

Regional Health-related Quality of Life Disparities in Malaysia: A Subgroup Cost-Effectiveness and Equity Analysis of Thalassaemia-related Neuropathy Screening

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Key finding: Despite substantially lower baseline HRQOL in Sabah, ThalPN screening remained cost-effective across regional and age subgroups at a willingness-to-pay threshold of MYR 50,000/QALY.

1. BACKGROUND / OBJECTIVE / METHODS



Background

- Thalassaemia - related peripheral neuropathy (ThalPN) affected 10-70% of patients¹⁻⁴.
- Regional disparities in health-related quality of life (HRQOL) may influence the value of screening when evaluated using QALYs.
- Equity-sensitive economic evaluation is important for national resource allocation.
- Sabah has a substantially lower GDP per capita, whereas Penang ranks third highest in Malaysia⁵.
- Sabah recorded the second highest out-of-pocket expenditure in Malaysia⁶.
- Sabah has the highest number of registered thalassaemia cases in the country, according to the Malaysia Thalassaemia Registry⁷.

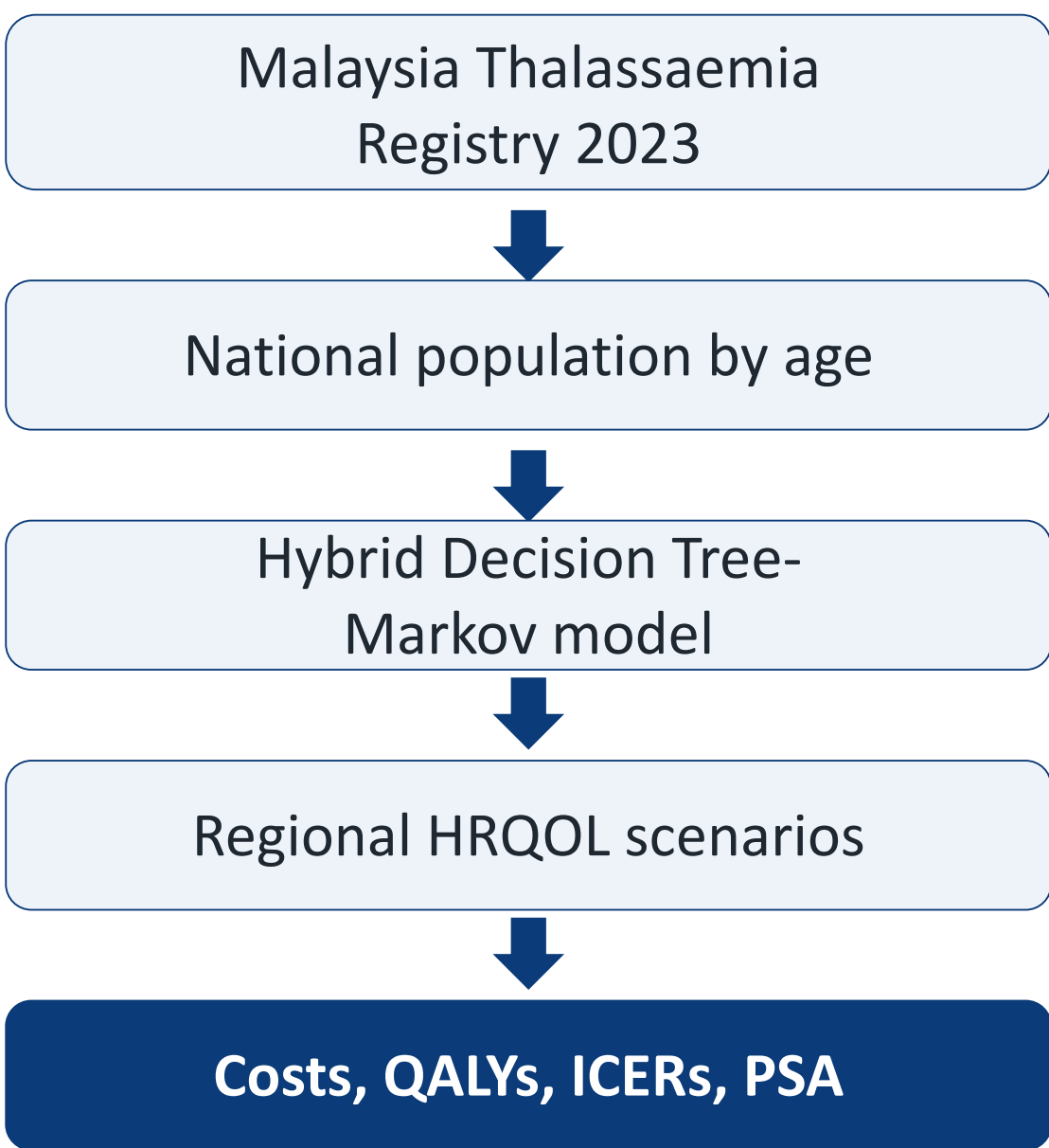


Objective

To evaluate whether regional HRQOL differences between Penang and Sabah alter the cost-effectiveness of a national ThalPN screening programme.

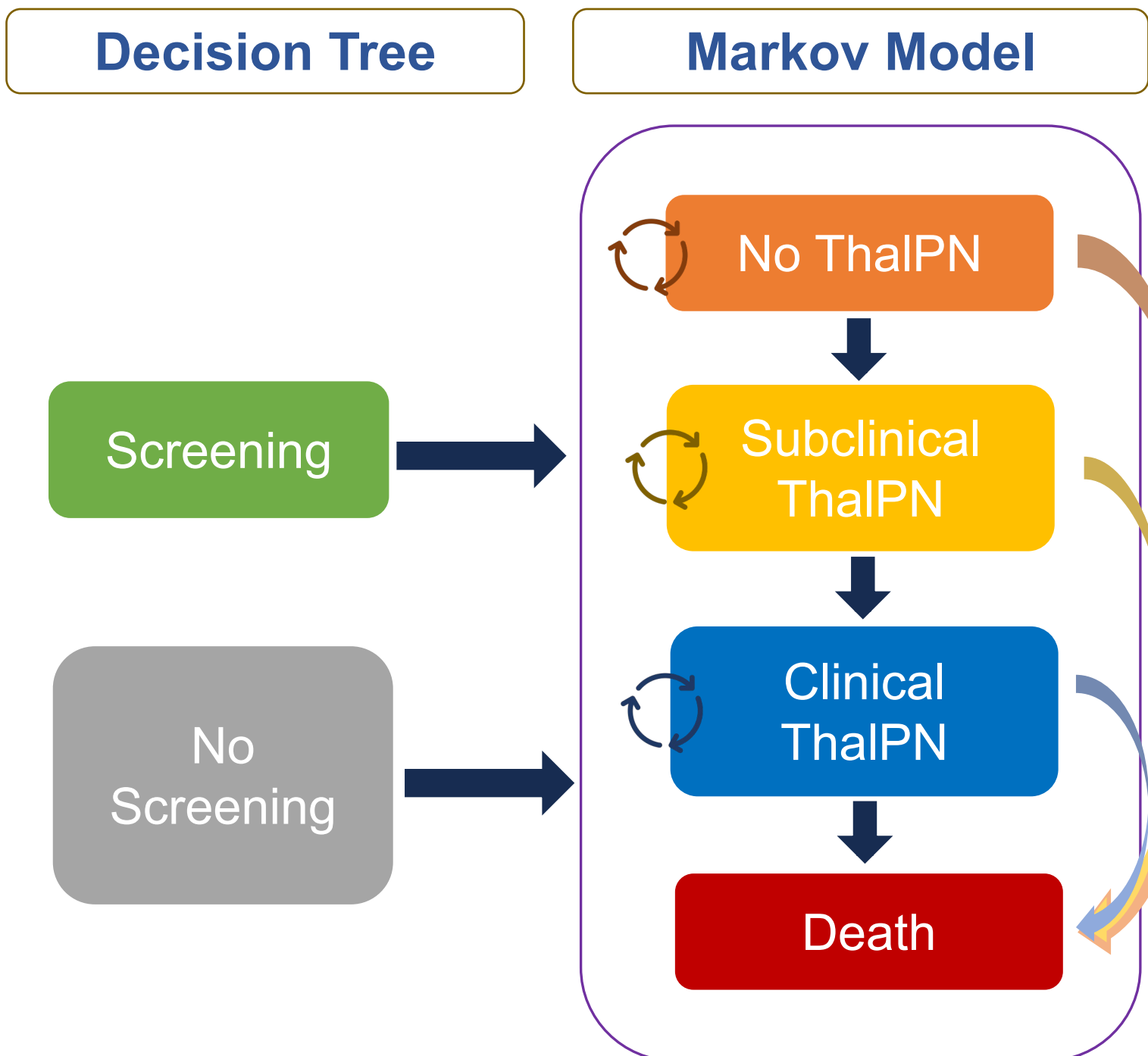


Methods



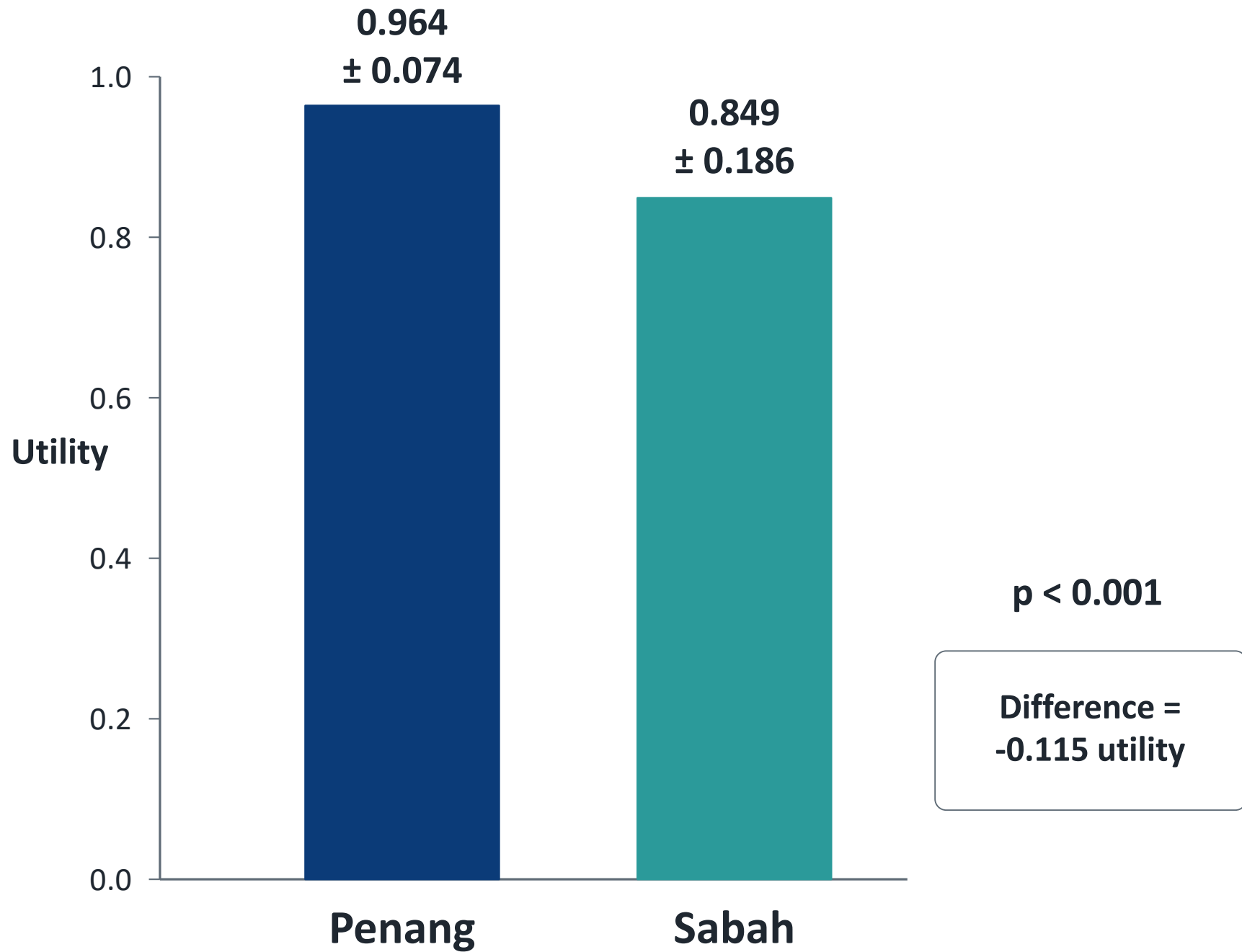
- Age cohorts:** 18–29, 30–39, ≥40 years
- Perspective:** Healthcare provider
- Outcome:** Cost/QALY gained
- WTP threshold:** MYR 50,000/QALY
- Regional adjustment:** Penang ThalPN relative utility multipliers applied to Sabah baseline HRQOL

Model structure

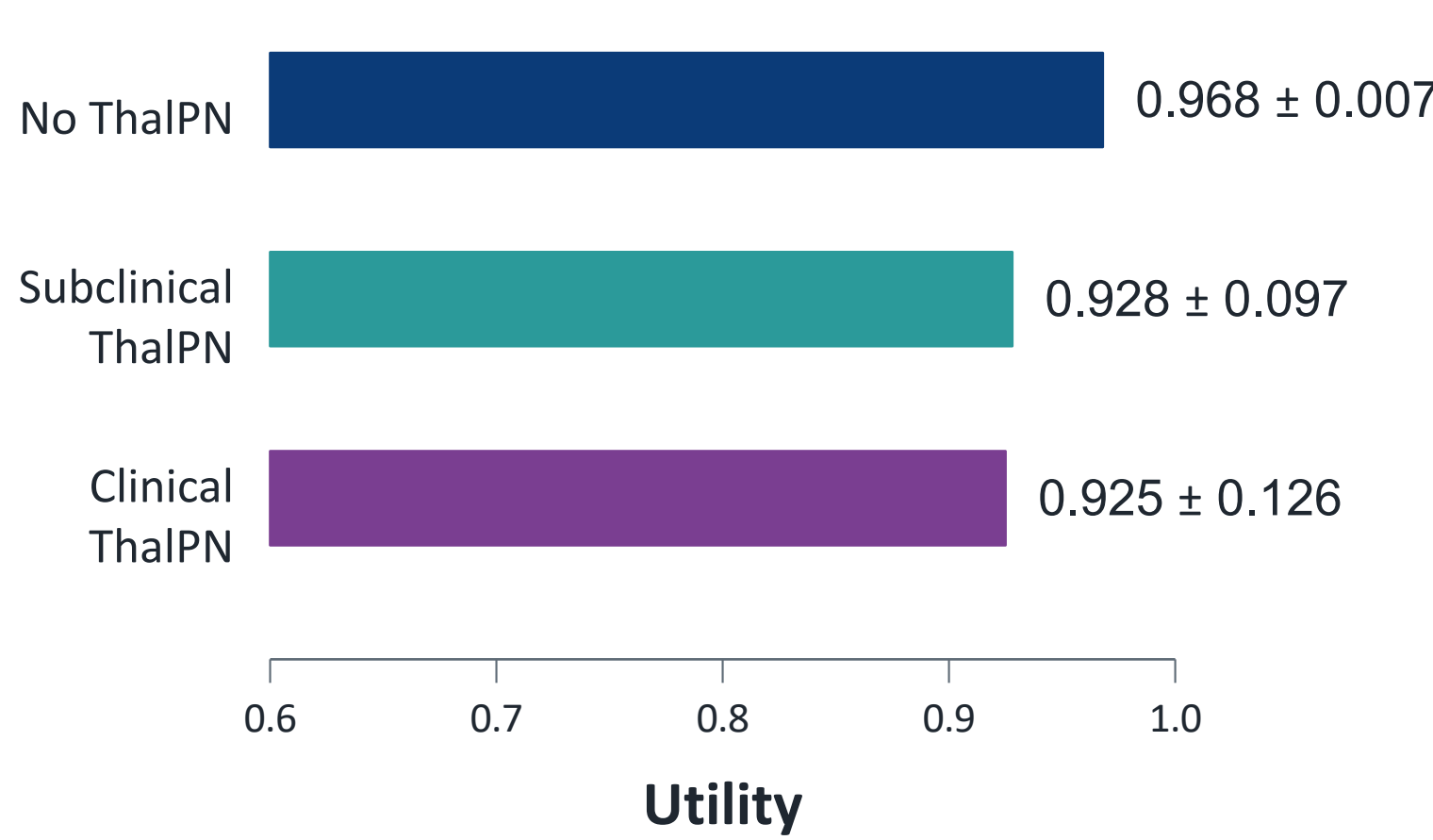


2. RESULTS/ UNCERTAINTY

A. Regional baseline HRQOL disparity

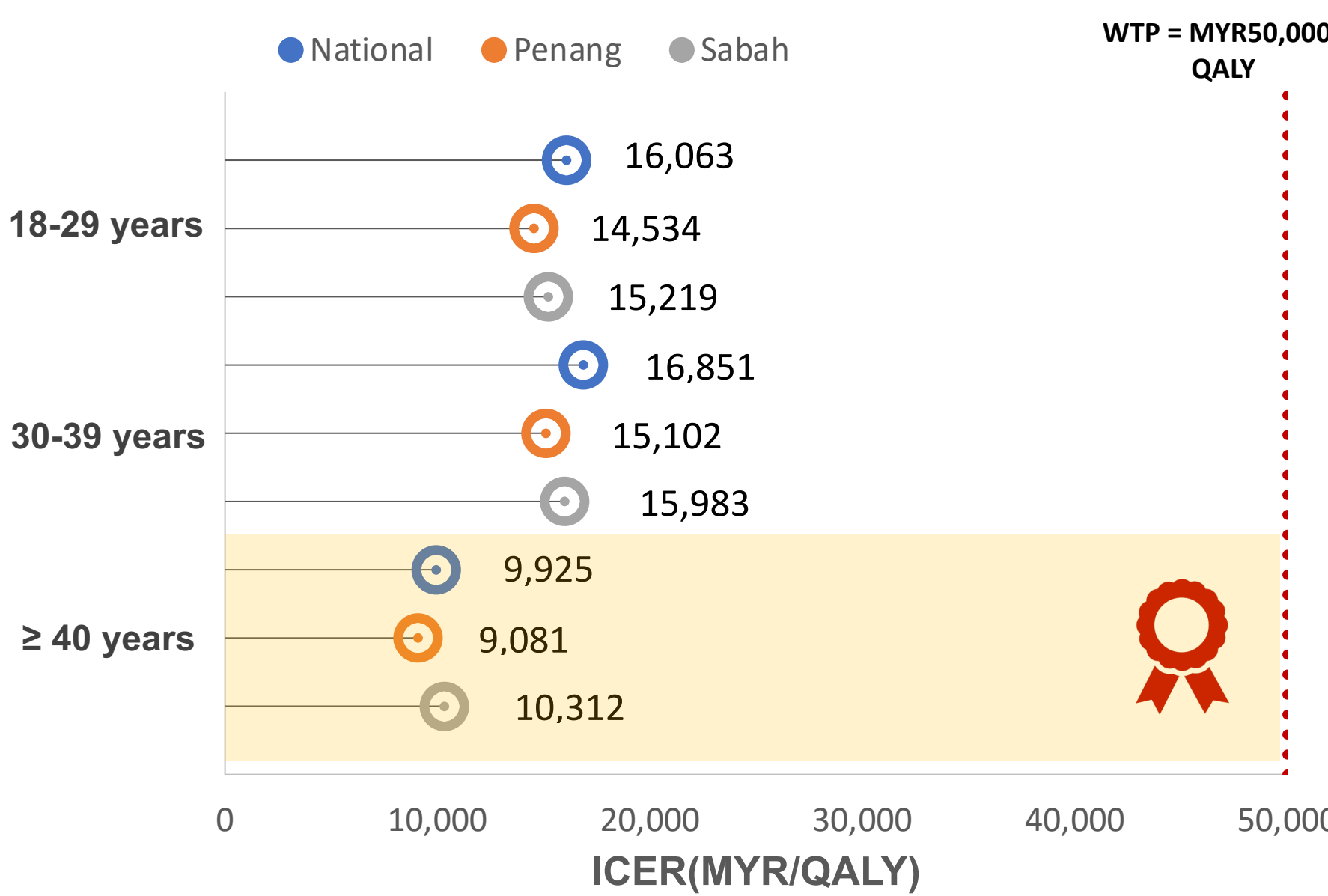


B. Utility declines before overt clinical neuropathy



HRQOL deterioration is already evident at the subclinical stage, supporting earlier detection.

C. ICERs by region and age cohort



All modelled ICERs remained below the MYR 50,000/QALY threshold.

D. Probabilistic sensitivity analysis (PSA)

	18–29 years	30–39 years	≥40 years
National	60%	54%	71%
Penang	61%	64%	74%
Sabah	59%	55%	65%

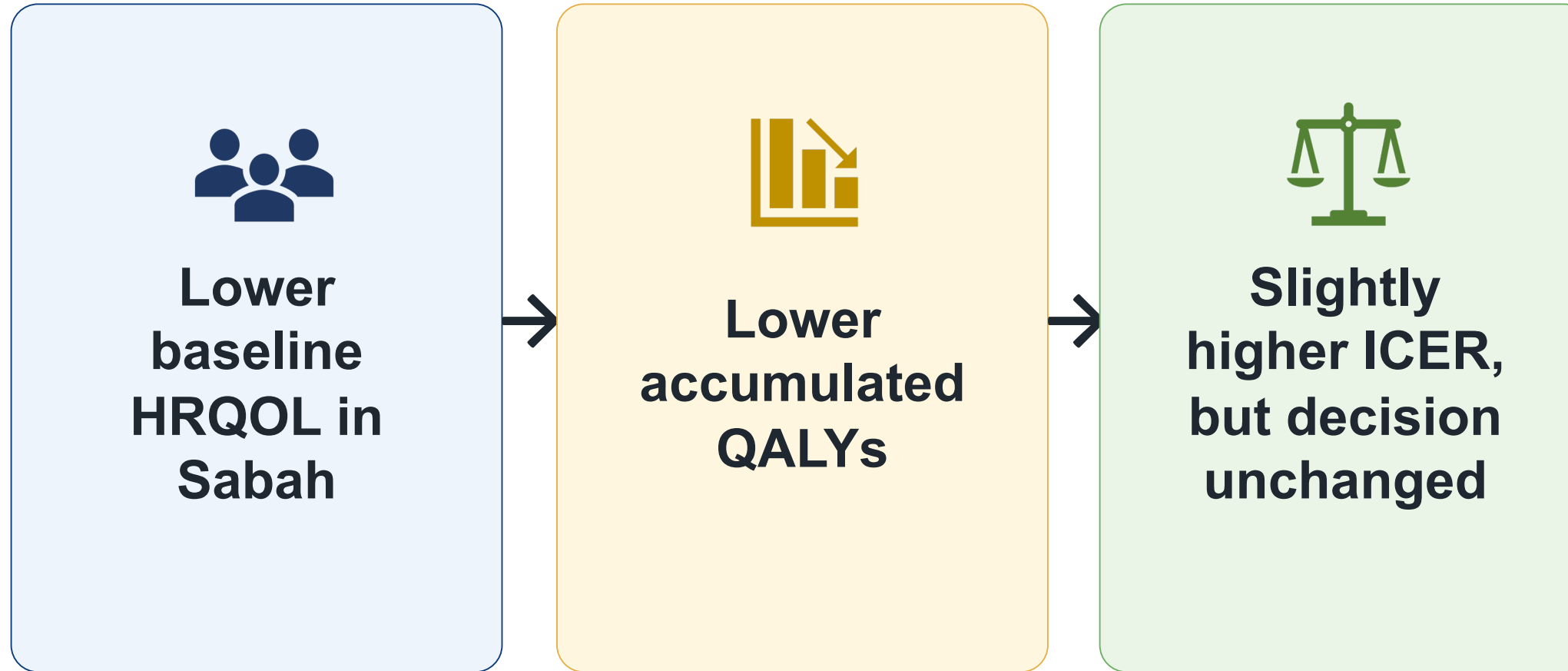
Corrected PSA results incorporated

≥40 years showed the greatest economic certainty

PSA rerun using fixed representative ages 25, 35 and 48 years for the predefined age cohorts.

3. EQUITY / STRENGTH & LIMITATION/ CONCLUSION

E. Equity interpretation



Regional disadvantage changed the magnitude of the ICER and decision uncertainty, but not the cost-effectiveness decision.

F. Strength

- Used primary Malaysian data for ThalPN prevalence, health-state utilities, and regional HRQOL
- Combined clinical and economic evidence within a hybrid Decision Tree- Markov model over a lifetime horizon
- Evaluated regional heterogeneity by comparing Penang and Sabah HRQOL scenarios rather than relying on a single national average.
- Extensive uncertainty analysis was performed using PSA and scenario analyses across predefined age cohorts.

G. Limitation

- Sabah-specific ThalPN utilities were unavailable; regional health-state utilities were extrapolated using Penang-derived utility multiplier applied to the Sabah baseline HRQOL.
- Clinical progression and screening effects relied partly on expert-informed assumptions because long-term ThalPN data are limited.
- The regional analysis therefore represents a model-based scenario and should not be interpreted as directly observed cost-effectiveness evidence for Sabah.

H. Conclusions

- ThalPN screening remained cost-effective across national, Penang and Sabah scenarios and across all age cohorts.
- Regional baseline HRQOL differences altered ICER magnitude and decision certainty but did not reverse the economic conclusion.
- The ≥40-year cohort showed the highest cost-effectiveness probability nationally (71%) and in Penang (74%); Sabah remained favourable at 65%.
- Regional HRQOL should be considered in equity-informed healthcare resource allocation.

I. Policy implication

Incorporating regional HRQOL into economic evaluation can support more equity-informed healthcare allocation in Malaysia.



Abbreviations: HRQOL, health-related quality of life; ICER, incremental cost-effectiveness ratio; QALY, quality-adjusted life year; PSA, probabilistic sensitivity analysis; ThalPN, thalassaemia-related peripheral neuropathy

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