How to determine the Cost-effectiveness thresholds in China

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Approaches to estimate the cost-effectiveness thresholds

- **Demand-side perspective**

Willingness-to-pay (WTP) surveys	Based on stated preferences, asking individuals directly about their willingness to pay (WTP) for specific health gains.
Value of a statistical life (VSL) analysis	Combining the quality-adjusted life expectancy and value of a statistical life to infer the value of a QALY.
Well-being valuation approach	Based on revealed preference, estimate the marginal rate of substitution between income and health.

[1] Vallejo-Torres L, et al. Value Health. 2016,19(5):558-66.
[2] Santos AS,et al. Expert Rev Pharmacoecon Outcomes Res. 2018,18(3):277-288.
[3] Thokala P, et al. Pharmacoeconomics. 2018,36(5):509-522.
[4] Huang L, et al. Soc Sci Med. 2018,211:131-136.

Approaches to estimate the cost-effectiveness thresholds

- **Supply-side perspective**

League table approach	Sorting the interventions based on their ICERs, and adding them to the package sequentially, the cost per QALY of the last intervention included represents the threshold.
Past funding decisions	Inferring the cost of QALYs from the past reimbursement decisions (implicit CETs).
Effect of expenditure	Estimating the health expenditure elasticity, and then translate this effect into LY gain and account for QOL to approximate the result to the marginal cost of a QALY.

[1] Vallejo-Torres L, et al. Value Health. 2016,19(5):558-66.
[2] Santos AS,et al. Expert Rev Pharmacoecon Outcomes Res. 2018,18(3):277-288.
[3] Thokala P, et al. Pharmacoeconomics. 2018,36(5):509-522.
[4] Huang L, et al. Soc Sci Med. 2018,211:131-136.

Empirical Research in China (1) | effect of expenditure

- **Ochalek et al. 2020**

Aim

- Estimate the marginal productivity of the health care system to provide an estimate of the cost per DALY averted for China

Methods

- First, estimating the **elasticity** of health outcomes with respect to health expenditure;
- Second, calculating cost per DALY averted from the estimated elasticity.

PharmacoEconomics
https://doi.org/10.1007/s40273-020-00954-y

ORIGINAL RESEARCH ARTICLE

Check for updates

Informing a Cost-Effectiveness Threshold for Health Technology Assessment in China: A Marginal Productivity Approach

Jessica Ochalek[1] · Haiyin Wang[2] · Yuanyuan Gu[3] · James Lomas[1] · Henry Cutler[3] · Chunlin Jin[2]

OLS regression:

$$health\ outcomes = \beta_1 \times health\ expenditure + \beta_2 \times control\ variable + \cdots + Constants$$

$$\text{DALYs averted} = 1\% \times \left|\epsilon^{\text{DALYs}}\right| \times \text{DALY burden}$$

$$\text{cost per DALY averted} = \frac{1\% \times \text{government expenditure on health}}{\text{DALY averted}}.$$

Ochalek J, Wang H, Gu Y, Lomas J, Cutler H, Jin C. Informing a Cost-Effectiveness Threshold for Health Technology Assessment in China: A Marginal Productivity Approach. Pharmacoeconomics. 2020;38(12):1319-1331.

Empirical Research in China (1) | effect of expenditure

- **Results: Cost per DALY averted**

Elasticity	Global Burden of Disease		China Census	Central estimate
	U5 and adult mortality	DALY	U5 and adult mortality	
DALYs averted	1,883,715	1,006,725	1,323,534	1,404,658
Cost per DALY averted (2017 RMB)	27,923	52,247	39,741	37,446
Cost per DALY averted (2017 USD)	4131	7730	5880	5540
% of GDP per capita	47%	88%	67%	63%

DALY disability-adjusted life-year, *GDP* gross domestic product

Ochalek J, Wang H, Gu Y, Lomas J, Cutler H, Jin C. Informing a Cost-Effectiveness Threshold for Health Technology Assessment in China: A Marginal Productivity Approach. Pharmacoeconomics. 2020;38(12):1319-1331.

Empirical Research in China (2) | VSL analysis

- **Cai et al. 2021**

Aim

- To analyze the CET in China using the VSL approach, the results of which amount to the value of a statistical QALY (VSQ).

Methods

- Estimating the value of a statistical QALY from VSL using an established mathematical process;
- Pooling data: VSL(from literature review) population mortality, health utility, and age distribution in China (from nationwide survey).

The European Journal of Health Economics
https://doi.org/10.1007/s10198-021-01384-z

ORIGINAL PAPER

Check for updates

Estimation of the cost-effective threshold of a quality-adjusted life year in China based on the value of statistical life

Dan Cai[1] · Si Shi[1] · Shan Jiang[2] · Lei Si[3,4] · Jing Wu[5] · Yawen Jiang[1]

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$$\mathrm{VSL} = \sum_{i=1}^{T(a)} \mathrm{VSQ}(a) \times u_i \times (1+r)^{-(i-1)}$$

$$= \mathrm{VSQ}(a) \sum_{i=1}^{T(a)} u_i \times (1+r)^{-(i-1)},$$

VSQ(a): the average value of a statistical QALY for the remaining life years at age a.

$$\mathrm{VSQ}(a) = \frac{\mathrm{VSL}}{\sum_{i=1}^{T(a)} u_i \times (1+r)^{-(i-1)}}$$

Cai D, Shi S, Jiang S, Si L, Wu J, Jiang Y. Estimation of the cost-effective threshold of a quality-adjusted life year in China based on the value of statistical life. Eur J Health Econ. 2021;16.

Empirical Research in China (2) | VSL analysis

- **Results: value of a statistical QALY**

Table 2 Estimates of CET as times of GDP per capita in the base case and using alternative VSL estimates

VSL scenario [references]	VSQ as times of GDP per capital	95% CI
Base case	1.45	1.36–1.55
Yang et al. (2016) [38]	1.30	1.26–1.35
Hammitt and Geng (2019) [39]	1.98	1.58–2.37
Jin et al. (2018) [40]	1.76	1.40–2.14
Hao et al. (2019) [41]	1.23	1.00–1.50
Zheng et al. (2019) [42]	1.08	1.04–1.12

CI confidence interval VSQ: value of a statistical QALY

CET : cost-effectiveness threshold

Cai D, Shi S, Jiang S, Si L, Wu J, Jiang Y. Estimation of the cost-effective threshold of a quality-adjusted life year in China based on the value of statistical life. Eur J Health Econ. 2021;16.

Empirical Research in China (3) | WTP surveys

- **Ziping Ye et al. 2022**

Applied Health Economics and Health Policy
https://doi.org/10.1007/s40258-022-00750-z

ORIGINAL RESEARCH ARTICLE

Check for updates

Willingness to Pay for One Additional Quality Adjusted Life Year: A Population Based Survey from China

Ziping Ye[1,2] · Raela Abduhilil[1] · Jiaxin Huang[1] · Lihua Sun[1]

Accepted: 18 July 2022

Sample

- 2008 individuals (quota sampling and snowball sampling)
- 87.5% were interviewed by telephone, 12.5% were interviewed face to face

Questionnaire

- **WTP payment**
  - ✓ Payment card: 5%, 10%, 20%, 40%, 80%,120%,160%, 320%, 480% of Chinese GDP per capita
  - ✓ Open-ended question
- **Health improvement**
  - ✓ QALY types : life extension and quality-of-life improvement with description of EQ-5D-5L
  - ✓ QALY gains: 0.1, 0.2, 0.4 and 0.8 QALYs
  - ✓ Certainty of health outcome: 50%, 75%, 100%

Ye Z, Abduhilil R, Huang J, Sun L. Willingness to Pay for One Additional Quality Adjusted Life Year: A Population Based Survey from China. Appl Health Econ Health Policy. 2022; 8:1–12.

Empirical Research in China (3) | WTP surveys

- **Results: WTP for an additional QALY**

Table 5 Descriptive statistics of willingness to pay for one additional quality-a

	Whole sample	
	Base case	Sensitivity analysis
N	3265	(2738, 4016)
Mean	113,120 (RMB)	(108,802, 129,788)
Standard deviation	223,362	
Median	36,236	(33,077, 62,019)
Minimum	0	
Maximum	2,976,923	
25th quantile	16,288	(16,162, 29,750)
75th quantile	124,038	(124,038, 132,308)

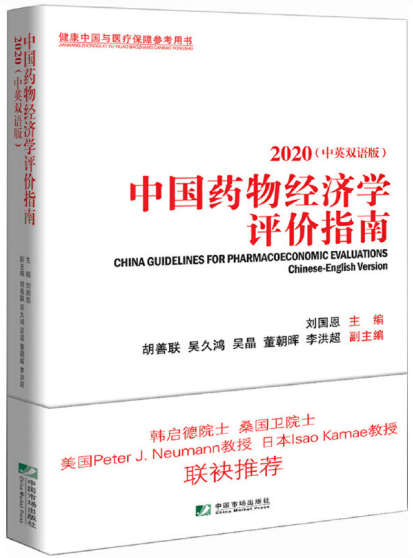
1.75 times GDP per capita

Ye Z, Abduhilil R, Huang J, Sun L. Willingness to Pay for One Additional Quality Adjusted Life Year: A Population Based Survey from China. Appl Health Econ Health Policy. 2022; 8:1–12.

Current status of the use of CETs in China

The CETs recommended by the China **guidelines** for pharmacoeconomic evaluations（2020）is **1 to 3 times** GDP per capita per QALY.

The CETs used by the **government** in the NRDL access negotiation is usually **0.5 to 1.5 times** GDP per capita per QALY , and in most cases it is **less than 1 times** GDP per capita per QALY.



CET : cost-effectiveness threshold

NRDL:China’s National Reimbursement Drug List

The gap between decision-makers and scholars and potential solutions

1.45 times per GDP per capital (2021)

1.75 times per GDP per capital (2022)

?

1 to 3 times per GDP per capital (guideline recommended)

0.5 to 1.5 times per GDP per capital (used in the access negotiation)

Thank you for your attention!

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