes	1.20	0.91- 1.59	1.01	0.72- 1.43
No	1.00	---	1.00	---
Oral health variables				
Oral dryness feeling				
Yes	1.40	1.19- 1.65	1.23	1.01- 1.48
No	1.00	---	1.00	---
Type of maxillary dental prostheses				
Fixed (Tooth-Implant supported)	1.00	---	1.00	---
Removable (Partial-Total)	0.87	0.46- 1.66	0.49	0.22- 1.10
None	1.33	0.79- 2.22	2.11	0.61- 7.30
Type of mandibular dental prostheses				
Fixed (Tooth-Implant supported)	1.00	---	1.00	---
Removable (Partial-Total)	1.18	0.49- 2.82	1.21	0.35- 4.17
None	1.49	0.72- 3.08	1.32	0.47- 3.69
Time of dental prosthesis use				
<5 years	1.15	0.91- 1.46	1.31	1.02- 1.69
≥5 years	1.00	---	1.00	---
Not applicable (If answered NONE to type of max-man prosthesis)	1.45	1.21- 1.74	NC	NC
Self-perceived dental prosthetic needs				
Yes	1.74	1.45- 2.09	1.48	1.20- 1.83
No	1.00	---	1.00	---
Dental prosthesis-related speech problems				
Never/almost never	1.00	---	1.00	---
Always/almost always/often	1.74	1.55- 1.95	1.67	1.47- 1.90
Dental prosthesis satisfaction				
Satisfied	1.00	---	1.00	---
Unsatisfied	1.69	1.51- 1.89	1.98	1.63- 1.83

Abbreviations: PR, Prevalence ratio; aPR, Adjusted Prevalence ratio; 95%CI, 95% confidence interval.

*Adjusted PR for the rest of the selected variables.

DISCUSSION

The present study demonstrated that individuals reporting a need for dental prostheses were more likely to experience difficulties in social interactions. Significant associations were also observed with socioeconomic status, place of residence, nutritional and general health, oral dryness, type and duration of mandibular prosthesis use, speech difficulties, and overall satisfaction with prostheses, even after adjusting for relevant covariates. These findings indicate that prosthetic needs extend beyond clinical function, reflecting broader social and quality-of-life dimensions.

Our secondary analysis revealed a strong association between perceived prosthetic needs and social interaction challenges, which was further shaped by sociodemographic conditions such as rural residence, enrollment in subsidized healthcare, and lower income levels. These results are consistent with reviews by Freeman (2020) and Muirhead *et al.* (2020) (22), which underscore the role of social determinants and access to services in shaping oral health outcomes. The concept of intersectionality provides an essential framework to understand how overlapping structural forces—including class, geography, and healthcare access—converge to influence oral health (23). A study conducted in Medellín, Colombia, similarly reported low levels of oral health-related quality of life among older adults in the public hospital system, largely attributable to restricted education and healthcare access (21). Together, these findings underscore the critical role of prosthetic interventions in addressing inequities driven by socioeconomic and educational disparities.

The association between malnutrition and prosthetic needs was particularly noteworthy. Our findings align with those of Lamy *et al.* (25), who demonstrated that edentulous individuals with one or no complete dentures faced a significantly higher risk of malnutrition based on the Mini Nutri-

tional Assessment. Other studies have corroborated this association, showing that reduced dietary variety linked to tooth loss increases vulnerability to malnutrition (26-28). These results highlight the importance of prosthetic rehabilitation as a strategy to safeguard nutritional health in older adults.

Although individuals in rural areas often face limited access to healthcare services, our findings show that perceived prosthetic needs were concentrated among older adults regardless of location. Future research should refine definitions of rural and urban contexts to explore these associations more precisely. Within a social determinants of health framework, geographic territory operates as a structural determinant, shaping inequities in access and outcomes. Socioeconomic status also emerged as a determinant of prosthetic needs, consistent with literature linking edentulism to restricted healthcare access. This aligns with Tudor Hart's "inverse care law," which asserts that those with the greatest health needs often receive the least care (29,30). The persistence of unmet prosthetic needs, particularly in relation to oral rehabilitation, exemplifies this principle. Patient satisfaction is strongly connected to accessibility and affordability, further reinforcing the relevance of the inverse care law in oral health.

Importantly, oral and general health are closely interrelated. Participants who perceived a need for prostheses were also more likely to report poor general health, consistent with evidence linking chronic oral diseases to systemic conditions such as cardiovascular disease, diabetes, and psychological disorders (31). Older adults therefore experience compounded vulnerabilities that negatively affect both oral and systemic well-being.

The duration of prosthesis use was also significant. Participants using prostheses for more than five years were more likely to report a need for replacement, likely due to material wear, anatomical changes, and functional decline.

This corresponds with the observed association between long-term use and lower satisfaction, and with findings by Erić *et al.* (32), who reported improved satisfaction and quality of life after denture replacement. By contrast, Epifania *et al.* (33) found that prosthesis quality, rather than duration, was the stronger determinant of satisfaction. The Canadian Agency for Drugs and Technologies in Health (CADTH) has reported that the average recall time for prosthesis evaluation or replacement is 7.9 years (range: 5.9-9.7 years), with interventions often needed after five years due to wear or fractures (34). “Plastic” partial dentures showed the lowest survival rates, with complications including caries, periodontal issues, and fractures, while metallic partial dentures had higher survival rates (87% at six years) but still presented complications such as loss of retention and abutment teeth. These outcomes mirror both the clinical and subjective findings of our study. Interestingly, our multivariable models revealed contrasting associations. Long-term prosthesis use (>5 years) was linked to increased self-perceived need, while short-term use (<5 years) was associated with social interaction difficulties. This discrepancy may reflect adaptation processes: initial adjustment challenges may hinder social integration, whereas long-term wear leads to functional decline and dissatisfaction.

These findings underscore the importance of preventive maintenance, regular follow-up, and personalized adaptation strategies in prosthetic care. Differences between maxillary and mandibular prostheses further illustrate the complexity of perceived needs. Maxillary prostheses generally provide greater support and aesthetics, facilitating better adaptation and speech. Consequently, perceived needs are often greater for maxillary replacements. Although our results linked social difficulties with removable prostheses, statistical significance was not reached, suggesting the need for longitudinal research to disentangle the interplay of quality, duration, and adaptability. While

clinical necessity may not always align with patient perception, aging often increases awareness of oral changes and prosthetic needs. Integrating both clinical evaluation and patient-reported outcomes into prosthetic planning ensures care that is responsive to functional, psychological, and social dimensions.

Although regression analysis suggested that living alone was linked to social interaction difficulties, statistical significance was not achieved. This may reflect the influence of broader social context and subjective perceptions. Nevertheless, perceived prosthetic need was consistently associated with prosthesis-related social interaction challenges, reinforcing the reciprocal relationship between oral health and social functioning. The weight of patient perception in clinical decision-making is evident. Tooth loss profoundly affects social functioning, while prosthetic rehabilitation enables re-engagement in meaningful activities, including community participation (35). Even completely edentulous adults benefit from regular evaluations and denture upgrades, which can significantly enhance quality of life. Our findings also align with Venegas-Sanabria *et al.* (2023), who, through a secondary analysis of the SABE survey, identified associations between edentulism, prosthesis use, self-rated health, and the Geriatric Oral Health Assessment Index (GOHAI) (21). Developed by Atchison and Dolan in 1990, the GOHAI is based on three assumptions: oral health can be measured by self-assessment; oral health status varies among individuals and can be captured through perception; and self-perception predicts oral health outcomes. Its 12-item Likert-based questionnaire assesses physical, psychosocial, and pain dimensions, offering a reliable index of oral health-related quality of life (36).

The Colombian adaptation of the Geriatric Oral Health Assessment Index (GOHAI) underwent standardized forward-backward translation and cultural adaptation to ensure semantic, concep-

tual, and contextual equivalence with the original instrument. Content and face validity were assessed through cognitive pretesting in 63 older adults.

Psychometric testing was conducted in a population-based sample of 7,200 participants, allocated to a working sample (WS=3,628) and a confirmatory sample (CS=3,572). Construct validity was examined using exploratory and confirmatory factor analyses, demonstrating a one-factor structure in the WS and acceptable fit for two- and three-factor models in the CS. Convergent validity was supported through a significant association with a global self-perceived health measure ($p=0.0001$). Discriminant validity was verified by statistically significant group differences according to age, skin phenotype, education level, socioeconomic stratum, insurance regime, and need for prosthetic rehabilitation.

Internal consistency was acceptable (Cronbach's $\alpha=0.80$). Temporal stability was confirmed via test-retest reliability in a subsample of 75 participants (Kendall correlation=0.85; $p=0.0000$). The evidence supports that the Colombian GOHAI is a psychometrically sound instrument for oral health-related quality-of-life assessment in older adults and suitable for application in comparable Spanish-speaking populations (37).

Finally, our methodological decision to use Prevalence Ratios (PRs) instead of Odds Ratios (ORs) was grounded in the high prevalence of the condition under study. PRs provide a more intuitive measure of relative risk, improving interpretability and aligning with research objectives (38,39). This enhances the applicability of our findings to both clinical and policy contexts.

STRENGTH AND LIMITATIONS

The main strength of this study is the source of the database used, SABE Survey has been certified by the National Administrative Department of

Statistics (DANE) and its methods and results have been used as a model for other national surveys. It is important to note that the National Study of Health, Well-being and Aging (SABE) was the first survey to use the master sample as a methodology to select samples with population representativeness and to understand the health and well-being conditions of Colombia's older adult population. Even if a few years have gone by since then, the data collected can provide insightful information on patterns and trends that may continue among people 60 and older.

It is critical to consider the study limitations while evaluating the validity and relevance of the results. First and foremost, it must be noted that this is a secondary study based on a survey that was carried out in 2015. As such, the research is limited by the data that is accessible and does not have control over the accuracy and completeness of the data that was gathered. For example, the actual type of dental prosthesis that each participant used is not specified, which limits our capacity to carry out a more thorough and accurate examination of the connections between the results. Additionally, because this study is cross-sectional in nature, causal links between the observed variables cannot be established; instead, associations can only be identified. Weighted analyses were not applied, as the sample represented only 6.1% of the total population. Consequently, the results should be interpreted as specific to the analyzed sample and cannot be directly generalized to the entire population. Although the representativeness of the SABE survey is acknowledged, the exclusion of several surveys in this particular analysis due to missing data could have introduced selection bias and may have led to underestimated or imprecise results. Therefore, further research is needed to overcome these methodological limitations and to incorporate additional variables. Nevertheless, it is guaranteed that the analyses performed with this subsample relied on complete and verified information. Since our study objective was focused on

identifying the variables related to self-perceived prosthetic needs and social interaction issues in the target population included in this study, we believe that this study provided an important approach including social and general health aspects related to oral health. Finally, in the interaction of multivariate models, most sociodemographic and health variables showed a weak association with the main outcomes. In this sense, further research with specific samples could elucidate scientific knowledge about the social determinants of oral health and dental prosthetic status and explore the access and use of oral health services in elderly population.

CONCLUSIONS

The findings of this study indicate that individuals who perceive a need for dental prostheses also report more social interaction problems, self-perceived malnutrition, poorer self-reported general health status, oral dryness, and dissatisfaction with their current prosthetic device. Additionally, various sociodemographic factors, particularly rural residence, low socioeconomic status, and affiliation with subsidized health systems, were associated with these perceptions.

Likewise, prosthesis use duration was associated with both early adaptation problems (<5 years) and replacement needs (≥ 5 years), underscoring the importance of continuous prosthodontic follow-up. These results highlight the clinical necessity of addressing patient-reported outcomes in prosthetic care and the public health imperative to expand access to affordable, high-quality prosthodontic services for vulnerable populations. Given the limitations of this cross-sectional, self-reported study, longitudinal and clinically based research is required to establish causal pathways and to design evidence-based interventions that improve oral function, social participation, and overall well-being in aging populations.

CONFLICT OF INTEREST: The authors have no conflict of interest to report.

DATA AVAILABILITY STATEMENT: Data sharing not applicable-no new data generated.

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ETHICS STATEMENT: This study involved a secondary analysis of the original 2015 dataset from the SABE survey, which was conducted in accordance with guidelines outlined in Resolution 8430 of 1993 and international standards established by the Council for International Organizations of Medical Sciences (CIOMS) in collaboration with the World Health Organization (WHO) regarding the protection and custody of data. The use and analysis of the data was conducted with confidentiality and security in file custody by the principal investigator. Furthermore, this study was approved by the Bioethics Research Committee of the Faculty of Dentistry at the University of Antioquia (Act 09/2020, Concept No. 122).

AUTHOR CONTRIBUTION STATEMENT: Study design: C.R.M. and M.F.E.E.; data acquisition and data set: M.F.E.E. and M.T.C.G.; Analysis of data: C.R.M. and A.A.A.S.; Interpretation and writing of the article: C.R.M., M.F.E.E., M.T.C.G. and A.A.A.S.

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SUPPLEMENTARY TABLE 1. COMPLETE DESCRIPTION OF THE STUDY VARIABLES.

Variables	Question of the original survey (SABE 2015)	Categorization
Sociodemographic		
1. Sex		Male Female
2. Age		< 70 ≥ 71
3. Place of residence		Urban (cities-municipalities) Rural
4. Socio-economic status (as provided by the housing/neighborhood and its divided in six strata)		Low (1 to 2) High (3 to 6)
5. Marital status		Married/with a partner Separated/widower/single
6. Living situation	P139. Who do you live with?	Alone Accompanied
7. Employment situation	Combined variable with the questions P226 (Do you currently work?) and P229 (What kind of occupation do you have (or did have)?)	Employed Retired/Pensioned Unemployed
8. Health insurance (in Colombia is divided according to the occupation and the ability to pay)	Economic active population Vulnerable population Without health insurance	Contributory Subsidized Non-affiliated
9. Educational level		Low (high school or less) High (technical, college or higher)
10. Monthly income	In which of the following ranges does your monthly income fall? (the minimum wage in Colombia in 2015 was 223 U\$ approx.)	≤ one minimum wage > one minimum wage
11. Sufficiency of income to cover basic needs	P249 Do you consider your income sufficient to meet your needs?	Sufficient incomes Insufficient incomes
12. Last month alcohol consumption		Consumer Non-consumer
13. Smoking habit		Current/former Non-consumer
Health status		
14. Self-perception of ageing		Yes No
15. Self-perception of nutritional status	Determination of the individual's nutritional status (according to height and weight)	Well-nourished Malnourished
16. Life satisfaction	P614 Are you satisfied with your life in general?	Satisfied Unsatisfied
17. Self-perception of helplessness	Have you needed the help of another person? (P423-P427- combined variable)	Yes No
18. Self-perception of usefulness	P625. Do you feel useless?	Useful Useless
19. Tranquility feeling	P629. In the last month, have you been anxious, restless, uneasy, or troubled without any apparent reason or cause?	Tranquil Untranquil

Variables	Question of the original survey (SABE 2015)	Categorization
20. Feeding autonomy	P701. In terms of eating, today were you able to... Eat by yourself, eat independently	Dependent Self-dependent
21. Bathing disability	P702. Are you able to wash his/her body (bathe) on your own and do not need assistance?	Dependent Self-dependent
22. Mobility impairment	Presence or absence of difficulties in moving	Adequate mobility Impaired Mobility
23. Physical activity	P719. Do you participate at least three times a week in any sports activity or exercise, such as swimming, jogging, playing tennis, cycling, doing aerobics, taking gym classes, or other activities that make you sweat or leave you out of breath?	Physically active Physically inactive
24. Self-reported general health status	P807. "In general, would you say that your health in the last 30 days has been...?"	Good/very good Fair/poor
25. Hypertension	P810. Has a doctor or nurse ever told you that you have high blood pressure, that is, hypertension?	Yes No
26. Diabetes	P812. Has a doctor or nurse ever told you that you have diabetes, that is, high blood sugar?	Yes No
27. Concurrent hypertension and diabetes	Combined variable between P810 and P812	Yes No
28. Neuropsychiatric disorders	P 828. Has a doctor or nurse ever told you that you had a nervous, mental, or psychiatric problem?	Yes No
Oral health		
29. Oral dryness feeling		Yes No
30. Type of maxillary prostheses		Fixed (Tooth-Implanted supported) Removable (Partial-Total) None
31. Type of mandibular prostheses		Fixed (Tooth-Implanted supported) Removable (Partial-Total) None
32. Time of prosthesis use		<5 years ≥5 years Not applicable
33. Self-perceived prosthetic needs	P861. Regardless of whether you have it or not (referring to a dental prosthesis), do you think you need a dental prosthesis?	Yes No
34. Prosthesis-related speech problems	P865. The dentures or prosthesis did not allow you to speak well	Never/almost never Always/almost always/often
35. Prosthesis-related eating discomfort	Combined variable with the questions: P862. Did you have to change the amount or type of food due to problems with your dentures or prosthesis? P863. Was it difficult to bite or chew any food because it was hard? P866. Were you able to eat anything without discomfort?	Never/almost never Always/almost always/often
36. Dental prosthesis satisfaction	P868. Did you like how your dentures or dental prosthesis look?	Satisfied Unsatisfied
37. Prosthesis-related social interaction problems	Combined variable obtained from the questions P865 (The dentures or prostheses did not allow you to speak well), P867 (You have limited your ability to interact or have contact with people due to the condition of his teeth or prosthesis), P871 (You felt shy or self-conscious because of problems with your dentures or prosthetics), and P872 (you have been uncomfortable eating in front of other people due to problems with your teeth or prosthesis)	Never/almost never Always/almost always/often