

**UK general population willingness to pay for scale and polish, and detailed and personalised oral hygiene advice.**

Chimezie Akuagwuagwu<sup>1</sup>, Marjon van der Pol<sup>2</sup>, Dwayne Boyers<sup>2</sup>

<sup>1</sup> University of Aberdeen, <sup>2</sup> Health Economics Research Unit, University of Aberdeen

## **Abstract**

**Objectives:** Understanding the value the general population place on dentistry services is important for policy makers to aide service planning. Willingness to pay (WTP) is an economic method used to elicit the value of a good or service. The aim of this study is to estimate United Kingdom (UK) general population WTP for commonly provided scale and polish, and detailed and personalised oral hygiene advice (OHA), and to investigate what factors influence WTP.

**Methods:** Participants completed an online hypothetical WTP survey for scale and polish and detailed and personalised oral hygiene advice. The estimation sample consisted of 1405 participants, nationally representative of the UK general population in terms of age and sex. Regression analysis was used to estimate WTP and determine what factors are associated with WTP. Analyses were conducted including and excluding protest answers.

**Results:** The mean (SD) WTP for a scale and polish is £26.77 (£21.91) excluding protest answers and £24.80 (£22.71) for the full sample. The mean (SD) WTP for detailed and personalised OHA is £16.56 (£19.75) excluding protest answers and £12.77 (£22.28) for the full sample. Participants on higher incomes, private attenders and those who stated that maintaining clean and healthy gums was important had higher WTP for both services. Participants in Scotland and Northern Ireland were WTP less than their English counterparts, reflecting the different regional specific payment systems.

**Conclusion:** The general UK population value scale and polish, and detailed and personalised OHA. This study provides estimates of WTP for these services which can be used to inform resource allocation decisions.

**Key Words:** Willingness-to-pay (WTP); Scale and Polish, Oral Hygiene Advice.

## 1. Introduction

As resources for dental care are scarce, choices need to be made about what care to provide. In publicly funded systems, such as the UK National Health Service (NHS), it is crucial that these choices are guided by the preferences of the general population given that they provide the resources for dental care (through taxation or public insurance).<sup>1,2</sup> **This requires measurement of the value that the general population place on dental care.** One 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.<sup>3</sup> An advantage of the Willingness To Pay (WTP) method is that the WTP value can be directly compared to the cost of that service, thereby indicating whether the service is worthwhile (provides more value than it costs). WTP has been widely used in health care and it is also popular in dental care where it has been used to value preventive care, orthodontics and implants.<sup>4,5</sup> Previous studies have tended to use patient samples rather than general population samples.

The aim of this study is to estimate the general UK population's WTP for scale and polish and detailed and personalised oral hygiene advice (OHA). Scale and polish is one of the most frequently provided dental treatments in the UK.<sup>6-8</sup> For example, in 2018-19 around 13 and 2 million scale and polishes were carried out in NHS England and Scotland respectively.<sup>6,8</sup> Scale and polish is the professional removal of deposits such as plaque and calculus from tooth surfaces. It is thought to slow down the inflammatory process of the gums and periodontium, although recent studies have found no evidence that regular planned scale and polish treatments reduce the early signs of gum disease (bleeding gums, probing depths, gum pockets) for patients at low risk of periodontitis.<sup>9</sup> The costs of providing scale and polish to the health services and patients are considerable. For example, the total treatment cost (to the NHS and patients) of NHS provided simple scale and polish for adults in Scotland was around £31 million in 2018/2019.<sup>8</sup> It is therefore important to understand the value the general population places on this service to guide resource allocation decisions. Despite the large-scale provision of scale and polish on the NHS, the value that the general UK population place on this treatment is unknown.

Providing patients with oral hygiene advice (OHA) to encourage self-care is considered to be important in terms of preventing periodontal disease. It has been suggested that the use of psychological approaches such as goal-setting and self-monitoring and therefore having more detailed and personalised hygiene advice may improve the effectiveness.<sup>10</sup> As well as understanding how effective more detailed and personalised hygiene advice is, it is also important to determine whether the population values such a service before scarce dental care funding resources can be allocated to its provision.

## **2. Methods**

This paper uses data from a UK general population online survey that were collected in parallel to the Improving the Quality of Dentistry randomised controlled trial.<sup>11</sup> The aim of the survey was to elicit the preferences of the general population for scale and polish and oral hygiene advice. Data collection was conducted through Qualtrics panels who recruited survey respondents through a partner provider<sup>1</sup> and took place in 2016. Population census-based quotas were used for age (among adult population), sex and UK region. We oversampled in Scotland to enable subgroup analysis across England and Scotland given regional differences in patient charges for dental care (based on activity-based treatment bands in England and Fee for service in Scotland). Responses were anonymised, and respondents were free to leave the survey at any point without having to give a reason for doing so. The survey was tested using a think-aloud study to identify misunderstandings of the questions and was soft-launched with N=30 respondents. In total, 1405 respondents completed the full survey including the WTP question. Ethical approval for the survey was granted by the College Ethics Review Board at the University of Aberdeen, UK (REF: 2015/12/1278).

### **2.1 WTP questions**

The respondents were first provided with a description of the services to be valued which was developed with the involvement of dentists and hygienists. In case of scale and polish they were informed that:

---

<sup>1</sup> It was not possible to calculate a response rate due to the complexity of the sampling algorithm.

*“A scale and polish is a professional clean for one's teeth. Regular scaling and polishing can help keep teeth and gums healthy, clean and fresh. **Scaling** removes the hard tartar which forms on teeth like scale inside a kettle. It also removes trapped food and plaque. A dentist or hygienist will use a rotating brush or rubber polisher with toothpaste to **polish** the teeth. Polishing helps to clean stains off the surfaces of teeth, helping them look and feel clean”.*

In the case of detailed and personalised oral hygiene advice, they were informed that:

*“Researchers are looking at a new way in which dentists and hygienists could provide oral hygiene advice. This new approach is called **Detailed and personalised** oral hygiene advice. **Detailed and personalised advice** is more detailed than what you might normally get at a dental check-up. It is designed just for you. Your dentist or hygienist will decide, with you, what your needs are. You will have a separate or longer appointment with the dentist or hygienist where you get **All** of the following:*

- *Advice about how to take care of your teeth by yourself.*
- *Information on how to recognise if something is wrong.*
- *You will be taught and shown how to brush and floss properly.*
- *Your dentist / hygienist will agree a detailed action plan with you.*
- *Your dentist or hygienist will check on your progress at your next dental check-up.*
- *You will be given more advice if needed.*

*If you need other treatments (e.g. Scale and polish) after your advice, this will count as a new appointment. The new appointment could be on the same day, or you might be asked to come back another time. “*

For each service they were then asked for the maximum amount of money they would be willing to pay out of pocket. **Out of pocket payment was chosen as the payment vehicle as most individuals are used to paying charges for dental care.** They were given a range of amounts to choose from: £0, £1, £5, £10.50, £15, £17.50, £20, £30, £50, £75 and >£75. These values were taken from our previous WTP survey of trial participants and included the patient charges in place at the time (£10.50 for a scale and polish in Scotland and £17.50 for a band 1 treatment in England).<sup>10</sup> If the response was over £75, the respondent was asked to provide the maximum amount they are willing to pay in an open-ended text box.

Respondents were encouraged to answer the question even if they do not normally pay for dental care or if they never have the service. It was explained that we were interested in finding out how much they value the service.

WTP questions such as these are known to generate protest answers where respondents tick £0 even though they value the service **but they protest against some component of the valuation scenario such as the payment vehicle**. They may for example feel that the NHS should provide the service free of charge. **It is common to use debriefing questions to try to differentiate between protest responses and true zero WTP.**<sup>12</sup> **The debriefing questions in this study were developed based on theory, previous contingent valuation studies, and the think aloud study.** If the response was £0, the respondent was asked for the reason given seven possible options: “The NHS should pay the full cost”, “I cannot afford to pay anything”, “I do not like the idea”, “I have no time”, “I do not need to have”, “I would prefer to spend my money on other things”, and “some other reason”. Respondents who selected “some other reason” were asked to state their reason in a text box. Respondents were able to tick multiple responses to this question. If respondents ticked the option “NHS should pay the full cost” their zero response was classified as a protest answer. **All other options represent valid reasons for a zero WTP including budget and time constraints and the individual not deriving utility from the service.** We also review the reasons provided in the text box to identify further protest answers.

## 2.2 Analysis

Regression analysis is used to examine the individual characteristics that are associated with WTP. **The choice of characteristics was informed by previous empirical evidence**<sup>4,5</sup>. Individual characteristics included socio-demographics (gender, age, gross household income, education, smoker and region) and dental-specific characteristics (how they normally pay for dental care, whether they heard of scale and polish before or whether they had oral hygiene advice before, how they describe their dental and oral health, how often they had bleeding gums when brushing their teeth in the past year and whether maintaining clean and healthy teeth and gums is important). **Previous evidence suggests that WTP for dental care is associated with age, gender, education, income, experience of receiving dental care and perceived importance of oral health.**<sup>4,5</sup> **Region and usual payment method for**

**dental care were included to explore whether WTP may to some extent be cost based. It has been recognised in the contingent valuation literature that some respondents may choose a value that they think reflects the cost of the good or service<sup>13</sup>.** Co-charges vary across the regions and region was therefore included in the model. For example, in England and Wales, scale and polish falls under band 1 treatment which at the time of the study incurred a charge of £17.50 in England. In Scotland and Northern Ireland, NHS payments are based on fee-for-service contracts. The patient charge for a scale and polish at the time of the study was £10.76 in Scotland. Dentists can charge a separate fee for intensive oral hygiene instruction in Scotland but they rarely do so and respondents are therefore unlikely to be familiar with the patient charge. In all regions patients pay for courses of treatment rather than individual treatments.

Interval regression is used as the WTP data are interval data. For example, if an individual selected £5, their WTP is greater than (or equal to) £5 but less than then next amount (£10.50). Therefore only the interval within which their WTP value lies is known (between £5 and £10.50 in the example). The interval regression model is estimated using INTREG in Stata 14. As the survey oversampled in Scotland we used survey weights for region<sup>2</sup>. **Whether or not to exclude protest answers is still an issue of debate.<sup>12</sup>** The model is therefore estimated excluding and including protest answers **to explore how sensitive the results are to excluding protest answers.**

### **3. Results**

Table 1 shows the descriptive statistics of the sample. In terms of dental characteristics, most respondents perceive their dental and oral health to be good or very good. Most respondents have heard of scale and polish previously which is not surprising given the widespread provision of this treatment. Respondents generally attach high importance to maintaining clean and healthy teeth.

---

<sup>2</sup> The survey probability weights were calculated as population proportion from region x divided by sample proportion from region x.

Table 2 shows the frequency of the WTP responses. The £20 response was chosen most often in case of scale and polish. Only 7 respondents indicated that they were willing to pay more than £75 for a scale and polish. In total, 117 respondents (8.3%) ticked £0. Of these<sup>3</sup> 55 stated they were not willing to pay anything because they expect the NHS to bear the full cost for the dental treatment and these are identified as protest answers. Other reasons selected were: I cannot afford to pay anything for scale and polish (N=30); I do not like scale and polish (N=12); I have no time to get scale and polish (N=3); I don't need to have scale and polish (N=13); I would prefer to spend my money on other things (N=10); and Other reason (N=20). A further 15 protest answers were identified in the reasons provided in the text box by the 20 respondents who selected other reason with most stating that they do not usually pay for scale and polish or that it should be part of the check-up charge.

A higher proportion (26.1%) of the sample ticked £0 for detailed and personalised hygiene advice and this was the most chosen option. In total, 366 respondents ticked £0. Of these 137 stated they were not willing to pay anything because they expect the NHS to bear the full cost for the dental treatment and these are identified as protest answers. Other reasons selected were: I cannot afford to pay anything for detailed and personalised oral hygiene advice (N=95); I do not like the idea of having detailed and personalised oral hygiene advice (N=21); I have no time to get detailed and personalised oral hygiene advice (N=12); I don't need to have detailed and personalised oral hygiene advice (N=121); I would prefer to spend my money on other things (N=42); and Other reason (N=47). A further 25 protest answers were identified in the reasons provided in the text box by the 47 respondents who selected other reason with most stating that it should be part of the check-up charge.

**There were 103 respondents who provided zero values for both services which includes 54 who provided protest answers for both services. Appendix 1 shows the individual characteristics that are associated with these responses. Respondents who are exempt and those who do not know how they pay for dental care or do not have dental care are more likely to have zero and protest responses. Interestingly those who prefer not to say what their income is are more likely to have zero responses which may indicate that**

---

<sup>3</sup> Note that this information was not collected from 8 respondents due to a programming error. These were respondents who stated that they had no teeth.

**there is a general issue around willingness to provide answers. Other characteristics that are important are importance of maintaining clean and healthy gums and teeth and age and region in the case of scale and polish.**

The mean (SD) WTP for a scale and polish, estimated using interval regression, is £26.77 (£21.91) excluding protest answers and £24.80 (£22.71) for the full sample. The mean (SD) WTP for detailed and personalised OHA is £16.56 (£19.75) excluding protest answers and £12.77 (£22.28) for the full sample. **The median WTP (using the interval midpoint) for a scale and polish is £25 excluding protest answers and £18.75 for the full sample. The median WTP for OHA is £16.25 excluding protest answers and £12.75 for the full sample.**

Table 3 shows the interval regression results for WTP for scale and polish. Younger respondents and those on higher incomes are willing to pay a higher amount for scale and polish whilst respondents living in Scotland and Northern Ireland are willing to pay less compared to England. **For example, respondents in Scotland are willing to pay £6.68 less for a scale and polish compared to England.** Usual payment method for dental care also matters. Those who are exempt (NHS pays full charges) are willing to pay less whilst those who pay the full cost out of pocket are willing to pay more compared to those who pay NHS co-charges. Respondents who attach higher importance to maintaining clean and healthy gums and teeth are willing to pay more for a scale and polish. Perceived dental health, and bleeding gums are not associated with willingness to pay for a scale and polish. The results for the full sample (including protest answers) were similar to the results for the sample excluding protest answers.

The results for detailed and personalised oral hygiene advice reported in Table 4 are in line with the results for scale polish in terms of income, usual payment method for dental care and importance of maintaining clean and healthy gums and teeth. The region effect is less pronounced. Individuals in Northern Ireland are willing to pay similar amounts compared to individuals living in England. Individuals who are aged 45 and 54 are willing to pay less compared to those aged 65 and over. Individuals who stated that they did not have oral

hygiene advice before are willing to pay less compared to those who have had advice. There is no clear education effect. Individuals who have other vocational or work-related qualifications, foreign qualifications or have an apprenticeship are willing to pay less compared to those with a level 4 qualification. However, it is difficult to interpret this result given the heterogeneity of this category. The results for the full sample (including protest answers) were similar to the results for the sample excluding protest answers.

#### **4. Discussion**

This is the first study to estimate the UK general population's WTP for scale and polish and detailed and personalised oral hygiene advice. The mean WTP was estimated at £26.77 for scale and polish and £16.56 for detailed and personalised hygiene advice. The question arises whether these values are realistic. **There are no directly comparable studies. To explore the face validity of the values we compare them to the prices charged in the private market as these could be argued to be more closely related to individuals' maximum WTP.** The price in the private market for a scale and polish range between £25 to £85.<sup>15</sup> Our estimate falls in the lower end of this range. It should be noted that our sample also includes non-users. **Non-users** may be willing to pay due to option value (they like the idea that it is available) or altruistic value (they value it because they feel that other people should have access to it) but are likely to have lower WTP values **which may decrease the overall mean WTP.**

**Mean WTP was lower and more response chose £0 for oral hygiene advice compared to scale and polish. This may reflect that respondents thought that oral hygiene advice was less effective than scale and polish. The difference in WTP may in part be due to the way the two services were described. The scale and polish description included potential benefits whilst the oral hygiene advice description focused on the process. The latter also referred to the possibility of further treatment being needed. This may have influenced respondents with tight budget constraints in particular.**

**Our study contributes to the literature examining the individuals' characteristics that are associated with WTP for dental care<sup>4,5</sup>. Previous literature has shown that income,**

**age, education, experience, gender and importance of oral health are associated with WTP<sup>5</sup>. Our study also showed an association between WTP and income, age, experience and importance placed on healthy teeth and gums. However, gender and education were not associated with WTP.** Perceived dental health and bleeding gums were also not associated with WTP. It may be the case that individuals do not necessarily perceive scale and polish and detailed and personalised oral hygiene advice to help with bleeding gums or general health and may perceive these to bring more aesthetic benefits.

**A strength of this study is that the role of region (which have different payment systems) and usual way of paying for dental care could also be explored. This is important given the concern that some responses may be cost based and not accurately reflect the value that an individual places on the service<sup>13</sup>. WTP for scale and polish was lower in Scotland and Northern Ireland which** appears to reflect the differences in how patient co-charges are calculated (although it should be noted that the co-charges are not directly comparable). There was a less pronounced region effect for detailed and personalised hygiene advice which may reflect that individuals were less familiar with the charges for oral hygiene advice as these are rarely used. Respondents who are exempt from co-charges were willing to pay less whilst those who pay the full cost were willing to pay more. **The role of exemption may partly reflect differences in socioeconomic status (individuals on low income benefits are exempt from charges).** That payment method and region were associated with WTP may suggest that responses are cost-based to at least some extent. Future research should explore this further. A mixed-method study could provide important insights into why individuals provided certain values.

There are some limitations. Firstly, the hypothetical nature of the method raises the question of whether individuals would pay their stated amount in real life. Secondly, it is sometimes argued that the WTP concept is problematic as it is a function of the ability to pay (income) and may therefore prioritise high-income people over low-income people as they place a higher value on the service. However, this should not be an issue as long as the sample is representative and as long as the decision-maker views the current income distribution as equitable. Donaldson<sup>12</sup> also proposed ways of dealing with the ability to pay issue such as using distributional weights.

## **Conclusion**

This study is important for resource allocation in dentistry and provides useful information for policy makers and dentists alike. It provides policy makers with clear evidence that, on average, the general population value services intended to prevent future oral health problems. **The WTP values can be used in resource allocation decisions to assess whether these services provide a net benefit (the WTP value is larger than the cost of providing the service). The findings of the study are also useful to service providers.** Understanding the characteristics of patients that are associated with the value placed on scale and polish and / or detailed and personalised oral hygiene advice is important for dentists and hygienists in terms of service provision and engaging with patients in shared decision-making.

## **Acknowledgements**

iQuaD was funded by the Health Technology Assessment Programme of the National Institute for Health Research, Current Controlled Trials number ISRCTN56465715. The Chief Scientist Office of the Scottish Government Health and Social Care Directorates funds HERU. The views expressed in this paper are those of the authors only and not those of the funding bodies.

## References

1. 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.
2. 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.
3. Donaldson C, Mason H, Shackley P. Contingent valuation in health. In: Jones A, ed. *The elgar companion to health economics*. 2nd ed. Cheltenham: Elgar; 2012.
4. Tan SHX, Vernazza CR, Nair R. Critical review of willingness to pay for clinical oral health interventions. *J Dent*. 2017;64:1-12. doi: <https://doi.org/10.1016/j.jdent.2017.06.010>.
5. Saadatfar N, Jadidfard MP. An overview of the methodological aspects and policy implications of willingness-to-pay studies in oral health: A scoping review of existing literature. *BMC Oral Health*. 2020;20(1):323-020-01303-3.
6. National Health Service. NHS dental statistics for england- 2016-2017. <https://digital.nhs.uk/data-and-information/publications/statistical/nhs-dental-statistics/nhs-dental-statistics-for-england-2016-17>. Published August 31, 2017. Accessed September/12, 2020.
7. Welsh government. NHS dental statistics in wales, 2018-2019. <https://gov.wales/sites/default/files/statistics-and-research/2019-09/nhs-dental-services-april-2018-march-2019-827.pdf>. Published September 2019. Accessed September/12, 2020.

8. Public Health Scotland. General dental services, treatment provided by dentists- all SDR item of service treatment claims, scotland, adults; 2000/01 – 2018/19.  
<https://www.isdscotland.org/Health-Topics/Dental-Care/General-Dental-Service/treatments-provided-by-dentists.asp>. Accessed September/12, 2020.
9. Lamont T, Worthington HV, Clarkson JE, Beirne PV. Routine scale and polish for periodontal health in adults. *Cochrane Database of Systematic Reviews*. 2018(12).
10. Renz A, Ide M, Newton T, Robinson P, Smith D. Psychological interventions to improve adherence to oral hygiene instructions in adults with periodontal diseases. *Cochrane Database of Systematic Reviews*. 2007(2).
11. Ramsay CR, Clarkson JE, Duncan A, et al. Improving the quality of dentistry (IQuaD): A cluster factorial randomised controlled trial comparing the effectiveness and cost-benefit of oral hygiene advice and/or periodontal instrumentation with routine care for the prevention and management of periodontal disease in dentate adults attending dental primary care. *Health Technol Assess*. 2018;22(38):1-+.
12. Frey UJ, Pirscher F. Distinguishing protest responses in contingent valuation: A conceptualization of motivations and attitudes behind them. *PLOS ONE*. 2019;14(1):e0209872.
13. Ryan M, San Miguel F. Testing for consistency in willingness to pay experiments. *Journal of Economic Psychology*. 2000;21(3):305-317. doi: [https://doi.org/10.1016/S0167-4870\(00\)00006-4](https://doi.org/10.1016/S0167-4870(00)00006-4).

14. 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.

**Table 1. Descriptive statistics of the sample**

	<b>Sample</b>	
	<b>N</b>	<b>%</b>
<b>Gender</b>		
Female	766	54.5
Male	639	45.5
<b>Age</b>		
<25	92	6.6
25 – 34	197	14.0
35 – 44	247	17.6
45 – 54	298	21.2
55 - 64	265	18.9
>64	306	21.8
<b>Income</b>		
<£10400	187	13.3
£10400 - £20800	327	23.3
£20800 - £31200	308	21.9
£31200 - £41600	170	12.1
£41600 - £52000	119	8.5
£52000+	135	9.6
Prefer not to say	149	10.6
Missing	10	0.7
<b>Education<sup>1</sup></b>		
Level 1	250	17.8
Level 2	240	17.1
Level 3	128	9.1
Level 4 or above	537	38.2
Other/Foreign/Apprenticeship	168	12.0
No qualification	82	5.8
<b>Smoker</b>		
No	1,148	81.7
Yes	257	18.3
<b>Region</b>		
England	1,039	74.0
Scotland	244	17.4
Wales	88	6.3
Northern Ireland	34	2.4
<b>Payment method</b>		
NHS pays some cost	640	45.6
NHS pays the full cost	271	19.3
I pay the full cost	314	22.4
Denplan/dental insurance	149	10.6
Do not know/Never had dental care	31	2.2
<b>Ever heard of scale and polish</b>		
Yes	1,308	93.1
No/Don't know/not applicable	97	6.9

<b>Ever had oral hygiene advice</b>		
Yes	1276	90.8
No	129	9.2
<b>Perceived dental health</b>		
Very poor/Poor	893	63.6
Fair	426	30.3
Good/Very Good	86	6.1
<b>Bleeding gums</b>		
Never/hardly ever	921	65.6
Occasionally	338	24.1
Fairly often/very often	146	10.4
	<b>Mean</b>	<b>SD</b>
<b>Importance of maintaining clean and healthy teeth and gums<sup>2</sup></b>	4.42	0.73

<sup>1</sup>Using the census categories: No qualifications (No formal qualifications); Level 1 (1-4 GCSEs, Scottish Standard Grade or equivalent qualifications), Level 2 (5 or more GCSEs, Scottish Higher, Scottish Advanced Higher or equivalent qualifications), Level 3 (2 or more A-levels, HNC, HND, SVQ level 4 or equivalent qualifications), Level 4 or above (First or higher degree, professional qualifications or other equivalent higher education qualifications), and Other/foreign/apprenticeship (Apprenticeship, Other vocational / work-related qualifications and non-UK / foreign qualifications)

<sup>2</sup> on a scale from 1 (strongly disagree) to 5 (strongly agree)

**Table 2. Frequency of WTP responses**

	<b>Scale and polish</b>		<b>Detailed and personalised hygiene advice</b>	
	N	%	N	%
£0	117	8.3	366	26.1
£1	12	0.9	20	1.4
£5	104	7.4	169	12.0
£10.50	212	15.1	224	15.9
£15	192	13.7	180	12.8
£17.50	68	4.8	56	4.0
£20	331	23.6	196	14.0
£30	180	12.8	109	7.8
£50	148	10.5	70	5.0
£75	34	2.4	11	0.8
>£75	7	0.5	4	0.3
If more than £75				
£90	1		2	
£100	3		1	
£120	1			
£150	1		1	
£200	1			

**Table 3. Association between WTP for scale and polish and individual characteristics<sup>1</sup>**

	Excluding protest answers		Full sample	
	Coefficient	p-value	Coefficient	p-value
<b>Gender (ref: female)</b>				
Male	-0.00300	(0.998)	-0.489	(0.680)
<b>Age (ref: &gt;64)</b>				
<25	5.037*	(0.086)	7.403**	(0.014)
25-34	3.379	(0.114)	4.866**	(0.026)
35-44	2.996	(0.144)	3.436	(0.104)
45-54	-0.553	(0.720)	0.953	(0.556)
55-64	1.129	(0.467)	2.026	(0.219)
<b>Income (ref: £52000+)</b>				
<£10400	-11.76***	(0.000)	-12.63***	(0.000)
£10400 - £20800	-10.22***	(0.001)	-11.20***	(0.000)
£20800 - £31200	-10.15***	(0.001)	-11.09***	(0.000)
£31200 - £41600	-6.802**	(0.033)	-7.074**	(0.026)
£41600 - £52000	-4.994	(0.144)	-4.626	(0.177)
Prefer Not to Say	-11.93***	(0.000)	-13.22***	(0.000)
<b>Education (ref: level 4 or above)</b>				
Level 1	-0.188	(0.909)	0.417	(0.805)
Level 2	-2.868**	(0.047)	-1.764	(0.242)
Level 3	-0.750	(0.708)	-0.639	(0.757)
Other/Foreign/Apprenticeship	-0.852	(0.683)	0.187	(0.929)
No qualification	-2.026	(0.407)	-0.0431	(0.986)
<b>Smoker (ref: No)</b>				
Yes	0.582	(0.691)	0.321	(0.829)
<b>Region (ref: England)</b>				
Scotland	-6.683***	(0.000)	-5.366***	(0.000)
Wales	-2.116	(0.329)	-1.431	(0.517)
Northern Ireland	-8.466***	(0.000)	-8.177***	(0.001)
<b>Payment method (ref: NHS pays some cost)</b>				
NHS Pays Full Cost	-8.888***	(0.000)	-10.87***	(0.000)
I Pay the Full Cost	12.30***	(0.000)	13.09***	(0.000)
Dental Insurance/Denplan	-1.630	(0.317)	-2.582	(0.133)
I Do Not Know/ never had dental care	-6.126	(0.127)	-6.922*	(0.092)
<b>Heard of scale and polish (ref: Yes)</b>				
No	-2.939	(0.246)	-3.421	(0.181)
<b>Perceived Dental Health (ref: Very good/good)</b>				
Fair	0.101	(0.932)	-0.400	(0.750)
Very Poor/Poor	-2.666	(0.211)	-2.444	(0.264)
<b>Bleeding gums (ref: Never/hardly</b>				

ever)				
Occasionally	0.766	(0.548)	1.751	(0.181)
Fairly often/very often	-2.182	(0.195)	-0.592	(0.736)
Importance of maintaining clean and healthy teeth and gums	2.024**	(0.022)	2.518***	(0.006)
Intercept	26.03***	(0.000)	21.60***	(0.000)
N	1327		1395	
McFadden R <sup>2</sup>	0.049		0.052	

<sup>1</sup> estimated using interval regression; \* p< 0.10; \*\* p <0.05; \*\*\* p<0.01

**Table 4. Association between WTP for detailed and personalised oral hygiene advice and individual characteristics<sup>1</sup>**

	Excluding protest answers		Full sample	
	Coefficient	p-value	Coefficient	p-value
<b>Gender (ref: female)</b>				
Male	-0.920	(0.443)	-1.326	(0.293)
<b>Age (ref: &gt;64)</b>				
<25	1.283	(0.633)	2.059	(0.464)
25-34	0.628	(0.782)	1.557	(0.504)
35-44	-0.747	(0.697)	-2.115	(0.297)
45-54	-3.140*	(0.058)	-3.178*	(0.072)
55-64	-0.876	(0.620)	-1.552	(0.405)
<b>Income (ref: £52000+)</b>				
<£10400	-11.27***	(0.000)	-12.89***	(0.000)
£10400 - £20800	-13.76***	(0.000)	-13.90***	(0.000)
£20800 - £31200	-12.76***	(0.000)	-13.92***	(0.000)
£31200 - £41600	-7.209**	(0.016)	-7.921***	(0.010)
£41600 - £52000	-6.496*	(0.056)	-8.390**	(0.016)
Prefer Not to Say	-12.97***	(0.000)	-14.55***	(0.000)
<b>Education (ref: level 4 or above)</b>				
Level 1	-1.236	(0.491)	-0.722	(0.695)
Level 2	-2.656	(0.104)	-1.595	(0.354)
Level 3	-1.756	(0.409)	-0.976	(0.661)
Other/Foreign/Apprenticeship	-4.162**	(0.019)	-4.746**	(0.012)
No qualification	-0.195	(0.943)	1.712	(0.547)
<b>Smoker (ref: No)</b>				
Yes	-0.353	(0.806)	-0.0967	(0.949)
<b>Region (ref: England)</b>				
Scotland	-3.057**	(0.028)	-2.472*	(0.099)
Wales	-3.162	(0.130)	-3.488	(0.120)
Northern Ireland	0.371	(0.900)	1.271	(0.693)
<b>Payment method (ref: NHS pays some cost)</b>				
NHS Pays Full Cost	-6.917***	(0.000)	-8.584***	(0.000)
I Pay the Full Cost	3.522**	(0.031)	4.897***	(0.004)
Dental Insurance/Denplan	0.893	(0.615)	0.650	(0.733)
I Do Not Know/ never had dental care	-3.252	(0.571)	-6.645	(0.208)
<b>Had oral hygiene advice (ref: Yes)</b>				
No	-7.464***	(0.002)	-8.434***	(0.000)
<b>Perceived Dental Health (ref: Very good/good)</b>				
Fair	-0.480	(0.702)	-0.165	(0.901)
Very Poor/Poor	-1.130	(0.614)	-0.545	(0.818)

---

<b>Bleeding gums (ref: Never/hardly ever)</b>				
Occasionally	<b>0.671</b>	<b>(0.600)</b>	<b>2.011</b>	<b>(0.138)</b>
Fairly often/very often	<b>2.006</b>	<b>(0.333)</b>	<b>3.323</b>	<b>(0.124)</b>
<b>Importance of maintaining clean and healthy teeth and gums</b>	<b>1.805**</b>	<b>(0.024)</b>	<b>2.040**</b>	<b>(0.020)</b>
<b>Intercept</b>	<b>22.78***</b>	<b>(0.000)</b>	<b>18.71***</b>	<b>(0.000)</b>
<b>N</b>	<b>1236</b>		<b>1395</b>	
<b>McFadden R<sup>2</sup></b>	<b>0.029</b>		<b>0.031</b>	

---

<sup>1</sup> estimated using interval regression; \* p< 0.10; \*\* p <0.05; \*\*\* p<0.01

**Appendix 1. Association between individual characteristics and zero and protest responses<sup>1</sup>**

	Scale and polish		Personalised oral hygiene advice	
	Zero responses Odds ratio	Protest responses Odds ratio	Zero responses Odds ratio	Protest responses Odds ratio
<b>Gender (ref: female)</b>				
Male	1.372	1.573	1.060	1.138
<b>Age (ref: &gt;64)</b>				
<25	0.176**	0.167*	0.644	0.608
25-34	0.424**	0.299**	0.744	0.552
35-44	0.509*	0.713	1.213	1.435
45-54	0.709	0.374**	1.093	1.052
55-64	0.735	0.537	1.137	1.197
<b>Income (ref: £52000+)</b>				
<£10400	2.856*	3.057	1.990**	2.406*
£10400 - £20800	2.579	2.674	1.777*	1.390
£20800 - £31200	1.977	2.761	2.062**	2.112*
£31200 - £41600	1.578	1.791	1.171	1.636
£41600 - £52000	1.340	0.712	1.590	2.388*
Prefer Not to Say	3.625**	3.358*	1.980**	2.348*
<b>Education (ref: level 4 or above)</b>				
Level 1	0.704	0.758	1.188	0.836
Level 2	0.851	0.458*	1.267	0.629
Level 3	1.028	1.129	1.275	0.862
Other/Foreign/Apprenticeship	0.685	0.595	1.602**	1.224
No qualification	0.712	0.289*	1.113	0.406*
<b>Smoker (ref: No)</b>				
Yes	1.623*	1.134	0.988	0.979
<b>Region (ref: England)</b>				
Scotland	0.438**	0.334**	0.916	0.791
Wales	0.667	0.539	1.100	1.173
Northern Ireland	0.709	0.959	0.747	0.595
<b>Payment method (ref: NHS pays some cost)</b>				
NHS Pays Full Cost	4.656***	3.381***	2.101***	1.949***
I Pay the Full Cost	0.444*	0.320*	1.034	0.459***
Dental Insurance/Denplan	1.527	1.944	1.034	1.060
I Do Not Know/ never had dental care	5.672***	2.144	3.413***	3.031**
<b>Heard of scale and polish (ref: Yes)</b>				
No	2.546**	1.538	1.511	1.062
<b>Perceived Dental Health (ref: Very good/good)</b>				

<b>Fair</b>	<b>0.948</b>	<b>1.117</b>	<b>0.902</b>	<b>0.885</b>
<b>Very Poor/Poor</b>	<b>0.586</b>	<b>0.739</b>	<b>0.622</b>	<b>0.831</b>
<b>Bleeding gums (ref: Never/hardly ever)</b>				
<b>Occasionally</b>	<b>0.590*</b>	<b>0.625</b>	<b>0.550***</b>	<b>0.614**</b>
<b>Fairly often/very often</b>	<b>0.708</b>	<b>0.412</b>	<b>0.717</b>	<b>0.578</b>
<b>Importance of maintaining clean and healthy teeth and gums</b>				
	<b>0.630***</b>	<b>0.703**</b>	<b>0.816**</b>	<b>0.898</b>
<b>N</b>	<b>1395</b>	<b>1395</b>	<b>1395</b>	<b>1395</b>
<b>McFadden R<sup>2</sup></b>	<b>0.178</b>	<b>0.145</b>	<b>0.057</b>	<b>0.071</b>

<sup>1</sup> estimated using logistic regression ;\* p< 0.10; \*\* p <0.05; \*\*\* p<0.01