

## Valuation on Health States: A Contingent Valuation Study

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**Abstract:** The use of Willingness-To-Pay (WTP) to value the benefits of health (care) in monetary terms is increasing. We aimed to estimate willingness-to-pay for health status with different severity level and identify determinant factors on WTP. A cross sectional study was conducted in Shiraz, Iran in March and April 2015. The open-ended method was used to estimate monthly WTP. Multivariate regression analyses using ordinary least squares were applied to examine the effect of socio-demographic factors on WTP. The mean value of private WTP is higher than the mean value of the altruistic WTP in all health status. But in worse health status, the mean value difference became greater that means respondents willing to pay private. The calculation of “mild/severe ratio” showed that increasing in severity of illness, the relative increase in private WTP was higher than altruistic WTP. The finding indicates that the mean of WTP increases at severe health status, therefore, health policy maker should allocate resources toward severe health status.

**Key words:** Cost benefit analysis, contingent value, willingness to pay, Iran, severe health status, indicates

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### INTRODUCTION

There is an increasing interest in cost-benefit analysis in the economic evaluation of health care services, cost-benefit analysis measures the benefits of health care in monetary terms (O'Brien and Gafni, 1996; Drummond *et al.*, 2015). There are two main methods to allocate monetary values to life and health. The first method is human-capital and friction cost measures (Koopmanschap *et al.*, 1995; Rice and Cooper, 1967; Kesztyus *et al.*, 2014). As a second method, willingness to pay for health care services is studied based on individual's preferences (Johannesson, 1996; Ryen and Svensson, 2015). The use of willingness to pay is increasing to value the benefits of health (care) in monetary terms (Diener *et al.*, 1998; Olsen and Smith, 2001; Yeung and Smith, 2005). Willingness to pay is the maximum amount of income an individual is willing to give up to ensure that a proposed service or good is available (Marseille *et al.*, 2015). One technique for estimating WTP is contingent valuation method which developed in the structure of cost-benefit analysis which are necessary to attribute value to goods or services that cannot be traded in a market (Borghi, 2008). It is a valid method for

estimating the value placed by people on health care interventions (Borghi, 2008). One application of CV method is for measuring altruistic activities in health sector. For example, Liu *et al.* (2000) used CV to estimate taiwanese mothers WTP to protect themselves and their children from suffering a minor illness a cold. They found that mother's altruistic WTP to protect their children from a cold is higher than their private WTP to protect themselves from a cold of equivalent duration and severity. Andersson and Lindberg (2009) indicated that altruistic willingness to pay was about one-third the private willingness to pay. The purpose of this study was to compare altruistic and private willingness to pay for health states with different severity levels.

### MATERIALS AND METHODS

In a cross-sectional study, the researchers measure the altruistic and private willingness to pay among adults that have income from the general population in Shiraz, Iran. The sample size was determined using the following equation in which  $p = 0.8$ ,  $d = 0.055$ :

$$N = \frac{Z_{1-\frac{\alpha}{2}} \cdot p(1-p)}{d^2} = 200$$

The urban population was divided into 9 areas, then 22 respondents were randomly selected of each region. Data were collected in March and April 2015 via open-ended questionnaire in a face to face interview.

**Ethical considerations:** The present study was approved by the Ethics Committee of Shiraz University of Medical Sciences. The aim of the research and interview method was explained to the respondents. In all stages of present study, data maintaining was done in order to keep participants confidentiality.

**Measurement issues:** Four methods used to measure willingness to pay in economic evaluation: open-ended, discrete choice, payment card and bidding games. Open-ended method asks the respondent the amount of money he/she is willing to pay for a specified good or service. Take-it-or-leave-it question proposes a bid for the good and asks if the respondent is willing to pay that price. Payment card technique lists a range of prices and the respondent is asked to mark the maximum amount of money he/she is willing to pay. Bidding games offer a sequence of values for the respondent who answers either yes or no to the proposed bid. The sequence of values finally, converges to the estimate about individual's willingness to pay. These different techniques have been assessed widely in the literature (O'Brien and Gafni, 1996; Klose, 1999; Mitchell and Carson, 1989; Arrow *et al.*, 1993), we selected the open-ended method for this study because the open-ended question method is a good method for finding first estimates and there is little information about willingness to pay in health care. Also, the open-ended method is easier to apply than other methods. In the open-ended questionnaire, it was possible to compare private WTP and altruistic WTP.

**Private and altruistic WTP for hypothetical health improvement:** Hypothetical health states with different severity levels was considered to estimate the willingness to pay. Six levels regarding mobility were used from a scale constructed by Nord (1993):

- Can move about without difficulty anywhere but has difficulties with walking more than a kilometer
- Can move about with difficulty at home but has difficulties in stairs and outdoors

- Moves about with difficulty at home. Needs assistance in stairs and outdoors
- Can sit. Needs assistance to move about both at home and outdoors
- To some degree bedridden. Can sit in a chair part of the day if helped up by others
- Completely bedridden

**Private WTP question:** For private WTP, the respondents were to disclose their willingness to pay to be treated from each health state and was presented in the following way: "if you are suffering from the different health states that stated in previous part. How much are you willing to pay to be treated from each health state?"

**Altruistic WTP question:** The scenario was the same as in the private WTP question but instead of disclosing their willingness to pay for their own health improvement, this question dealt with the respondent's willingness to pay for someone else's possibility to be treated from each health state. This question was presented in the following way: "assume now, that a stranger is suffering from the described different health states. How much are you willing to pay for stranger's treatment of any health status?"

**Data analysis:** Data were analyzed on STATA Version 13. To compare private WTP and altruistic WTP was applied mean of willingness to pay in every health states. In order to analyze the elicited internal preferences and caring externalities in relation to the degree of severity of the six health states, a ratio was constructed where the sum of the willingness to pay for the two mildest health states (first and second level) was divided by the sum of the willingness to pay for the two most severe health states (fifth and sixth level). A low 'mild/severe ratio' indicates a stronger evaluation of severe health states (or a weaker evaluation of mild health states).

## RESULTS AND DISCUSSION

Scio-demographic characteristics of the study population: a total of 200 people participated in this study. All of respondent have insurance and more than 60% have academics education. Furthermore, more than of 50% of participant was male (Table 1).

The mean of income for respondent was \$707 USA and monthly incomes between male and female has a major difference. Table 2 shows monthly income for participant regarding demographic variables.

Table 1: Socio demographic characteristic of participant

Variables	Frequency	Percentage
<b>Sex</b>		
Male	111	5/55
Female	89	5/44
<b>Age</b>		
35>	112	88
35≤	56	44
<b>Marital status</b>		
Single	93	107
Married	5/46	5/53
<b>Education</b>		
Non-academics	66	134
Academics	33	67
<b>Supervisor</b>		
Own	94	47
Father	57	28
Mother	10	5
Spouse	39	19
<b>Insurance</b>		
Armed force	8	4
Health service	70	35
Social security	108	54
Others	14	7

Table 2: The average monthly income of participants regarding study variables

Variables	Month mean (US\$)	p-values
<b>Sex</b>		
Male	866	508.5
Female	0.000	
<b>Age</b>		
>35	667	0.112
≤35	759	
<b>Marital status</b>		
Single	748	0.201
Married	670.5	
<b>Education</b>		
Non-academics	519.5	0.000
Academics	799.5	
<b>Supervisor</b>		
Own	825.5	0.001
Father	700	
Mother	582.5	
Spouse	468	
<b>Insurance</b>		
Armed force	457	0.01
Health service	623	
Social security	796	
Others	600.5	
Total	707.5	

Figure 1 shows that the mean value of private WTP is higher than the mean value of the altruistic WTP in all health status and differences in the WTP is higher in the severe status.

The ‘mild/severe ratio’ was smaller for the private WTP 0.5 than altruistic WTP 0.75 (p<0.000), indicating a higher evaluation related to level of severity for private WTP (Table 3).

The calculation of “mild/severe ratio” in Fig. 2 showed that when severity of illness increased the relative increase in private WTP was higher than altruistic WTP.

Table 3: Ratio of caring externalities and internal preference according to Socio-demographic variables (mild/severe ratio)

Variables	Altruistic WTP (mild/serve ratio)	Private WTP (mild/serve ratio)	p-values
All	0.75	0.50	0.000
<b>Sex</b>			
Male	0.76	0.49	0.000
Female	0.74	0.52	0.000
<b>Age</b>			
>35	0.74	0.48	0.000
≤35	0.77	0.51	0.000
<b>Marital status</b>			
Single	0.74	0.48	0.000
Married	0.76	0.52	0.000
<b>Education</b>			
Non-academics	0.75	0.49	0.000
Academics	0.75	0.51	0.000
<b>Income</b>			
Low	0.69	0.46	0.000
High	0.82	0.55	0.000
<b>Insurance</b>			
Armed force	0.7	0.34	0.005
Health service	0.73	0.52	0.000
Social security	0.77	0.51	0.000
Others	0.76	0.47	0.002

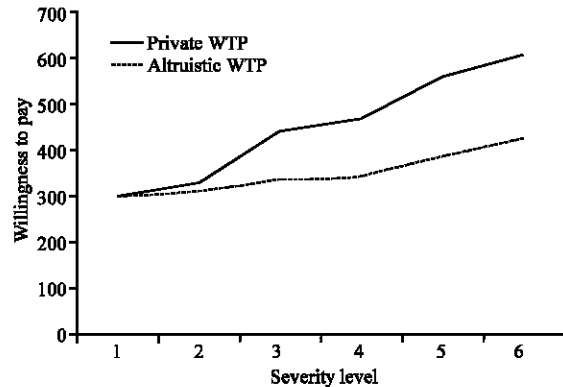


Fig. 1: The mean of private and altruistic WTP

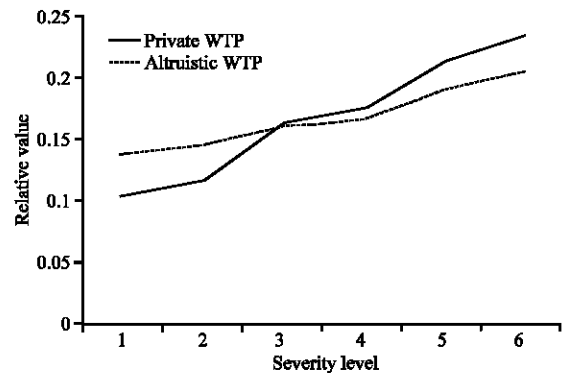


Fig. 2: Private and altruistic WTP, relative value

This study aimed to compare altruistic and private willingness to pay for health states with different severity levels. Evidence of altruistic willingness to pay was

provided by results. In current study, a large proportion of participants 88.8% were willing to pay for caring externalities (altruistic WTP). Existence of altruistic willingness to pay have shown in many studies that were the same by present study results. Jacobsson *et al.* (2005) in Sweden found evidences for altruistic preference by willingness to pay technique in 2005. Jacobsson *et al.* (2005) concluded that 75.3% of respondents were willing to pay altruistic activities in Iran. Culyer *et al.* (2001) demonstrated that people are influenced by others health status directly or indirectly, so, they feel a sense of responsibility for other's health improvement.

The findings of this study also show that the mean value of private WTP is higher than the mean value of the altruistic WTP in all health status. But in worse health status, the mean value difference became greater that means respondents willing to pay private. Hurley and Mentzakis (2011) in a study showed that in emergency health state, private WTP was more significant than altruistic WTP. Jacobsson *et al.* (2005) also found the mean value of the altruistic WTP was lower than the mean value of the private WTP in all health states. They estimated that external benefits was 15-20% of own-benefits for severe health conditions (Culyer, 2001). Andersson and Lindberg (2009) resulted that willingness to pay for a traffic safety device that would protect the general public was about one-third of the willingness to pay for a device that protected only each one. Smith (2007) similarly found average willingness to contribute for the treatment of another person equal to about one-half of the willingness to pay for one's own treatment (Smith, 2007). However, the mentioned studies were similar to present study, there are some essays which have different results.

Liu *et al.* (2000) showed that mother's WTP for their children's health is approximately twice as large as their WTP for themselves. Other studies also showed that parent's willingness-to-pay for policies to reduce health risks or provide treatment to their children actually exceeds their willingness-to-pay for such gains to themselves (Keszyus *et al.*, 2014; Dickie and Gerking, 2007; Dickie and Messman, 2004). The difference in the results could be due to differences in research group.

The calculation of "mild/severe ratio" showed that increasing in severity of illness, the relative increase in private WTP was higher than altruistic WTP. But Jacobsson *et al.* (2005) showed different results. The difference could be due to differences in economic, social and cultural structures.

## CONCLUSION

The finding indicates that the mean of WTP increases at sever health status, therefore, health policy maker should allocate resources toward severe health status.

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