Willingness to pay per quality-adjusted life year of Non-Hodgkin Lymphoma patients in Vietnam

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ABSTRACT

Objectives: To estimate Willingness to pay per quality-adjusted life year (WTP/QALY) of patients with Non-Hodgkin Lymphoma (NHL) and analyze related factors to WTP/QALY of NHL patients. Patients and methods: Cross-sectional study has been conducted based on surveying NHL patients, satisfying inclusion and exclusion criteria in 5 specialized hospitals of Vietnam from March to August 2018. The structured questionnaire on socio-demographic and clinical characteristics, EQ-5D-5L and WTP were built to directly interview patients. Regression and correlation analysis have been conducted to estimate the related factors to WTP/QALY. The data were analyzed with relevant statistical tests and simple linear regression using SPSS 20.0 statistical software provided by International Business Machines (IBM) - New York, United State of America. A p-value <0.05 was considered statistically significant. Results: Sample included 516 NHL patients with the ratio of men: women of 1.37:1, the average age of 53.57 ± 14.37 years old, the average time of NHL onset of 1.32 ± 0.63 years. The median value of WTP/QALY was accounted for 45,604,698.96 (0.00 – 187,311,321.74) VND/QALY. With the confidence interval of 95%, the statistically significant differences in LogWTP/QALY have been found between men and women (0.179; 95% CI: 0.023 – 0.335; p = 0.025); fulltime- working patients and non-working patients (0.270; 95% CI: 0.275 – 0.512; p = 0.022), intellectual workers and unemployed/ housewife/ disability patients (0.555; 95% CI: 0.095 – 1.014; p = 0.009); lost-income and unlost-income status (0.267; 95% CI: 0.090 – 0.445; p = 0.003), family income (r = 0.272, p = 0.000) and patient income (r = 0.288, p = 0.000), HR-QoL (r = 0.436; p = 0.000). Linear regression analysis with 95% reliability showed R^2 = 0.291; p = 0.000 with two related factors to LogWTP/QALY including HR-QoL coefficient (β = 1.339; p = 0.000) and family income (β = 8.50 x 10^{-9}; p = 0.014). Conclusion: The median value of WTP/QALY was accounted for 45,604,698.96 (0.00 – 187,311,321.74) VND/QALY. With the confidence interval of 95%, linear regression analysis showed two related factors to LogWTP/QALY including HR-QoL coefficient and family income.

Keywords: *Non-Hodgkin Lymphoma, Willingness to pay, quality-adjusted life year*

1. INTRODUCTION

Non-Hodgkin lymphoma (NHL) is one of the most common types of cancer, accounting for about 4% of all cancers and the most common types of lymphomas [1], the solid tumors of the immune system. Hodgkin's lymphoma accounts for about 10% of all lymphomas, and the remaining 90% are referred to as non-Hodgkin lymphoma [2]. Non-Hodgkin lymphoma represents a wide spectrum of illnesses that vary from the most indolent to the most aggressive malignancies. They arise from lymphocytes that are at various stages of development, and the characteristics of the specific lymphoma sub type reflect those of the cell from which they originated [3]. There were about 4,3 million NHL patients and 200.000 deaths caused by NHL all over the world [1]. Approximately 55,000 to 60,000 new cases of non-Hodgkin lymphoma are diagnosed annually in the United States, this number has nearly doubled during past 3 decades [4]. In Vietnam,

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there were nearly 2.700 NHL cases each year, accounting for 2% of new cases of cancer [5]. Based on the World Health Organization classification of hema-tological and lymphoid tumors, these diseases have been classified as B-cell and T-cell neoplasms [4]. Treatment of these diseases, including radiation therapy, chemotherapy, immunotherapy and radioimmu-notherapy, is based on the histology and extent of disease [4]. Treatment cost of NHL places a significant economic burden on patients and society. In a study in the USA, the WTP for asthma treatment ranged from $200 and $350 per month (corresponding to 54.60 - 95.55 million VND/QALY) [21]. In recent years, willingness to pay (WTP) is a term used in economics and is defined as the maximum amount a person is prepared to pay for their treatment. WTP is another method used to assess the value of health benefits in a cost–benefit analysis [6]. In the world, especially in Viet Nam, there is no comprehensive research on WTP for a QALY of NHL patients, therefore, this study was conducted to estimate willingness to pay for a QALY of NHL patients in Vietnam. To assess the health-related quality of life when analyzing WTP/QALY, there are various scales such as SF-36 (Short Form-36)

[7], Health Utilities Index (HUI) [8] and EQ-5D-5L (Euro-Quality of Life-5 Dimension-5 Level) but the EQ-5D-5L is generic tool used frequently in many countries worldwide [9].

2. METHODS
2.1. Study design
Cross-sectional study design was used. The dataset consisted of data medical records and from directly interview by questionnaires from February to September 2018 of NHL patients treated in 5 specialized hospitals in Vietnam. The study design has been approved by The Human Research Ethics Committee of University of Medicine and Pharmacy at Ho Chi Minh city.

2.2. Study participants
This study was conducted in 5 specialized hospitals in Vietnam, including National Cancer Hospital, Cho Ray Hospital, Ho Chi Minh City Oncology Hospital, Blood Transfusion Hematology Hospital and National Institute of Hematology and Blood Transfusion. All NHL patients, satisfying the inclusion and exclusion criteria (Table 1) were invited to participate in the study during their treatment at researched hospitals from February to September 2018.

Table 1. The inclusion and exclusion criteria

Inclusion criterias	Exclusion criterias
- Non-Hodgkin Lymphoma patients were treated at those specialized hospital in Viet Nam. - Patients agree to participate in the research. - Patients have ability to read, write and answer all questions in the survey questionnaire.	- Patients are not able to communicate in Vietnamese. - Patients do not complete the survey questionnaire. - Patients stop treatment because of changing hospital and morality. - Medical records don't have enough information. - Patients do not use Health Insurance for treatment.

2.3. Data collection
We carried out directly interviews with selected NHL patients by 3-part questionnaire, including socio-demographic information and disease-related characteristics of patients, EQ-5D-5L scale, and WTP for a QALY question. Each interview took approximately 20 minutes. Before real interview with patients, interviewers experienced training sessions with role-play part to ensure the essential skills for interview. Besides that, the study collected some pathological information from medical records of interviewed patients. Socio-

demographic information included age, gender, educational level, place of residence, occupation, average monthly income of patients and family. Disease-related characteristics included BMI coefficient, length of treatment cycle, time of illness onset, disease episode, treatment regimens, type of health insurance.

2.4. Measures and instruments
2.4.1. EuroQoL-5 dimension-5 levels (EQ-5D-5L)
The Vietnamese version of EQ-5D-5L, provided and allowed to use by the developers was used in this

study. The EQ-5D-5L consisted of 5 questions about 5 dimensions of health (mobility, self-care, usual activities, pain/discomfort, anxiety/depression). Each question had 5 options that correspond to levels ranging from "not difficult" to "impossible" [24]. There were 3125 possible health states based on the combination of 5 dimensions and 5 levels of response. Each health state could be transformed into utility score by using the interim scoring for EQ-5D-5L. Due to the unavailability of Vietnamese value set and based on the geographical proximity and socio- economic similarity recommended by Agota Szende and colleagues in Thailand [25], Thailand value set has been used with score ranging from -0,451 to 1. EQ-5D-5L also included visual analogue scale called EQ-VAS for patient to self-rate their health from a 0– 100 unit 'thermometer-type' scale with 100 representing "the best health you can imagine" and 0 — "the worst health you can imagine" [26]. Then, interviewer confirmed once again about patient's current health point by repeating the question and recording it in numbers to ensure accuracy.

2.4.2. Questionnaire for WTP

We used a single question to directly ask NHL patients to determine WTP, 'Imagine you continue to live with your current health. If the doctor appoints a new treatment, which helps you to achieve the best health right away and maintain it within 1 year. However, you are not covered by health insurance, you must pay all full cost. What is the highest amount you are willing to pay for the new treatment within 1 year?'. To determine the real figure WTP/QALY, the bidding technique has been used, in which the interviewer asked the acceptance of patients when he continuously

increased the first value that patient offered until the patient did not accept. The largest figure that patients accepted to live one healthy year was considered as WTP.

2.4.3. Data and statistical analysis

The socio-demographic information, disease-related characteristics and HR-QoL coefficient of patients were analyzed using descriptive statistics and expressed as percentages or mean (stan- dard deviation) where appropriate.

The WTP for a QALY was estimated using the following expression:

$$WTP/QALY = \frac{WTP/year}{1 - HRQoL}$$

To estimate WTP/QALY, the study removed cases with HR-QoL = 1.000 (state 11111 in EQ-5D-5L) [27]. WTP/QALY value were expressed as median (IQR).

Before checking correlation, the study checked the normal distribution of WTP/QALY value. Because WTP/QALY distributed abnormally, the study converted to LogWTP/QALY. After elim- inating outliers and checking the normal distribution of LogWTP/QALY, the study conducted cor- relation tests with related factors by using T-test, One-way Anova, Pearson. Then, we built linear regression to identify integrated relationship between independent variables and LogWTP/QALY. All analyses were carried out with SPSS version 20.0, provided by IBM — New York, United State of America.

3. RESULTS AND DISCUSSIONS
3.1. Characteristics of study sample

Results of socio-demographic information and disease-related characteristics of 516 NHL patients according were presented in Table 2.

Table 2. Demographic and pathological characteristics of Non-HodgkinLymphoma patients

Characteristic	Group	Frequency (%)/ Mean (SD)	Cumulative percent/ Minimum - Maximum
Gender	Male	298 (57.8)	57.8
	Female	218 (42.2)	100.0
Academic level	Primary school/ Secondary school	255 (49.4)	49.4
	High school	156 (30.2)	79.7
	University/Colleges/ Post-graduate	105 (20.3)	100.0
	Urban of Ho Chi Minh/ Hanoi City	68 (13.2)	13.2

Characteristic	Group	Frequency (%)/ Mean (SD)	Cumulative percent/ Minimum - Maximum
Hometown	Suburban of Ho Chi Minh/ Hanoi City	42 (8.1)	21.3
	Other provinces	406 (78.7)	100.0
Occupation	Manual labor (Worker/Famer)	221 (42.8)	42.8
	Intellectual labor	40 (7.8)	50.6
	Retired	99 (19.2)	69.8
	Housewife/Unemployed/ Disability	100 (19.4)	89.1
	Other	56 (10.9)	100.0
Job Status	Full time	222 (43.0)	43.0
	Unemployed	155 (30.0)	73.0
	Retired	106 (20.5)	93.6
	Other	33 (6.4)	100.0
Lost-income status	Yes	146 (28.3)	28.3
	No	370 (71.7)	100.0
Marital status	Single	51 (9.9)	9.9
	Married	452 (87.6)	97.5
	Others	13 (2.5)	100.0
Type of health insurance	State health insurance	475 (92.1)	92.1
	Private health insurance	41 (7.9)	100.0
Level of health insurance coverage	80%	271 (52.5)	52.5
	95%	52 (10.1)	62.6
	100%	193 (37.4)	100.0
Treatment regimen	Chemotherapy	124 (24.0)	24.0
	Chemotherapy + Rituximab	368 (71.3)	95.3
	No information	24 (4.7)	100.0
Disease episode	I	53 (10.3)	10.3
	II	141 (27.3)	37.6
	III	119 (23.1)	60.7
	IV	131 (25.4)	86.0
	No information	72 (14.0)	100.0
Age		53.57 (14.37)	17-86
Average monthly income (VND)		5,487,007.91 (297,286.74)	100,000-50,000,000
Number of working days		25.44 (5.10)	6.00-30.00
Family income (VND)		11,173,872.88 (532,976.55)	200,000-100,000,000
Time of illness onset (year)		1.32 (0.63)	1-3

The study included 516 patients from 5 specialized hospitals, with a male-to-female sex ratio of 1.37:1 and an average age of 53.57 ± 14.37 years. Regarding education level, 49.4% of patients had completed primary or secondary school, 30.2% had finished high school, and 20.3% had either completed or were pursuing university, college, or post-graduate programs. A total of 21.3% of NHL

patients resided in Ho Chi Minh City or Hanoi, with 13.2% living in urban areas and 8.1% in suburban regions. The majority of patients, 78.7%, were from other provinces. The most common occupation was manual labor (workers/farmers) at 42.8%, followed by housewives, unemployed, or disabled patients at 19.4%, retirees at 19.2%, and others, including students and businesspeople, at 10.9%, while 7.8% were intellectual laborers. Most patients were full-time workers (43.0%), 20.5% were retired, and 30.0% were unemployed. Additionally, 71.7% did not lose income while receiving treatment. Almost all patients (87.6%) were married. The average monthly income of those who earned an income was 5,487,007.91 ± 297,286.74 VND, with an average of 25.44 ± 5.10 working days per month. The average family income was 11,173,872.88 ± 532,976.55 VND. All patients used health insurance for treatment, with 92.1% relying on state insurance and 7.9% on private insurance. In terms of coverage, 52.5% had 80% insurance coverage, 10.1% had 95% coverage, and 37.4% had full 100% coverage. The average time since NHL onset was 1.32 ± 0.63 years. A combination of chemotherapy and rituximab was used in 71.3% of patients. The distribution of patients across the four treatment stages was nearly equal, with the highest proportion (27.3%) in stage II, and the lowest (10.3%) in stage I.

3.2. Quality of life of Non-Hodgkin Lymphoma patients
Results of HR-QoL value of 516 patients according to EQ-5D-5L and VAS scale were presented in Table 3.

According to Table 3, the value of HR-QoL of NHL patient based on EQ-5D-5L scale ranged from 0.133 to 1.000 with average value of 0.771 ± 0.223. The QoL value according to VAS scale is not significantly different from the EQ-5D-5L scale with an average value of 0.609 ± 0.177 and ranges from 0.100 to 1.000.

Table 3. Quality of life of Non-Hodgkin Lymphoma patients

	Value	
	EQ5D	**VAS**
Mean	0.771	0.609
Std. Deviation	0.223	0.177
Minimum	-0.133	0.100
Maximum	1.000	1.000

3.3. Willingness to pay per Quality-adjusted life year of Non-Hodgkin Lymphoma patients
In order to evaluate WTP/QALY, the study removed 185 cases with EQ-5D-5L HR-QoL score of 1.000, the analyzed sample remained 331 cases. The results were shown in Table 4.

According to Table 4, the study recorded WTP/QALY of NHL patients ranged from 0.00 to 5,386,343,079.56 VND/QALY, with median value was 45,604,698.96 (0.00 − 187,311,321.74) VND/QALY. The distribution of WTP per QALY paid for a year of living was abnormal because a half of patients have WTP/QALY value less than 45,604,698.96 VND/QALY (50%).

Table 4. Willingness-to-pay per quality-adjusted life year of Non-Hodgkin Lymphoma patients

WTP/QALY		WTP/QALY (VND)	LogWTP/QALY
Mean		146,157,389.37	8.15
Std. error of Mean		9,563,221.67	0.04
Mean			
Median		100,313,056.20	8.11
Std. deviation		124,689,155.42	0.61
Minimum		804,933.29	5.91
Maximum		477,623,014.00	9.73
Percentiles	25	53,447,660.86	7.77
	50	100,313,056.20	8.11
	75	229,063,002.58	8.56

3.4. Related factors to Willingness to pay per Quality-adjusted life year of Non-Hodgkin Lymphoma patients

To analyze the correlation between independent variables and WTP/QALY of NHL patients, from 331 cases, 126 patients who were unwilling to pay were eliminated, 205 remaining cases were checked for the normal distribution. Due to the abnormal distribution, the study con- verted WTP/QALY value to LogWTP/QALY. Then, 3 outliers have been removed and the normal distribu- tion with Histogram chart of 202 LogWTP/QALY values has been checked. The study recorded data LogWTP/QALY normally distributed and continued to conduct correlation tests with related factors with results shown in Table 5 and 6.

According to Table 5, the study recognized statistically differences in WTP/QALY value between men and women with mean difference of 0.179 (95%CI: 0.023 – 0.335, p = 0.025), between of fulltime-working patients and non-working patients with mean difference of 0.270 (95%CI: 0.028 – 0.512; p = 0.022); between intellectual workers and unemployed/housewife/disability patients with mean difference of 0.555 (95% CI: 0.095 – 1.014; p =0.009); between patients losing income when treated in hospital and patient without losing income with mean difference of 0.267 (95% CI: 0.078 – 0.457, p = 0.003).

Table 5. Correlation between gender, living place, employment and episode of disease and LogWTP/QALY

Factor		Frequency	LogWTP/QALY	
			Mean (SD)	p value
Gender	Male	113	8.24 (0.56)	**0.025**
	Female	89	8.07 (0.56)	
Job status	Full time	77	8.33 (0.57)	**0.013**
	Unemployed	64	8.06 (0.51)	
	Retired	45	8.11 (0.54)	
	Other	16	7.80 (0.68)	
Marital status	Single	22	8.28 (0.51)	0.511
	Married	177	8.15 (0.57)	
	Other	3	7.97 (0.40)	
Occupation	Manual labor (Worker/Famer)	79	8.17 (0.59)	**0.018**
	Intellectual labor	14	8.56 (0.47)	
	Retired	37	8.15 (0.48)	
	Housewife/ Unemployed/ Disability	50	8.01 (0.53)	
	Other	22	8.27 (0.60)	
Education level	Primary school/ Secondary school	110	8.11 (0.58)	0.136
	High school	53	8.17 (0.56)	
	University/ Colleges/ Post-graduate	39	8.32 (0.50)	
Living place	Urban of Ho Chi Minh/ Ha Noi City	30	8.34 (0.53)	0.085
	Suburban of Ho Chi Minh/Ha Noi City	15	8.31 (0.61)	
	Other provinces	157	8.12 (0.56)	
Lost-income status	No	152	8.10 (0.54)	**0.030**
	Yes	50	8.37 (0.60)	
Episode of disease	I	23	8.17 (0.57)	0.536
	II	60	8.11 (0.53)	

Factor		Frequency	LogWTP/QALY	
			Mean (SD)	p value
Episode of disease	III	46	8.27 (0.60)	
	IV	56	8.16 (0.59)	
Insurance coverage level	80%	114	8.18 (0.56)	
	95%	19	8.22 (0.63)	0.714
	100%	69	8.12 (0.55)	
Regimen	Chemotherapy	60	8.17 (0.57)	
	Chemotherapy + Rituximab	134	8.19 (0.55)	0.793

Table 6. Correlation between age, average monthly income, length of treatment cycle, time off illness onset to Log WTP/QALY

Factor	LogWTP/QALY	
	Pearson coefficient of correlation (r)	p value
Age	-0.050	0.434
Average monthly income	0.288	0.000
Family income	0.272	0.000
QoL coefficient (EQ-5D-5L)	0.436	0.000
Time of illness onset	-0.132	0.061

The Table 6 showed that there were positive correlations between LogWTP/QALY value with average monthly income of patients (r= 0.288; p=0.000); family's income (r = 0.272; p = 0.000) and HR-QoL coefficient (r = 0.436; p = 0.000).

The linear regression analysis has been conducted to assess the integrated relationship between LogWTP/QALY and related factors. It has been found out that the linear regression model has $R^2 = 0.291$, p = 0.000 with related factors including HR-QoL coefficient ($\beta = 1.339$, p = 0.000) and family income (FI) ($\beta = 8.50 \times 10^{-9}$, p = 0.014). The model was shown as follow:

$$\text{LogWTP/QALY} = 7.110 + 8.5 \times 10^{-9} \times FI + 1.339 \times QoL$$

The model showed that LogWTP/QALY as well as WTP/QALY depends on two factors including family income and HR-QoL, in which, HR-QoL coefficient had the strongest impact on LogWTP/QALY ($\beta = 1.339$, p = 0.000). It meant QoL increased by 1 unit, LogWTP/QALY increased by 1.339 unit, which is relevant to the increasing in WTP/QALY by 22 times. When family income increased by 1 million VND, LogWTP/QALY increased 0.0085 unit, which is relevant to the increasing in WTP/QALY by 1.02 times.

4. DISCUSSION

Non-Hodgkin Lymphoma is one of the most common types of cancer. It places a heavy burden on patients and society, especially in developing countries. Moreover, it is essential to evaluate willingness to pay of patients in-order-to select suitable life-saving treatments and establish national healthcare policy. This is the first study analyzing willingness to pay of NHL patients in Vietnam for these purposes.

The sex ratio in the study was approximately 1.37:1, which was slightly different to the study of Beaven et al. (50% vs 50%; respectively) [10] and study of Jensen (51.1% vs 48.9%, respectively) [11]. The mean age of NHL patients undergoing treatment in VietNam was 53.57 ± 14.37 years old, which was lower than those in US (59.8 ± 14.8 years old) [12], but similar with those in Korea (51 years old) [13]. The study also conducted average income of 5,487,007.91 ± 297,286.74 VND, which is higher than the study of Nguyen, L.H. (1,214,684 ± 836,546 VND) [14], lower than average income in Thailand (13,194 ± 10,078 bath/year) [15].

The study recorded that HR-QoL of NHL patients was about 0.771 ± 0.223, which is higher than the result

of Douduijin et al. 's study, which shown that QoL of low or a low-intermediate age-adjusted International Prognostic Index (aaPI) group (EQ-5D-5L; 0.74 ± 0.80); high and high- intermediate aaPI group (EQ-5D-5L; 0.44 ± 0.49) [16]. This is explained by the different scales using in these studies. Study of Douduijin used the questionnaire consisted of both 3-scale including: EuroQol–5D [17], the European Organization for Research and Treatment of Cancer (EORTC) Quality of Life Questionnaire (QLQ-C30) (Version 2.0) [18] and the Multidimensional Fatigue In- ventory (MFI-20) [19], while this study used EQ-5D-5L and VAS scale. There were some studies used EQ-5D scale to evaluate HR-QoL of NHL patients including study of Glaser [5], Jefford [20].

The median value of willingness to pay per quality-adjusted life year in this study was about 45,604,698.96 (0.00 – 187,311,321.74) VND/ QALY, which could be compared to the WTP for the therapy of other treatment. In a study in the USA, the WTP for asthma treatment ranged from $200 and $350 per month (corresponding to 54.60 – 95.55 million VND/QALY) [21], which was lower than the value of this study. This could be explained by the following reasons: although their income was not high, but they had to spend their real feeling of treatment, so they deeply understood about their disease. In addition, Vietnamese people were also supported by their families a lot (Vietnamese household's income is 11,173,872.88 ± 532,976.55 VND). They considered about those following reason during the survey. In Vietnam, Nguyen TTT et al. [22] found that WTP/QALY of outpatients at Heart Institute in HCMC was valued at 50.13 ± 3.36 million VND/QALY, it was remarkedly lower than the results of recent study because the mean age of that study was out of the working age, mainly older patients with cardiovascular disease, who had no personal income. At the same time, cardiovascular diseases are chronic diseases could be treated long-term, the cost for each treatment was not high and the level of life-threatening danger was not necessarily equal to Lymphoma.

We used bidding technique to elicit WTP. The investigator offered the subject a WTP value which was accepted or rejected and continued to make higher or lower offers depending upon whether the subject accepts or rejects the previous offers. A suspected weakness of the bidding game was its vulnerability to starting-point bias, which meant

higher starting bids tend to pro- duce higher accepted bids. But the advantage of this method was to reflect the actual ability of willingness to pay of NHL patients.

The study acknowledged correlation between sex, working status, occupation, lost-income status, average monthly income of patients, family's income, HR-QoL coefficient and WTP/QALY, while the study of Nguyen TTT et al. at Heart Institute in Ho Chi Minh City showed that the influencing factors to WTP/QALY of cardiovascular disease patients including gender, living area, household income [22]. On the other hand, the study of Khachapon Nimdet in Thailand presented that only gender and household income were statistically significant factors associated with the WTP/QALY values for life-saving treatment [15]. Another study about WTP/QALY associated with herpes zoster indicated that community members and patients gave mean WTP/QALY values that varied significantly based on age, sex, socio-economic status, experience with shingles and duration of the health state evaluated [23].

There were two main limitations in this study. First, the participants did not represent the entire Vietnamese population, which might include different socioeconomic characteristics. We surmount this limitation by collecting patients from 5 leading hospitals in the field of cancer treatment in both North and South Area of Vietnam, including 4 specialized and 1 general hospital (National Cancer Hospital, Cho Ray Hospital, Ho Chi Minh City Oncology Hospital, Blood Transfusion Hematology Hospital and National Institute of Hematology and Blood Transfusion). Second, we estimated the WTP/QALY value using only one life-threatening disease scenario. The WTP/QALY in this study should not be used for other diseases. Valuing WTP/QALY from different hypothetical scenarios should be estimated in future studies. Therefore, in order to improve treatment accessibility for patients, healthcare policies need to focus on individuals who lack family support and those with low income due to their occupations.

5. CONCLUSION
The median value of WTP/QALY was accounted for 45,604,698.96 (0.00 – 187,311,321.74) VND/QALY. With the confidence interval of 95%, linear

regression analysis showed two related factors to LogWTP/QALY including HR-QoL coefficient and family income.

REFERENCES

[1] *Sheets SSF. Non-Hodgkin Lymphoma. Natl Cancer Inst* 2015.

[2] K. R. Shankland, J. O Armitage and B. W. Hancock, "Non-Hodgkin lymphoma", *The Lancet* 380, p. 848–857, 2012

[3] J. O. Armitage, R. D. Gascoyne,… and F. Cavalli, "Non-Hodgkin lymphoma", *The Lancet* 390, p. 298–310, 2017.

[4] S. M. Ansell and J. Armitage, "Non-Hodgkin lymphoma: Diagnosis and treatment", In *Mayo Clinic Proceedings* 2005.

[5] A. W. Glaser, L. K. Fraser and J. Corner, *"*Patient-reported outcomes of cancer survivors in England 1–5 years after diag- nosis: A cross-sectional survey""*, BMJ open* 3, pii: e002317, 2013. URL 10.1136/bmjopen- 2012-002317.

[6] S. Masaki, R. Tatsukawa and M. Uryu, "Treatment satisfaction, willingness to pay and quality of life in Japanese patients with psoriasis", *The Journal of dermatology,* 44, 2017, 143–146.

[7] J. Brazier, J. Roberts, and M. Deverill, "The estimation of a preference-based measure of health from the SF-36", *Journal of health economics,* 21, p.271–292, 2002.

[8] W. J. Furlong, D. H. Feeny,… and R. D. Barr, "The Health utilities index (HUI®) system for assessing health-related quality of life in clinical studies", *Annals of medicine,* 33, p. 375–384, 2001.

[9] G. Richardson and A. Manca, "Calculation of quality adjusted life years in the published literature: a review of methodology and transparency", *Health economics,* 13, p.1203–1210, 2004.

[10] S. J. Walters and J. E. Brazier, "Comparison of the minimally important difference for two health state utility measures: EQ-5D and SF-6D", *Quality of life research,* 14, p. 1523–1532, 2005.

[11] R. E. Jensen, N. K. Arora,… and K. M. Bellizzi, "Health-related quality of life among survivors of aggressive non-Hodgkin lymphoma", *Cancer,* 119, 672–680, 2013. URL 10.1002/cncr.27781.

[12] K. M. Bellizzi, J. H. Rowland,… and N. M. Aziz, *"*Physical activity and quality of life in adult survivors of Non-Hodgkin's lymphoma", *Journal of Clinical Oncology*, 960, 2009.

[13] D. Kang, J. Cho, M. K. K. Im Ryung, …and S. J. Kim, "Health-Related quality of life in Non-Hodgkin lymphoma survivors: A prospective cohort study", *Cancer research and treatment: official journal of Korean Cancer Association,* 50, 1051, 2018.

[14] L. H. Nguyen and A. T. D. Hoang, "Willingness to pay for social health insurance in central Vietnam", *Frontiers in public health,* 5, 89, 2017.

[15] K. Nimdet and S. Ngorsuraches, "Willingness to pay per quality-adjusted life year for life-saving treatments in Thailand", *BMJ open,* 5, e008123, 2015.

[16] J. Doorduijn, I. Buijt,…and P. Sonneveld, *"*Self-reported quality of life in elderly patients with aggressive non-Hodgkin's lymphoma treated with CHOP chemotherapy", *European journal of haematology,* 75, 116–123, 2005.

[17] Group TE., "EuroQoL-A new facility for the measurement of health-related quality of life", *Health policy,* 16, 199–208, 1990

[18] N. K. Aaronson, S. Ahmedzai,… and B. Bergman, *"*The European organization for research and Treatment of can- cer QLQ-C30: A quality of life instrument for use in international clinical trials in oncology," *JNCI: Journal of the National Cancer Institute,* 85, 365–376, 1993.

[19] E. Smets, B. Garssen, A. Cull and J. De Haes, "Application of the multidimensional fatigue inventory (MFI-20) in cancer patients receiving radiotherapy", *British journal of cancer,* 73, 241, 1996

[20] M. Jefford, A. C. Ward,…and K. Lisy, *"*Patient-reported outcomes in cancer survivors: a

population-wide cross-sectional study", *Supportive Care in Cancer,* 25, p. 3171–3179, 2017

[21] K. Blumenschein and M. Johannesson, "Relationship between quality-of-life instruments, health state utilities, and willingness to pay in patients with asthma. Annals of allergy, asthma," *Annals of allergy, asthma & immunology,* 80, p.189–194, 1998.

[22] T. T. Nguyen, T. T Nguyen and T. T Than, "Willingness to pay for a quality-adjusted life year of outpatients with cardiovascular diseases", *Value in Health,* 19, A658–A659, 2016.

[23] T. A. Lieu, G. T. Ray,… and D. Rusinak, "Willingness to pay for a QALY based on community member and patient preferences for temporary health states associated with herpes zoster", *Pharmacoeconomics,* 27, 1005–1016, 2009.

[24] S. J. Walter and J. E. Brazier, "Comparison of the minimally important difference for two health state utility measures: EQ-5D and SF-6D", *Quality of life research,* 14, p. 1523–1532, 2005.

[25] A. Oppe, M. Devlin and N. J. Szende, "EQ-5D value sets: inventory, comparative review and user guide", *EQ-5D value sets: Inventory, comparative review and user guide,* 2007.

[26] S. J. Whitehead and S. Ali, "Health outcomes in economic evaluation: the QALY and utilities", *British medical bulletin,* 96, p. 5–21, 2010.

[27] J. Martín-Fernández, E. Polentinos-Castro,...and M. I. Cura-González, *"Willingness to pay for a quality-adjusted life year: An evaluation of attitudes towards risk and preferences", BMC health services research*, 287, 2014.

Ngưỡng chi trả trên mỗi năm sống có chất lượng ở bệnh nhân u lympho không Hodgkin tại Việt Nam

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TÓM TẮT

Mục tiêu: Ước tính sự sẵn lòng chi trả cho mỗi năm sống điều chỉnh theo chất lượng (WTP/QALY) của bệnh nhân u lympho không Hodgkin (ULKH) và phân tích các yếu tố liên quan đến WTP/QALY của bệnh nhân ULKH. Phương pháp: Nghiên cứu cắt ngang đã được thực hiện dựa trên khảo sát các bệnh nhân ULKH thỏa mãn các tiêu chí lựa chọn và loại trừ tại 5 bệnh viện chuyên khoa ở Việt Nam từ tháng 3 đến tháng 8 năm 2018. Bộ câu hỏi về đặc điểm nhân khẩu học xã hội và lâm sàng, EQ-5D-5L và ngưỡng chi trả đã được xây dựng để phỏng vấn trực tiếp bệnh nhân. Phân tích hồi quy và tương quan đã được tiến hành để ước tính các yếu tố liên quan đến WTP/QALY. Dữ liệu được phân tích bằng các kiểm định thống kê liên quan và hồi quy tuyến tính đơn giản sử dụng phần mềm thống kê SPSS 20.0 do Công ty Quốc tế Máy tính (IBM) — New York, Hoa Kỳ cung cấp. Giá trị p <0.05 được coi là có ý nghĩa thống kê. Kết quả: Mẫu nghiên cứu gồm 516 bệnh nhân ULKH với tỷ lệ nam: nữ là 1.37:1, độ tuổi trung bình 53.57 ± 14.37 tuổi, thời gian trung bình từ khi phát bệnh 1.32 ± 0.63 năm. Giá trị trung vị của WTP/QALY có giá trị 45,604,698.96 (0.00 – 187,311,321.74) VND/QALY. Với khoảng tin cậy 95%, sự khác biệt có ý nghĩa thống kê trong LogWTP/QALY đã được tìm thấy giữa nam và nữ (0.179; 95% CI: 0.023 – 0.335; p = 0.025); bệnh nhân làm việc toàn thời gian và bệnh nhân không làm việc (0.270; 95% CI: 0.275 – 0.512; p = 0.022), lao động trí óc và bệnh nhân thất nghiệp/ nội trợ/ khuyết tật (0.555; 95% CI: 0.095 – 1.014; p = 0.009); tình trạng mất thu nhập và không mất thu nhập (0.267; 95% CI: 0.090 – 0.445; p = 0.003), thu nhập gia đình (r = 0.272, p = 0.000) và thu nhập bệnh nhân (r = 0.288, p = 0.000), HR-QoL (r = 0.436; p = 0.000). Phân tích hồi quy tuyến tính với độ tin cậy 95% cho thấy R2= 0.291; p = 0.000 với hai yếu tố liên quan đến LogWTP/QALY bao gồm hệ số HR-QoL (β = 1.339; p = 0.000) và thu nhập gia đình (β = 8.50 x 10⁷; p = 0.014). Kết luận: Giá trị trung vị của WTP/QALY đạt giá trị 45,604,698.96 (0.00 – 187,311,321.74) VND/QALY. Với khoảng tin cậy 95%, hai yếu tố liên quan đến LogWTP/QALY bao gồm hệ số HR-QoL và thu nhập gia đình.

Từ khóa: U lympho không Hodgkin, ngưỡng chi trả, măm sống điều chỉnh theo chất lượng