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STATED PREFERENCES AND WILLINGNESS TO PAY FOR MOLAR TREATMENT: RESULTS OF PILOT STUDY

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ABSTRACT

This study attempts to determining stated preferences for treatment of molar and the willingness to pay of the selected alternative. The study is based on questions from the interview of Christopher Robert Vernazza, used in his thesis "The monetary value of oral health: willingness to pay for treatment and prevention".

Using a sample of 111 people visit their dentists in Plovdiv. The method of study is a direct anonymous questionnaire with questions about the choice of alternative health and willingness to pay its (direct open question); demographic, social and economic characteristics of the respondents; history, severity of dental disease and frequency of visits to the dentist.

The estimates of willingness to pay for the proposed health alternatives with their standard deviation were as follows: root canal treatment and placing a crown - 121,30 ± 84,53 BGN; extract the tooth and leaving a gap - 51,67 ± 74,13 BGN; placing a removable denture - 120,00 ± 156,52 BGN; placing fixed bridge - 125,71 ± 66,79 BGN; implant - 491,43 ± 478,90 BGN.). The level of income affects payment decisions. We found that with increasing household income increases willingness to pay – the moderate positive relationship exists (Spearman's rho=0,429). Demographic and other socio-economic factors have no got a statistically significant impact on the willingness to pay of the selected health choices.

Key words: willingness to pay, stated preferences, dental services, molar treatment, health economics.

INTRODUCTION

In this paper is presented the results of a study on stated preferences and willingness to pay (WTP) for the treatment of broken molar. The study is part of a interuniversity project of Medical University - Plovdiv, No15/2012, on the subject: "Contingent valuation and WTP of patients with skin and dental disease".

The purpose of this study was to determine patient preferences for treatment of a broken molar with insensitive nerves, and willingness to pay for chosen alternative.

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The tools of this study is based on interview of Christopher Robert Vernazza, used in his dissertation - "The monetary value of oral health: willingness to pay for treatment and prevention" [1]. The method of Vernazza's study is an interview. Unlike his study we use an anonymous questionnaire with explanatory text at the beginning of the questionnaire sheet.

Establishing WTP Vernazza uses payment cards technique. The choice of the maximum payment amount is mediated by secondary technique that provides the interviewee order given his cards into three chambers - the tray that is willing to pay, it is not in his power to pay and hesitate [2]. For measuring WTP in our research we formulated direct open question that followed-up the selected treatment choice.

MATERIAL AND METHODS

The survey was conducted during the period March 2013 - May 2013 within the city of Plovdiv. We took from the Bulgarian Dental Association - Plovdiv Regional College lists of all practicing dentists in Plovdiv. Then randomly were selected five dentists which confirmed willingness to participate in the study. They were given 25 questionnaires to be completed by their patients. The survey included people aged over 18 years without being made further selection (the principle of voluntary respondents). Since submitted a total of 125 questionnaires were returned 111 questionnaires.

Survey contains questions related to:
- selection of stated preference;
- determining the WTP by direct, open question according the selected alternatives;
- demographic characteristics;
- economic and social status - household income, employment, health insurance, exposure to occupational diseases;
- history of dental diseases, including frequency of visits to the dentist and the reasons thereof.

To the attention of the respondents were offered two alternatives to choose to treat for broken molar with insensitive nerves. Alternative "A" was related to the selection of respondents to preserve the tooth by root canal treatment and placing a crown, while the alternative "B" suggests extraction of the tooth and then four possible sub choices as listed below:
- leaving a gap - B1;
- placing removable denture - B2;
- placing fixed bridge - B3;
- placing an implant - B4.

Demographic characteristics were identified with questions about gender, age and educational level. Socio-economic characteristics were established with questions about employment, health insurance and total household income. The question of household income was closed-ended including scale with eight floors - each floor with 300 BGN size. Lowest income level was 200 BGN and the last floor over 2 000 BGN was open.

Data processing was performed using the software SPSS 17.0 and MS Excel for Windows. It was used the nonparametric correlation coefficient (Spearman's rho) and nonparametric tests (Kolmogorov-Smirnov - Z, Mann-Whitney - U and Kruskal-Wallis - K Test). The results were shown at a significance level $P<0,05$.

RESULTS

The average age of respondents was 45,17 ± 14,31 years. The gender distribution was as follows: male 41,8% (n=46) and women 58,2% (n=64).

The proportion of the respondents with "Master" education degree was highest - 36,9% (n=41), followed by those with secondary education - 36,9% (n=41). Persons with a "Bachelor" degree were 24,3% (n=27). Those with primary school were respectively 1,8% (n=2).

A significantly higher proportion of working people - 81,8% (n=90) was found and unemployed were 18,2% (n=20).

Significant proportion of respondents opted for alternative "A" - 86,5% (n=96), which means that they prefer to preserve the molar and placing a crown.

Those who have chosen extraction - 13,5% (n=15) are listed as under the following alternatives:
- leaving a gap - 40 % (n=6);
- placing removable denture - 33,3% (n=5);
- placing fixed bridge - 46,7% (n=7).
- placing an implant - 46,7% (n=7).

The proportion and number of persons selected under any of the alternatives are higher than those set for the main alternative "B" because some respondents gave more than one possible choice.

The average amount that the respondents are willing to pay for alternative "A" was 121,30 ± 84,53 BGN (min = 20 BGN, max = 500 BGN). Mode and median was 100 BGN. One respondent chose that alternative, but has indicated that it is willing to pay zero for a particular treatment, and four persons left field WTP empty.

The distribution of responses on willingness to pay for alternative "A" is shown in **Table 1.** We further grouped the respondents' answers using the scale width of each interval of 100 BGN and go to open over 400 BGN.

Skewness (1,797) and Kurtosis (4,611) are positive and show that it downloaded the right shoulder and the tip of the test distribution of WTP for the alternative "A" is above that of normal. The conclusion is that the distribution of the WTP for alternative "A" is not normal can be made based on non-parametric test of Kolmogorov-Smirnov (Z=1,997; 2-tailed P=0,001).

Table 1. *WTP for selected alternative "A" – root canal treatment and placing the crown.*

WTP, BGN	N	Share, %
≤100	55	57,3
101-200	29	30,2
201-300	4	4,2
301-400	2	2,1
401 ≤	1	1,0
Zero	1	1,0
Without answer	4	4,2

WTP for choosing another alternative "B" was as follows:
- leaving a gap - 51,67 ± 74,13 BGN (min=10 BGN, max =200 BGN);
- placing removable denture - 120,00 ± 156,52 BGN (min = 50 BGN, max = 400 BGN);
- placing fixed bridge - 125,71 ± 66,79 BGN (min = 50 BGN, max = 200 BGN);
- placing an implant - 491,43 ± 478,90 BGN (min = 40 BGN, max = 1000 BGN).

The distribution of responses on WTP in alternative "B" is shown in **Table 2.**

Table 2. *Distribution of WTP reported for the alternative "B" and related sub choices.*

WTP, BGN	Leaving a gap		Removable denture		Fixed bridge		Implant	
	N	Share, %	N	Share, %	N	Share, %	N	Share, %
≤10	2	25	-	-	-	-	-	-
10,01 - 20	2	25	-	-	-	-	-	-
20,01 - 40	-	-	-	-	-	-	1	11
40,01 - 50	1	12,5	4	57	2	22	1	11
50,01 - 100	-	-	-	-	2	22	-	-
100,01 - 150	-	-	-	-	-	-	1	11
150,01 - 180	-	-	-	-	1	11	-	-
180,01 - 200	1	12,5	-	-	2	22	1	11
200,01 - 400	-	-	1	14	-	-	-	-
400,01 - 1000	-	-	-	-	-	-	3	33
Without answer	2	25	2	29	2	22	2	22

We did not find statistically significant relationship between WTP for alternative "A" and demographic factors as age (≤35 years, 35 years <) (U=614,5; Sig.P=0,176) and gender (U=822,0; Sig.P = 0,169). No significant differences were detected by Kruskal-Wallis Test, between the WTP of respondents in six groups according to the level of education (χ2=5,519; Sig.P=0,238). The same applies to the socio-economic indicators: employment (U=562,5; Sig.P=0,494) as availability of health insurance (U=154,0; Sig. P=0,097).

The result of the non-parametric Kruskal-Wallis test for significant differences between the willingness to pay for alternative "A" and the level of household income was statistically significant (χ2 = 19,966; Sig. P = 0,006). Therefore, the level of income affects WTP decisions. We found that with increasing household income increases WTP – the moderate positive relationship exists (Spearman's rho=0,429). This can be seen in **Table 3.**

Table 3. *Distribution and descriptive statistic of WTP for the root canal treatment and placing a crown ("A") grouped by the household income.*

Household Income, BGN	N	Mean	Std. Dev.	Min	Max	
≤ 200	2	50,000	0,000	50,00	50,00	
200,01 - 500	16	78,750	56,318	0,00	200,00	
500,01 - 800	23	106,087	53,491	30,00	200,00	
800,01 - 1100	10	103,000	41,200	50,00	200,00	
1100,01 - 1400	6	96,667	49,261	40,00	150,00	
1400,01 - 1700	14	138,571	82,262	50,00	350,00	
1700,01 - 2000	6	121,667	61,455	70,00	200,00	
2000,01 ≤	14	216,429	129,532	50,00	500,00	

The study of Yon Tamaki et al on WTP for regular dental check-ups in Japan leads to similar conclusions - with increasing household income, the number of people who are willing to pay less than 1 000 JPY (about $ 10) decreases. Those who are willing to pay less and more than 2,000 JPY (about $ 20) are increasing [3].

The results of nonparametric analysis did not confirm the presence of statistically significant relationships between willingness to pay at sub choices after the extraction and characteristics - age, gender, education, employment and household income. The data are presented in **Table 4.**

Table 4. *Statistical significance of the nonparametric tests of the relationship between WTP for the stated preferences after the tooth extraction.*

Sub choices based on the tooth extraction	Age	Gender	Education	Employment	Household Income
	Sig.	Sig.	Sig.	Sig.	Sig.
Leaving a gap	1,000	0,340	0,475	1,000	0,285
Removable denture	0,617	0,414	0,617	0,617	0,135
Fixed bridge	0,797	0,467	0,467	0,797	0,637
Implant	0,067	0,688	0,136	0,120	0,539

Unlike the present study other researchers concluded that gender and dental status (no lost tooth) as independent variables are able to predict the levels of average WTP when placing the implant [4]. Similar studies found that people with higher educational level, living in the area of Helsinki, was willing to pay an average of 297,40 EUR, while those with lower education (241,0 EUR) to receive emergency filling of tooth with broken structure [5, 6]. In our studied population we did not find statistical significant differences between WTP of individuals with higher levels of education (bachelor and master) and lower. The main reason for this is probably due to the small sample size.

CONCLUSION

The study of willingness to pay is a major challenge, particularly in an environment in which the formation of a quasi market relations in health care dates back soon. Dental care system stands closest to our idea to market in health care, of course regulated to some extent by the state. The main feature of dental services market is its "direct" nature - as confirmed by our study, the predominant method of payment was "out-of-pocket". This in turn determines the nature of the market pricing of dental services.

This study shows the high reliability applications tools for determining patient preferences and willingness to pay of preferred choice. The questions of the survey proved understandable answers have their logical explanation. The only exception is the question that identifies dental history. Its format has proved inconvenient and he needs to be edited to facilitate the respondents in giving an exact number of consumed dental services and manipulations in the past. Another result that allows us to believe in the validity of the estimates of willingness to pay is established correlation of the amounts given by the levels of household income. This is close to the fundamental economic logic that the level of consumer income and willingness to pay are positive related.

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