

SYSTEMATIC REVIEW

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# Patient preferences and willingness to pay for dental services: a systematic review

Atefeh Najafi Shahkoochi<sup>1</sup>, Vahid Alipour<sup>1\*</sup>, Jalal Arabloo<sup>2</sup> and Zahra Meshkani<sup>3</sup>

## Abstract

**Background** Oral health is a fundamental aspect of overall well-being. However, dental diseases have a significant impact on access to care due to economic and social barriers. This systematic review of the literature on willingness to pay (WTP) for dental services aims to inform policy and planning by identifying the key factors influencing preferences.

**Methods** A systematic literature review was conducted using the following databases: PubMed, Embase, Web of Science core collection, Scopus, and Google Scholar. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) recommendations were followed. Original studies on the preference and WTP for dental services published up to October 2023 were considered. Inclusion criteria included an active population aged  $\geq 18$  years and various methodological approaches to eliciting WTP, such as discrete choice experiment (DCE) and contingent valuation (CV) techniques. The quality of selected studies was assessed by using the ISPOR checklist.

**Results** A total of 45 articles were eligible for inclusion, indicating that WTP research was primarily based on convenience and non-probabilistic sampling. Mean WTP showed significant variation and was influenced by demographic factors (age, gender), socioeconomic conditions, insurance cover, and perceived need for dental care. The main attributes identified from the studies related to cost (out of pocket payment, price), service delivery, time, and treatment outcome.

**Conclusions** The review underlined that demographic and socio-economic variable greatly influence WTP, implying the need for district policies to improve access to dental services. Future research should address the methodological limitations of the included studies and evaluate the potential for prospective studies to enhance understanding of patient preferences in dental care.

**Keywords** Willingness to pay, Dental care, Oral health, Patient preference

\*Correspondence:

Vahid Alipour  
vahid.alipour1360@yahoo.com

<sup>1</sup>Department of Health Economics, School of Health Management and Information Sciences, Iran University of Medical Sciences, Tehran, Iran

<sup>2</sup>Health Management and Economics Research Center, Health Management Research Institute, Iran University of Medical Sciences, Tehran, Iran

<sup>3</sup>National Center for Health Insurance Research, Tehran, Iran



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## Background

Despite being a relatively recent development, oral health-related quality of life (OHRQoL) has important implications for dental clinical practice and research [1]. The World Health Organization (WHO) recognizes oral and dental health as a key indicator of overall health, well-being and quality of life. Oral disorders can substantially affect an individual's functional, social and psychological well-being [2], potentially restricting activities at school, workplace and home, thereby diminishing the quality of life for both children and adults [3]. Numerous studies have indicated a relationship between oral and dental diseases and systemic conditions such as diabetes [4, 5], cardiovascular diseases [6, 7], chronic kidney diseases [8], pregnancy complications [9], and increased body mass index [10, 11].

According to existing literature, oral and dental diseases are prevalent public health issues worldwide [12]. The Global Burden of Disease Study (2016) identified severe periodontal disease as the 11th most common condition globally, with a reported prevalence of periodontal disease varying worldwide from 20 to 50% [13]. With the growing population of elderly individuals, the prevalence of oral diseases also rises [14]. The costs associated with dental care can be prohibitive, contributing to household poverty and long-term debts [5].

Access to health care has increasingly been recognized over the years as a crucial factor influencing health outcomes. Access to dental care is a significant yet intricate aspect of the broader discussions about health care access [16]. Although numerous studies emphasize the importance of dental care for maintaining oral health, barriers such as dental anxiety [17], treatment costs [18] (irrespective of insurance premiums), ethnicity, and socioeconomic status [18] often impede access to care [19, 20]. An analysis of the global economic impact of oral and dental diseases estimated that \$29.8 billion is spent annually on treatment for general oral conditions, accounting for 4.6% of global health expenditures [21].

Willingness to pay (WTP) for goods and services can be estimated using various methodologies. Revealed preferences focus on observing individuals' actual purchasing behavior at different price points [22], while stated preference methodologies have gained acceptance as valid approaches for assessing preferences related to medical products and services [23]. Stated preference methods include contingent valuation (CV) and discrete choice experiment (DCE) [24]. Preference refers to an individual's preference for one alternative over another, shaped by values derived from knowledge, experience, and reflection, and forms a crucial aspect of evidence-based health care. Research demonstrates that incorporating patient preferences into healthcare decisions enhances the quality of care and personalized care [25].

Barber *et al.* conducted a systematic review to assess how multi-attribute stated preference experiments in dentistry have been employed to elicit preferences for dental procedures, treatment outcomes, oral health states, and service delivery from various perspectives. The review revealed that attributes related to cost (92%), time domains (e.g., waiting time or time for treatment effect; 66%), and different effectiveness measures (50%) were most frequently included. Effectiveness attributes included the accuracy of diagnostic tests, the longevity of restorations, treatment efficacy, appearance, and function [25]. Tan *et al.* performed a critical review to identify, consolidate, and evaluate the quality of WTP studies in dentistry. Their findings indicated that most studies selected an out-of-pocket payment vehicle. Eleven studies utilized a bidding method [26–36], followed by open-ended formats questions, and payment cards. Higher incomes generally corresponded with higher WTP values, while various demographic factors influenced WTP in included studies [37].

Despite an increase in research on dental-related WTP and preferences, there exists a gap in studies summarizing the factors affecting WTP, attributes and levels of attributes. Understanding these elements is vital for informing health systems and creating evidence-based policies that improve dental health care and services, ultimately promoting oral and dental health. Therefore, the objectives of this study were to: (a) systematically review studies reporting WTP values for dental interventions, (b) identify factors influencing WTP and preferences, and (c) identify attributes and levels of the attributes used in studies eliciting preferences for dental services.

## Methods

This systematic review aimed to assess the characteristics, levels, and evidence associated with preferences and WTP for dental services. Additionally, the factors influencing WTP were identified. The study was conducted and reported in accordance with the PRISMA principles [38].

### Study selection and screening

A literature search was conducted on October 14, 2023, using the following databases: PubMed, Embase, Web of Science core collection, Scopus, and Google Scholar to identify relevant studies related to patients' and people's preferences for dental services. The reference lists of the included studies and previous systematic reviews were also reviewed. The search in the databases was conducted without any restrictions regarding publication time, language, and status. The search strategy included a combination of keywords and Medical Subject Headings (Mesh) such as "Oral health", "oral health care", dentistry, "dental care", "dental service(s)", "willingness-to-pay",

WTP, “contingent valuation”, “discrete choice experiment”, DCE, “patients’ preferences”, “patients’ valuations” and “patients’ utilities”. The search strategy for each database is presented in Supplementary Table 1. The results from each database were imported into EndNote software (Thomson Reuters/ version X20.1).

After removing duplicates, the titles and abstracts of the articles were screened, and irrelevant articles were excluded. The full text of the remaining articles was reviewed based on the inclusion and exclusion criteria. Two researchers A.NS. and J.A. independently conducted all stages of screening and selection of articles, with any differences in opinion being resolved through discussion.

### Inclusion and exclusion criteria

Published studies related to patient preferences for dental services were selected according to the following criteria. Studies were included if they fulfilled the following criteria:

- Population: Adults aged 18 or older requiring dental services.
- Intervention: All dental services, including preventive, restorative, prosthetic, root canal treatment, dental surgery, orthodontics, and interventions related to the organization of dental services (e.g., dental insurance).
- Studies addressed stated preferences and WTP for dental services using methods like DCE, CV, bidding game, payment card, open-ended questions, and take-it-or-leave-it (TIOLI) approaches.
- Studies employing revealed preference methods such as hedonic pricing and travel costs, reviews, editorials, letters to editors, abstracts, poster presentations, conference presentations, news and non-English full-text studies were excluded.

### Critical appraisal of studies

The quality of the included studies was assessed using a checklist provided by the International Association of Pharmaceutical Economics (ISPOR) [39]. The checklist consists of 10 questions evaluating different aspects of the articles, including title and abstract, introduction, materials and methods, results, discussion and conclusion, and other items. Each study was independently reviewed by two researchers (A.NS and J.A.), with discrepancies resolved through consensus. Each checklist item was scored from zero to one, resulting in a range from zero (lowest) to 30 (highest). Studies scoring below 15 were classified as low quality, scores between 15 and 20 as medium quality, and scores above 20 as high quality.

### Extraction and synthesis

Relevant information from each included article was extracted, including types of WTP or preference elicitation methods, key findings on WTP and preferences, WTP amounts, influencing factors, and attributes and levels of attributes. Additional, study characteristics collected included author, publication year, country, population, sample size, sampling method, response rate, perspective, methodology (pre-testing/reliability) and instrument used. Excel software was utilized for this stage.

## Results

### Quantity and quality of available evidence

The database search yielded a total of 2302 articles. Following the removal of duplicate records, 964 articles remained for review. The titles and abstracts of these articles were screened, resulting in 103 articles proceeding to the next stage. The full texts of these articles were then evaluated according to the eligibility criteria established by the researchers. Ultimately, 45 articles qualified for inclusion in the final analysis based on adherence to these criteria (Fig. 1).

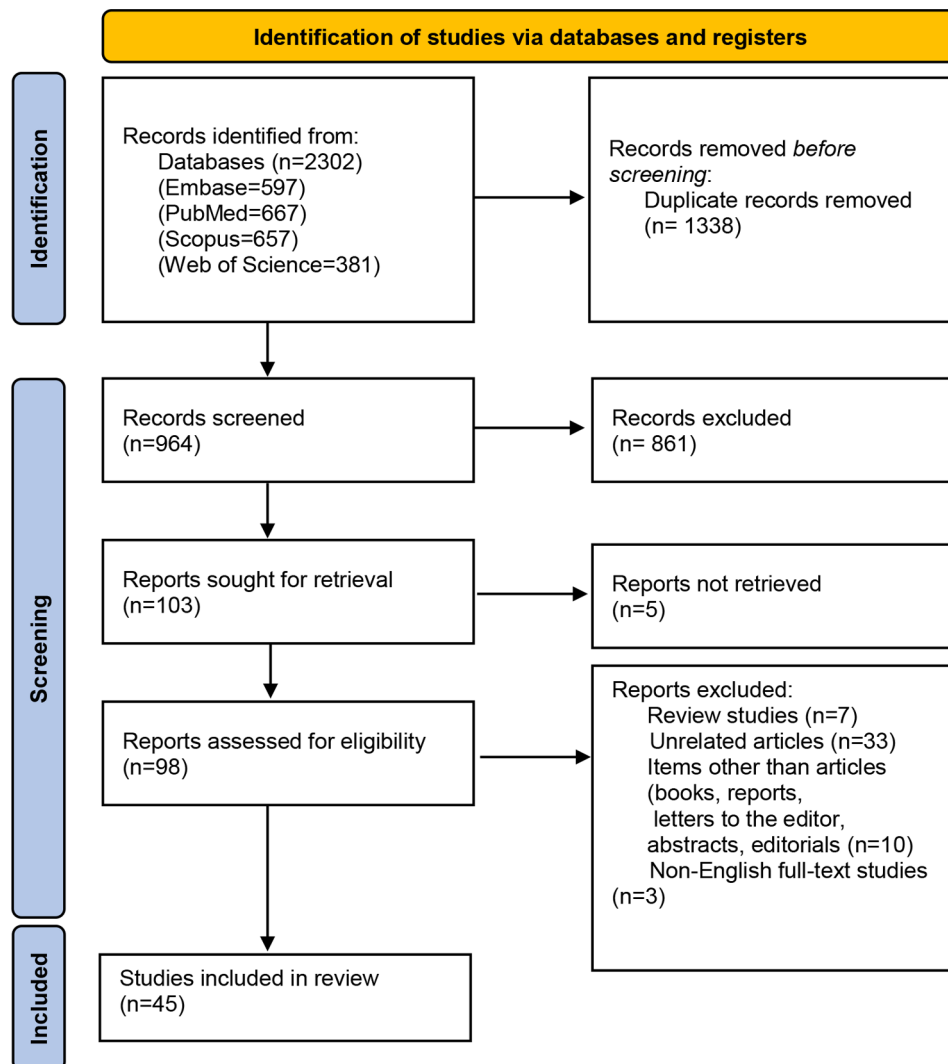
Supplementary Table 2 presents quality assessment scores for the studies ranging from 11 [40] to 28 [41]. Only 18 articles attained acceptable quality scores (score above 20) [33, 41–57], while 25 received average scores (score 15–20) [27–29, 32, 58–78], and two studies scored poorly (score lower than 15) [40, 79]. The studies with average and poor scores frequently failed to adequately justify evidence-based selection of attributes and their respective levels, appropriate design of scenarios, evaluation of experimental designs, and accurate elicitation of preferences.

### Study characteristics

Supplementary Table 3 summarizes the study characteristics including sample group and size, sampling method, response rate, study perspective, pre-testing and reliability, instrument, type of WTP and preferences elicitation, factors and attributes affecting WTP and preferences, the amount of WTP (WTP 2024 PPP US\$).

### An overview of methodological aspects of WTP studies in dental services

The studies were published between 1999 and 2023, with most conducted in England (15 studies) [28, 41, 44–46, 50–52, 54, 59, 60, 66, 69, 70, 77], Saudi Arabia (4 studies) [29, 53, 61, 74], Malaysia and Singapore (3 studies) [58, 63, 71], and Japan (3 studies) [40, 64, 76]. One studies conducted simultaneously in England and Brazil [66], and one study conducted simultaneously in England and Germany [28].



**Fig. 1** Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram

The sample size of the studies ranged from 27 to 9024. Among them, nine studies used convenience sampling [32, 48, 51, 54, 57, 67, 72, 75, 78], and 5 studies employed non-probability sampling methods (without mentioning the type of method) [44, 45, 59, 73, 74], and 14 studies [29, 41, 42, 49, 52, 55, 56, 60–63, 68, 69, 76] did not report any type of sampling method) (Table 1). Twenty-two studies reported a response rate above 50% [27, 40, 43, 47–49, 53, 54, 57, 61–66, 68, 70, 73, 75, 76, 78] and 21 studies did not report participation rates [28, 29, 32, 41, 42, 44–46, 50–52, 55, 58–60, 67, 69, 71, 72, 77, 79]. Of the studies conducted, 25 studies examined the perspective of the general population [28, 29, 32, 33, 40, 41, 43, 46, 49, 51, 53, 54, 56, 60, 62, 63, 66–70, 72–74, 79, 80], 23 studies examined the perspective of the patients [27, 28, 42, 44, 45, 47, 48, 50, 52, 55, 57–59, 61, 65, 70–72, 75–78], and two studies examined the perspective of the providers

[55, 56], with one study examining both patient and provider perspectives [55].

Data were collected through interviews (5 studies) [27, 41, 43, 68, 69] and questionnaires (40 studies) [28, 29, 32, 33, 40, 42, 44–67, 70–79], of which 7 studies used online questionnaires [41, 45, 46, 52, 53, 74, 77]. In addition, five studies employed both methods simultaneously [27, 29, 33, 53, 77]. To measure WTP and preferences, 11 studies used the DCE method [27, 29, 43, 47, 53, 55, 60, 62, 73, 75, 77], 10 studies used the open-ended question method [32, 40, 45, 59, 61, 65, 66, 71, 78, 80], and ‘bidding game’ [28, 45, 46, 52, 57, 58, 63, 74, 76, 81], seven studies employed payment card measures [44, 51, 54, 65, 66, 68, 70] and 4 studies did not report an extraction method in the main study [33, 41, 42, 48]. The remaining studies used the following methods: ‘shuffled payment card’(3 studies) [50, 56, 67], ‘similar to payment card’ (1 study)

**Table 1** Type of sampling in the included studies

Row	Type of Sampling	Used in Studies (References)
1	Not Reported	14 [28, 42, 45, 50, 52, 55, 57, 66, 71–74, 77, 79]
2	Convenience Sampling (Non-Probability Sampling)	9 [29, 40, 44, 47, 54, 58, 59, 65, 78]
3	Non-probability Sampling	5 [27, 51, 62, 68, 76]
4	Purposive Sampling (Non-Probability Sampling)	4 [41, 46, 63, 69]
5	Snow-ball Sampling (Non-Probability Sampling)	2 [53, 61]
6	Quota Sampling (Non-Probability Sampling)	1 [70]
7	Random Sampling	4 [56, 60, 75, 80]
8	Systematic Sampling (Random Sampling)	2 [32, 67]
9	Split Sample Design	2 [48, 49]
10	Random-Digit Dialing (Random Sampling)	1 [33]
11	List-Assisted Random Digit Dialing Protocol (Random Sampling)	1 [43]

**Table 2** Type of dental services in the included studies

Type of Dental Services	Number
Oral Health Care Schemes (Delivery of Dental Care, Dental Expenses)	2 [48, 75]
Dental Material	1 [57]
Preserving Teeth	2 [67, 78]
Restorative and Prosthetic	2 [32, 51]
Orthodontic	6 [44, 45, 54, 59, 72, 74]
Tooth Replacement and Implant	6 [29, 60, 63, 68, 73, 76]
Special Care (Molar, Crown, Fear, Hypodontia, Dentin Regeneration, Emergency Public Dental Services)	10 [41–43, 49, 52, 52, 56, 61, 62, 69]
Preventive Interventions	13 [28, 33, 40, 46, 47, 50, 53, 58, 66, 70, 77, 79, 80]

[72], ‘drop-down box’ (1 study) [69], and ‘yes/no questions’ (1 study) [45].

The pre-test (pilot) of the tool for eliciting WTP values and preferences was conducted in 19 studies, and the sample size in the pilot studies varied from 10 to 50. The pre-test included discussions with dentists [46, 49, 51, 56, 68, 73, 74], trial participants [43, 53, 73], economists and health economists [68, 73], experts [27, 77], consultants [53], patients [27, 51, 78], parents [51], adults [33], and non-clinicians [74].

Of the included studies, 14 examined WTP and preferences for preventive services, 10 examined WTP and preferences for special dental services such as molar treatment, dental crown treatment, fear treatment, hypodontia (congenital toothlessness), dentine restoration and emergency general dental services, seven examined WTP and preferences for dental prostheses and implants and six examined WTP and preferences for

**Table 3** Mean WTP from different dental services (based on 2024 PPP US\$)

Type of Dental Services	Mean WTP* (≈)
Multiple Services**	74 PPP US\$
Oral Health care Scheme	250 PPP US\$
Orthodontic Treatment	4570 PPP US\$
Preventive Intervention	53.4 PPP US\$
Special Care***	300 PPP US\$
Tooth Replacement and Implant and Prosthetic	2600 PPP US\$

\*All WTP values were updated based on an ‘EPPI Centre Cost Converter’ source [89]

\*\* Multiple Services: Tooth preservation versus extraction AND Scale and polish AND Preventive and curative (fissure sealant and composite filling)

\*\*\* Molar, Crown, Fear, Hypodontia, Dentin Regeneration, Emergency Public Dental Services

orthodontics. Table 2 shows the frequency of studies of WTP and preferences by type of service(s).

**Average WTP for dental services and influencing factors**

Based on the included studies, the average WTP for dental services ranged from PPP US\$ 53.4 (Preventive Intervention) to PPP US\$ 4570 (Orthodontic Treatment). The average WTP for dental services and interventions is summarized in Table 3.

**Factors affecting WTP or preference in the included studies**

Table 4; Fig. 2 illustrate the effect of the variables on WTP. In two studies, only socioeconomic status [44] and tooth condition [65] were mentioned as influencing factors on WTP and preferences, with their details not reported. Additionally, five studies did not mention factors influencing WTP [40, 42, 44, 48, 52].

In general, the studies identified seven groups of factors influencing WTP and preferences, including the following (frequency):

- Demographic variables (30/45): Age (15/45) (out of the total 45 included articles 15 have reported the effect of this variable), marital status (2/45), gender (6/45), having children (1/45), ethnicity (4/45), place of residence (1/45), and personality traits (1/45).
- Socio-economic status variables (28/45): Income (11/45), education (10/45), having a job (4/45), length of employment (1/45), and multiple deprivation index (1/45).
- Variables related to insurance coverage (5/45): Costs covered by the government (1/45), full payment by the National Health Services (NHS) (1/45), private insurance (2/45), and supplementary dental insurance (1/45).
- Tooth condition (5/45): Use of dentures (1/45), number of teeth (1/45), daily brushing (1/45), and area of missing tooth (1/45).

**Table 4** Factors affecting WTP or preference in the included studies

Study	Factors affecting WTP or preference
Espelid et al., 2006 [57]	Type of Treatment (Not in Agreement) Duration of Treatment ↓ <sup>*</sup> Adverse Reaction ↓
R. Nair and R. Yee, 2016 [71]	Age ↓ Ethnicity ↑ ** Using Oral Impact on Daily Performance ↓
D. Re, et al., 2017 [67]	Income ↑ Education Level ↑ Job Level ↑
K. K. Nyamuryekung'e, et al., 2018 [65]	Age ↓ Income ↑ Dental Status ↓ Experience of Treatment ↑
I. Sever, et al., 2018 [48]	Age ↓ Out of Pocket Payment ↓ Education Level ↓ Explanation of Treatment ↑ Staff Behavior ↑ Dentist Instead of Hygienist ↑ Personalized Advice from Hygienist ↓ Type of Clinics: Private ↓ Waiting Time ↓
E. Widström and T. Seppälä, 2012 [75]	Age ↓ Income ↑ Gender (Women) ↓
G. D. Fenton, et al., 2022 [54]	Type of Dentist (Specialist Dentist) ↑ Tooth Colored ↑
C. R. Vernazza, et al., 2018 [44]	Age: Age of respondents ↑ Age of child ↓ Income ↑ Education Level ↑ Experience of Toothache ↓ Index of Multiple Deprivation ↓ Socio-Economic Status ↓
K. Edwards, et al., 2022 [45]	Age ↓ Dentist Instead of Hygienist ↑ Type of Clinics: Public ↑
A. I. Linjawi and A. M. Abushal, 2020 [74]	NR
G. Farronato, et al., 2016 [72]	Income ↑ Experience of Treatment ↑
A. S. A. Smith and S. J. Cunningham, 2004 [59]	Lack of Self-Confidence ↑ Experience of Health State ↑ Experience of Need for Treatment ↑ Experience of Treatment ↑
S. Ghahramani, et al., 2022 [78]	Age ↑ Income to Expenditure Matching ↑ Education Level ↑ Ethnicity ↑ Gender (Women) ↑ Type of Clinics: Private ↑
C. Akuagwuagwu, et al., 2022 [46]	Age ↓ Income ↑ Location ↑ Insurance ↓ Out of Pocket Payment ↑ Importance of Oral Health ↑
L. Bahanan, et al., 2023 [53]	Ability to get appointment ↑ Dentist instead of Hygienist ↑ Waiting Time ↓



**Table 4** (continued)

Study	Factors affecting WTP or preference
D. Boyers, et al., 2021 [50]	Personalized Advice from Hygienist ↓ Personalized Advice from Dentist ↑ Aesthetic ↑ Bleeding During Treatment ↓
N. Saadatfar and M. P. Jadidfar, 2021 [47]	Income ↑ Job Level ↑ Experience of Toothache ↑
D. Matthews, et al., 2002 [33]	Anxiety ↓ Dental Pain ↓
Y. Tamaki, et al., 2004 [40]	NR
M. van der Pol, et al., 2023 [77]	Income ↑ Education Level ↑ Frequent of Treatment ↑
R. Mittal, et al., 2022 [58]	Age ↓ Marital Status (Married) ↑ Visit Dentist Regularly ↑ Self Perceived Oral Health ↑ Education Level ↑ Ethnicity ↑ Prosthetic Status (Not Wearing) ↑
S. Tianviwat, et al., 2008 [27]	Income ↑
S. Dixon and P. Shackley, 1999 [70]	NR
N. S. Giyansyah, et al., 2021 [79]	Age ↑ Length of Work ↑
E. G. Walshaw, et al., 2019 [66]	Income ↑ Perception of Need for Treatment ↑ Experience Recent Dental Pain ↑ Experiences of Treatment ↑
K. Oshima, 2023 [80]	Age ↓ Income ↑ Having Children ↓ Job Level ↑ Gender (Women) ↓ Number of Teeth ↓ Daily Tooth Brushing ↑
C. R. Vernazza, et al., 2015 [28]	NR
O. Bailey, et al., 2022 [51]	Income ↑ Dentist instead of Hygienist (Other Therapist) ↑ Waiting Time ↓ Treatment Time ↓
S. Barber, et al., 2019 [41]	Waiting Treatment (Not in Agreement) Cost of Treatment ↓ Discomfort (Not in Agreement)
S. Barber, et al., 2022 [52]	Treatment Time ↓ Problem During Treatment ↓ Appearance ↑ Discomfort ↓
N. Chebib, et al., 2020 [55]	Type of Clinics: Dental practice ↑ Dentist at home ↓ Medical centered ↓
S. Felgner and C. Henschke, 2023 [56]	Age ↓ Out of Pocket Payment ↓ Dental Supplementary Insurance ↑ Gender (Women) ↓ Duration of Treatment ↑ Aesthetic ↑ Tooth Colored ↑ Risk of Treatment ↓

**Table 4** (continued)

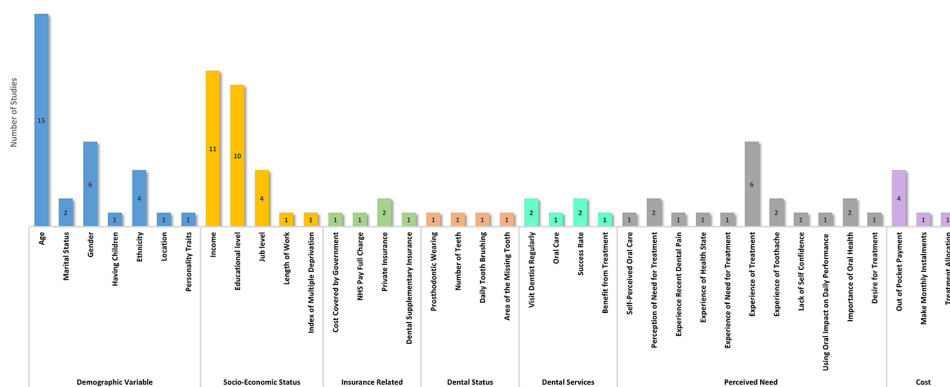
Study	Factors affecting WTP or preference
I. Sever, et al., 2019 [49]	Out of Pocket Payment ↓ Explanation of Treatment ↑ Staff Behavior ↑ Dentist Instead of Hygienist ↑ Personalized Advice from Hygienist ↓ Type of Clinics: Private ↓ Waiting Time ↓
S. Birch, et al., 2004 [43]	Age ↓ Importance of Oral Health ↑ Visit Dentist Regularly ↑ Perception of Need for Treatment ↓ Education Level ↑ Ethnicity: White ↑ Success Rate ↑ Cost of Treatment ↓
B. Halvorsen and T. Willumsen, 2004 [42]	Income ↑ Benefit from Treatment: Dental treatment ↑ / Dental fear treatment ↓
C. R. Vernazza, et al., 2015 [69]	Income ↑ Experience of Treatment ↓
N. Atanasov, et al., 2016 [62]	Income ↑
H. S. Hawsawi, et al., 2022 [61]	Age ↓ Marital Status ↑ Private Insurance ↓ Education Level ↑ Job Level ↑ Gender (Women) ↑
S. Tada, et al., 2021 [76]	NR
L. L. Muzio, et al., 2014 [73]	Age ↑ Private Insurance ↑ Education Level ↑ Success Rate ↑
B. Al Garni, et al., 2012 [29]	Income ↑ Education Level ↑ Gender (Women) ↑ Type of Clinics: Government Setting ↓ Area of the Missing Tooth ↑ Desire for Treatment (Implant) ↑
S. Esfandiari, et al., 2009 [68]	Cost Covered by Government ↑ Make monthly Instalments ↑
S. F. Y. Ting, et al., 2021 [63]	Income ↑ Personality Traits ↓
D. Augusti, et al., 2014 [32]	Oral Care ↑ Experience of Treatment ↑
G. McKenna, et al., 2016 [60]	Income ↑ Treatment Allocation ↑

\*↓ The effect of variable (factor) is negative

\*\*↑ The effect of variable (factor) is positive

- Variables related to the use of dental services (6/45): Regular visits to the dentist (2/45), oral and dental care (1/45), success rate of treatment (2/45), and benefits of treatment (1/45).
- Perceived need (19/45): Perceived dental care (1/45), perceived need for treatment (2/45), experience of recent toothache (1/45), experience of health status (1/45), experience of need for treatment (1/45), experience of treatment (6/45), experience of toothache (2/45), lack of self-confidence (1/45), use of oral impact on daily performance (1/45), importance of oral health and teeth (2/45), and desire for treatment (1/45).
- Cost (6/45): Out-of-pocket payment (4/45), monthly instalments (1/45), and sharing of treatment (by family) (1/45).





**Fig. 2** Factors affecting on WTP and preferences

**Using attributes to identifying preferences for dental services**

The attributes and levels identified in the studies are shown in Table 5. The attributes ranged from 1 to 9, and price or starting bid price was identified as the only attribute in some studies. The components were mostly related to services (88.9%), cost and out-of-pocket payment (60%), time frames (40%), and risk and effectiveness of treatment (33.3%). Person-related components (8.9%) were used to a lesser extent in the studies to identify people’s preferences.

**Discussion**

Our study is the first systematic review to identify and analyze the components and evidence associated with preferences and WTP for dental services. This review identified variables and factors affecting WTP and preferences, as well as attributes and levels of components related to dental services, and average WTP for various dental services. Understanding these variables is crucial for tailoring dental care to meet the diverse needs of patients and healthcare providers.

Most studies have used convenience sampling for WTP studies, despite recommendations for utilizing samples representative of the general population. This limitation highlights the importance of improving research methodologies to ensure that findings are more generalizable and applicable to broader populations. Providing more opportunities for face-to-face interviews with participants and more detailed information about the desired service would be beneficial. In this review, nine studies used convenience sampling, and five used non-probability sampling. Another review reported five studies using convenience sampling and seven studies using probability sampling [37]. In another review, more than 50% of the studies used convenience sampling [82].

In the present study, the sample size varied from 27 to 9024. In other studies, the total sample size ranged from 36 to 990 [37] and between 16 and 1528 participants [82]. Additionally, 65% of the studies in another review did not

report the sample size and, generally, 50% of the studies did not adequately describe the study setting [83]. Such omissions can hinder the ability of future researchers and policymakers to accurately interpret and utilize the findings. In the present review, 22 studies (less than 50%) had a response rate of more than 50%. Our results are not consistent with previous studies [82]. Pre-testing (pilot testing) is an important strategy to reduce bias and improve the validity of WTP studies [84]. Pre-testing was not conducted in more than 50% of the studies, which aligns with the findings from previous reviews [37, 82]. In another review, only half of the studies included a pre-test phase to assess aspects of experimental and survey design [25]. Incorporating pre-testing could significantly enhance the methodological rigor of future studies.

Preference elicitation methods provide an opportunity to understand the preferences of the target group, including patients, policymakers, and other stakeholders, for processes, outcomes and structures related to different health domains, such as oral health. DCEs have become very popular in health care. In the bidding game, responses may be incorrect due to starting point bias [85]. In the payment card method, responses may be influenced by range bias [82]. However, some authors recommend the mixed payment card method as the most appropriate WTP method for oral health [86]. In this review, the DCE and bidding game were the most dominant methods for eliciting preferences and WTP. In the review study by Saadatfar et al. (2020), 20 articles used ‘bidding game’ while three studies used DCE [82]. In another review, the bidding game was also the predominant method for eliciting preferences [37]. In a review by Barber et al. (2018), all studies used a DCE to elicit preferences in dentistry [25].

The included studies identified preferences for the provision of dental services or treatment from the perspective of patients, dentists or the public. Recognizing these diverse perspectives is vital for effectively addressing the complexities of dental care delivery. The best perspective for identifying preferences for dental services is

**Table 5** Attributes and levels identified in the studies

Row	Attributes	Levels	Used in studies
Services Factors			
1	Ability to get an appointment	- Within 2–3 weeks - Within 1–2 months - After 3 months	3
2	Dental staff behavior	- Warm and friendly - Formal and inattentive	3
3	Type of dental clinics/ Access	- Free government dental clinics - Private dental clinics - At home - At your family dental practice - At your family medical practice - In a specialist setting (hospital/ community clinic)	6
4	Type of dentist	- Dentist (General) - Hygienist - Your family dentist - Another auxiliary health care - Provider who has been trained to have the necessary skills - Specialist	3
5	Type of treatment	Varied in different studies	11
6	Explanation of dental treatment OR Oral Advise	- With detailed - None	5
7	Insurance coverage	- Covered - Not covered	3
8	Average life span of treatment OR Stability	- 5 years - 8 years - 11 years - 14 years	3
Risk OR Effectiveness			
9	Discomfort after OR during treatment OR Pain OR Comfort	- None - Mild - Moderate - Persistent - Severe - At starts - Few hours or days - When specific forces are applied to the teeth to produce movements	6
10	Compatibility OR Success rate	Varied in different studies (based on type of treatment)	4
11	Problem during treatment OR Adverse reaction OR Bleeding OR Complication OR Psychosocial	- No or mild problems - Severe problem - Moderate problem - Occasionally - Fairly often - Very often - One out of 10,000 people will have an allergic reaction (as seen in the picture). - The reaction will disappear when the restoration is replaced with another material - Gingival recession - Phonetic/Speech problems	5
Personality Factors			
12	Experience of treatment	- Yes - No	1
13	Satisfaction	Without levels (No mentioned in study)	1
14	Adherence Treatment	Without levels (No mentioned in study)	1
15	Information for selecting dental office	Without levels (No mentioned in study)	1
Appearance			

**Table 5** (continued)

Row	Attributes	Levels	Used in studies
16	Appearance after treatment OR Aesthetic OR Filling color	<ul style="list-style-type: none"> <li>- Not tooth colored</li> <li>- Highly visible or strongly visible</li> <li>- Tooth colored/but visible</li> <li>- Tooth colored and not visible</li> <li>- Natural color</li> <li>- Lightly visible or partially visible</li> <li>- Visible in specific phases of treatments</li> <li>- Leaving a gap</li> <li>- Very unclean</li> <li>- Unclean</li> <li>- Moderately clean</li> <li>- Clean</li> <li>- Very clean</li> <li>- Improved appearance</li> <li>- Suboptimal appearance (teeth are straight with no gaps.</li> <li>- Color match of teeth is good</li> <li>- Small gaps or some teeth might look slightly grey or yellow)</li> <li>- Filling colors: white and silver-gray</li> </ul>	8
Function			
17	Bite after treatment OR Chewing	<ul style="list-style-type: none"> <li>- Improved</li> <li>- Same</li> </ul>	3
Time domains			
18	Length OR Duration of treatment procedure OR Total Treatment Time	<ul style="list-style-type: none"> <li>- 20</li> <li>- 40 min</li> <li>- 60</li> <li>- 80 min</li> <li>- 2 months</li> <li>- &lt; 6months</li> <li>- &gt; 24months</li> </ul>	10
19	Waiting Time (It varies based on the type of service)	<ul style="list-style-type: none"> <li>- 5–15 min</li> <li>- 15–30 min</li> <li>- &gt; 30 min</li> <li>- Less than one week</li> <li>- 2 weeks</li> <li>- 4 weeks</li> <li>- 6 weeks</li> <li>- 3 months</li> <li>- 1 year</li> <li>- 3 years</li> </ul>	7
20	Office opens late or on holiday	<ul style="list-style-type: none"> <li>- Yes</li> <li>- No</li> </ul>	1

that of the patient. Identification of patient preferences by health care providers is likely to make care cheaper, more effective and more aligned with what people want [87]. In the review, more than half of the studies examined the perspective of the general population (55%) and that of patients (51%), while only two studies examined the perspective of providers. This imbalance indicates a need for more comprehensive research that incorporates the viewpoints of dental care providers to better inform practice. In another review, of the 12 studies reviewed, six studies examined the perspective of the general population, three studies examined the perspective of patients, and three studies examined both patients' and dentists' perspectives [25].

In this review, the quality scores of the studies ranged from 12 to 28. The reviewed studies did not score well in areas such as evidence-based selection of attributes and levels, appropriate scenario design, evaluation of experimental designs, and correct elicitation of preferences. In another review, the quality scores of the studies (using the same quality assessment checklist) ranged from 16 to 30, and the reviewed studies generally did not mention details in the selection of attributes and levels of attributes [25]. Other reviews did not assess the quality of the studies ] [37, 82, 88]. Improving the quality of research in this area is essential for generating reliable evidence that can inform clinical practice and policy.

In this review, the attributes ranged from 1 to 9, and in 27 studies the cost or initial price offer was considered

as the only component. Most of the components were related to service(s) (88.9%), such as the behavior of treatment staff, treatment center facilities, type of treatment, etc., cost and direct payment, out of pocket payment (60%), time frames (40%), and risk and effectiveness of treatment (33.3%). Person-related components, such as service satisfaction and treatment experience, were the least used components in the studies. This gap in the literature signifies the importance of incorporating patient experiences and satisfaction as key factors in assessing WTP. In another review, the components identified ranged from 2 to 7 variables, which were related to cost (92%), time domains (66%), and various effectiveness measures (50%). Effectiveness components included diagnostic test accuracy, repair life, the treatment effectiveness in terms of appearance and performance [25].

According to the studies, several factors influence WTP for oral and dental care. These factors are critical for understanding the diverse motivations and constraints that patients face when seeking dental services. Factors such as gender, age, household income, employment status, marital status, number of children, presence of elderly people in the family, previous treatment experiences, regular visits to the dentist, frequency of tooth brushing, and dental health status were identified [70]. In this study, demographic variables (66.7%), socioeconomic status variables (62.2%), variables related to receipt of dental services (13.3%), and variables related to insurance coverage and dental condition (11.1%) were identified as influencing factors on WTP. In another review, income, education, female, and younger age were identified as factors influencing WTP [37]. Another review found a significant correlation between income and WTP in the studies reviewed. These insights are invaluable for policymakers who must develop strategies that account for these multifaceted influences on patient behavior. In addition, age, education, experience of dental care, gender and perceived importance of oral health were identified as factors influencing WTP [82]. Therefore, policymakers must consider these influencing factors when valuing services. This consideration is essential for creating equitable and effective dental care policies that resonate with the needs of different population segments.

Despite a systematic and rigorous approach taken in this review to identify components and WTP for dental services, it is possible that some relevant evidence was not reported. This study has several limitations. First, it did not include grey literature or dissertations, which may have led to the omission of relevant. Additionally, the search was conducted only in English, potentially excluding valuable research published in other languages. This linguistic limitation may restrict the diversity of perspectives captured in the findings. Moreover, only 18 studies included specific attributes and levels related to

WTP for dental services, reflecting a gap in the existing dental literature that highlights the need for more comprehensive research in this area. Future studies should aim to fill this gap by exploring a wider array of attributes relevant to patient preferences. Thirdly, the diversity of sampling methods employed across the included studies, which ranged from convenience sampling to probability sampling, along with the use of different data collection techniques such as online questionnaires and face-to-face interviews, may introduce potential biases and impact the validity and reliability of the findings. Lastly, most of the reviewed studies were retrospective, primarily measuring preferences and WTP for dental services, underscoring the necessity for prospective research to further explore these dynamics and enhance understanding of patient preferences in dental care. Conducting prospective studies will provide richer and more actionable insights for clinicians and policymakers alike.

## Conclusion

As some WTP studies can be used to price and evaluate interventions, there is a need to identify the factors that influence WTP for services such as dental services. Studies that have identified the factors influencing WTP for dental services indicate that demographic variables such as age, marital status, gender, having children, ethnicity, place of residence and socio-economic status variables such as income, education, having a job, duration of employment have a potential impact on WTP. Therefore, policymakers must consider these influencing factors when valuing services.

## Abbreviations

WTP	Willingness to Pay
DCE	Discrete Choice Experiment
CV	Contingent Valuation
NR	Not Reported
UK	United Kingdom

## Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12903-025-05520-6>.

Supplementary Material 1  
Supplementary Material 2  
Supplementary Material 3

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## Author contributions

The research question, search strategy, and study objectives were developed through discussions between the two authors. A.NSh was responsible for searching and extracting data from the selected papers, while JA and VA reviewed the results and interpreted the data. The discussion and conclusion

were formulated based on conversations between the authors. All authors reviewed and approved the final manuscript.

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#### Data availability

All data generated or analyzed during this study are included in this published article and its appendices.

#### Declarations

#### Ethical approval

This study was approved by the Research Ethics Committee of Iran University of Medical Sciences (IR.IUMS.REC.1402.503).

#### Consent for participate

Not applicable.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare no competing interests.

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