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Using health economic analysis to assess the monetary value of the quality criterion in national vaccine tenders

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Centralised vaccine procurement in Finland

- National Vaccination Program (NVP) vaccines
  - Tax-funded
  - Procured through public tenders
  - Purchased at an interval of 2–4 years
  - Open EU-tender procedure
- Ministry of Social Affairs and Health (MSAH) is the responsible of the procurement of vaccines
  - THL prepares tenders

Comparing the vaccine products

- A higher price can be paid for a more effective vaccine product
- **Effectiveness: v**accinations reduce disease cases compared to
  - no-vaccination scenario or
  - less effective vaccine
  - Measured in **Quality-Adjusted Life Years (QALYs)**.
- Costs are evaluated from the healthcare payer perspective
  - Vaccine costs
  - Savings in treatment costs

Example: comparison of two vaccine products

- If other vaccine is both more effective and less expensive, it is accepted
- Usually the more effective vaccine product is also more expensive
  - Is the additional benefit worth the extra cost?

  -> Assess the Incremental Cost-Effectiveness Ratio (ICER)

ICER and WTP

$$ICER = \frac{\Delta C}{\Delta E} = \frac{Costs_{vaccineA} - Costs_{vaccineB}}{Effects_{vaccineA} - Effects_{vaccineB}}$$

Incremental cost-effectiveness ratio (ICER)

- Difference in costs / difference in effects
- Incremental cost / incremental effect

-> Incremental costs per QALY gained

Willingness-to-pay (WTP) for a QALY

- WTP threshold: maximum cost per health outcome that a health system is willing to pay
- “Cost-effective” = ICER < WTP

Evaluation criteria in the procurement of the vaccines

- A higher price may be paid for a more effective product
- At least 2 vaccine products are available with differing effectiveness (quality)
- Quality criteria are assessed using previously conducted cost-effectiveness analysis (CEA)
  - CEA is conducted when a new vaccine is considered into the NVP
- CEA is used to assess incremental costs and QALYs of the more effective vaccine product (vaccine A) compared to the less effective vaccine (vaccine B)

The maximum acceptable price difference (x) for a given willingness-to-pay (WTP) threshold

$$\frac{(C_{vaccineA} - S_{vaccineA}) - (C_{vaccineB} - S_{vaccineB})}{E_{vaccineA} - E_{vaccineB}} = \text{WTP}$$

$$\frac{((C_{vaccineB} + x) - S_{vaccineA}) - (C_{vaccineB} - S_{vaccineB})}{E_{vaccineA} - E_{vaccineB}} = \text{WTP}$$

The price difference is presented at different willingness-to-pay threshold values

How is the maximum acceptable price difference formed

- MSAH makes the decision which WTP threshold is applied in the tender
- The budget constraint also imposes limitations
  - budget is limited

- Example: WTP = 0 € per QALY gained
  - Price difference x = $S_{vaccineA} - S_{vaccineB}$
  - The savings achieved from the reduction in disease cases are equal to the price difference of the vaccines

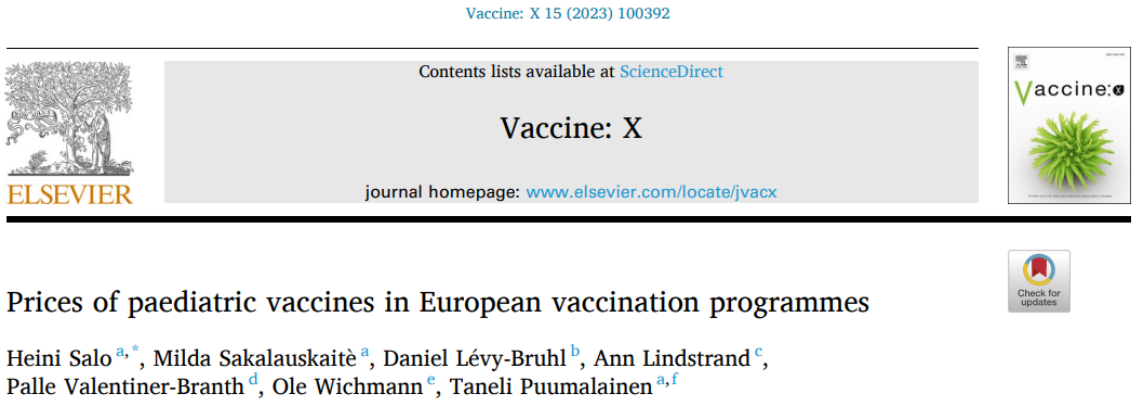
In Finland the decision-makers have not specified an explicit range of cost-effectiveness threshold values below which an intervention would automatically be accepted

- Infant varicella, pneumococcal and rotavirus vaccination programmes were considered to be cost-effective at WTP values 15 000–25 000 euros per QALY gained from health care provider perspective

Vaccination programme	Cost (€) / QALY gained
PCV7	
No herd effect (< 5 v)	54 600
Herd effect on IPD	20 600
Rotavirus	25 000
Varicella	15 000
Influenza (TIV, healthy children)	Cost-saving
HPV	Cost-saving

Prices were lower in countries where vaccines in the NVP were tax-funded and nationally/regionally procured

- Vaccine prices differ notably in Europe
- 23/32 countries answered the survey
- Data from 2016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Prices of paediatric vaccines in European vaccination programmes

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Funding

- 17 funded the vaccines by taxes
- 6 by social insurance

Procurement

- 18 countries procured the vaccines through public tenders or negotiations
- 5 countries purchased the vaccines by healthcare providers and reimbursed from the health insurance system

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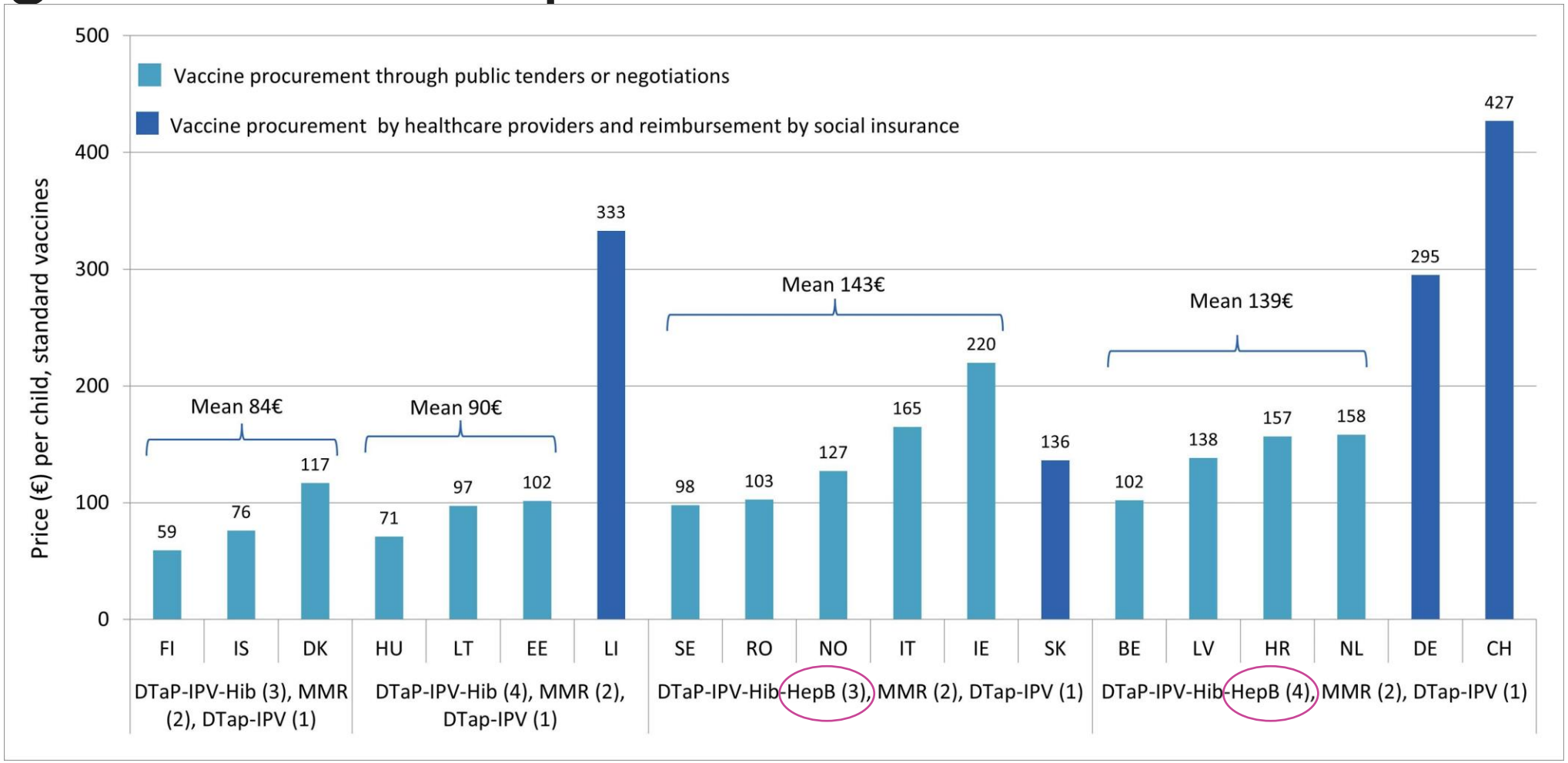
Fig. 2. Price (€) per child and mean price (€) per child vaccinated with standard vaccines in national vaccination programme in 19 European countries in 2016



Pentavalent or hexavalent combination vaccine

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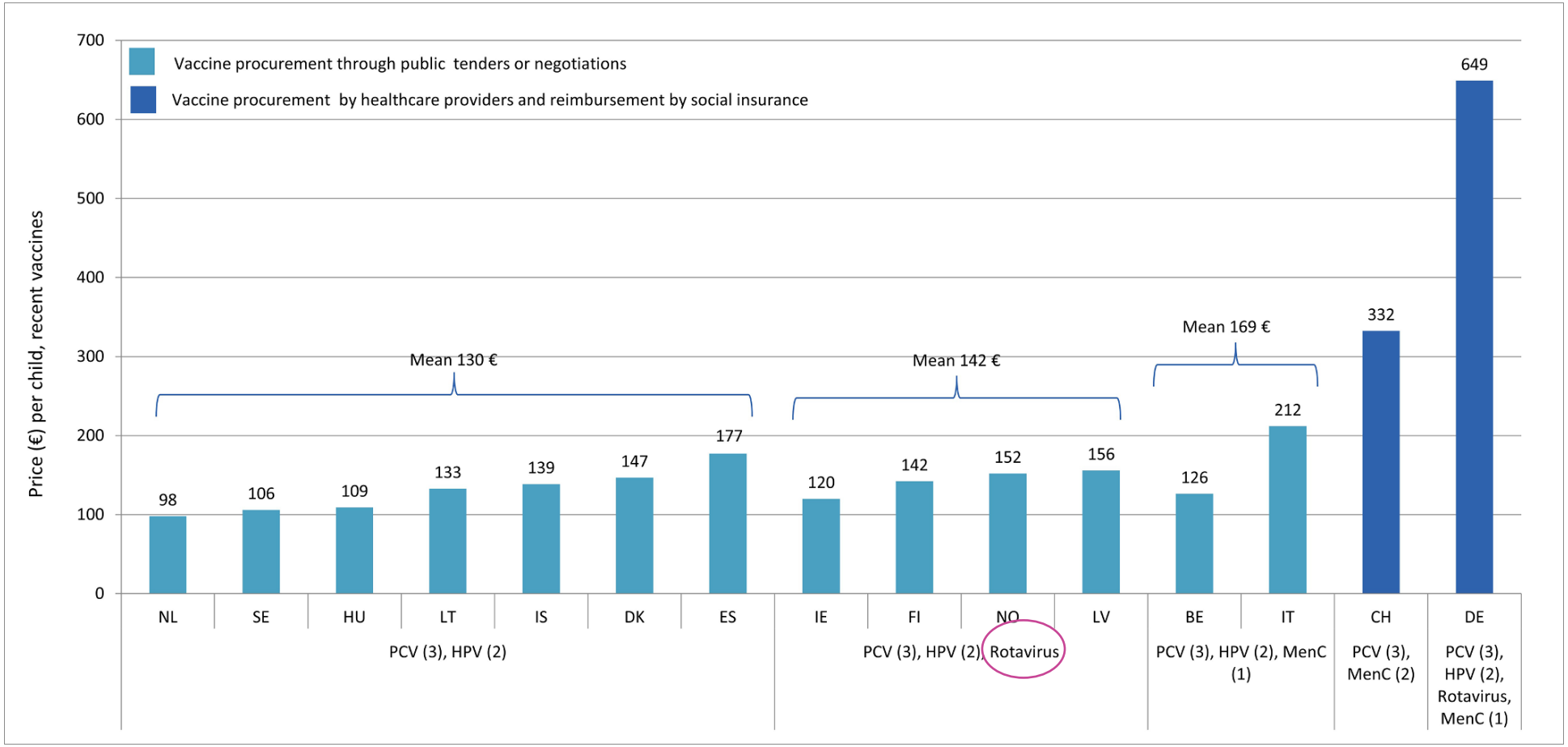
Fig. 4. Price (€) per child and mean price (€) per child vaccinated with recent vaccines in national vaccination programmes in 15 European countries in 2016.



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Many thanks!