

UK general population's willingness to pay for dental check-ups

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Abstract

Objectives: Choices about which dental treatments to provide in a publicly funded system should be guided by the value that the general population place on those treatments. The aim of this study was to estimate United Kingdom (UK) general population willingness to pay (WTP) for dental check-ups, and to investigate what factors influence WTP.

Methods: WTP was elicited using a hypothetical question in an online survey. The sample consisted of 594 participants, nationally representative of the UK general population in terms of age and gender. Regression analysis was used to examine what factors are associated with WTP. Analyses were conducted including and excluding protest answers.

Results: The mean WTP for a dental check-up is £31.32 for the full sample and £33.17 excluding protest answers. Respondents on higher incomes and those with higher university education had higher WTP. Respondents in Scotland were WTP less than respondents living in the rest of the UK which may be the result of NHS dental check-ups being free to patients in Scotland.

Conclusion: The general UK population value dental check-ups. This study provides estimates of WTP for dental check-ups which can be used in Cost-Benefit Analyses.

KEYWORDS

economics, dental, program evaluation, surveys and questionnaires

1 | INTRODUCTION

Dental check-ups, which include simple examination and advice, are routinely provided across many countries. In the United Kingdom (UK), dental check-ups are provided both publicly and privately. The interest in this paper is in informing decisions about publicly provided dental check-ups. The majority of dental care is provided in the NHS with only 27% of dental care provided privately.¹ The total costs of providing dental check-ups can be considerable. For example, the total National Health Service (NHS)

treatment cost of dental check-ups for adults in Scotland was around £30.5 million in 2018/2019 and constituted around 13% of the total NHS dental treatment costs.² There are increasing pressures on the budget for dental care and choices must be made about what care to provide. In publicly funded dental care these choices should be guided by general population's preferences as they provide the resources for dental care (through taxation or public insurance),^{3,4} Whilst the private market may provide some insights into individuals' WTP for check-ups, consumers of private dental care are unlikely to be representative of the general

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population and it is therefore important to elicit WTP in a broader sample. Information is therefore needed on the value that the general population place on dental care.

A popular method for estimating the value that individuals place on a service is by asking them to state the maximum amount of money they would be willing to pay using a hypothetical survey.⁵ Contingent valuation has been used within dentistry to estimate the WTP for services in orthodontics, periodontics, prosthodontics and others.⁶ Two previous studies have estimated WTP for dental check-ups.^{7,8} Tamaki et al⁷ found that 73.3% of a sample of patients in Japan were willing to pay less than 20 US dollars for regular dental check-ups. Harris et al⁸ conducted a trial eliciting willingness to pay (WTP) for different types of advice provided at an NHS adult dental check-up in England. Their baseline 'verbal advice' comparison group could be considered similar to a routine dental check-up. The mean WTP was £30.20 in a sample of 227 NHS dental patients with moderate or high risk of poor oral health. These studies used patient samples rather than general population sample. A general population sample is more appropriate if the aim is to inform resource allocation decisions in a Cost-Benefit Analysis (CBA) framework where the value of a service is compared to the cost of providing the service. This study aimed to estimate the general UK population's WTP for dental check-ups in a way that can be used to inform CBAs of dental check-ups.

2 | METHODS

2.1 | Sample

This study used data from an online survey of the UK general population conducted in parallel to a randomized controlled trial that tested the effectiveness and cost-effectiveness of offering patients different dental recall intervals.⁹ The aim of the survey was to estimate the UK general adult population's preferences for dental check-ups. Data collection was conducted through Qualtrics panels, an international online survey panel company. The survey panel provided respondents matching general population quotas of age, gender, and region (with oversampling in Scotland to allow sub-group analysis). Participants received an invitation email and provided implied consent by clicking the link to take part. All data were anonymised and respondents were free to leave the survey at any point without having to give a reason for doing so. Respondents who completed the survey were reimbursed in a manner determined by the survey panel from which they were partaking. The data were collected between May and July, 2016. Think aloud interviews and a pilot study were conducted before the final launch. In total, 597 respondents completed the full survey including the WTP question. Three 'Speeders' respondents who completed the survey in less than a third of the median time (15.6 min) are removed from the sample. The survey was approved by the University of Aberdeen College Ethics Review Board (CERB: 2015/1/1170).

2.2 | WTP question

Dental check-ups are a familiar service and a detailed explanation was therefore not required. There were a number of questions about dental check-ups before the WTP question in order to get the respondent to start considering check-ups. They were asked how often they normally see their dentist for a check-up and when they had their last check-up.

Respondents were then asked for the maximum amount of money they would be willing to pay out of pocket for a dental check-up:

'We would like to find out how much you value dental check-ups. What is the maximum amount of money you would be willing to pay out of pocket for a dental check-up?'

Respondents were asked to indicate their response in a drop-down box. The available answers ranged from £0 to £100 on a continuous scale (0,1,2,3,4,5, ..., 97,98,99,100). Respondents who valued the service at more than £100 were asked to type the maximum amount of money in an open-ended text box. Respondents were encouraged to answer the WTP question even if they do not normally pay for dental care.

Protest answers where respondents select £0 are common in WTP studies.³ Respondents may value the service but they protest against a certain component of the value elicitation scenario. To identify protest answers a follow-up question was asked if respondents selected £0. Respondents were asked why they were not willing to pay. Possible responses were: 'The NHS should pay the cost of all dental care'; 'I cannot afford to pay for dental check-ups'; 'I hate going to the dentist'; 'I do not have the time for dental check-ups'; 'I do not feel like I need to have my teeth checked by a dentist'; 'I would prefer to spend my money on other things'; and 'Some other reason'. Respondents who answered 'some other reason' were then provided with an open text box and asked for details. The response to the follow-up question was used to identify true protest answers. Zero WTP values where the chosen reason was 'NHS should pay the cost of all dental care' were deemed protest responses. Text box details were analysed to identify further protest answers.

After selecting a WTP value respondents were asked how often they would like to have a dental check-up at that price. Possible responses were: Less than every 2 years; Every 2 years; Every year; Every 6 months; Every 3 months; and More often.

2.3 | Analysis

The WTP responses are described using a histogram. The mean WTP and 95% confidence intervals are estimated. Survey weights are used for region given the oversampling in Scotland. Regression analysis was used to examine the association between WTP and individual characteristics. Individual characteristics included gender, gross household

TABLE 1 Sample characteristics.

| | Study sample | | General population* |
|-------------------------------------|--------------|------|---------------------|
| | N | % | % |
| Gender | | | |
| Male | 292 | 48.9 | 49.1 |
| Female | 305 | 51.1 | 50.9 |
| Age | | | |
| <35 | 131 | 22.0 | 28.9 |
| 35-44 | 110 | 18.4 | 17.7 |
| 45-64 | 227 | 38.0 | 32.5 |
| >64 | 129 | 21.6 | 20.9 |
| Household income | | | |
| <£20 800 | 248 | 42.0 | 31.0 |
| 20 801-41 600 | 189 | 32.0 | 35.0 |
| >41 600 | 92 | 15.6 | 37.0 |
| Prefer not to say/ missing | 68 | 11.4 | |
| University education | | | |
| No | 446 | 74.7 | 73.0 |
| Yes | 151 | 25.3 | 27.0 |
| Smoker | | | |
| No | 469 | 78.6 | |
| Yes | 128 | 21.4 | |
| Region | | | |
| Scotland | 183 | 30.7 | 8.4 |
| England | 392 | 65.7 | 83.9 |
| Wales | 13 | 2.2 | 4.8 |
| Northern Ireland | 4 | 1.5 | 2.9 |
| Perceived dental health | | | |
| Very poor | 11 | 1.8 | |
| Poor | 45 | 7.5 | |
| Fair | 201 | 33.7 | |
| Good | 260 | 43.6 | |
| Very good | 80 | 13.4 | |
| Normal frequency of check-up | | | |
| Every 3 months | 34 | 5.7 | |
| Every 6 months | 457 | 76.6 | 71.0 |
| Every 12 months | 49 | 8.2 | |
| Every 24 months | 4 | 0.7 | |
| Risk-based | 17 | 2.9 | |
| When I need a check-up | 14 | 2.4 | |
| When I have problems | 15 | 2.5 | |
| Never had a check-up | 7 | 1.2 | |

*General population figures for gender, age, education and region are based on the 2011 census data.¹⁰ General population figures for household income is based on the 2016/17 UK family resources survey.¹¹ General population figures for normal frequency of check-ups is based on the 2009 Adult Dental Health Survey.¹

income, university education, smoker, region and self-reported dental and oral health. Previous evidence suggests that WTP for dental care is associated with age, gender, education and income.⁴ Region was included as co-charges vary across the regions. There are no co-charges for NHS dental check-ups in Scotland but co-charges exist in the other regions. The model was estimated including and excluding protest responses. Individual characteristics associated with protest responses were also explored using logit regression.

3 | RESULTS

Table 1 shows the sample characteristics. In total, 57% of the sample describe their dental and oral health to be good or very good. The majority of the sample (90.5%) have a dental check-up at least once a year. This is much higher compared to for example the statistics reported in the 2009 Dental Health Survey where 71% of the sample had a dental check-up at least once a year.¹ Only four respondents stated that they have never had a dental check-up. The percentage of respondents in both the low and the high income categories are lower compared to the general population.

Figure 1 presents the distribution of responses. A relatively large proportion (20.1%) selected a WTP of £20. Ten (1.8%) respondents reported their WTP to be higher than the maximum of £100. The values reported by these respondents in the open text box were £101, £110, £140, £150 three respondents), £200 two respondents), £250 and £500 respectively.

In total, 64 (10.7%) respondents selected a WTP of £0. Of these, 41 stated they were unwilling to pay anything because they expected the NHS to pay the full cost (protest answers). Other reasons selected were: I cannot afford dental check-ups ($N = 15$); I hate going to the dentist ($N = 1$); I have no time ($N = 1$); I would prefer to spend money on other things and other reasons ($N = 6$).

Table 2 shows that the majority of respondents who selected a positive WTP preferred to have check-ups every 6 months (56.0%) or

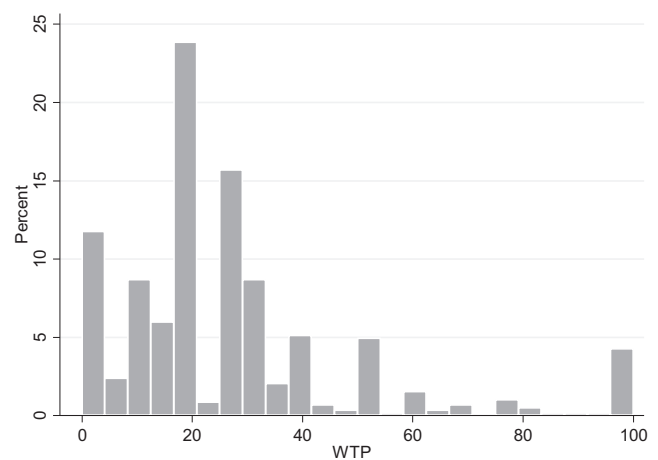


FIGURE 1 Histogram of willingness to pay (WTP) responses¹.
¹ Responses higher than the maximum £100 ($N = 10$) are excluded to improve readability.

yearly (28.0%). Around 11% preferred to have a check-up at the selected price less often (every 2 years or less) and around 5% preferred to have a check-up every 3 months or more often. The table also reports mean and median WTP by preferred frequency. There does not seem to be a clear relationship between preferred frequency and WTP.

The mean (95% confidence interval) WTP for dental check-ups is £31.32 (£28.16–£34.47) for the full sample, £33.17 (£29.90–£36.44) excluding protest answers and £34.36 (£31.02–£37.69) excluding all zero responses. When excluding the four outliers with WTP values of £200 and more the mean (95% confidence interval) WTP are £29.75 (£27.42–£32.09), £31.52 (£29.14–£33.90) and £32.66 (£30.26–£35.06) respectively.

TABLE 2 Preferred frequency of dental check-ups.

| Preferred frequency | N | % | Mean WTP | Median WTP |
|---------------------------|-----|------|----------|------------|
| Less than every 2 years | 34 | 6.4 | 45.9 | 21.5 |
| Every 2 years | 23 | 4.3 | 37.4 | 30.0 |
| Every year | 148 | 28.0 | 34.4 | 25.0 |
| Twice a year | 296 | 56.0 | 30.0 | 20.0 |
| Four times a year or more | 28 | 5.3 | 42.2 | 28.0 |

Abbreviation: WTP, willingness to pay.

| | Full sample | | Excluding protest answers | |
|---|-------------|---------|---------------------------|---------|
| | Coefficient | p-Value | Coefficient | p-Value |
| Constant | 25.40*** | 0.000 | 27.37*** | 0.000 |
| Gender (ref: Male) | | | | |
| Female | 5.09 | 0.074 | 3.80 | 0.206 |
| Age (ref: >64) | | | | |
| <35 | 0.51 | 0.905 | 1.08 | 0.810 |
| 35–44 | –6.28 | 0.166 | –4.79 | 0.316 |
| 45–64 | –3.57 | 0.343 | –3.37 | 0.393 |
| Income (ref: <£20800) | | | | |
| £20801–£41600 | 8.00* | 0.016 | 6.76 | 0.051 |
| >£41600 | 14.15*** | 0.001 | 13.12** | 0.003 |
| Prefer not to say/missing | 0.49 | 0.917 | 0.36 | 0.941 |
| Education (ref) | | | | |
| University | 7.59* | 0.023 | 8.99* | 0.010 |
| Smoker (ref: No) | | | | |
| Yes | 2.55 | 0.462 | 1.50 | 0.678 |
| Region (ref: England, Wales and Northern Ireland) | | | | |
| Scotland | –9.74** | 0.001 | –8.58** | 0.008 |
| Perceived dental health (ref: Very good/good) | | | | |
| Fair/poor/very poor | –2.12 | 0.660 | 0.65 | 0.903 |
| N | 594 | | 553 | |
| Adjusted R ² | 0.042 | | 0.033 | |

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3 shows the association between individual characteristics and WTP for dental check-ups using linear regression. Higher income and university education are associated with a higher WTP. Respondents living in Scotland are willing to pay less compared to respondents living in the rest of UK. Censored regression models were also estimated using log WTP as the dependent variable with similar results.

Table 4 shows the association between individual characteristics and protest responses using logistic regression. Females and individuals with higher income are less likely to provide protest answers. Individuals who report poorer dental and oral health and those living in Scotland are more likely to provide protest answers.

4 | DISCUSSION

The aim of this study was to estimate the UK general adult population WTP for dental check-ups. The estimated mean WTP for a dental check-up was £31.22 for the full sample and £33.06 excluding protest answers. To date only one other study in the UK has conducted similar research. Harris et al⁸ found a similar mean WTP to this study (£30.20). The study estimates can also be compared with the market price of dental check-ups which ranges from £20 to £120.¹² The estimate from this paper is within this range but it should be noted that the range is very wide. The association between education and WTP

TABLE 3 Association between willingness to pay and socio-demographic characteristics.

TABLE 4 Association between protest answers and sociodemographic characteristics.

| | Odds ratio | p-Value |
|---|------------|---------|
| Constant | 0.09*** | 0.000 |
| Gender (ref: Male) | | |
| Female | 0.40* | 0.011 |
| Age (ref: >64) | | |
| <35 | 1.11 | 0.840 |
| 35-44 | 1.99 | 0.171 |
| 45-64 | 0.94 | 0.898 |
| Income (ref: <£20800) | | |
| £20801- £41600 | 0.37* | 0.021 |
| > £41600 | 0.31* | 0.045 |
| Prefer not to say/missing | 0.96 | 0.934 |
| Education (ref) | | |
| University | 1.51 | 0.276 |
| Smoker (ref: No) | | |
| Yes | 0.40 | 0.072 |
| Region (ref: England, Wales and Northern Ireland) | | |
| Scotland | 2.76** | 0.003 |
| Perceived dental health (ref: Very good/good) | | |
| Fair/poor/very poor | 3.22** | 0.007 |
| N | 594 | |
| Pseudo R ² | 0.1084 | |

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

is in line with other studies.^{6,13} The data from this paper showed validity in that individuals with higher income were willing to pay more for a dental check-up. It is sometimes argued that the relationship between ability to pay and WTP is problematic when those values are used to decide what care to fund. However, the counterargument is that this is not an issue as long as WTP is elicited in a sample representative of the general population and the decision maker views the current income distribution as equitable. Donaldson¹⁴ also proposed ways of dealing with any ability to pay issue including the use of distributional weights.

NHS charges for dental check-ups vary across the UK. Check-ups are free of charge in Scotland but NHS patient co-charges exist in England, Wales and Northern Ireland (unless patients are exempt). The results showed that respondents living in Scotland were willing to pay less than respondents living in other parts of the UK and they were also more likely to give protest answers. It could be argued that at least some of the respondents based their WTP on their current out-of-pocket costs for dental check-ups. Akuagwu et al¹⁵ also found that WTP (for scale and polish) varied across regions in the UK. The use of future qualitative research may provide some insights into the reasons for individuals' WTP values including the role that the current cost of the service plays.

There are limitations to this study. Firstly, the WTP question is hypothetical. Respondents may not be willing to pay the stated

amount in real life. Evidence suggests that WTP values elicited using stated preferences are higher than those elicited using revealed preferences.¹⁶ It should be noted that the WTP estimate in this study was at the lower end of the market price for private dental check-up which may suggest that hypothetical bias was less of an issue in this context. Alternatively, it may be that consumers of private dental care tend to have higher incomes compared to the general population resulting in a higher WTP. Secondly, a concern with online survey panels is that respondents often complete a large number of surveys for financial reward, and as such maybe considered professional survey takers. However, online survey panels are an efficient mode of data collection for monetary valuations and can offer a solution to the falling response rates from postal questionnaires.^{17,18} Third, over 90% of the sample stated to have a dental check-up at least once a year. It is possible these are individuals who place an intrinsic value to this service and may state a higher WTP than individuals that do not have regular check-ups. We note that while, similar to a sample from private clinics, our sample may overstate WTP, our methodology allows us to elicit the intrinsic value of dental check-ups from a broader sample and without the biases associated with revealed preference. Fourthly, the regression analysis explained only a small part of the variation in WTP. There are likely to be other characteristics that are associated with WTP for dental check-ups that were not observed in the survey such as for example whether the individual lives in an urban or rural area. Fifthly, the value that individuals place on dental check-ups may have changed due to the COVID-19 pandemic and reduced access to NHS dentists. We leave this for future research.

5 | CONCLUSION

The UK general population value dental check-ups. This information can be used in resource allocation decisions by comparing the value that the population place on dental check-ups with the costs of providing this service in a Cost-Benefit Analysis.

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CONFLICT OF INTEREST STATEMENT

None.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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REFERENCES

1. Steele J, O'Sullivan I. *Executive Summary: Adult Dental Health Survey 2009*. NHS Digital; 2011.
2. NHS Scotland. Dental statistics: NHS treatment and fees. *Statistics as at*. 2019. <https://www.isdscotland.org/Health-Topics/Dental-Care/Publications/2019-09-17/2019-09-17-DentalFees-Report.pdf>
3. Shackley P, Donaldson C. Willingness to pay for publicly-financed health care: how should we use the numbers? *Appl Econ*. 2000;32(15):2015-2021.
4. O'Brien B, Gafni A. When do the "dollars" make sense?: toward a conceptual framework for contingent valuation studies in health care. *Med Decis Making*. 1996;16(3):288-299.
5. Donaldson C, Mason H, Shackley P. Contingent valuation in health. In: Jones A, ed. *The Elgar Companion to Health Economics*. 2nd ed. Elgar; 2012.
6. Tan SHX, Vernazza CR, Nair R. Critical review of willingness to pay for clinical oral health interventions. *J Dent*. 2017;64:1-12. doi:10.1016/j.jdent.2017.06.010
7. Tamaki Y, Nomura Y, Teraoka K, et al. Characteristics and willingness of patients to pay for regular dental check-ups in Japan. *J Oral Sci*. 2004;46(2):127-133.
8. Harris R, Lowers V, Laverty L, et al. Comparing how patients value and respond to information on risk given in three different forms during dental check-ups: the PREFER randomised controlled trial. *Trials*. 2020;21(1):21.
9. Clarkson JE, Pitts NB, Goulao B, et al. Risk-based, 6-monthly and 24-monthly dental check-ups for adults: the INTERVAL three-arm RCT. *Randomized control trail*. 2020;24:60-138.
10. Office for NS. Census Data Catalogue. Updated 2011.
11. UK government Department for Work, and pensions. *Family Resources Survey 2016*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/692771/family-resources-survey-2016-17.pdf
12. Studman A. Private and NHS dental charges Which?2020. <https://www.which.co.uk/reviews/dentists/article/private-and-nhs-dental-charges>. Accessed September/12, 2020
13. Steigenberger C, Flatscher-Thoeni M, Siebert U, Leiter AM. Determinants of willingness to pay for health services: a systematic review of contingent valuation studies. *Eur J Health Econ*. 2022;23(9):1455-1482.
14. Donaldson C. Valuing the benefits of publicly-provided health care: does 'ability to pay' preclude the use of 'willingness to pay'? *Soc Sci Med*. 1999;49(4):551-563. doi:10.1016/S0277-9536(99)00173-2
15. Akuagwuagwu C, van der Pol M, Boyers D. UK general population willingness to pay for scale and polish, and detailed and personalized oral hygiene advice. *Community Dent Oral Epidemiol*. 2022;50(4):233-242.
16. Fifer S, Rose J, Greaves S. Hypothetical bias in stated choice experiments: is it a problem? And if so, how do we deal with it? *Transport Res*. 2014;61:164-177. doi:10.1016/j.tra.2013.12.010
17. Dillman DA, Phelps G, Tortora R, et al. Response rate and measurement differences in mixed-mode surveys using mail, telephone, interactive voice response (IVR) and the internet. *Soc Sci Res*. 2009;38:1-18.
18. Determann D, Lambooi MS, Steyerberg EW, de Bekker-Grob EW, de Wit GA. Impact of survey administration mode on the results of a health-related discrete choice experiment: online and paper comparison. *Value Health*. 2017;20(7):953-960. doi:10.1016/j.jval.2017.02.007

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