Willingness to pay for a quality-adjusted life year among advanced non-small cell lung cancer patients in Viet Nam, 2018

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Abstract

To examine the willingness to pay (WTP) for a quality-adjusted life year (QALY) gained among advanced non-small cell lung cancer (NSCLC) patients in Viet Nam and to analyze the factors affecting an individual's WTP.

A cross-sectional, contingent valuation study was conducted among 400 NSCLC patients across 6 national hospitals in Viet Nam. Self-reported information was recorded from patients regarding their socio-demographic status, EQ-5D (EuroQol-5 dimensions) utility, EQ-5D vas, and WTP for 1 QALY gained. To explore the factors related to the WTP, Gamma Generalized Linear Model and multiple logistic regression tools were applied to analyze data.

The overall mean and median of WTP/QALY among the NSCLC patients were USD $11,301 and USD $8002, respectively. Strong association was recorded between WTP/QALY amount and the patient's education, economic status, comorbidity status, and health utility.

Government and policymakers should consider providing financial supports to disadvantaged groups to improve their access to life saving cancer treatment.

Abbreviations: EQ-5D = EuroQol-5 dimensions, GDP = gross domestic product, NSCLC = non-small cell lung cancer, QALY = quality-adjusted life year, WTP = willingness to pay.

Keywords: 2018, non-small cell lung cancer, QALY, Viet Nam, willingness to pay

1. Introduction

Lung cancer is the leading cause of cancer mortality worldwide, accounting for nearly 10 million deaths in 2018.[1] Non-small cell lung cancer (NSCLC) is the most common type of lung cancer, including squamous cell carcinoma, adenocarcinoma, and large cell carcinoma, making up approximately 80% to 85% of lung cancer cases worldwide.[2] NSCLC has a significant financial burden to society that increases with disease progression.[3]

In Viet Nam, lung cancer was reported to be the second leading cause of cancer mortality for both males and females since

2012.[4] More than 80% of the lung cancer cases in Viet Nam were NSCLC, with majority of case (about 89%) Viet Nam being detected at advanced stages (IIIB or IV). A study conducted in 2014 reported that the economic burden of NSCLC in Viet Nam was more than 3517 billion VND, equivalent to $150 million. Given the significant economic burden of NSCLC in Viet Nam, cost-effective strategies for Viet Nam are needed to better manage NSCLC cases.

In Viet Nam, health technology assessments such as cost-effectiveness or cost-utility analysis has recently been applied to evaluate and recommend medicines for reimbursement as part of the health insurance scheme.[5] Cost-effectiveness or cost-utility analysis estimates the incremental cost-effectiveness ratio by comparing 2 health interventions. Interventions are considered "good value for money" if the incremental cost-effectiveness ratio falls below a certain cost-effectiveness threshold. This threshold has been normally based on the level of population's willingness to pay (WTP) for a quality-adjusted life year (QALY) gained. Estimating the WTP for a QALY gained threshold among NSCLC patients would provide important information for implementation of health technology assessment to prioritize health interventions against NSCLC in Viet Nam. This study will be the first to examine the WTP for a QALY gained among advanced NSCLC patients in Viet Nam and the factors affecting WTP.

2. Methods

2.1. Study design

A cross-sectional study was conducted using contingent valuation method, a survey-based economic practice, which asks

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Table 1

The starting bids in the iterative bidding technique.

No. (1)	Compared to average GDP (2)	First bid (in VND) (3) = (2) × GDP	First bid (in USD) (4) = (3)/23,200*
1	.1	5,000,000	216
2	.2	10,000,000	432
3	.5	25,000,000	1078
4	.7	40,000,000	1724
5	1	50,000,000	2155

*We use the currency exchange at the time of analysis: 1 USD = 23,200 VND.

individuals how much they are willing to pay for a particular goods or service.[6–8]

2.2. Study subjects, sample size, and sampling

Patients with advanced stages of NSCLC (IIIB or IV stage) aged between 18 and 70 years were selected for this study. The sample size was estimated using the WHO formula for estimating 1 population proportion:

$$n = Z^2_{(1-\alpha/2)} \frac{P*(1-P)}{d^2}$$

The value n defines the minimum sample size required, P is the anticipated proportion of NSCLC patients who were willing to pay for a QALY gained equal or above 1 GDP (gross domestic product) = 50% (proportion estimated for the largest sample), d is an absolute precision (.05) and $Z_{1-\alpha/2} = 1.96$ ($\alpha = 5\%$). The minimum sample size was calculated to be 384. To account for non-response rate, a sample of 400 NSCLC patients were recruited for this study.

The study was conducted in the oncology departments of 6 referral hospitals in Viet Nam, which had the appropriate medical equipment for the treatment of cancer. These sites included: Bach Mai Hospital, Hanoi Oncology Hospital, Viet Nam National Cancer Hospital (in the North), Da Nang Hospital (in the Center), Cho Ray Hospital, and Ho Chi Minh City Medicine and Pharmacy University Hospital (in the South). From September to December 2018, 400 NSCLC patients, who could communicate well, were conveniently selected from these study hospitals. NSCLC patients who were unaware of their own health problem were excluded from the study. All 400 questionnaires were accepted because of no missing data and logical error.

2.3. Data collection and study questionnaire

Physicians from the studied hospitals were briefed on the study objectives before referring the selected patients to the interviewers. The NSCLC patients were then interviewed by trained interviewers after their routine consultation.

Patients were asked about their health states (or utility) using the EuroQol-5 dimension-5 levels instrument (EQ-5D-5L) (the Vietnamese version).[9] The health utilities ranged from 1 = "perfect health" to 0 = "death". Negative values represented health states the person considers worse than death.

To measure the patient's willingness to pay, an iterative bidding technique was applied, consisting of a sequence of dichotomous choice questions (i.e., yes or no) followed by a final open-ended question. Data collectors presented individual patients with the following question "Assuming a novel treatment method would be available now, that could free you from lung cancer and allow you to recover perfectly without any side effects, but the treatment is not covered by health insurance and you would have to pay for the treatment costs, would you be willing to pay an amount of [starting bid] per year for this kind of treatment?"

Patients were randomly assigned bids of USD $216, $432, $1078, $1724, $2155, equating to VND 5,000,000; 10,000,000; 25,000,000; 40,000,000; 50,000,000, respectively (Table 1). These figures were benchmarked at .1; .2; .5; .7; 1 GDP per capita in Viet Nam for 2017, respectively.[10] If the patient was willing to pay for the treatment at the rate of the first bid offered, then a follow-up question with a higher bid would be asked. If the respondent was unwilling to pay for the first suggested amount, then the second threshold would be reduced to a lower level. Following the double-bounded dichotomous question, all patients were presented with an open-ended question "What is the maximum price you would be willing to pay per year for the treatment?". An example of the bidding technique is represented in Figure 1.
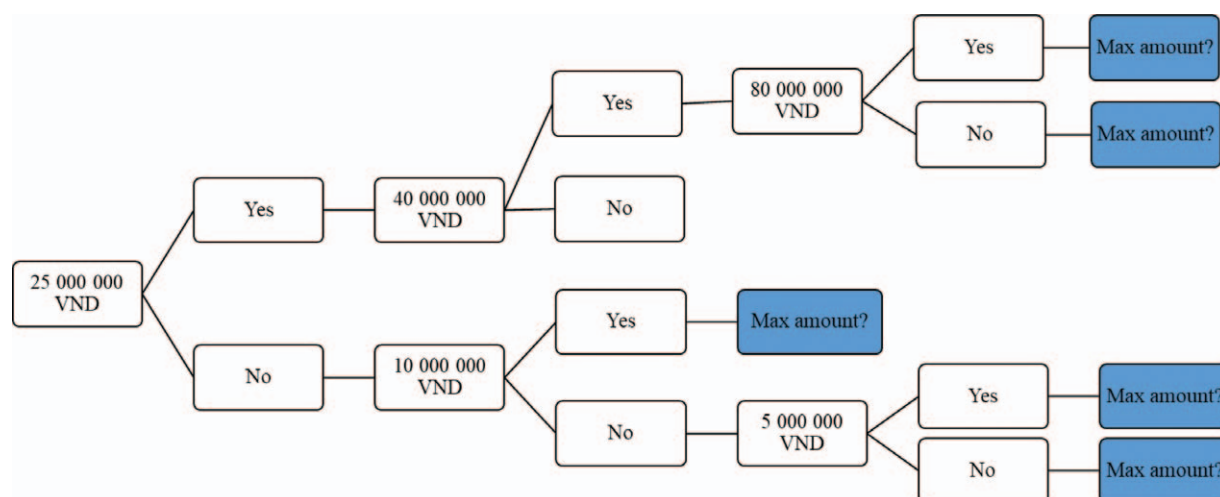
Figure 1. Example of iterative bidding technique with an initial bid of 25,000,000 VND.

In addition, self-reported patient's characteristics were recorded, including: sex, age, education, occupation, economic status, and health behavior such as smoking and alcohol use.

2.4. Data management and analysis

All study data were entered into EpiData 3.1 management software, and statistical analysis was then carried out using Stata 14. Health utility of the NSCLC patients was derived from the Viet Nam EQ-5D score set. The WTP/QALY ratio for each participant was computed using the following formula:

$$WTP/QALY = \frac{WTP}{1 - \text{curent patient's health utility}}$$

Descriptive analyses were applied to determine the background characteristics of the study participants. The generalized linear model with link (log) and gamma distribution was applied to identify individual's socio-economic traits that would influence the amount of WTP (as the data on WTP max amount were right skewed). A logistic regression model was performed, with a significance level of .05, to estimate the probability of willingness to pay for a QALY gained at the bid of equal or greater than 1 per capita GDP of Viet Nam in 2017.

2.5. Ethical considerations

Ethical approval was obtained from the Institutional Review Board of the Hanoi University of Public Health. Informed consent forms were obtained from all subjects before participating in the study.

3. Results

3.1. General characteristics of the study respondents

The general characteristics of the study respondents are summarized in Table 2. The study sample consisted of more men (56.3%) than women (43.8%), majority (62.3%) of the participants were over 50 years old. Most respondents (90.5%) completed secondary school or higher, with 9.5% having had an education level lower than primary school. The proportion of people who worked in formal and informal economic sectors were quite similar (49.3% and 48.8%, respectively). There were slightly more patients from rural areas (53.5%) as compared to those from urban locations (46.5%). Almost all of respondents identified themselves as the Kinh (majority group). Most of them were married (90.8%) and had no religion (87.5%). Approximately 8.3% of the patients self-identified as poor (classified by the local government). All study respondents had health insurance.

The prevalence of smoking and alcohol drinking among the study respondents were 51.7% and 48.5%, respectively. The percentage of patients with disease stage IIIB and IV were 25.8% and 74.2%, respectively. About one-third of participants had other comorbidities. The mean and median of EQ-5D health utility were .66 and .73, respectively.

3.2. Willingness to pay for a QALY gained (WTP/QALY)

The overall mean and median of WTP/QALY among NSCLC patients were USD $11,301 and USD $8002, respectively (standard deviation of USD $11,175; with a range of USD $0

Table 2

Characteristics of respondents.

Factor	Level	Value
N		400
Gender	Male	225 (56.3%)
	Female	175 (43.8%)
Age group	18–29 yr	23 (5.8%)
	30–39 yr	56 (14.0%)
	40–49 yr	72 (18.0%)
	50–59 yr	103 (25.8%)
	60+	146 (36.5%)
Education	Primary and lower	38 (9.5%)
	Secondary/High school	129 (32.3%)
	Bachelor or higher	233 (58.3%)
Occupation	Formal employee	197 (49.3%)
	Informal employee	195 (48.8%)
	Unemployed	8 (2.0%)
Living area	Urban	186 (46.5%)
	Rural	214 (53.5%)
Ethnicity	Kinh	394 (98.5%)
	Minority	6 (1.5%)
Religion	Yes	50 (12.5%)
	No	350 (87.5%)
Marital status	Single	22 (5.5%)
	Married	363 (90.8%)
	Divorced/widowed	15 (3.8%)
Economic status	Poor	33 (8.3%)
	Non-poor	367 (91.8%)
Health insurance	Yes	400 (100.0%)
Smoking	Yes	207 (51.7%)
	No	193 (48.3%)
Alcohol use	Yes	194 (48.5%)
	No	206 (51.5%)
Comorbidity	Yes	137 (34.3%)
	No	263 (65.8%)
Disease stage	Stage IIIB	103 (25.8%)
	Stage IV	297 (74.3%)
Utility value, mean (SD)		.66 (.26)
Utility value, median (IQR)		.73 (.60, .80)

to USD $48,013). The WTP/QALY amount was identified to be higher among men, older patients, those with higher education, those who worked as formal employees, urban dwellers, Kinh people, non-poor people, non-smoking patients, non-drinking patients, patients without comorbidity, those with disease state IIIB and those with higher health utility (Table 3).

The proportion of patients who were willing to pay for a QALY gained at the rate of equal or more than 1 GDP per capita of Viet Nam (USD $2342) was 79.0% (95% CI: 74.7–82.9%). This was higher among men, older patients, those with higher education, those working as formal employees, urban dwellers, Kinh people, non-poor people, non-smoking patients, non-drinking patients, patients without comorbidity, those at disease state IIIB and those with higher health utility (Table 4).

3.3. Regression analyses of correlates of the WTP/QALY

Gamma Generalized Linear Model (Table 5) shows that the WTP/QALY amount was significantly associated with respondent's

1) education – people with higher education were willing to pay a higher amount;

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Table 3

Willingness to pay for a quality-adjusted life year gained by patients' characteristics.

Factor	Level	Mean	Median	SD	Min	Max
N		11,301	8002	11,175	0	48,013
Gender	Male	11,759	8002	11,482	0	47,286
	Female	10,712	7854	10,771	0	48,013
Age group	18–29 yr	12,877	12,220	11,823	220	40,772
	30–39 yr	10,340	7470	10,533	279	41,914
	40–49 yr	10,716	6164	12,625	21	48,013
	50–59 yr	10,268	7881	9908	0	41,694
	60+	12,439	8002	11,413	0	48,013
Education	Primary and lower	7370	3200	9637	0	37,645
	Secondary/High school	11,005	8002	10,871	0	41,694
	Bachelor or higher	12,106	8002	11,469	0	48,013
Occupation	Formal employee	12,848	8002	11,188	21	48,013
	Informal employee	9962	6473	11,060	0	47,286
	Unemployed	5857	2408	8481	246	23,645
Living area	Urban	12,469	8002	11,775	0	48,013
	Rural	10,286	7638	10,549	0	41,914
Ethnicity	Kinh	11,339	8002	11,148	0	48,013
	Minority	8804	4315	13,743	246	36,181
Economic status	Poor	4984	2589	5554	0	20,255
	Non-poor	11,869	8002	11,381	0	48,013
Health insurance	Yes	11,301	8002	11,175	0	48,013
Smoking	Yes	10,961	8002	10,899	0	41,914
	No	11,666	8002	11,481	21	48,013
Alcohol use	Yes	10,949	7796	10,638	0	41,914
	No	11,633	8002	11,674	21	48,013
Comorbidity	Yes	9400	7881	9402	0	48,013
	No	12,291	8002	11,892	0	48,013
Disease stage	Stage IIIB	12,414	8002	12,427	0	48,013
	Stage IV	10,915	7809	10,702	0	47,286
Utility value	First quintile	4822	2755	5698	0	24,404
	Second quintile	9617	6360	9956	0	38,837
	Third quintile	13,839	8002	12,537	79	48,013
	Fourth quintile	14,164	10,127	11,606	0	41,914
	Top quintile	14,490	8043	11,763	0	40,772

Table 4

Patients having willingness to pay equal or above 1 gross domestic product by patients' chacracteristics.

Factor	Level	n	Proportion (%)	95% CI
N		400	79.0	74.7; 82.9
Gender	Male	225	80.9	75.1; 85.8
	Female	175	76.6	69.6; 82.6
Age group	18–29 yr	23	73.9	51.6; 89.8
	30–39 yr	56	73.2	59.7; 84.2
	40–49 yr	72	76.4	64.9; 85.6
	50–59 yr	103	77.7	68.4; 85.3
	60+	146	84.2	77.3; 89.7
Education	Primary and lower	38	68.4	51.3; 82.5
	Secondary/High school	129	75.2	66.8; 82.4
	Bachelor or higher	233	82.8	77.4; 87.4
Occupation	Formal employee	197	85.8	80.1; 90.3
	Informal employee	195	73.3	66.5; 79.4
	Unemployed	8	5.00	15.7; 84.3
Living area	Urban	186	79.6	73.1; 85.1
	Rural	214	78.5	72.4; 83.8
Ethnicity	Kinh	394	79.4	75.1; 83.3
	Minority	6	5.00	11.8; 88.2
Economic status	Poor	34	52.9	35.1; 70.2
	Non-poor	366	81.4	77.1; 85.3
Smoking	Yes	207	76.8	70.5; 82.4
	No	193	81.3	75.1; 86.6
Alcohol use	Yes	194	78.9	72.4; 84.4
	No	206	79.1	72.9; 84.5
Comorbidity	Yes	137	76.6	68.7; 83.4
	No	263	80.2	74.9; 84.9
Disease stage	Stage IIIB	103	79.6	70.5; 86.9
	Stage IV	297	78.8	73.7; 83.3
Utility value	First quintile	85	55.3	44.1; 66.1
	Second quintile	75	84.0	73.7; 91.4
	Third quintile	87	83.9	74.5; 90.9
	Fourth quintile	97	84.5	75.8; 91.1
	Top quintile	56	91.1	80.4; 97.0

2) economic status – the non-poor people were willing to pay higher amount;

3) comorbidity status – people without the comorbidity were willing to pay higher amount; and

4) health utility – people with higher health utility were willing to pay higher amount.

Table 6 report identifies the multiple logistic regression analysis of correlates of willing to pay for a QALY gained at the rate of equal or more than 1 GDP per capita of Viet Nam. There was a strong correlation between willingness to pay for a QALY gained at the rate of equal or more than 1 GDP per capita of Viet Nam and economic status (the non-poor were willing to pay higher amount) and health utility (people with higher health utility were more likely willing to pay).

4. Discussion

To our knowledge, this is the first study in Viet Nam to analyze WTP for a QALY gained among advanced NSCLC patients. The evidence generated from this study may be useful for policymakers in prioritizing health interventions against NSCLC in Viet Nam.

Our study found that the overall mean WTP/QALY amount among NSCLC patients was USD $11,301. This is equal to about 4.4 GDP per capita of Viet Nam in 2017. This is much higher than the level of WTP/QALY among the general population in rural Viet Nam in 2012, which showed that the mean of WTP/QALY ranges from USD $667 to USD $993 (.38–.56 GDP per capita of Viet Nam in 2012).[11] The WTP/QALY amount lies in

Table 5

Gamma Generalized Linear Model for willingness to pay for a quality-adjusted life year gained.

Factor	Level	Exp(b)	95% CI (lower; upper)	P-value
Gender	Male (ref)			
	Female	1.006	.812; 1.247	.956
Age group	18–29 yr (ref)			
	30–39 yr	.935	.582; 1.502	.782
	40–49 yr	.857	.542; 1.352	.506
	50–59 yr	.993	.637; 1.549	.977
	60+	1.134	.738; 1.745	.566
Education	Primary and lower (ref)			
	Secondary/High school	1.490	1.044; 2.128	**.028**
	Bachelor or higher	1.628	1.122; 2.364	**.010**
Occupation	Unemployed (ref)			
	Formal employee	2.022	.991; 4.125	.986
	Informal employee	2.026	.989; 4.152	.053
Living area	Urban (ref)			
	Rural	.868	.704; 1.071	.188
Ethnicity	Kinh (ref)			
	Minority	.899	.407; 1.989	.794
Economic status	Poor (ref)			
	Non-poor	1.888	1.316; 2.71	**.001**
Smoking	Yes (ref)			
	No	.997	.717; 1.386	.985
Alcohol use	Yes (ref)			
	No	.982	.703; 1.372	.917
Comorbidity	Yes (ref)			
	No	1.302	1.069; 1.586	**.009**
Disease stage	Stage IIIB (ref)			
	Stage IV	.965	.777; 1.198	.744
Utility value		6.111	4.317; 8.652	**<.001**

Statistical significance at P < .05 (p < 0.01 is indicated in the table).

Table 6

Multiple logistic regression for willingness to pay for a quality-adjusted life year gained at the rate of equal or more than 1 gross domestic product.

Factor	Level	Odds ratio	95% CI (lower; upper)	P-value
Gender	Male (ref)			
	Female	.888	.497; 1.589	.690
Age group	18–29 yr (ref)			
	30–39 yr	1.121	.324; 3.881	.857
	40–49 yr	1.332	.397; 4.463	.643
	50–59 yr	2.244	.691; 7.283	.179
	60+	3.041	.943; 9.813	.063
Education	Primary and lower (ref)			
	Secondary/High school	.873	.344; 2.215	.776
	Bachelor or higher	1.876	.715; 4.926	.201
Occupation	Unemployed (ref)			
	Formal employee	.675	.355; 1.282	.230
	Informal employee	.267	.458; 1.553	.141
Living area	Urban (ref)			
	Rural	1.411	.771; 2.585	.264
Ethnicity	Kinh (ref)			
	Minority	.186	.025; 1.361	.098
Economic status	Poor (ref)			
	Non-poor	2.882	1.208; 6.871	**.017**
Smoking	Yes (ref)			
	No	2.141	.874; 5.247	.096
Alcohol use	Yes (ref)			
	No	.549	.223; 1.353	.192
Comorbidity	Yes (ref)			
	No	1.173	.659; 2.089	.587
Disease stage	Stage IIIB (ref)			
	Stage IV	1.320	.697; 2.498	.394
Utility value	First quintile (ref)			
	Second quintile	5.382	2.357; 12.290	**<.001**
	Third quintile	3.859	1.747; 8.523	**.001**
	Fourth quintile	5.523	2.505; 12.178	**<.001**
	Top quintile	8.776	2.984; 25.810	**<.001**

Statistical significance at P < .05 (p < 0.01 is indicated in the table).

the range of the treatment costs for lung cancers in Viet Nam in 2014 (VND 172,333,617–339,542,672 or USD $7833–15,434 for lung cancer stage III, and VND 160,690,121–266,197,825 or USD $7304–12,100 for lung cancer stage IV).[3]

The threshold of WTP/QALY among NSCLC patients in Viet Nam was higher than the thresholds reported from other Asian countries, with USD $8799 among patients with Epilepsy in China in 2010,[12] USD $9000 among adults from the general population in Malaysia in 2014,[13] and USD $5123 among patients with lung cancer in Thailand in 2015.[14]

The WTP/QALY amount found in this study was lower than the range of cost-effectiveness threshold of USD $25,971 to USD $38,964 (£20,000–30,000) used by National Institute for Health and Care Excellence (NICE) in 2008,[15] and the most commonly cited threshold of USD $22,416 (€20,000) in the Netherlands.[16] Higher results were derived from the existing values of preventing a statistical fatality in the UK context, with estimates ranging between USD $30,125 (£23,199) and USD $51,981 (£40,029) per QALY.[17] In 2003, Gyrd-Hansen,[18] using a discrete choice experiments approach and time-trade-off utilities, estimated a WTP per QALY of USD $13,448 (€12,000) in the general Danish population for relatively small-sized health gains. Shiroiwa et al[19] study of WTP for an additional year of survival in full health found that the mean WTP per QALY ranged from USD $29,884 (£23,000) in the UK, USD $41,030 (€36,600) in Australia and USD $49,315 (€44,000) in the US.

Our findings suggest the significant association between WTP/QALY and the patient's education, economic status, comorbidity status. These findings are similar to the WTP/QALY among the general population in rural Viet Nam.[11] A study from Thailand also showed that better-off people and those with a higher quality of life were significantly more likely to be interested in new treatment and be willing to participate in the treatment.[14] The lower WTP was identified among worse-off patients who have a lower likelihood of accessing new treatment therapies. Thus, the Government of Viet Nam should provide further financial support to the disadvantaged groups in order to improve their access to life-saving treatments.

In this study, we found the health utility value is an independent factor of the WTP/QALY. A study conducted among metastatic breast cancer patients in Korea in 2009 also found the willingness-to-pay for cancer treatment was associated with higher quality of life score.[20] However, this is different from the reports by some previous studies conducted among the general population in the UK in 1998,[21] in Japan in 2011,[22] and in Iran in 2015,[23] which demonstrated that people with more severe health problems had higher value of WTP/QALY. The difference in the preference of the general population and that of the cancer patients could be an explanation for the difference in their willingness to pay. A study on the WTP/QALY among the general population in Vietnam should be conducted in the near future.

4.1. Methodological considerations

Some methodological constraint associated with the use of the contingent value method in this study was the potential bias introduced from the way the questions were framed, the contingent valuation scenarios, the elicitation method used, and the survey method that was conducted. To overcome these challenges, we conducted several field visits in order to develop appropriate contingent valuation scenarios and questions. We

also implemented a number of cognitive interviews to make sure that the contingent valuation scenarios and questions were easy to understand among the local people. Appropriate training of enumerators and further field-testing also helped to ensure the validity and reliability of the study findings.

A disadvantage of the bidding model is the threat of starting-point bias, where the respondent's final WTP value is dependent on the first bid prompted by the interviewer.[24,25] The starting-point bias is known as "an anchoring effect"[26] which occurs when the first bid influences the WTP amount as the respondent may consider it as a "normal" value. We set up the starting point based on the experience of our pilot study.

The biggest limitation of this study is the convenience sampling. This is highly vulnerable to selection bias and high level of sampling error. Another limitation is information bias, which occurs when the WTP depends on who does the interview, what information is provided about the new treatment, and what other information the respondents have about the therapy. We selected interviewers with research experiences, and provided them with appropriate training to ensure they provide clear information about the treatment scenarios to minimize risk of bias.

The final limitation identified is strategic bias, which occurs when a respondent purposely states a higher WTP than the true level. We consider the risk of a strategic bias where respondents would overstate their true WTP as it is based on future predictions of treatment. A strategic bias where respondents would underestimate their true WTP would to the extent that it exists mean an underestimation of the elicited WTP in this study. Since the elicited WTP is high relative to the cost of provision, the risk of this bias does not present a substantial problem for this study.

5. Conclusions

In Viet Nam, lung cancer has a serious health and economic impact on patients, their families and the society. Estimating the WTP for a QALY gained threshold among NSCLC patients provides important information for the implementation of health technology assessment to prioritize health interventions in treating NSCLC in Viet Nam. Our study shows that many patients were willing to pay for the treatment that helps to improve their health. The amount of WTP/QALY ranged between the treatment cost, with WTP/QALY associated with socio-economic status and health status of the patient. Government and health policymakers should consider their ability to fund therapy for disadvantaged groups to ensure timely access to care.

Author contributions

HVT, HVM, VQM, VNA, VVC, and DHL contributed to the study design, coordinating data collection in Viet Nam, developing research questions and conducting the statistical

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analysis of data, drafting and revising the manuscript; HTNA, KQL, PCP contributed to the data collection, conducting the statistical analysis of data, and drafting the manuscript; HTNA and KQL contributed to data analysis and drafting the manuscript. All authors read and approved the final submitted manuscript.

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