

# Perceived Importance vs Performance in Dental Care: Exploring Patient Satisfaction Across Age, Gender, and Purchasing Power

Reyner Pérez-Campdesuñer <sup>1</sup>, Alexander Sánchez-Rodríguez <sup>2</sup>, Gelmar García-Vidal <sup>1</sup>,  
Rodobaldo Martínez-Vivar <sup>1</sup>, Margarita De Miguel-Guzmán <sup>3</sup>

<sup>1</sup>Faculty of Law, Administrative and Social Sciences, Universidad UTE, Quito, Ecuador; <sup>2</sup>Faculty of Engineering Sciences and Industries, Universidad UTE, Quito, Ecuador; <sup>3</sup>Department of Administration, Instituto Superior Tecnológico Atlántico, Santo Domingo, Ecuador

Correspondence: Reyner Pérez-Campdesuñer, Faculty of Law, Administrative and Social Sciences, Universidad UTE, Av. Mariscal Sucre s/n and Mariana de Jesús, Bloque A, Quito, 170527, Ecuador, Email reyner.perez@ute.edu.ec

**Introduction:** Patient satisfaction is a key indicator of healthcare quality, particularly in dental services, where both clinical and non-clinical factors shape perceptions of care. This study aims to investigate the impact of demographic variables—specifically age, gender, and purchasing power—on patient satisfaction with dental services in Quito, Ecuador.

**Methods:** A sample of 485 patients was surveyed using a modified SERVPERF model combined with an attribute matrix. The instrument captured the perceived importance and satisfaction associated with 14 service attributes. Stratified random sampling was applied based on age, gender, and purchasing power. Satisfaction indices were calculated, and differences among groups were analyzed using the chi-square test.

**Results:** Age was the only variable with a statistically significant impact on patient satisfaction ( $p < 0.05$ ), whereas gender and purchasing power showed no significant differences. Professionalism, quality, and empathy were rated as the most essential attributes across all groups. Interestingly, attributes considered less important—such as waiting time and payment methods—received higher satisfaction scores. The attribute matrix revealed that critical attributes (important but underperforming) differed mainly by age group. The highest satisfaction scores were observed among patients under 25, while the lowest were reported among those aged 40 to 60 and in lower-income groups.

**Discussion:** Findings highlight the relevance of age-sensitive strategies in dental care and underscore a potential misalignment between what patients value most and what they rate most positively. The combined SERVPERF and attribute matrix approach proved effective for generating actionable insights. Further research in diverse contexts is needed to validate these findings.

**Keywords:** care strategies, customer satisfaction, dental services, patient satisfaction, patient preference, purchasing power segmentation, service perception, SERVPERF model

## Introduction

Customer satisfaction, regardless of the product or service being evaluated, serves as a critical indicator for assessing the effectiveness of the underlying process. Ensuring customer satisfaction is essential for the sustainability of any business operation; it not only guarantees the retention and loyalty of current customers but also fosters growth through positive word-of-mouth and recommendations. Satisfied customers are more likely to share their experiences, thus driving new clientele and ensuring the long-term success of the business.<sup>1</sup> The significance of understanding and monitoring customer satisfaction becomes even more vital when it comes to sectors such as healthcare, where the quality of service directly impacts patient trust and organizational reputation.

It is essential to note that customer satisfaction is a multifaceted construct, influenced by numerous factors that extend beyond the core attributes of the product or service itself. Among the primary variables influencing satisfaction are the product's design and functionality, the execution of operational processes, and the available technology.<sup>2</sup> Additionally, the

training and motivation of service personnel play a crucial role in shaping customers' perceptions.<sup>3</sup> Even the individual expectations or moods of consumers, which can fluctuate based on a range of personal and external factors, significantly affect how a product or service is evaluated.<sup>4</sup> These elements collectively contribute to the complex nature of customer satisfaction, making it essential for businesses to adopt a holistic approach to its measurement and improvement.

The concept of customer satisfaction is deeply intertwined with the quality of the product or service offered. However, defining the precise boundaries between “quality” and “satisfaction” is a challenge in itself. While quality is inherent to the product or service, its recognition as such is only possible when it positively influences the consumer's perception. Satisfaction, in this sense, can be viewed as a reflection in a mirror, with quality being the object that causes the reflection. If the object—quality is not present, the reflection—satisfaction cannot exist.<sup>5</sup> This metaphor encapsulates the delicate relationship between the two concepts and highlights the need for businesses to prioritize both quality and customer satisfaction in tandem.

Research into customer satisfaction spans various industries and sectors, including transportation,<sup>6</sup> hospitality,<sup>7</sup> and the restaurant industry,<sup>8</sup> among others. In the healthcare sector, a vast body of research also exists, examining various aspects of service delivery and patient satisfaction across different types of services.<sup>9</sup> More specifically, in the domain of dental services, numerous studies have been conducted, shedding light on the factors that influence patient satisfaction and the challenges inherent in providing high-quality care.<sup>10</sup> These studies emphasize the importance of understanding patient expectations and the characteristics that lead to higher satisfaction levels within the context of oral healthcare.

The dental services industry offers a wide array of treatments, ranging from basic cleanings and whitening to more complex procedures like root canal treatments, extractions, dental implants, prosthetics, and oral surgeries. Despite the diversity of these services, a set of common attributes can be identified that significantly influence or determine patient satisfaction.<sup>11–13</sup> These attributes include the perceived professionalism of staff, the quality of care provided, the efficiency of the service, and the overall patient experience. Importantly, ongoing research aims to understand whether demographic factors, such as age,<sup>14</sup> gender,<sup>15</sup> disability status,<sup>16</sup> or purchasing power, contribute to significant variations in patient satisfaction. This line of inquiry helps to identify how different segments of the population experience dental care and provides insights into potential areas for service improvement.

Research on customer satisfaction is extensive and varied, covering a wide range of sectors and products.<sup>17,18</sup> In fact, a total of 62,895 publications on this topic are recorded in Scopus, with the oldest study dating back to 1925,<sup>19</sup> which focused on customer perceptions in the context of automobile body design. This early research underscores the longstanding interest in understanding how customer satisfaction influences consumer behavior and product evaluation across various industries.

The scope of research on customer satisfaction has evolved over the years, not only to analyze its direct effects on consumer behavior but also to explore its broader impact on other performance variables within businesses. These variables include profitability,<sup>20</sup> customer loyalty,<sup>21</sup> social responsibility,<sup>22</sup> customer retention,<sup>23</sup> and overall business performance. By examining these interrelationships, researchers aim to demonstrate the critical role that customer satisfaction plays in driving organizational success and long-term viability.

One of the key frameworks for analyzing customer satisfaction is the North American perspective, as presented by Parasuraman et al<sup>24</sup> which defines satisfaction as the outcome of a matching process between customers' initial expectations and their final perceptions of the service received.<sup>25</sup> This perspective gave rise to SERVQUAL, a widely adopted model that focuses on measuring service quality through a set of key dimensions. According to SERVQUAL, customer satisfaction is influenced by the gap between expectations and perceptions of service performance.<sup>26–28</sup> Over time, several variations of this model have been developed, such as SERICSAT,<sup>29</sup> PROSERV,<sup>30</sup> and RURALQUAL.<sup>31</sup> These versions aim to refine and adapt SERVQUAL to various contexts, expanding its applicability to diverse industries. One notable expansion of SERVQUAL is the use of the Kano model, which categorizes service attributes into four types: basic, standard, attractive, and contradictory.<sup>32</sup> This approach helps businesses identify the most impactful attributes for customer satisfaction and prioritize them accordingly.

From an alternative perspective, Grönroos<sup>33</sup> posits that customer satisfaction is primarily determined by the actual quality of products or services and how consumers perceive them. In this framework, the SERVPERF model<sup>34</sup> stands out as a key tool for evaluating customer satisfaction based on the performance of the service. Unlike SERVQUAL, which

focuses on the gaps between expectations and perceptions, SERVPERF concentrates solely on measuring perceived service quality, making it a more direct and efficient approach for assessing satisfaction in specific contexts.

As customer satisfaction research has evolved, more advanced techniques have been introduced, such as machine learning,<sup>35</sup> text mining analysis,<sup>36</sup> and the study of facial expressions,<sup>37</sup> which offer new ways to capture and analyze customer sentiment. These innovations reflect the growing demand for businesses to utilize data-driven methodologies to deepen their understanding of customer satisfaction and improve service delivery.

A notable variant of the SERVPERF model is proposed by Noda Hernández et al,<sup>38</sup> who builds upon the SERVPERF framework by introducing the concept of an attribute matrix to assess customer satisfaction. This matrix analyzes the relative importance and satisfaction of various service attributes, providing a more detailed understanding of customer perceptions. The desired state of each attribute is defined by the organization based on its strengths, strategies, and competencies. The matrix serves as a valuable tool for identifying areas where improvement is needed and for prioritizing efforts to enhance customer satisfaction.

The present research was conducted to analyze patient satisfaction within dental services, with a particular focus on assessing whether demographic factors such as age, gender, or purchasing power exert a differentiating influence on patient satisfaction. By examining these variables, this study aims to uncover potential disparities in satisfaction levels and provide valuable insights for dental service providers to refine their offerings and tailor their services to meet the diverse needs of their patient base.

## Materials and Methods

The steps described below were applied to develop this research.

### Definition of the Attributes to Be Evaluated

To define the attributes to be assessed, a group of experts was formed, consisting of eight members: four health professionals linked to dental services with more than five years of experience, and four university professors with a PhD, with more than 10 years of experience in research and teaching in the field of administrative sciences. As a result of this joint work, the following attributes were defined as those to be considered for the evaluation of customers:

- Professionalism.
- Empathy and communication.
- Dental care time.
- Available technology.
- Accessibility (Location, schedule, and communication methods).
- Comfort.
- Hygiene.
- Waiting time and punctuality.
- Quality and durability of dental interventions.
- Aesthetics of dental restorations.
- Variety of dental services or interventions offered.
- Additional facilities: Additional services such as emergency care outside of regular hours, availability of radiology services in the clinic or cosmetic dentistry services may be valued by some patients.
- Cost and transparency.
- Payment methods (credit, installments, insurance).

### Design of the Instruments

Once the attributes to be evaluated were defined, it was decided to determine two variables for each attribute: the importance of the attribute and the customer's perception of the attribute. The importance of the attributes was determined using the Kendall concordance method, which asked a group of experts to rank them in descending order of importance. To

evaluate the perception of the attributes, an ordinal evaluation scale ranging from 1 to 10 was used, where customers were asked to rate their level of satisfaction with each attribute under analysis based on the service received.

Additionally, the survey inquired about the age of respondents, who were divided into four groups: those under 25, those aged 25 to 40, those aged 41 to 60, and those over 60. The gender of the respondents was also determined, and three possible purchasing power groups were established based on characteristics such as whether they have a stable job, whether they own property (eg, a house or car), the number of dependents in their care, and the number of basic salaries they receive.

Group 1 does not own property, does not have a job, or only has a basic salary per capita. Group 2 owns only one property, has a stable job with two or more basic wages per capita, and Group 3 includes individuals with purchasing power who do not fall into either Group 1 or Group 2.

### Definition of Population and Sample

The research was conducted in Quito, Ecuador’s capital. According to the Institute of Statistics and Census, in 2022, a total of 2,011,000 inhabitants lived in this city. For this population, a sample size was determined using equation 1, establishing a sample size of 485.

$$n = \frac{N * p * q * z^2}{e^2 * (N - 1) + z^2 * p * q} \tag{1}$$

Where:

- N: population size
- p: probability of success (0.5)
- q: probability of failure (0.5)
- e: researcher error (5%)
- z: constant of the normal distribution: 1.96 for the 95.5% confidence level.

To achieve the research objectives, a stratified random sampling approach was employed, taking into account the variables of age, gender, and purchasing power. Table 1 presents the characterization of the sample.

### Application and Processing of the Instruments

The information was collected from patients who had received dental services in the city. For each group defined in the population, the importance of the attributes was determined after verifying the level of agreement among the clients that comprised each group. Likewise, the evaluation of each attribute was defined. With this information, the client satisfaction index was calculated using Equation 2.

**Table 1** Sample Composition

Demographic Group	Segment	Quantity	Percentage
Age	Under 25	76	15.670
	25 to 40	114	23.505
	40 to 60	167	34.432
	Over 60	128	26.391
Gender	Female	245	50.515
	Male	240	49.484
Purchasing power	Group I	135	27.835
	Group II	238	49.072
	Group III	112	23.092

$$ISC = \sum_{i=1}^n IA_i * E_i \quad (2)$$

Donde:

IA<sub>i</sub>: Importance of attribute i

E<sub>i</sub>: Evaluation of attribute i

Based on the behavior of the ISC, a descriptive analysis of the indicator's behavior is conducted for each of the groups that comprise the sample. Subsequently, based on these results, a Chi-square hypothesis comparison test was applied to compare the differences in means between the groups in the sample. Based on these results, the attribute matrix was constructed, following the proposal by Noda Hernández et al<sup>38</sup> to characterize the behavior of the attributes in each group in greater detail and to reach more specific conclusions.

## Ethical Considerations

It should be noted that ethical procedures for research with human beings were adopted and respected, and that the participation criteria included being 18 years of age or older, and that no confidential information or personal data of the participants was handled, who limited themselves to anonymously answering the questionnaires applied on customer satisfaction, after reading and signing the term of free and informed consent and expressing their willingness to participate in the research and accepting that the results were published. The Institutional Research Ethics Committee (IREC) considered this to be non-interventionist research, granting an exemption for this study, taking into account the above factors.

## Results

The analysis began by determining the perceived importance of the service attributes across demographic groups. For this purpose, a panel of 28 expert customers was formed, comprising four groups of seven individuals each, selected to represent the different demographic segments defined in the sampling design.

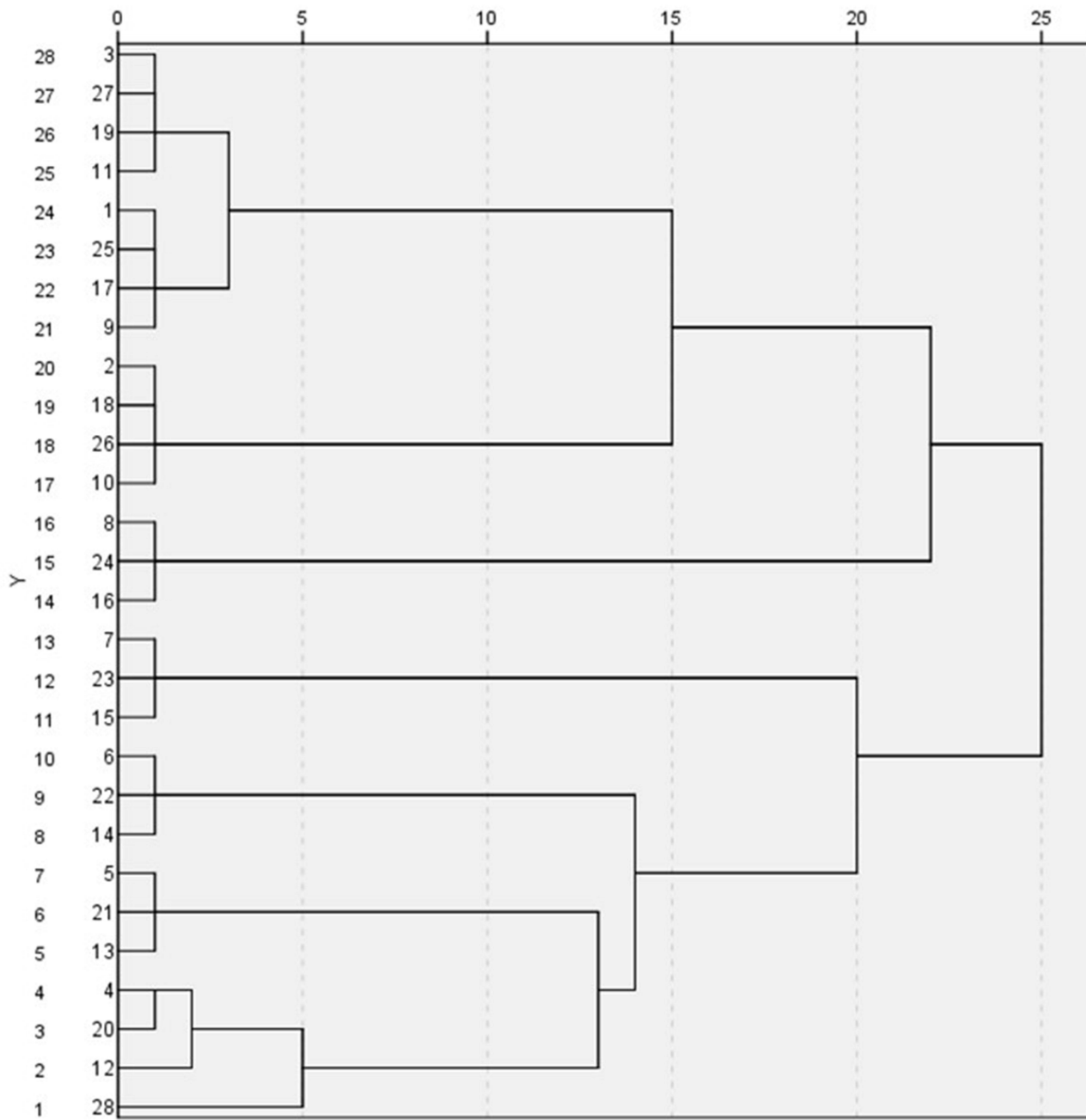
As shown in Table 2, Kendall's coefficient of concordance, all groups exceeded the threshold value of 0.5, indicating a satisfactory level of agreement among experts regarding the relative importance of the attributes. The highest concordance was observed among participants aged 40 to 60 years ( $W = 0.813$ ), followed closely by those over 60 years ( $W = 0.817$ ). In contrast, the group under 25 years of age showed the lowest concordance ( $W = 0.503$ ), suggesting greater variability in the prioritization of attributes among younger participants. Gender- and purchasing power-based groups also showed acceptable levels of agreement, with all coefficients ranging between 0.505 and 0.565.

Figure 1, a dendrogram of market segments used to define attribute importance, visually represents the segmentation utilized to structure the expert panels. The hierarchical clustering confirms the separation by age, gender, and purchasing power.

The detailed results of attribute ranking are presented in Table 3, which shows the relative importance of attributes by demographic group. While the absolute values of importance vary slightly across segments, the overall hierarchy remains

**Table 2** Kendall's Coefficient of Concordance

Demographic Group	Segment	Kendall's Coefficient
Age	Under 25	0.503
	25 to 40	0.631
	40 to 60	0.813
	Over 60	0.817
Gender	Female	0.509
	Male	0.618
Purchasing power	Group I	0.505
	Group II	0.531
	Group III	0.565
	General	0.512



**Figure 1** Dendrogram of Market Segments Used to Define Attribute Importance.

consistent. Across nearly all groups, professionalism, quality, empathy, and communication were identified as the most essential attributes. Conversely, payment methods, additional facilities, and dental care time were consistently ranked as the least important; the remaining attributes occupied intermediate positions, with some demographic variation in their weightings.

Across all demographic groups, the attributes most consistently rated as highly important were professionalism, quality, empathy, and communication—highlighting their perceived centrality in the delivery of dental services. In contrast, attributes such as payment methods, additional facilities, and dental care time were considered the least essential. The remaining attributes occupied middle-ground positions, reflecting moderate perceived importance depending on the group.

As shown in [Table 3](#), this general hierarchy of importance holds relatively steady across gender and purchasing power groups, with minimal fluctuation. However, when examining age groups, more pronounced variations emerge. For instance, respondents

**Table 3** Relative Importance of Attributes by Demographic Group

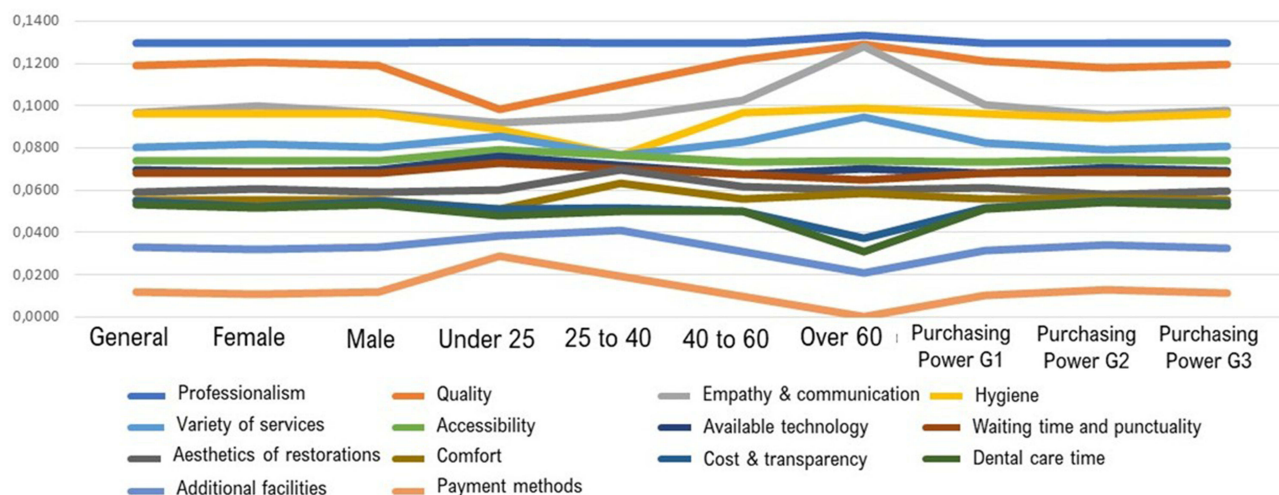
Attributes	Total	Gender		Age				Purchasing Power		
		Female	Male	Under 25	25-40	40-60	Over 60	Group I	Group II	Group III
Professionalism	0.129	0.129	0.129	0.130	0.130	0.129	0.133	0.129	0.130	0.129
Quality	0.119	0.120	0.119	0.098	0.110	0.122	0.129	0.121	0.118	0.120
Empathy and communication	0.096	0.100	0.096	0.092	0.094	0.102	0.128	0.101	0.096	0.098
Hygiene	0.096	0.096	0.096	0.089	0.077	0.097	0.099	0.096	0.094	0.096
Variety of services	0.080	0.082	0.080	0.086	0.077	0.083	0.094	0.082	0.079	0.081
Accessibility	0.074	0.074	0.074	0.079	0.076	0.073	0.074	0.074	0.074	0.074
Available technology	0.070	0.069	0.069	0.076	0.072	0.068	0.070	0.068	0.071	0.069
Waiting time and punctuality	0.068	0.068	0.068	0.073	0.070	0.068	0.065	0.068	0.069	0.068
Aesthetics of restorations	0.059	0.061	0.059	0.060	0.070	0.062	0.060	0.061	0.058	0.060
Comfort	0.055	0.056	0.055	0.051	0.063	0.056	0.059	0.056	0.057	0.055
Cost and transparency	0.055	0.052	0.055	0.051	0.052	0.050	0.037	0.052	0.055	0.054
Dental care time	0.053	0.052	0.053	0.048	0.050	0.050	0.031	0.051	0.054	0.053
Additional facilities	0.033	0.032	0.033	0.038	0.041	0.031	0.021	0.032	0.034	0.033
Payment methods	0.012	0.011	0.012	0.029	0.019	0.010	0.000	0.010	0.013	0.011

under the age of 25 placed slightly higher importance on some attributes traditionally viewed as secondary (eg, payment methods, additional facilities). At the same time, the quality of service was comparatively de-emphasized. Conversely, participants over 60 years of age tended to assign lower importance to cost, service time, and payment methods, while attributing greater importance to professionalism, empathy, communication, hygiene, and the variety of services offered.

These intergroup differences in attribute prioritization are more clearly illustrated in Figure 2, which shows the variation in the perceived importance of attributes across groups, highlighting the shifting weight of individual attributes based on demographic segmentation.

Once the relative importance of the attributes was determined for each demographic group, the next step was to evaluate how patients rated their actual satisfaction with each attribute. This assessment is summarized in Tables 4, 5, and 6, which present satisfaction scores disaggregated by gender, age, and purchasing power, respectively.

In general, satisfaction levels across all attributes ranged from 5 to 10, indicating overall moderate to high perceptions of service quality. Interestingly, the characteristics with the highest satisfaction scores were often those rated as less critical during



**Figure 2** Variation in the Perceived Importance of Attributes Across Groups.

**Table 4** Patient Satisfaction Patterns by Gender

Attributes	Female			Male		
	Min	$\bar{X}$	Max	Min	$\bar{X}$	Max
Professionalism	5.00	7.17	9.00	9.00	6.82	5.00
Empathy and communication	6.00	7.86	10.00	10.00	7.85	6.00
Dental care time	5.00	7.06	9.00	9.00	7.02	5.00
Aesthetics	6.00	7.96	10.00	10.00	8.10	6.00
Technology	5.00	6.95	9.00	9.00	7.03	5.00
Comfort	6.00	7.99	10.00	10.00	7.97	6.00
Hygiene	5.00	7.17	9.00	9.00	6.95	5.00
Access	5.00	7.02	9.00	9.00	7.16	5.00
Waiting time	6.00	8.00	10.00	10.00	7.94	6.00
Cost and transparency	5.00	7.03	9.00	9.00	7.03	5.00
Payment methods	6.00	7.98	10.00	10.00	8.05	6.00
Facilities	6.00	8.05	10.00	10.00	8.07	6.00
Quality	5.00	6.97	9.00	9.00	7.01	5.00
Variety	6.00	7.84	10.00	10.00	7.88	6.00
General satisfaction	6.29	7.41	8.46	8.50	7.37	6.36

**Table 5** Patient Satisfaction Patterns by Age

Attributes	Under 25			25 to 40			40 to 60			Over 60		
	Min	$\bar{X}$	Max	Min	$\bar{X}$	Max	Min	$\bar{X}$	Max	Min	$\bar{X}$	Max
Professionalism	5.00	6.76	9.00	5.00	7.06	9.00	5.00	7.00	9.00	5.00	7.03	9.00
Empathy and communication	6.00	7.94	10.00	6.00	7.83	10.00	6.00	7.87	10.00	6.00	7.82	10.00
Dental care time	5.00	6.90	9.00	5.00	7.13	9.00	5.00	6.93	9.00	5.00	7.17	9.00
Aesthetics	6.00	7.92	10.00	6.00	7.99	10.00	6.00	8.11	10.00	6.00	8.03	10.00
Technology	5.00	7.02	9.00	5.00	6.94	9.00	5.00	6.98	9.00	5.00	7.04	9.00
Comfort	6.00	7.82	10.00	6.00	7.45	10.00	6.00	8.23	10.00	6.00	8.17	10.00
Hygiene	5.00	7.20	9.00	5.00	7.06	9.00	5.00	6.89	9.00	5.00	7.22	9.00
Access	5.00	7.49	9.00	5.00	7.10	9.00	5.00	6.95	9.00	5.00	7.09	9.00
Waiting time	6.00	8.20	10.00	6.00	8.00	10.00	6.00	7.89	10.00	6.00	7.93	10.00
Cost and transparency	5.00	7.16	9.00	5.00	7.31	9.00	5.00	6.86	9.00	5.00	6.95	9.00
Payment methods	6.00	8.08	10.00	6.00	7.93	10.00	6.00	7.94	10.00	6.00	8.15	10.00
Facilities	6.00	8.04	10.00	6.00	7.98	10.00	6.00	8.16	10.00	6.00	8.01	10.00
Quality	5.00	7.20	9.00	5.00	6.91	9.00	5.00	6.90	9.00	5.00	7.09	9.00
Variety	6.00	8.04	10.00	6.00	7.91	10.00	6.00	7.82	1.00	6.00	7.78	10.00
General satisfaction	6.48	7.46	8.11	6.29	7.38	8.50	6.38	7.35	8.41	6.29	7.42	8.46

**Table 6** Patient Satisfaction Patterns by Purchasing Power

Attributes	Group I			Group II			Group III		
	Min	$\bar{X}$	Max	Min	$\bar{X}$	Max	Min	$\bar{X}$	Max
Professionalism	5.00	6.88	9.00	5.00	7.09	9.00	5.00	6.86	9.00
Empathy and communication	6.00	7.73	10.00	6.00	7.93	10.00	6.00	7.85	10.00
Dental care time	5.00	6.96	9.00	5.00	7.11	9.00	5.00	6.95	9.00
Aesthetics	6.00	7.83	10.00	6.00	8.13	10.00	6.00	8.05	10.00
Technology	5.00	6.81	9.00	5.00	7.04	9.00	5.00	7.10	9.00

(Continued)

**Table 6** (Continued).

Attributes	Group I			Group II			Group III		
	Min	$\bar{x}$	Max	Min	$\bar{x}$	Max	Min	$\bar{x}$	Max
Comfort	6.00	8.17	10.00	6.00	7.94	10.00	6.00	7.85	10.00
Hygiene	5.00	7.14	9.00	5.00	6.96	9.00	5.00	7.21	9.00
Access	5.00	7.17	9.00	5.00	7.06	9.00	5.00	7.08	9.00
Waiting time	6.00	7.99	10.00	6.00	8.04	10.00	6.00	7.74	10.00
Cost and transparency	5.00	6.80	9.00	5.00	7.10	9.00	5.00	7.14	9.00
Payment methods	6.00	8.01	10.00	6.00	7.97	10.00	6.00	8.13	10.00
Facilities	6.00	7.84	10.00	6.00	8.16	10.00	6.00	8.10	10.00
Quality	5.00	6.92	9.00	5.00	6.96	9.00	5.00	7.17	9.00
Variety	6.00	7.59	10.00	6.00	8.00	10.00	6.00	7.86	10.00
General satisfaction	6.29	7.31	8.06	6.36	7.43	8.50	6.29	7.41	8.46

the prioritization stage—namely, additional facilities, payment methods, variety of services, and waiting time. This pattern suggests a potential mismatch between what patients value most and what providers tend to perform best.

Conversely, the attributes that received the lowest satisfaction scores were among those considered most critical: professionalism, technology, quality, dental care time, cost, and transparency. These results highlight areas where service improvement efforts may be most needed, particularly given the high strategic importance attributed to these elements by most demographic groups.

Regarding overall satisfaction, [Table 7](#) presents the mean satisfaction index across the various demographic segments. The highest satisfaction levels were observed among patients under 25 years of age, followed closely by individuals in Purchasing Power Group II. At the opposite end, Purchasing Power Group I and individuals aged 40 to 60 reported the lowest average satisfaction levels.

To verify whether the observed differences in satisfaction levels across demographic groups were statistically significant, a chi-square test of independence was conducted. The results are presented in [Table 8](#), which shows the significance levels of the chi-square test on mean differences.

Among the three demographic variables analyzed—age, gender, and purchasing power—only age showed statistically significant differences in satisfaction levels across multiple attributes, with p-values below 0.05. This confirms that age plays a differentiating role in how patients perceive and evaluate dental services. In contrast, no significant differences were found for gender or purchasing power, suggesting that these factors do not substantially influence satisfaction outcomes within the context of this study.

Given that the customer satisfaction index is a composite measure influenced by two key components, the perceived importance of each attribute and the level of satisfaction reported by patients, a deeper analysis was conducted using an attribute matrix, as shown in [Figure 3](#). For the construction of this matrix, a mean importance threshold of 0.7 and a desired satisfaction level of 7.0 were used to classify the attributes across four quadrants.

At first glance, [Figure 3](#) reveals that attribute behavior varies across demographic groups. However, a closer examination shows that despite shifts in exact importance or satisfaction scores, most attributes tend to maintain consistent classifications within the matrix structure.

**Table 7** Mean Satisfaction Scores by Demographic Group

Age			Gender			Purchasing Power		
Under 25	25-40	40-60	Over 60	Female	Male	Group I	Group II	Group III
7.55	7.47	7.46	7.53	7.50	7.48	7.41	7.53	7.50

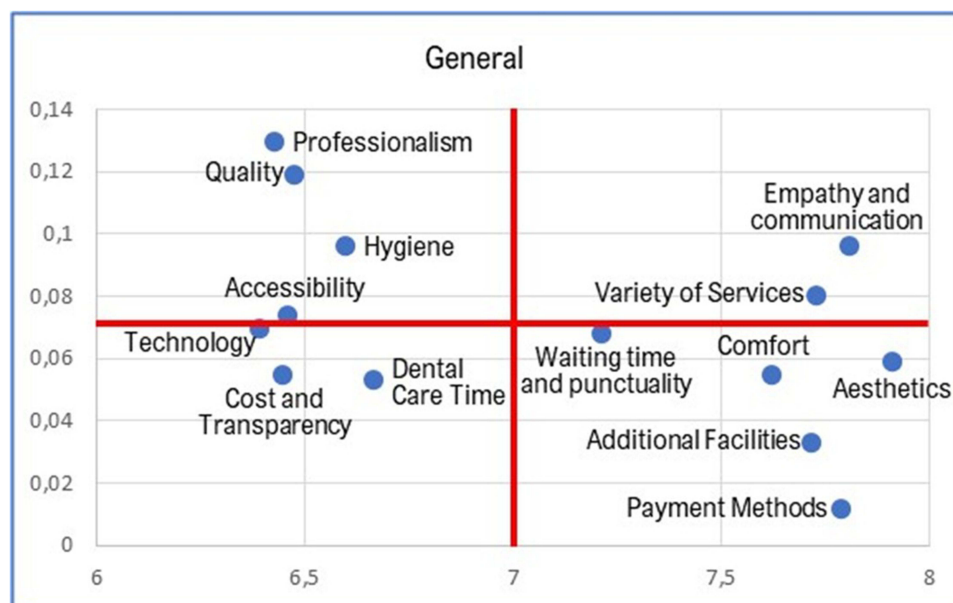
**Table 8** Significance Levels of the Chi-Square Test on Mean Differences

Variables	Age	Gender	Purchasing Power
Professionalism	0.004	0.746	0.048
Empathy and communication	0.000	0.859	0.836
Time of dental care	0.001	0.171	0.649
Aesthetics	0.002	0.524	0.387
Available technology	0.006	0.275	0.0252
Comfort	0.000	0.644	0.339
Hygiene	0.001	0.106	0.328
Access	0.002	0.898	0.756
Waiting time and punctuality	0.000	0.552	0.437
Cost and transparency	0.001	0.439	0.128
Payment methods	0.009	0.583	0.427
Additional facilities	0.005	0.328	0.653
Quality	0.000	0.009	0.878
Variety of services	0.001	0.672	0.242
Satisfaction	0.000	0.446	0.352

In the overall analysis, four attributes were identified as critical (important but evaluated below the desired threshold): professionalism, quality, hygiene, and access. Two attributes were classified as strengths (important and well evaluated): variety of services and empathy and communication. Five attributes were labeled as compensatory (well evaluated but less critical): waiting time and punctuality, aesthetics, comfort, easy access, and payment methods. Finally, three attributes—technology, cost, and transparency, and dental care time—were categorized as indifferent, as they were perceived as relatively unimportant and evaluated below the desired state.

This pattern remained largely consistent when data were segmented by gender and purchasing power, suggesting uniformity in service perception across those variables.

However, when disaggregated by age group, more nuanced differences emerged:



**Figure 3** General Attribute Matrix.

- In the under-25 group, attributes clustered only in two quadrants, with seven classified as critical and seven as compensatory, reflecting a polarized evaluation pattern.
- Among participants aged 25 to 40, waiting time regained its typical classification, and empathy, communication, waiting time, and variety of service emerged as strengths.
- In the 40 to 60 group, cost and transparency, technology, and dental care time were seen as indifferent, while empathy, communication, and variety of service were again positioned as strengths.
- For individuals over 60, the distribution closely mirrored that of the general analysis, reinforcing the consistency of attribute perception among older patients.

These findings suggest that age is not only a significant factor in overall satisfaction levels, but also in the way service attributes are prioritized and assessed in terms of both importance and performance.

## Discussion

The results obtained from this research substantiate the effectiveness of customer satisfaction evaluation models, particularly the SERVPERF model<sup>34</sup> in measuring the level of acceptance of the quality of services provided. SERVPERF, which focuses on the actual performance of services, proved to be a reliable framework for understanding patient satisfaction in the context of dental care. Furthermore, the approach proposed by Noda Hernández et al<sup>38</sup> which builds upon the SERVPERF foundation, enhances the evaluation process by incorporating two distinct measurement scales: one for the importance assigned to service attributes, and another for the perceived performance of those attributes. This dual perspective enables a more nuanced analysis of service quality. Importantly, this approach also addresses some limitations of the more widely known SERVQUAL model,<sup>26–28</sup> which is based on the gap between expectations and perceptions but may not always accurately reflect service priorities.

Additionally, this research contributes to the existing body of knowledge by incorporating several attributes previously identified as relevant in dental service satisfaction studies, such as those by Klaassen et al.<sup>13</sup> Lemay et al<sup>39</sup> and Wencheslaus et al.<sup>40</sup> These include core elements such as professionalism, empathy, accessibility, and cost—factors that consistently emerge as important determinants of patient satisfaction. Their inclusion in this study strengthens the external validity of the findings and confirms the importance of these variables in shaping service perceptions across diverse populations.

Building on this, the multidimensional structure of dental service satisfaction found in this study aligns with broader empirical research. Klaassen et al<sup>13</sup> identified a wide range of influential attributes, including professionalism, skills and knowledge, empathy, emotional care, cleanliness, infrastructure, location, and waiting times, all of which contribute to patient evaluations. Our findings reflect this diversity, confirming the relevance of many of these elements, particularly those classified as critical in the attribute matrix, such as professionalism, hygiene, and access.

Further comparisons reinforce this alignment. Lemay et al<sup>39</sup> emphasized waiting times and the location of the dental facility as significant factors affecting perceptions, both of which, in our study, were generally well rated but not among the most valued attributes. Wencheslaus et al,<sup>40</sup> meanwhile, pointed to pain management, cost, and service availability as key concerns, especially among underserved populations. Our results support these conclusions to some extent: attributes such as cost and service time were perceived as less critical by older patients, despite their potential clinical or functional implications. These nuances underscore the importance of tailoring care strategies to patient expectations, which vary with age and context.

A significant contribution of this study lies in its demographic segmentation, which reveals that age has a substantial influence on satisfaction levels and attribute prioritization. Unlike gender and purchasing power, which did not yield significant differences, age appears to shape both expectations and evaluation patterns. Younger patients, for instance, tended to rate less critical attributes (eg, payment methods or additional facilities) more positively. In comparison, older patients prioritized professionalism and empathy, despite assigning them lower satisfaction scores. These patterns suggest that generational preferences, previous healthcare experiences, and communication styles may all influence how patients perceive and evaluate dental services.

This divergence supports the need for targeted adaptations in service design. Younger users may value speed, convenience, and digital accessibility, while older patients may seek reassurance, trust, and more transparent

communication. Recognizing and addressing these differences through differentiated service strategies could improve overall satisfaction levels and foster patient loyalty.

Although the sample was designed to be representative of Quito's urban population, cultural and regional factors may limit the generalizability of the findings. Satisfaction is a context-sensitive construct influenced by norms, experiences, and service expectations. Further research, especially comparative or longitudinal studies, could help determine whether these patterns persist in different populations and healthcare systems. Additionally, qualitative methods may shed light on the emotional and cognitive processes underlying satisfaction ratings in various age groups.

In summary, this study confirms the usefulness of combining SERVPERF with an attribute matrix as a tool for identifying mismatches between importance and performance in healthcare settings. It also highlights the role of age in modulating service perceptions, which should inform the development of more inclusive, personalized, and responsive care models in dentistry and beyond.

## Conclusions

This study provides robust evidence on the factors that shape patient satisfaction in dental services, highlighting the decisive role of age in shaping expectations and perceptions of care. By integrating a performance-based evaluation model with a prioritization matrix, the research offers a comprehensive and nuanced understanding of service quality—one that extends beyond simple satisfaction metrics to identify gaps between what patients value and what they experience.

A key finding is the differentiated behavior across age groups, which exhibited distinct patterns in how service attributes are prioritized and assessed. In contrast, gender and purchasing power showed no statistically significant influence on satisfaction, suggesting that age-sensitive approaches should be prioritized in the design of dental services. These insights enable providers to develop more targeted, patient-centered strategies that adapt to the evolving expectations of diverse age cohorts.

Another significant contribution is the identification of a misalignment between attribute importance and satisfaction levels. Attributes considered less relevant by patients often received higher satisfaction scores, while core elements—such as professionalism and clinical quality—were underperforming despite their high perceived value. This finding invites reflection on how service priorities are defined and how resources are allocated in practice.

From a methodological standpoint, the study demonstrates the value of combining quantitative evaluation with strategic prioritization tools to support evidence-based decision-making in healthcare management. The approach used is replicable and adaptable to other healthcare contexts, reinforcing its practical utility.

Despite its strengths, the study has limitations. The analysis was conducted in a single urban setting, which may restrict the generalizability of the results to other cultural or geographic contexts. Additionally, the use of self-reported measures, although standardized, may be influenced by subjective biases.

Future research could explore these dynamics in rural or cross-cultural settings, incorporating qualitative methods to gain a deeper understanding of the motivations, expectations, and emotional factors underlying satisfaction ratings. Longitudinal studies may also help to evaluate how satisfaction evolves over time and in response to service improvements.

In summary, this research makes a significant contribution both conceptually and practically to the understanding of patient satisfaction in dental services. It highlights the importance of aligning service performance with patient priorities and provides a clear roadmap for improving quality of care through strategic, demographic-sensitive planning.

## Data Sharing Statement

The original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding author.

## Ethics and Informed Consent Statement

The study did not involve any clinical procedures, biomedical experimentation, or collection of sensitive personal data. Instead, the data were collected through anonymous surveys and interviews that adult patients voluntarily completed, addressing only their service perceptions and general demographic characteristics. In Ecuador, according to Ministerial Agreement 4883 of the Ministry of Public Health (Official Register Supplement 173, of December 12, 2013), ethical review by an Institutional Review Board (IRB) or Human Research Ethics Committee (CEISH) is required only for

biomedical or clinical research that may pose physical or psychological risks to participants. Our study, being observational, non-interventional, and of minimal risk, is exempt under this regulation. Nevertheless, we affirm that all procedures complied with the ethical standards of the 2013 revision of the Declaration of Helsinki, including respect for informed consent, privacy, and voluntary participation. Participants were informed of the purpose of the study and their right to withdraw at any point without consequence. No personal or identifiable information was recorded. The above is assumed to be an exemption from the ethical compliance requirement.

Verbal informed consent was obtained from all participants involved in the study. Prior to participation, respondents were informed about the purpose of the research, the voluntary nature of their participation, and the confidentiality of their responses. The study involved no sensitive personal data and was conducted in full compliance with the ethical principles outlined in the Declaration of Helsinki (2013 revision).

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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The authors declare no conflicts of interest in this work.

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