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# Economic Analysis of Willingness to Pay for Dental Procedures and Associated Factors

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## Abstract

**Objective:** To evaluate the willingness to pay (WTP) for basic dental procedures according to sociodemographic variables of individuals from the Brazilian population. **Methods:** A quantitative and analytical study was conducted, using a cross-sectional observational design, to examine the willingness to pay (WTP) for dental procedures. A total of 280 individuals participated in this study through digital forms on the Google Workspace platform (Google Forms). Socioeconomic data, oral disease burden, oral health complaints, and willingness to pay for dental procedures were collected. Multiple regressions were generated between the independent variables and the WTP for dental procedures, considering a significance level of $p < 0.05$ and a 95% confidence interval. **Results:** Socioeconomic factors and level of involvement in Dentistry were the variables associated with higher willingness to pay (WTP) for basic dental procedures. Compared to individuals with an income of 5 or more minimum wages (MW), those with lower income (up to 2 MW) exhibited lower WTP for routine check-ups (RP = 0.732, $p < 0.01$), anterior tooth restoration (RP = 0.785, $p < 0.01$), simple extraction (RP = 0.763, $p < 0.01$), and simple tooth cleaning (RP = 0.812, $p < 0.01$). When compared to dental professionals, individuals not connected to Dentistry had lower WTP for anterior tooth restoration (RP = 0.774, $p < 0.01$), extraction (RP = 0.769, $p < 0.01$), and simple tooth cleaning (RP = 0.742, $p < 0.01$). **Conclusion:** Income and involvement in Dentistry were the factors that influenced the preference and valuation of dental procedures. Understanding the factors that influence valuation and preferences in health can assist managers and policymakers in emphasizing the importance of basic or routine oral health care.

## Keywords

Health Care Economics and Organizations, Cost-Benefit Analysis,

Oral Health, Dentistry

## 1. Introduction

While epidemiological surveys have shown improvements in the oral health conditions of the Brazilian population, such as a reduction in the prevalence of dental caries and tooth loss, the World Health Organization (WHO) recognizes oral diseases as a public health issue. Due to their high prevalence, oral diseases have been considered a significant non-communicable chronic condition worldwide (WHO, 2022), impacting individuals' quality of life and having economic significance (WHO, 2022; Nico et al., 2016; Bulgareli et al., 2018).

The significative prevalence of oral diseases translates into demand for healthcare services (Macêdo et al., 2016). Although Brazil has a universal, public, and free healthcare system with the presence of a private sector, it's important to understand the variables that influence how users of the service value dental treatment. This valuation can affect whether individuals seek dental treatment or not. In this scenario, studies in health economics can provide support for decision-making regarding healthcare treatments, promoting rational and efficient use of resources based on the attributes valued more or less by the service user. Furthermore, it can contribute to better planning of healthcare actions and programs (Sever et al., 2018; Vernazza et al., 2014).

Among the methods used to assess health valuation in relation to dental treatments, willingness to pay (WTP) has proven to be one of the most useful methods (Leung & McGrath, 2010), especially for estimating intangible costs related to quality of life (Silva et al., 2016). WTP represents an individual's preference strength for a particular intervention and the maximum amount of money they would invest in that intervention (Mckenna, 2016; Augusti et al., 2014).

It's important to note that validated willingness-to-pay questionnaires for the Brazilian population in the context of oral health care do not exist in the literature. Therefore, the analysis of WTP for basic dental procedures can provide support for decision-making, planning, and organization of teams and their workflow.

Thus, the present study aimed to evaluate the willingness to pay for basic dental treatments according to socioeconomic variables of individuals in the Brazilian population.

## 2. Material and Methods

### 2.1. Study Characterization

This is a quantitative and analytical study with an observational, cross-sectional design, constituting field research on economic assessment of willingness to pay. All national (Resolution CNS/MS N° 466/2012) and international (Helsinki Declaration) ethical principles related to research involving human subjects were preserved. The research was approved by the Research Ethics Committee of the

Federal University of Paraíba (protocol 28166820.5.0000.5188).

### 2.2. Study Population and Eligibility Criteria

The sample consisted of individuals aged 18 years or older, users and non-users of public services, residing in any Brazilian state. To determine the sample size, a representative sample was calculated using finite population sampling calculation. With an estimated population of 1,000,000, a significance level of 95%, a maximum tolerated sampling error of 5%, an expected proportion of 90%, and a design effect of 2.0 were considered. The minimum of 277 participants was calculated. An additional 20% of the sample was added to account for potential refusals or data collection losses, resulting in a sample size of 347 individuals. Invitation to participate in the study was conducted through digital media (Instagram, Facebook, and WhatsApp), using a probabilistic snowball sampling technique. This study included adult individuals who agreed to participate after signing the Informed Consent Form. Incomplete, duplicated, or inconsistently answered questionnaires were excluded from the analysis.

### 2.3. Data Collection

Data was collected through digital questionnaires using the Google Workspace platform (Google Forms) (https://www.google.com/forms), between June 2021 and June 2022, including the pilot study. Initially, questions were presented regarding socioeconomic characteristics (gender, age group, family income, education level, and involvement in dentistry), oral disease burden (number of oral issues such as dental caries, periodontal disease, missing teeth, and need for dental prosthesis) (De Lucena et al., 2021), and current dental complaints.

Questionnaires about the willingness to pay were also administered in which individuals were instructed to indicate the direct cost amount they were willing to pay for different types of dental procedures (routine check-up, anterior tooth resin restoration, simple extraction, and simple tooth cleaning). For each willingness to pay question, participants were asked: "How much would you pay for a specific dental treatment?" Participants were instructed to provide a whole numeric value, without any ranges from zero to infinity. Respondents were given access to the recommended average value for each procedure, according to the Brazilian Hierarchical Classification of Dental Procedures (CBHPO) (CFO, 2020) table, to guide them on the average cost charged for the procedures. The instrument will be made available upon request to the corresponding author.

### 2.4. Pilot Study

The questionnaire was initially presented to a sample of 32 individuals and was subsequently re-administered to the same individuals with a two-week interval between applications. Then, the internal consistency of the questionnaires was calculated using Cronbach's Alpha coefficient, resulting in a value of 0.941, indicating very high internal consistency. Additionally, the Intraclass Correlation

Coefficient (ICC) was calculated to assess the questionnaire's stability between the two applications. The following values were obtained: ICC for routine check-up = 0.973; ICC for anterior tooth resin restoration = 0.905; ICC for simple extraction = 0.970; ICC for simple tooth cleaning = 0.967. For the pilot study, the Kaiser-Meyer-Olkin (KMO) adequacy test for the sample resulted in a score of 0.846, and the Bartlett's test of sphericity showed statistical significance ($p < 0.001$), indicating a good correlation between the variables.

### 2.5. Statistical Analysis

Initially, absolute and relative frequencies of all individual variables were obtained to characterize the sample. The distribution analysis using the Kolmogorov-Smirnov test revealed that the data did not follow a normal distribution. The willingness to pay results were analyzed by comparing the categories of independent variables. The Mann-Whitney test was used for variables with two categories, and the Kruskal-Wallis test was used for variables with three categories. If a statistically significant difference was found between groups, the differences were confirmed using the Bonferroni post-hoc test. The analyses were conducted at a 95% confidence level.

Variables that showed $p < 0.05$ in the bivariate analysis were entered into the multiple Poisson regression model. Variables with a $p$-value < 0.05 were considered significant. For each variable included in the model, prevalence ratio (PR) measures and 95% confidence intervals were obtained. All analyses were performed using IBM SPSS Statistics software (SPSS for Windows, Version 22.0. Armonk, NY: IBM Corp.).

## 3. Results

The instrument was applied to a total of 280 individuals, ranging from 18 to 79 years old, predominantly female (63.9%), with college education (93.6%), family income exceeding 5 minimum wages (39.3%), users of public services or the general public (64.3%), without any oral health complaints (70%), and having an oral disease burden of up to 2 oral health problems. Considering the anticipated loss percentage in the study, the sample size was deemed sufficient, meeting the minimum required for estimating calculations (n = 277).

In this study, the internal consistency of the willingness to pay variables presented a Cronbach's Alpha of 0.801. The KMO value resulted in a score of 0.780, and the Bartlett's test of sphericity showed statistical significance ($p < 0.001$). Based on this, it can be concluded that the variables had good internal consistency, and the sample size can be considered appropriate.

Table 1 presents the distribution of the WTP values for each procedure, including the mean, median, standard deviation, minimum, and maximum values. Considering the average values provided to respondents during the questionnaire completion (Routine check-up = R$100.00; Anterior tooth resin restoration = R$153.00; Simple extraction = R$157.00; Simple tooth cleaning = R$105.00), it's

evident that the mean values were higher than these reference values. However, when analyzing the median, it's apparent that the WTP values were similar to the provided reference values.

Table 1. Measures of central tendency of the Willingness to Pay (WTP) values.

| | Mean | Median | Standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| **WTP for Routine Check-up** | R$121.27 | R$100.00 | 50.532 | R$40.00 | R$500.00 |
| **WTP for Anterior Tooth Resin Restoration** | R$181.40 | R$153.00 | 81.279 | R$50.00 | R$500.00 |
| **WTP for extraction** | R$147.35 | R$150.00 | 63.000 | R$0.00 | R$500 |
| **WTP for simple tooth cleaning** | R$112.89 | R$100.00 | 49.691 | R$0.00 | R$500 |

Table 2 presents the comparison of willingness to pay for routine check-up by categories of independent variables. A statistically significant difference was observed between the categories of income ($p < 0.001$), education level ($p = 0.020$), involvement in dentistry ($p = 0.046$), and current oral health complaint ($p = 0.027$). It is noticeable that individuals with an income exceeding 5 minimum wages, higher education level, involvement in the dental profession, and without a current oral health complaint are willing to pay more for a routine check-up.

Table 2. Comparison of willingness to pay for a routine check-up among the groups of independent variables in the study.

| Independent variables | | WTP routine check-up | | | |
|---|---|---|---|---|---|
| | | Mean | Standard deviation | Median (Q25 - Q75) | *p*-value |
| **Sex** | Male | 122 | 60 | 100 (100 - 150)[a] | 0.675 |
| | Female | 121 | 44 | 100 (100 - 150)[a] | |
| **Age group** | Up to 30 years | 116 | 43 | 100 (100 - 150)[a] | 0.214 |
| | More than 30 years | 126 | 56 | 100 (100 - 150)[a] | |
| **Family income** | Up to 2 minimum wages | 102 | 33 | 100 (80 - 100)[a] | **<0.001** |
| | Between 2 and 5 minimum wages | 111 | 39 | 100 (90 - 140)[a] | |
| | More than 5 minimum wages | 143 | 61 | 130 (100 - 150)[b] | |
| **Education level** | Up to High School | 100 | 34 | 100 (80 - 100)[a] | **0.020** |
| | College Education | 123 | 51 | 100 (100 - 150)[b] | |

Continued

| | | | | | |
|---|---|---|---|---|---|
| **Level of involvement in dentistry** | Users of services or the general public | 118 | 52 | 100 (100 - 150)[a] | **0.046** |
| | Dentistry student | 119 | 48 | 100 (100 - 150)[a] | |
| | Dentistry professionals | 130 | 45 | 120 (100 - 150)[b] | |
| **Oral health complaint** | Yes | 115 | 60 | 100 (100 - 120)[a] | **0.027** |
| | No | 124 | 46 | 100 (100 - 150)[b] | |
| **Oral disease burden** | Up to 1 oral disease burden | 119 | 42 | 100 (100 - 150)[a] | 0.167 |
| | 2 oral disease burdens | 125 | 49 | 100 (100 - 150)[a] | |
| | 3 or 4 oral disease burdens | 118 | 63 | 100 (100 - 120)[a] | |

Different letters indicate statistically significant differences.

In the multiple regression model, it was observed that only the family income variable was associated with willingness to pay for routine consultations, in which individuals with a family income of up to 2 minimum exercises (PR = 0.732) and between 2 and 5 activities, minimum (PR = 0.778) are willing to pay less for a routine consultation than individuals with family income greater than 5 minimum wages (Table 3).

Table 3. Multiple Poisson regression of factors related to willingness to pay for routine dental check-up with the adjusted model.

| Variables | | B | *p*-value | PR | CI 95% |
|---|---|---|---|---|---|
| **Family income** | Up to 2 minimum wages | −0.312 | <0.001 | 0.732 | 0.648; 0.828 |
| | Between 2 and 5 minimum wages | −0.251 | <0.001 | 0.778 | 0.700; 0.864 |
| | More than 5 minimum wages | Ref. | . | 1 | |
| **Education level** | Up to High School | −0.091 | 0.329 | 0.913 | 0.761; 1.096 |
| | College Education | Ref. | . | 1 | |
| **Level of involvement in dentistry** | Users of services or the general public | −0.043 | 0.427 | 0.958 | 0.861; 1.065 |
| | Dentistry student | 0.019 | 0.809 | 1.019 | 0.875; 1.186 |
| | Dentistry professionals | Ref. | . | 1 | |
| **Oral health complaint** | Yes | −0.028 | 0.653 | 0.973 | 0.861; 1.098 |
| | No | Ref. | . | 1 | |

B: Regression Coefficient; *p*-value: Statistical Significance; PR: Prevalence Ratio; 95% CI: 95% Confidence Interval.

Regarding the willingness to pay for an anterior tooth resin restoration, a statistically significant difference was observed between the categories of income ($p < 0.001$), education level ($p = 0.031$), involvement in dentistry ($p < 0.001$), and current oral health complaint ($p = 0.008$). Individuals with an income exceeding 5 minimum wages, higher education level, involvement in the dental profession, and without any current oral health complaints were willing to pay more for an anterior tooth resin restoration (Table 4).

Table 4. Comparison of willingness to pay for anterior tooth resin restoration among the groups of independent variables in the study.

| Independente variables | | WTP anterior tooth resin restoration | | | |
|---|---|---|---|---|---|
| | | Mean | Standard deviation | Median (Q25 - Q75) | *p*-value |
| **Sex** | Male | 146 | 55 | 150 (130 - 200) | 0.137 |
| | Female | 158 | 64 | 153 (150 - 200) | |
| **Age group** | Up to 30 years | 146 | 49 | 153 (150 - 200) | 0.984 |
| | More than 30 years | 161 | 70 | 153 (133 - 200) | |
| **Family income** | Up to 2 minimum wages | 132 | 49 | 150 (100 - 160)[a] | **<0.001** |
| | Between 2 and 5 minimum wages | 136 | 44 | 150 (140 - 200)[b] | |
| | More than 5 minimum wages | 183 | 70 | 200 (150 - 250)[c] | |
| **Education level** | Up to High School | 139 | 39 | 145 (100 - 155)[a] | **0.031** |
| | College Education | 155 | 62 | 153 (150 - 200)[b] | |
| **Level of involvement in dentistry** | Users of services or the general public | 144 | 53 | 150 (120 - 190)[a] | **<0.001** |
| | Dentistry student | 152 | 55 | 160 (120 - 250)[a] | |
| | Dentistry professionals | 183 | 76 | 200 (150 - 250)[b] | |
| **Oral health complaint** | Yes | 141 | 41 | 150 (125 - 180)[a] | **0.008** |
| | No | 159 | 67 | 154 (150 - 200)[b] | |
| **Oral disease burden** | Up to 1 oral disease burden | 153 | 61 | 153 (130 - 200)[a] | 0.076 |
| | 2 oral disease burdens | 163 | 67 | 160 (150 - 200)[a] | |
| | 3 or 4 oral disease burdens | 139 | 45 | 150 (125 - 180)[a] | |

Different letters indicate statistically significant differences.

In the multiple regression model, it was observed that the family income variable was associated with willingness to pay for an anterior tooth resin restoration. Individuals with a family income of up to 2 minimum wages (PR = 0.785) and between 2 and 5 minimum wages (PR = 0.837) were willing to pay less for an anterior tooth resin restoration compared to those with a family income exceeding 5 minimum wages. An association was also observed between the variable of involvement in dentistry and willingness to pay. In this sense, users of services or the general public (PR = 0.883) were willing to pay less for an anterior tooth resin restoration compared to dental professionals (Table 5).

Table 5. Multiple Poisson regression of factors related to willingness to pay for anterior tooth resin restoration with adjusted model.

| Variables | | B | *p*-value | PR | 95% CI |
|---|---|---|---|---|---|
| **Family income** | Up to 2 minimum wages | −0.242 | 0.001 | 0.785 | 0.682; 0.903 |
| | Between 2 and 5 minimum wages | −0.179 | <0.001 | 0.837 | 0.758; 0.923 |
| | More than 5 minimum wages | Ref. | . | 1 | |

Continued

| | | | | | |
|---|---|---|---|---|---|
| **Education level** | Up to High School | −0.124 | 0.245 | 0.883 | 0.717; 1.089 |
| | College Education | Ref. | . | 1 | |
| **Level of involvement in dentistry** | Users of services or the general public | −0.256 | <0.001 | 0.774 | 0.687; 0.872 |
| | Dentistry student | 0.006 | 0.950 | 1.006 | 0.829; 1.122 |
| | Dentistry professionals | Ref. | . | 1 | |
| **Oral health complaint** | Yes | −0.070 | 0.149 | 0.932 | 0.847; 1.025 |
| | No | Ref. | . | 1 | |

B: Regression Coefficient; *p*-value: Statistical Significance; PR: Prevalence Ratio; 95% CI: 95% Confidence Interval.

Regarding the willingness to pay for a simple extraction, a statistically significant difference was observed between the categories of income ($p < 0.001$) and involvement in dentistry ($p < 0.001$). It is noticeable that individuals with an income exceeding 5 minimum wages and dental professionals are willing to pay more for a simple extraction (Table 6).

Table 6. Comparison of willingness to pay for simple extraction among the groups of independent variables in the study.

| Independent variables | | WTP simple extraction | | | |
|---|---|---|---|---|---|
| | | Mean | Standard deviation | Median (Q25 - Q75) | *p*-value |
| **Sex** | Male | 139 | 61 | 150 (100 - 160)[a] | 0.117 |
| | Female | 152 | 64 | 150 (100 - 180)[a] | |
| **Age group** | Up to 30 years | 147 | 56 | 150 (100 - 165)[a] | 0.928 |
| | More than 30 years | 147 | 69 | 150 (100 - 170)[a] | |
| **Family income** | Up to 2 minimum wages | 122 | 46 | 100 (100 - 158)[a] | **<0.001** |
| | Between 2 and 5 minimum wages | 145 | 57 | 150 (100 - 160)[b] | |
| | More than 5 minimum wages | 165 | 72 | 157 (150 - 200)[c] | |
| **Education level** | Up to High School | 133 | 36 | 143 (100 - 160)[a] | 0.260 |
| | College Education | 148 | 64 | 150 (100 - 180)[a] | |
| **Level of involvement in dentistry** | Users of services or the general public | 134 | 47 | 150 (100 - 159)[a] | **<0.001** |
| | Dentistry student | 152 | 66 | 157 (100 - 200)[b] | |
| | Dentistry professionals | 181 | 84 | 180 (150 - 200)[b] | |
| **Oral health complaint** | Yes | 138 | 50 | 150 (100 - 160)[a] | 0.128 |
| | No | 151 | 68 | 150 (100 - 180)[a] | |
| **Oral disease burden** | Up to 1 oral disease burden | 151 | 66 | 150 (100 - 180)[a] | 0.087 |
| | 2 oral disease burdens | 153 | 65 | 150 (100 - 180)[a] | |
| | 3 or 4 oral disease burdens | 131 | 54 | 145 (100 - 160)[a] | |

Different letters indicate statistically significant differences.

In the multiple regression model, it was observed that the family income variable was associated with willingness to pay for a simple extraction. Individuals with a family income of up to 2 minimum wages (PR = 0.763) and between 2 and 5 minimum wages (PR = 0.899) were willing to pay less for a simple extraction compared to those with a family income exceeding 5 minimum wages. An association was also observed between the variable of involvement in dentistry and willingness to pay. Thus, users of services or the general public (PR = 0.769) were willing to pay less for a simple extraction compared to dental professionals (Table 7).

Table 7. Multiple Poisson regression of factors related to willingness to pay for simple extraction with adjusted model.

| Variables | | B | p-value | PR | 95% CI |
|---|---|---|---|---|---|
| **Family income** | Up to 2 minimum wages | −0.271 | <0.001 | 0.763 | 0.677; 0.859 |
| | Between 2 and 5 minimum wages | −0.106 | <0.001 | 0.899 | 0.813; 0.995 |
| | More than 5 minimum wages | Ref. | . | 1 | . |
| **Level of involvement in dentistry** | Users of services or the general public | −0.263 | <0.001 | 0.769 | 0.682; 0.867 |
| | Dentistry student | −0.103 | 0.235 | 0.902 | 0.761; 1.069 |
| | Dentistry professionals | Ref. | . | 1 | . |

B: Regression Coefficient; *p*-value: Statistical Significance; PR: Prevalence Ratio; 95% CI: 95% Confidence Interval.

Regarding the willingness to pay for a simple cleaning, a statistically significant difference was observed between the categories of income ($p < 0.001$) and involvement in dentistry ($p < 0.001$). It is noticeable that individuals with an income exceeding 5 minimum wages and dental professionals are willing to pay more for a simple cleaning (Table 8).

Table 8. Comparison of willingness to pay for simple cleaning among the groups of independent variables in the study.

| Independent variables | | WTP simple cleaning | | | |
|---|---|---|---|---|---|
| | | Mean | Standard deviation | Median (Q25 - Q75) | *p*-value |
| **Sex** | Male | 106 | 38 | 100 (90 - 120)[a] | 0.134 |
| | Female | 117 | 55 | 100 (90 - 120)[a] | |
| **Age group** | Up to 30 years | 108 | 37 | 100 (90 - 120)[a] | 0.205 |
| | More than 30 years | 118 | 59 | 100 (90 - 150)[a] | |
| **Family income** | Up to 2 minimum wages | 100 | 31 | 100 (80 - 110)[a] | **<0.001** |
| | Between 2 and 5 minimum wages | 104 | 36 | 100 (80 - 105)[a] | |
| | More than 5 minimum wages | 129 | 64 | 105 (100 - 150)[b] | |
| **Education level** | Up to High School | 95 | 22 | 100 (80 - 110)[a] | 0.110 |
| | College Education | 114 | 51 | 100 (90 - 120)[a] | |
| **Level of involvement in dentistry** | Users of services or the general public | 103 | 34 | 100 (83 - 110)[a] | **<0.001** |
| | Dentistry student | 105 | 32 | 100 (80 - 110)[a] | |
| | Dentistry professionals | 144 | 76 | 120 (100 - 150)[b] | |

Continued

| | | | | | |
|---|---|---|---|---|---|
| **Oral health complaint** | Yes | 102 | 31 | 100 (80 - 113)[a] | 0.054 |
| | No | 117 | 55 | 100 (100 - 150)[a] | |
| **Oral disease burden** | Up to 1 oral disease burden | 112 | 41 | 100 (90 - 150)[a] | 0.329 |
| | 2 oral disease burdens | 119 | 62 | 100 (90 - 150)[a] | |
| | 3 or 4 oral disease burdens | 103 | 32 | 100 (90 - 110)[a] | |

Different letters indicate statistically significant differences.

In the multiple regression model (Table 9), it was observed that the family income variable was associated with willingness to pay for a simple cleaning. Individuals with a family income of up to 2 minimum wages (PR = 0.812) and between 2 and 5 minimum wages (PR = 0.828) were willing to pay less for a simple cleaning compared to those with a family income exceeding 5 minimum wages. An association was also observed between the variable of involvement in dentistry and willingness to pay. Thus, users of services or the general public (PR = 0.742) and dental students (PR = 0.786) were willing to pay less for a simple cleaning compared to dental professionals.

Table 9. Multiple Poisson regression of factors related to willingness to pay for simple cleaning with adjusted model.

| Variables | | B | p-value | PR | 95% CI |
|---|---|---|---|---|---|
| Family income | Up to 2 minimum wages | −0.208 | <0.001 | 0.812 | 0.729; 0.904 |
| | Between 2 and 5 minimum wages | −0.188 | <0.001 | 0.828 | 0.748; 0.917 |
| | More than 5 minimum wages | Ref. | . | 1 | . |
| Level of involvement in dentistry | Users of services or the general public | −0.298 | <0.001 | 0.742 | 0.653; 0.844 |
| | Dentistry student | −0.241 | 0.002 | 0.786 | 0.675; 0.915 |
| | Dentistry professionals | Ref. | . | 1 | . |

B: Regression Coefficient; *p*-value: Statistical Significance; PR: Prevalence Ratio; 95% CI: 95% Confidence Interval.

## 4. Discussion

The results of this study demonstrate that income and level of involvement in dentistry are associated with willingness to pay and, consequently, with the valuation that individuals attribute to basic oral health treatments. Overall, it is observed that individuals with lower income and lower involvement in dentistry attribute less value to dental procedures. To some extent, these findings support previous literature, indicating that barriers to access are significant, and individuals with lower per capita income have lower rates of dental service utilization and a higher likelihood of never having visited a dentist (Galvão & Roncalli, 2021; Fagundes, 2021).

Even though Brazil provides a healthcare system that offers free dental care to the Brazilian population, approximately 8.2% of the population has never visited a dentist (Galvão & Roncalli, 2021). Among individuals who accessed dental care

in the past year, the utilization of public services was higher among those with lower income, while direct payment for dental consultations was more frequent among individuals with higher income (Fagundes, 2021). Therefore, the lower willingness to pay for dental procedures among individuals with lower income can be justified by users' prior experiences with oral healthcare services, as well as the fact that this group predominantly relies on the public healthcare system. Despite individuals with lower income and education levels exhibiting greater severity of oral health problems (De Lucena et al., 2021), these individuals are less likely to spend on dental procedures due to either objective factors like lack of funds or subjective factors such as a lack of understanding of oral health as a priority.

Disparities in the use of dental services have been associated with determinants such as gender and age, but also with variables reflecting inequalities, such as income, education, possession of health insurance, and region of the country. The literature indicates that the high cost of procedures can influence access to dental services (Augusti et al., 2014; Sam et al., 2020), similar to how the ability to pay influences the value a user would be willing to pay for procedures (Sendi et al., 2017). It is evident that for all types of procedures evaluated in this study, income was associated with higher willingness to pay. This positive association between income and willingness to pay can be explained by a greater payment capacity among individuals with higher family income (Srivastava et al., 2014).

The literature has shown divergent findings regarding the influence of income on willingness to pay. The study conducted by Leung and McGrath (Leung & McGrath, 2010) did not find a statistically significant association between willingness to pay for a procedure to replace a lost tooth. On the other hand, the study conducted by McKenna et al. (2016), also related to tooth replacement, found a significant association between income levels and willingness to pay.

Regarding gender, it is evident that women tend to value health more generally and are the primary consumers of dental services. However, in this study, gender did not influence willingness to pay. Similar results were found by McKenna et al. (2016) and Augusti et al. (2014). Leung and McGrath (2010) identified that gender was a relevant factor in determining willingness to pay for implant rehabilitation, observing that women were more willing to pay for the treatment than men. In the present study, willingness to pay for basic dental procedures was assessed. It is suggested that gender may influence willingness to pay for more specialized or cosmetic procedures, which were not evaluated in this study.

The multiple regression models did not show an association between education and willingness to pay. The literature has demonstrated that higher levels of education are associated with better oral health conditions (De Lucena et al., 2021; Sam et al., 2020). It would be expected to observe a positive association between education and willingness to pay, similar to what was found for income. However, the results of this study did not demonstrate this effect, suggesting that other variables, such as family income and level of involvement in dentistry, may account for this association. It should also be considered that the majority of the sample

in this study had a higher level of education. Additionally, education and income are variables that often exhibit collinearity, which may explain the findings.

Associations were observed with the individual's level of involvement in the field of Dentistry. Prior knowledge about the benefits of a dental procedure and the importance of oral health can result in a greater willingness to pay (Srivastava et al., 2014), which could justify the fact that WTP is influenced by the individual's level of involvement in dentistry. Additionally, dental professionals tend to value their work more, which would justify a higher WTP from this group. Another point is that, for the resin restoration procedure, the average WTP value was higher than the WTP value for extraction, considering that the values provided in the questionnaires were approximations. This could indicate a greater valuation of aesthetic procedures by individuals.

A limitation of the present study is the possibility of influence from pre-existing information about the dental procedures that were discussed, before assessing WTP, for the general public or service users. Studies that relate oral health literacy and willingness to pay for dental procedures could be relevant to verify if higher oral health literacy might be related to treatment valuation. Additionally, providing average values for the procedures seems to have anchored the chosen values. A limitation of this study is the use of digital forms, which could exclude a portion of the population that does not have access to this type of tool.

Due to resource limitations faced by some countries, some healthcare systems worldwide have adopted co-payment systems for more specialized services, such as dental care. Although Brazil has a universal and free healthcare system, with coverage of various dental procedures, access barriers often prevent some of the population from using these services, leading them to seek alternative care. The free dental treatment under the Brazilian Unified Health System (SUS) may have also influenced the results of this study, particularly concerning basic dental procedures.

It is evident, therefore, how important it is to strengthen equity in access, directing resources to those who have greater health needs and limited access, such as lower-income groups. Furthermore, understanding service users' preferences for dental procedures through WTP can allow healthcare managers and policymakers to expand access to these procedures and enhance the healthcare system's capacity to meet these increasing demands. It's important to note the novelty of this study, as no other studies have been found that assessed WTP for dental procedures in the Brazilian population.

Income and involvement in dentistry were the factors that influenced the preference and valuation of dental procedures. Understanding the factors that influence valuation and preferences in health can assist managers and policymakers in emphasizing the importance of basic or routine oral health care.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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