

Healthcare innovations with impact

Why engineers and health economists should collaborate more closely

Óbuda University Budapest

6 September 2022



Outline of my talk

- Innovations in medical technology have had a large impact on society
- Healthcare increasingly expensive
- Threat for access to healthcare and adoption of innovations
- New technologies should improve the efficiency of healthcare
 - provide value to payers
 - align with user/patient preferences
- Health economists can help provide these insights
- Closer collaboration between engineers and health economists is important to face the societal challenge of affordable healthcare for all

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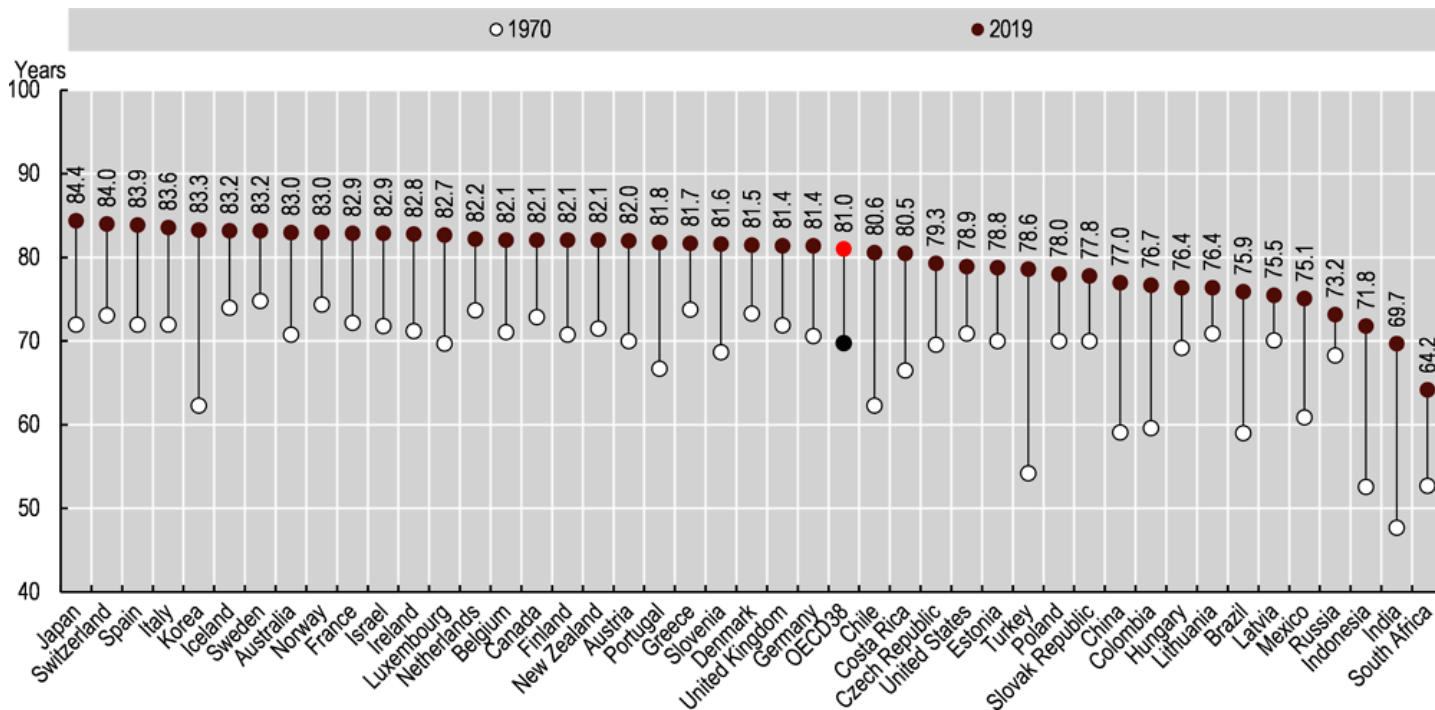
Innovations in medical technology have had a large impact on society

- People around the world live longer and healthier lives
 - life expectancy has improved
 - health-related quality has improved

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Life expectancy at birth, 1970 and 2019 (or nearest year)

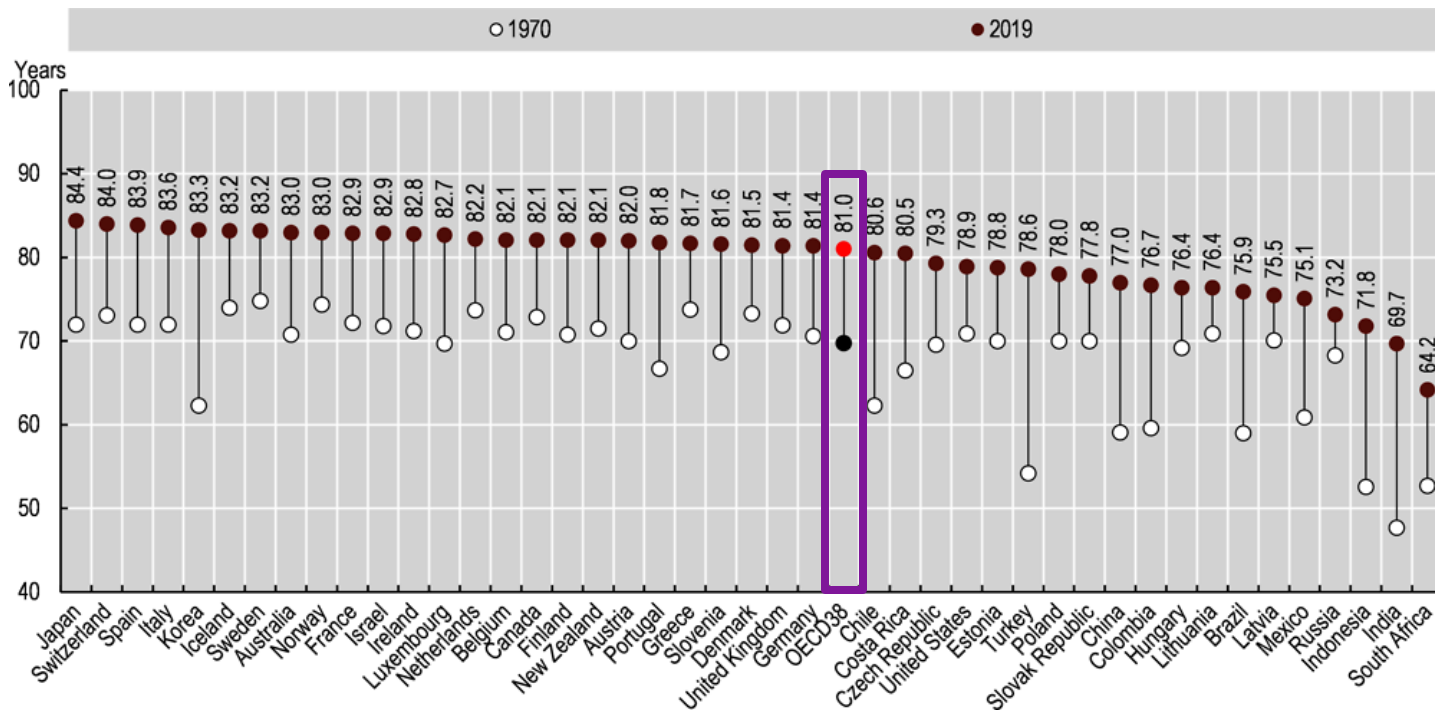
Source: OECD Health Statistics 2021



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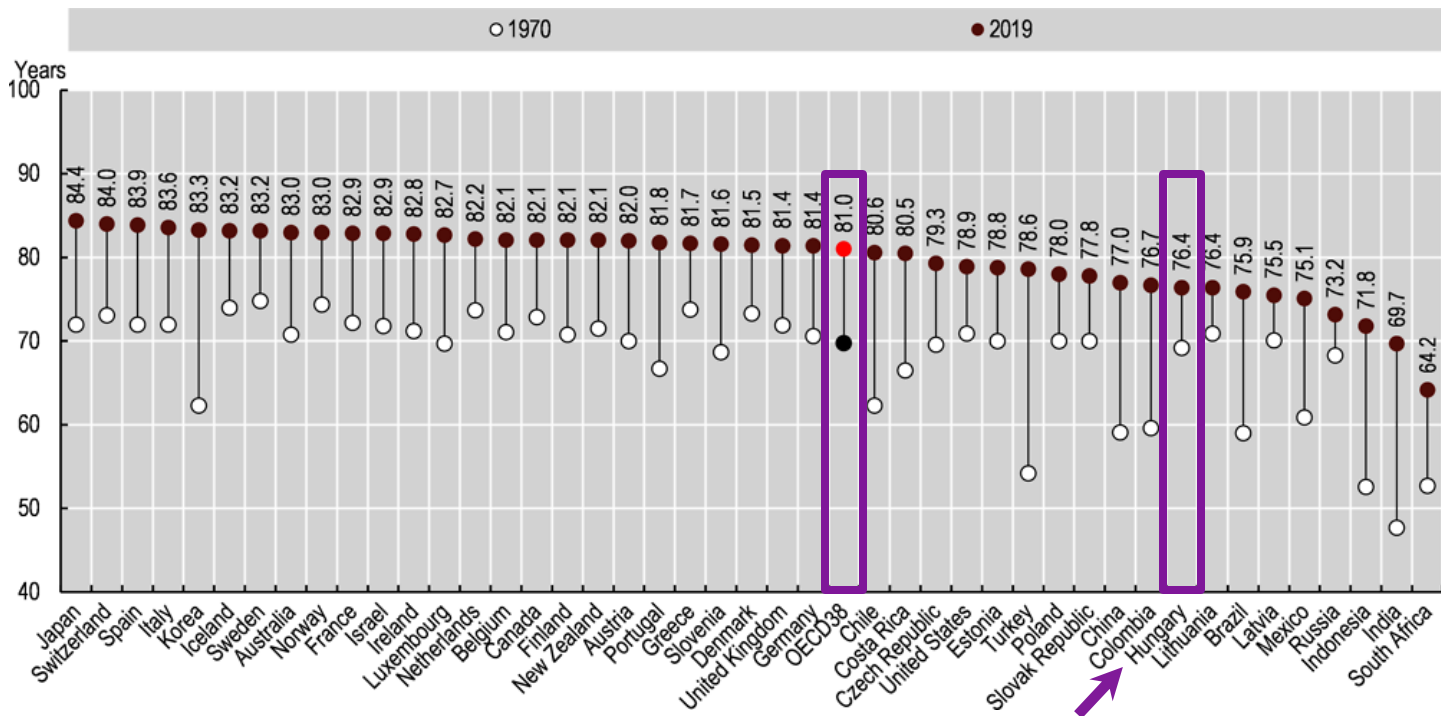
Source: OECD Health Statistics 2021



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Life expectancy at birth, 1970 and 2019 (or nearest year)

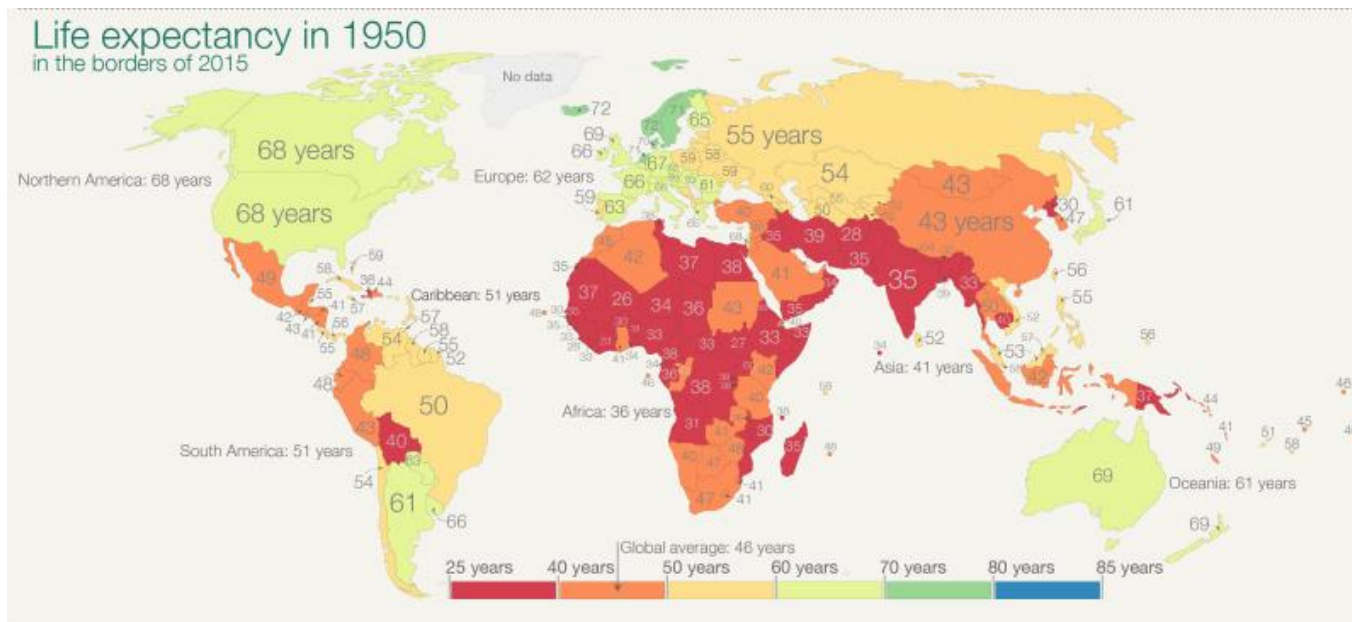
Source: OECD Health Statistics 2021



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Life expectancy in 1950 and 2015

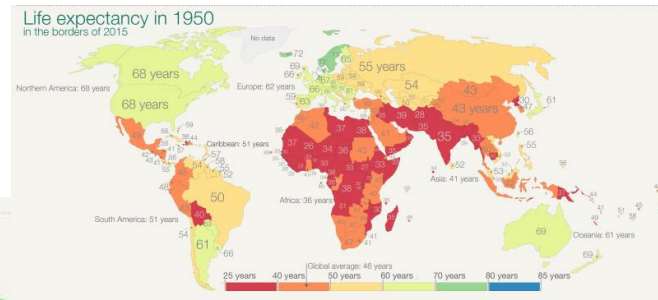
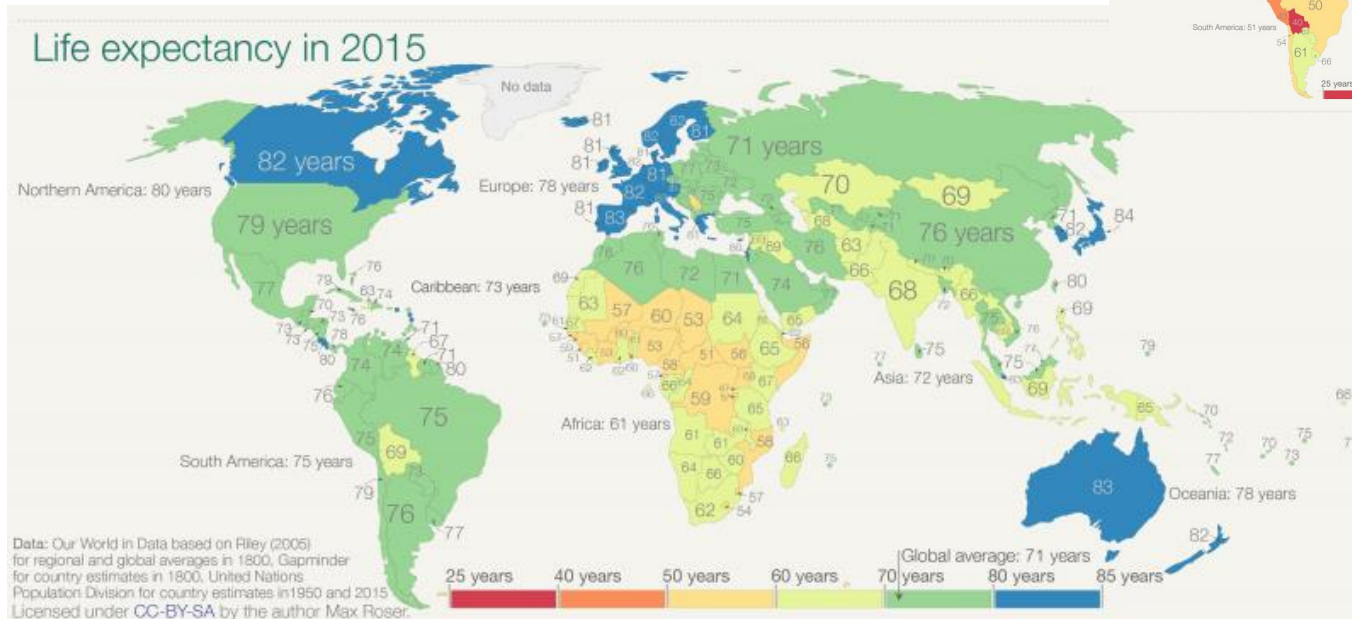
Source: <https://ourworldindata.org/life-expectancy>



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Life expectancy in 1950 and 2015

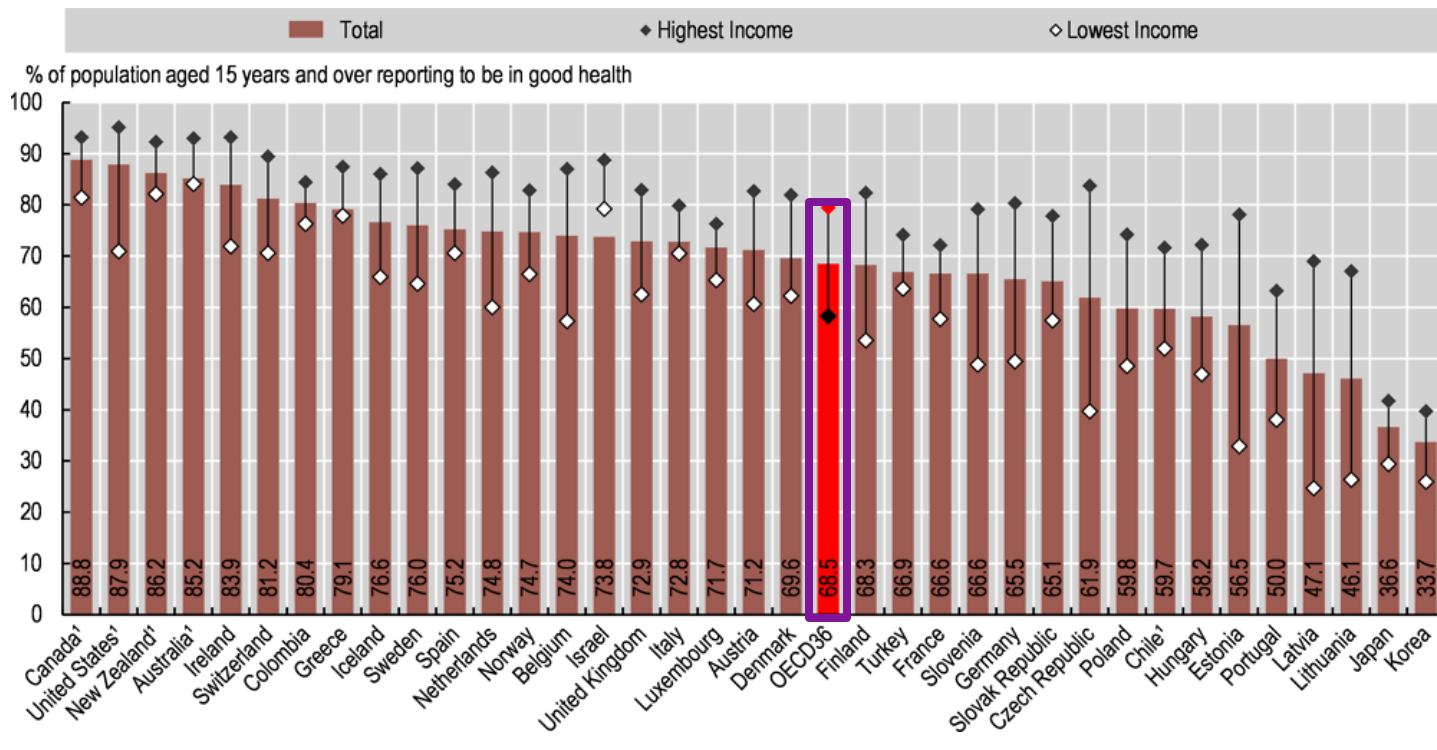
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Adults rating their own health as good or very good (2019)

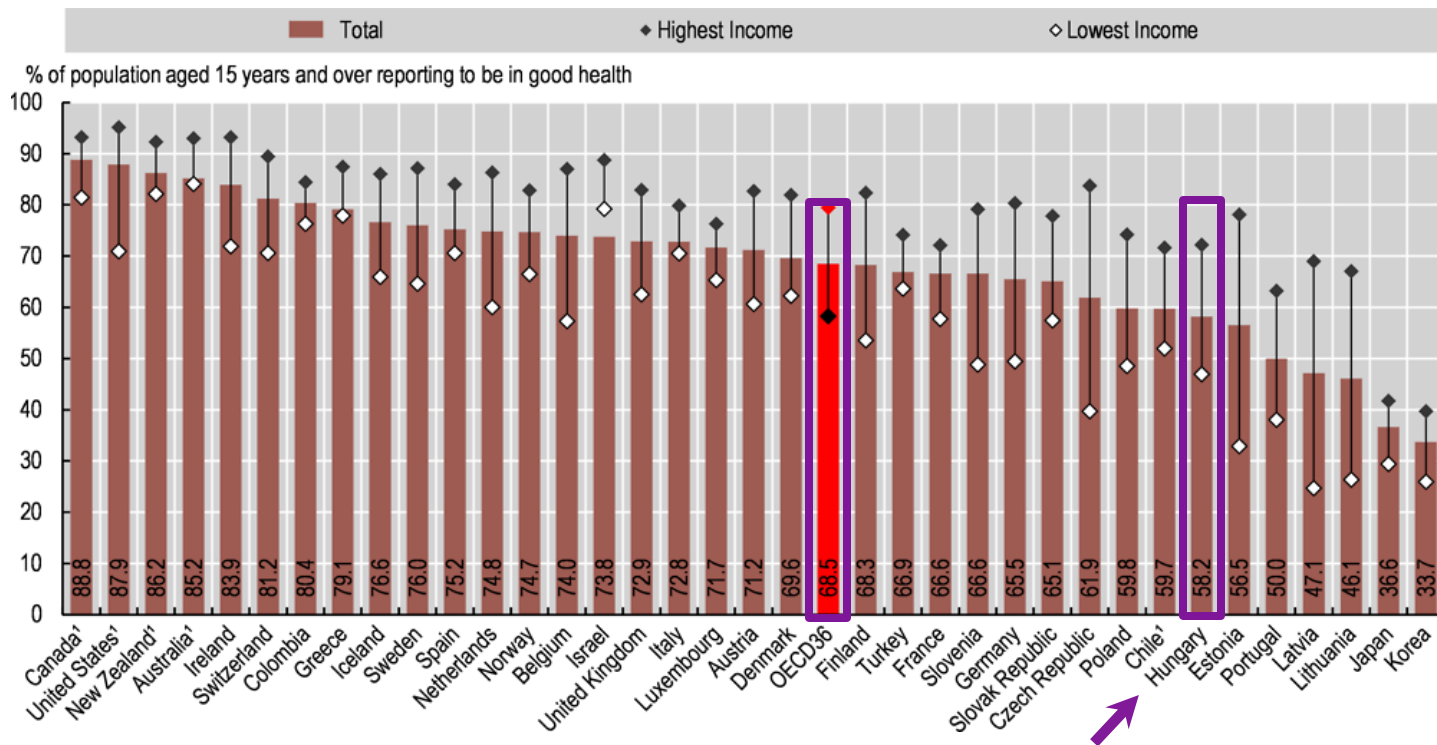
Source: OECD Health Statistics 2021



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Source: OECD Health Statistics 2021



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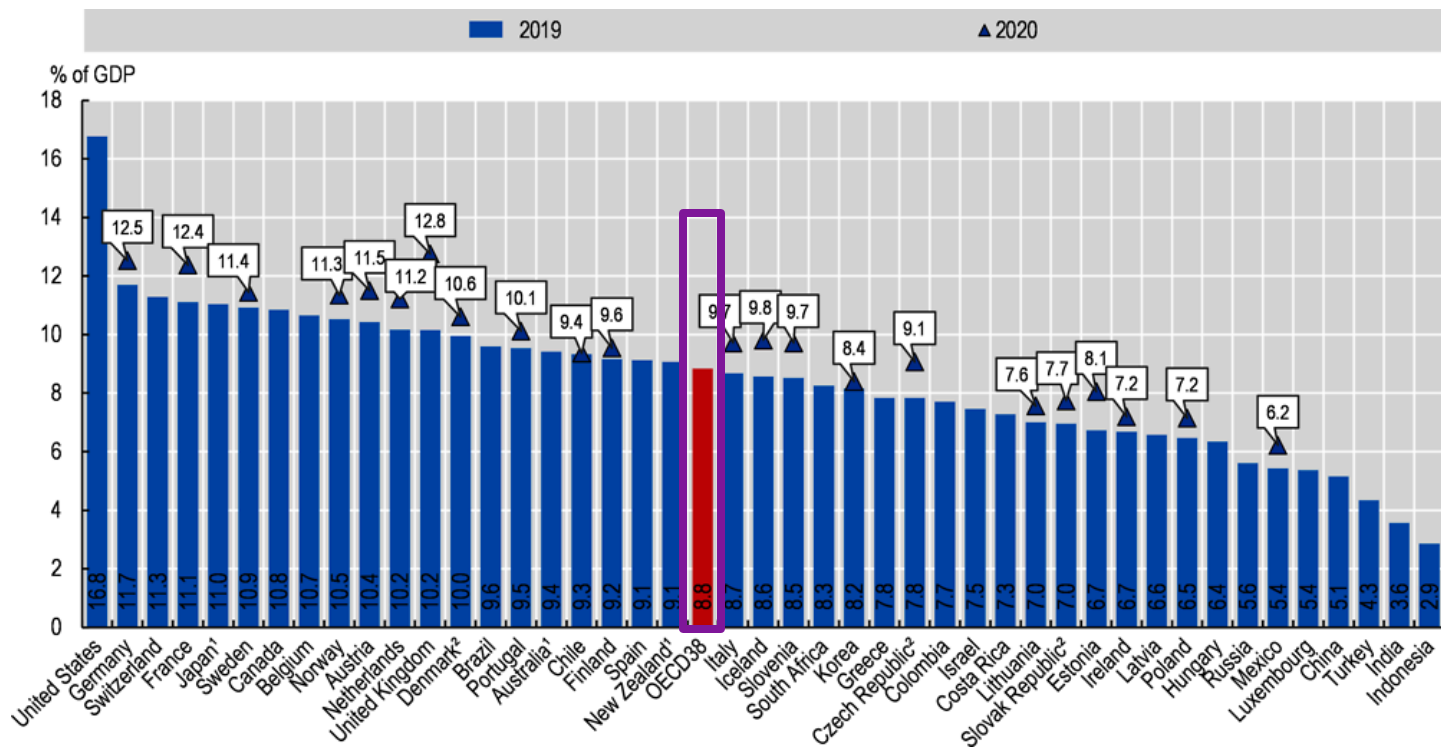
Innovations in medical technology have had a large impact on society

- People around the world live longer and healthier lives
- Introduction of new possibilities for treatment has increased expectations and demand for care of patients
- Adoption of new technologies has contributed to a substantial rise in healthcare expenditures

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Health expenditure as a share of GDP (2019 / 2020)

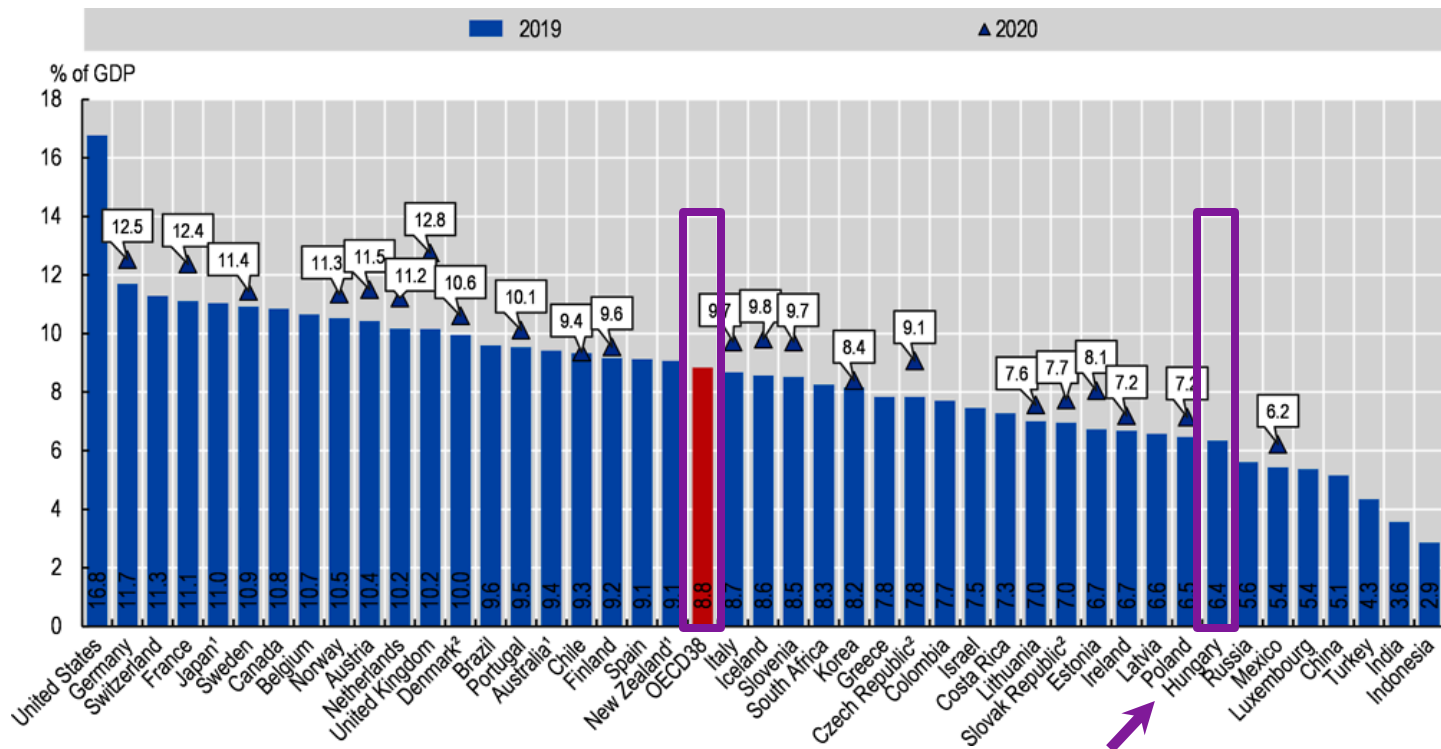
Source: OECD Health Statistics 2021, WHO Global Health Expenditure Database.



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Health expenditure as a share of GDP (2019 / 2020)

Source: OECD Health Statistics 2021, WHO Global Health Expenditure Database.



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Expensive healthcare is threat for access to healthcare and adoption of innovations

- People around the world live longer and healthier lives
- People have increased expectations and demand for healthcare
- Substantial rise in healthcare expenditures, in the past and the future
- Budget for healthcare is limited, individual and society
- Huge societal challenge to provide the healthcare that citizens need and want within the limits of available budgets
- In a way, innovations in medical technology have been a blessing in disguise

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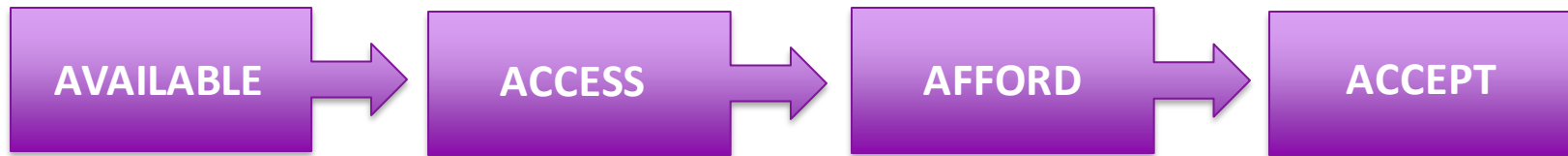
New technologies should improve the efficiency of healthcare

- To secure and promote access for patients to future innovations, it is important that new technologies improve the efficiency of healthcare
 - provide the same benefits at lower costs, or more benefits at the same costs
 - align innovations with patient preferences to improve adoption and adherence

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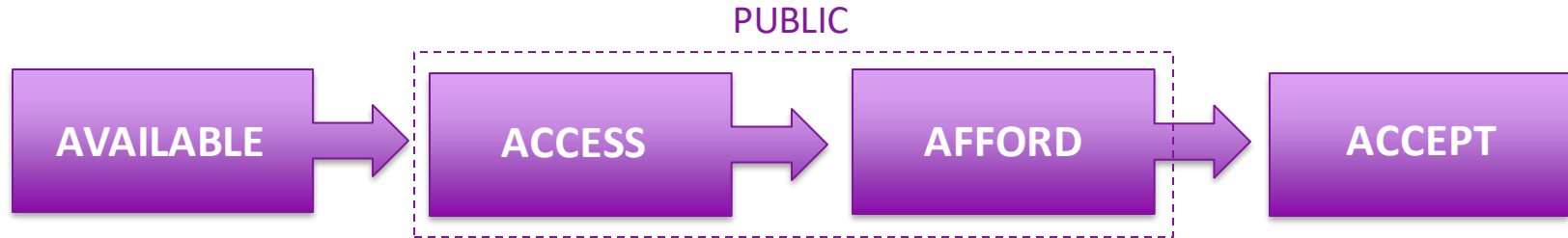
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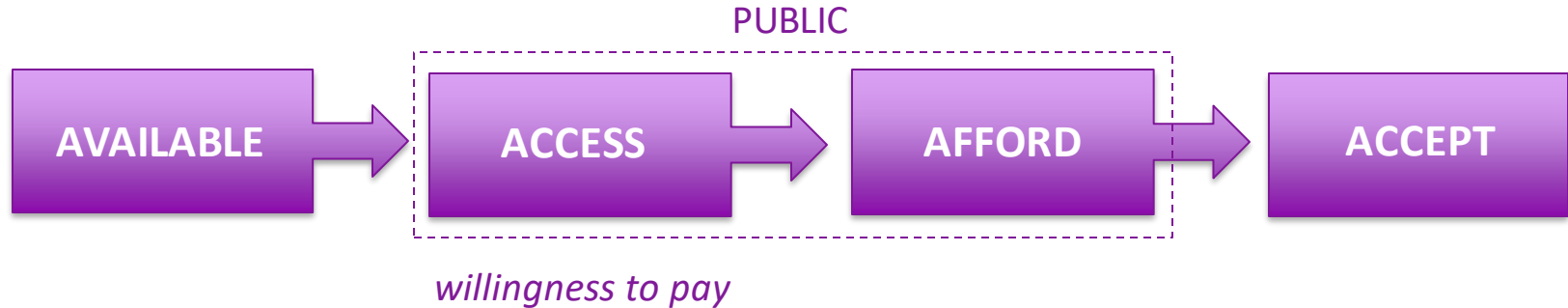
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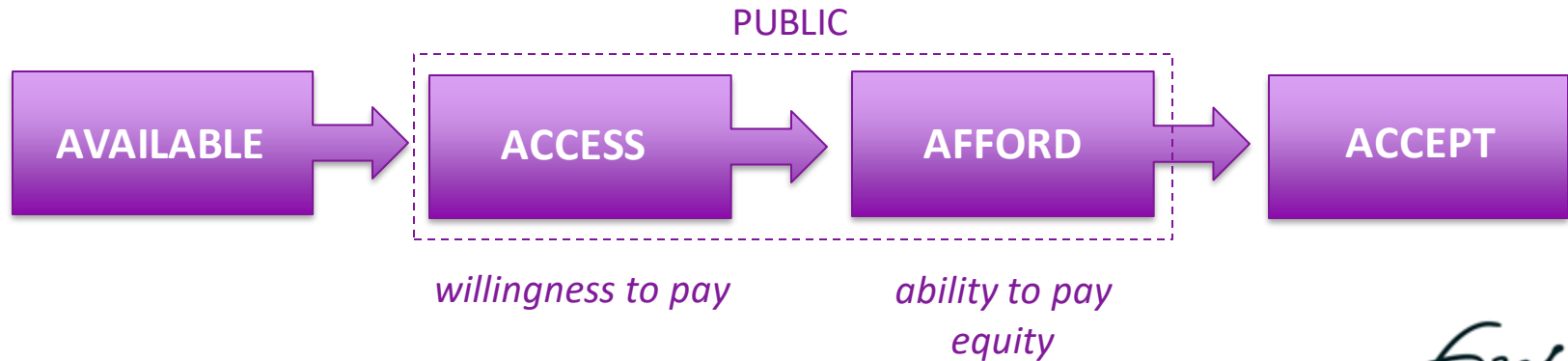
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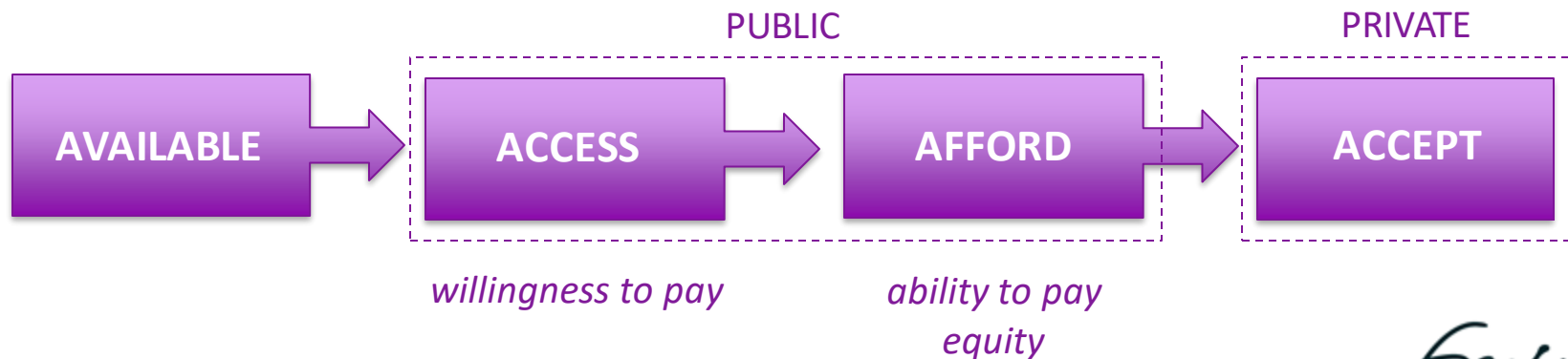
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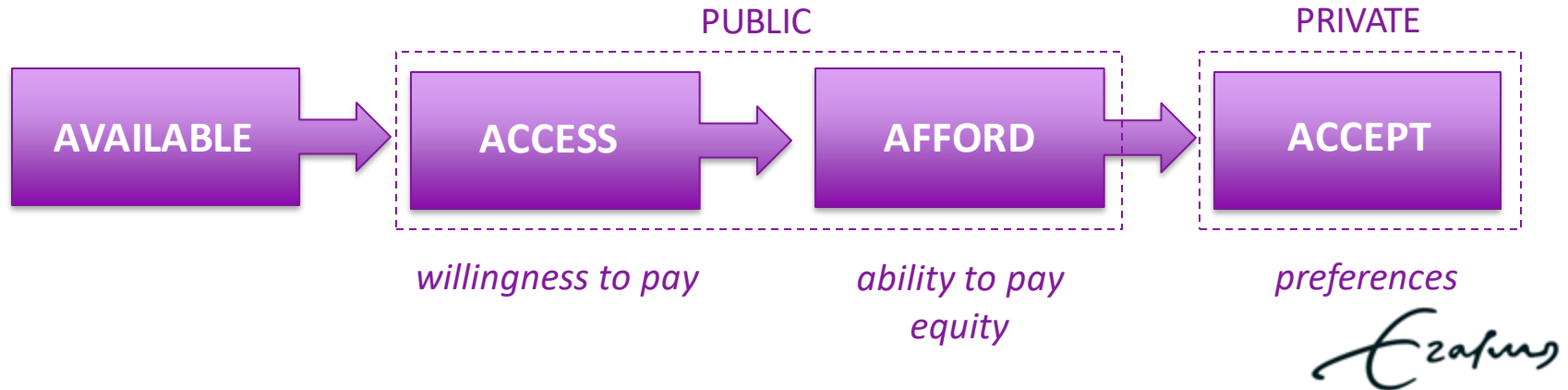
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Efficiency: value for money

- Money → costs
 - All relevant costs to patient and society
 - Treatment, time, productivity, informal care
- Value → benefits
 - Symptoms, health status, quality of life
- Cost-benefit analysis (or cost-effectiveness analysis)
 - Difference in costs between current technology and new technology
 - Difference in benefits between current technology and new technology

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Efficiency: value for money



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Efficiency: value for money

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costs

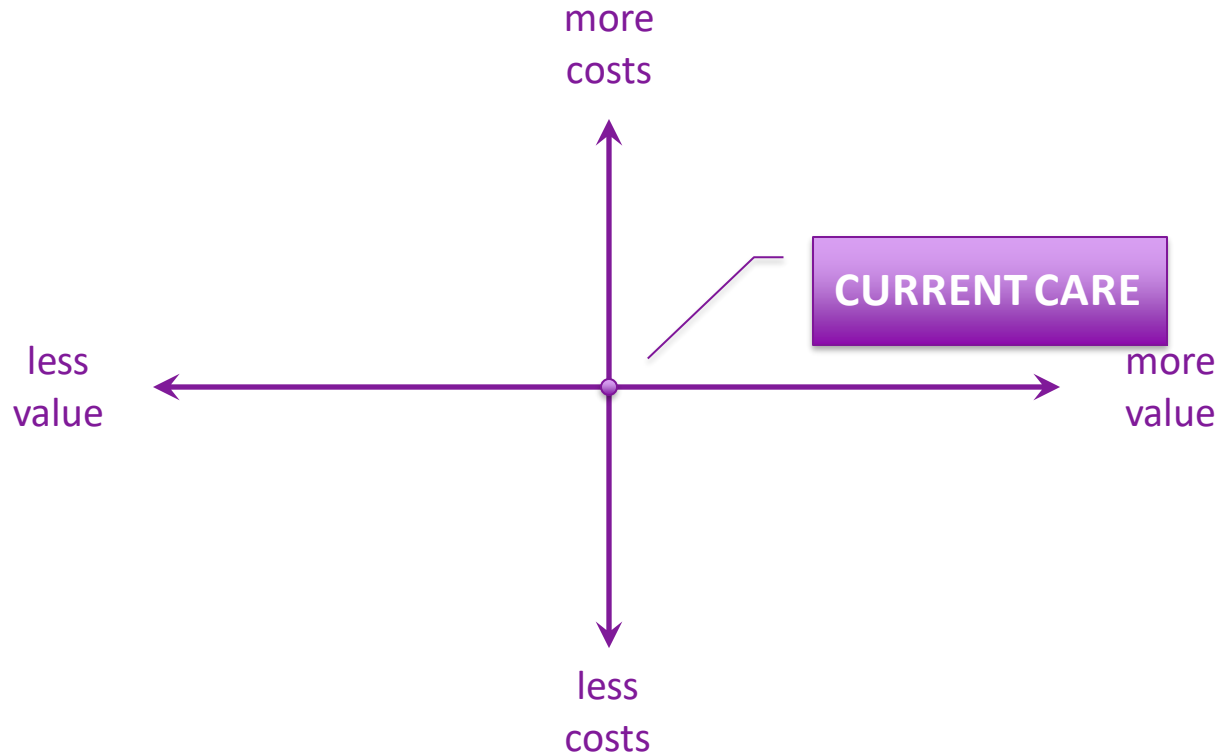


less
costs

CURRENT CARE

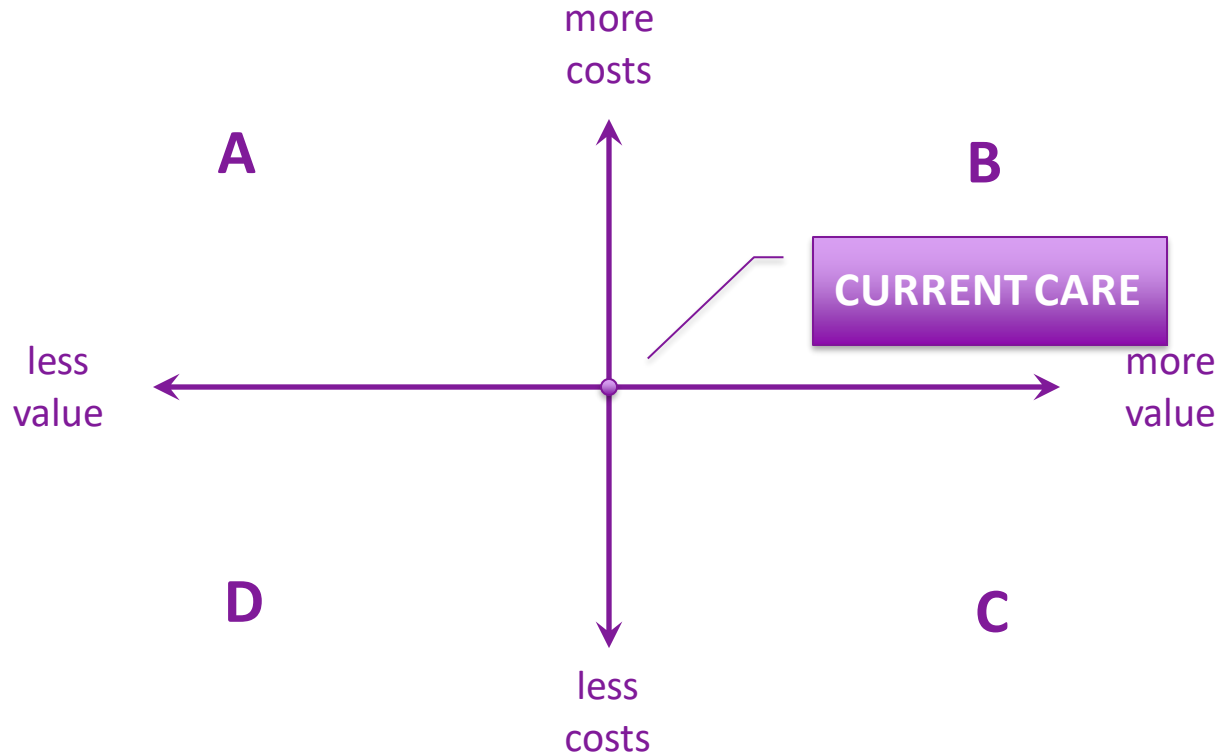
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Efficiency: value for money



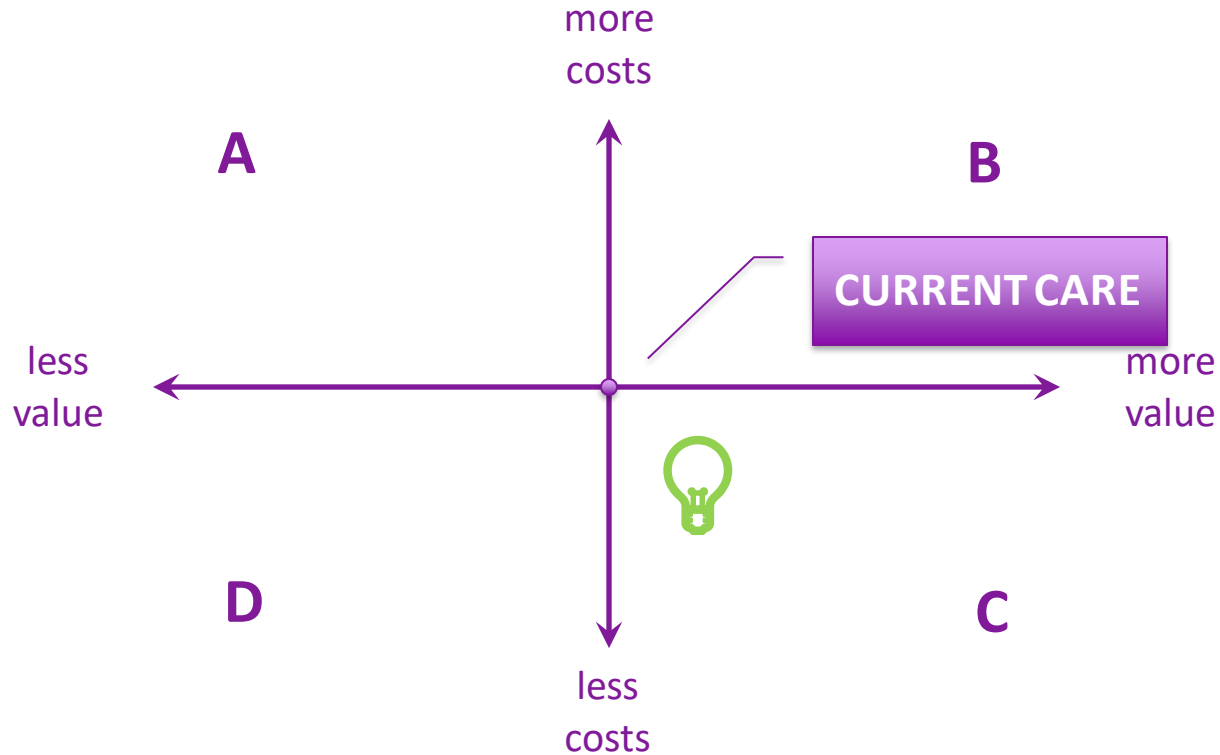
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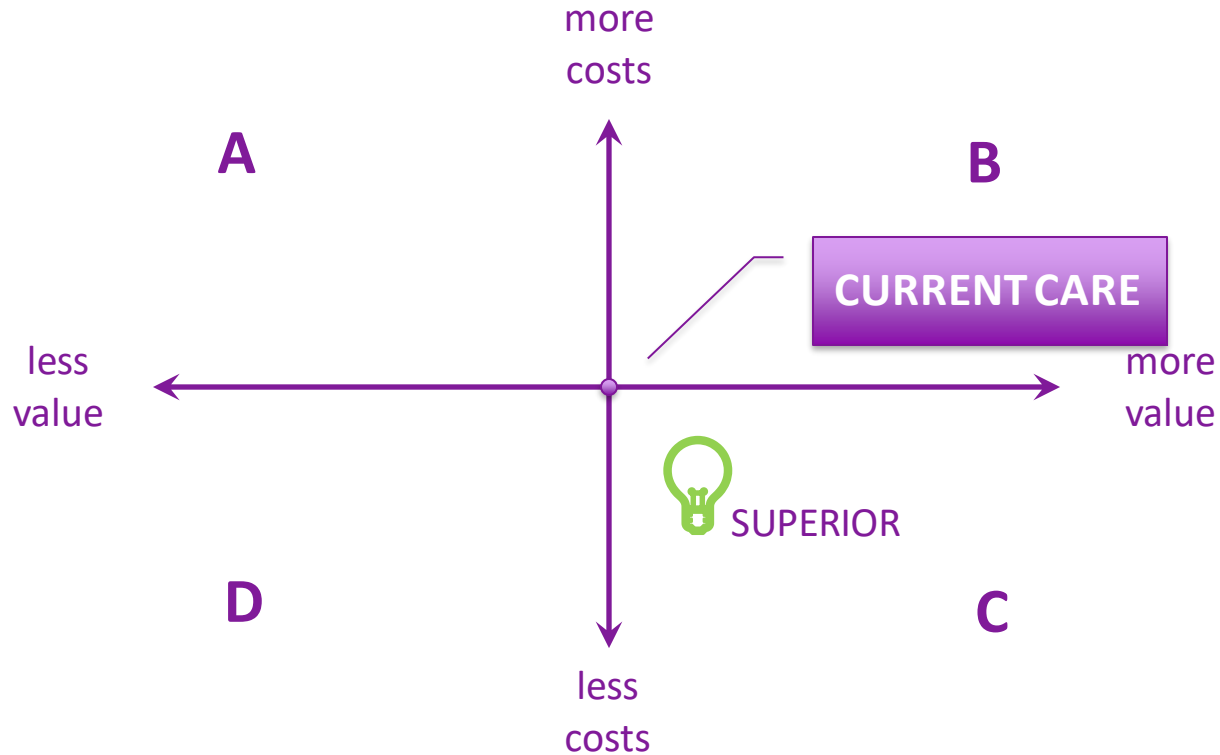
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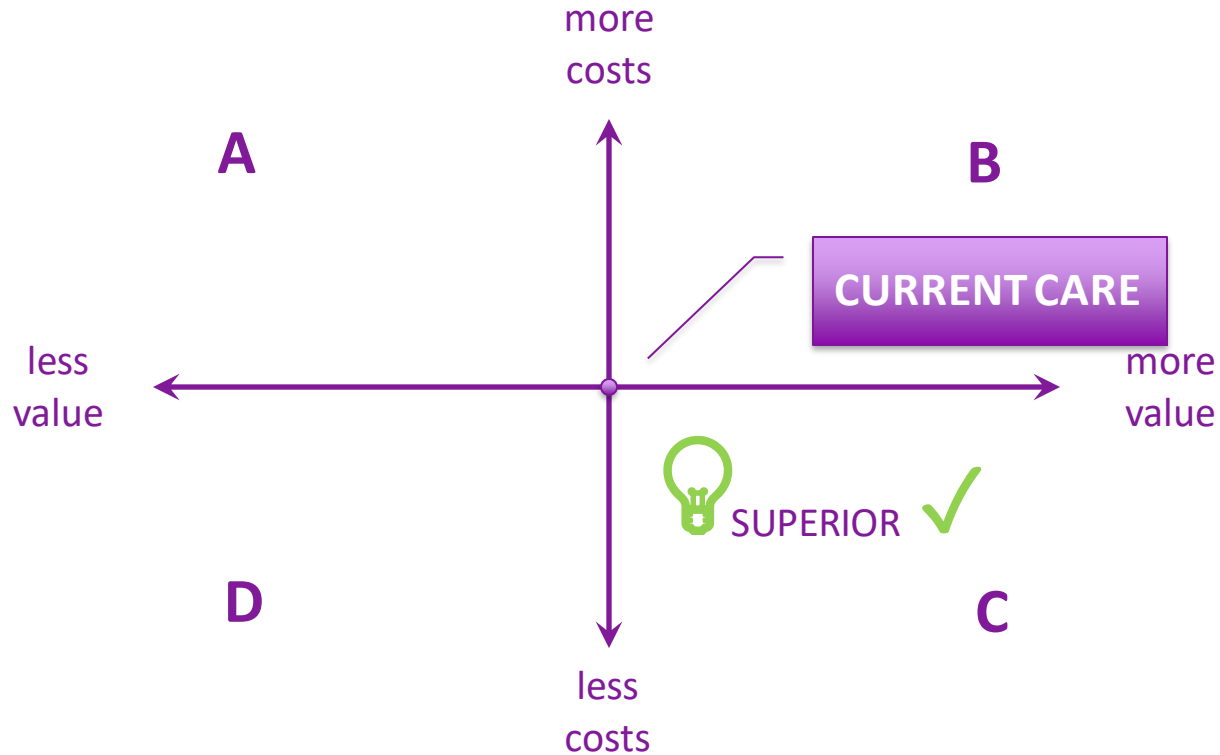
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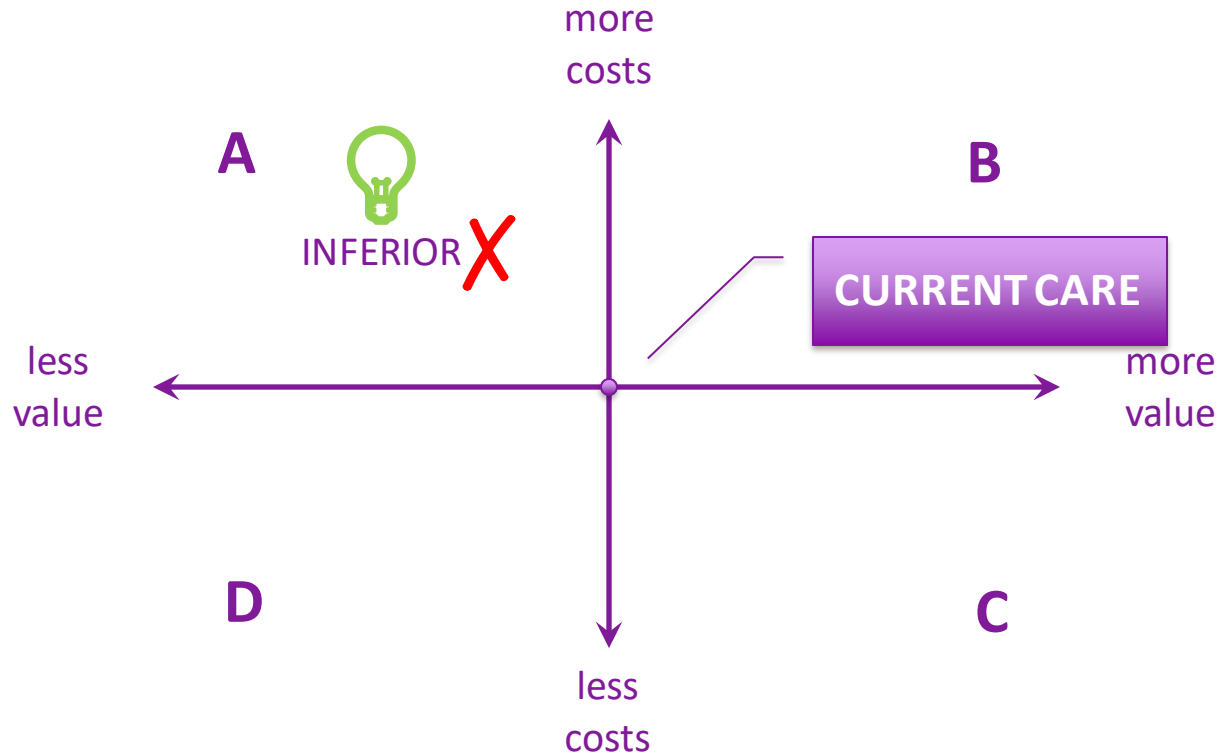
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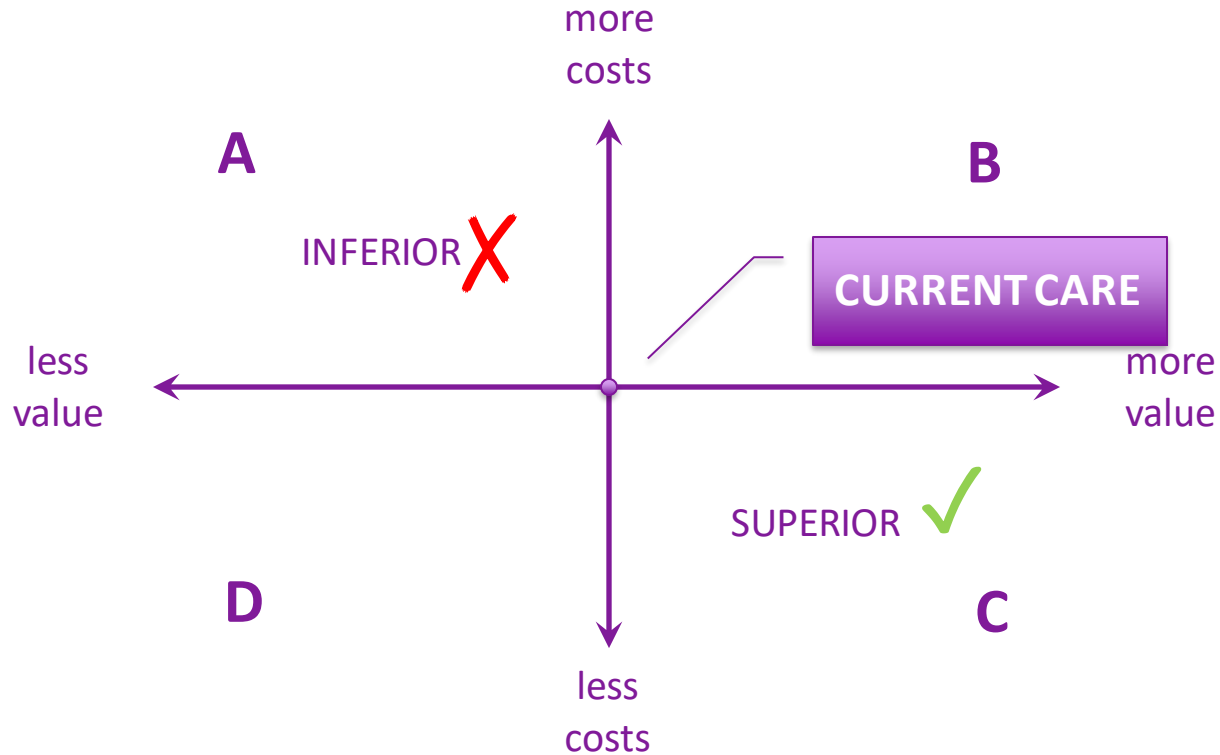
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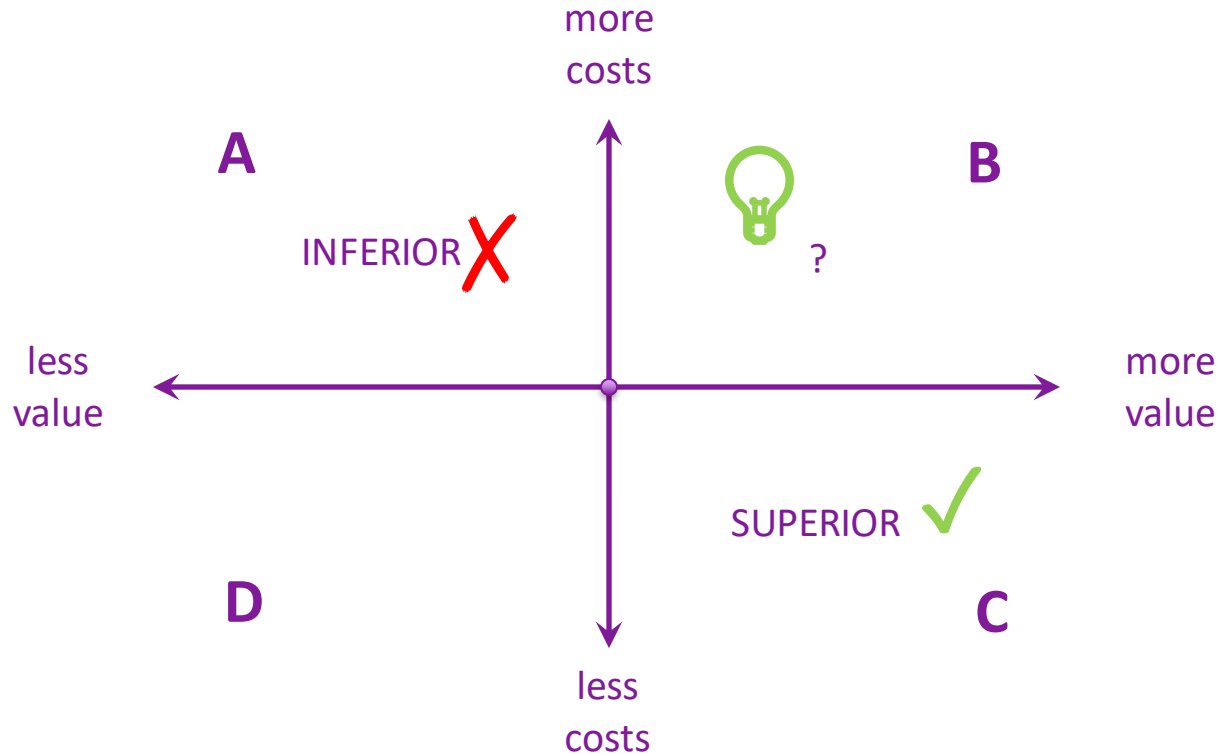
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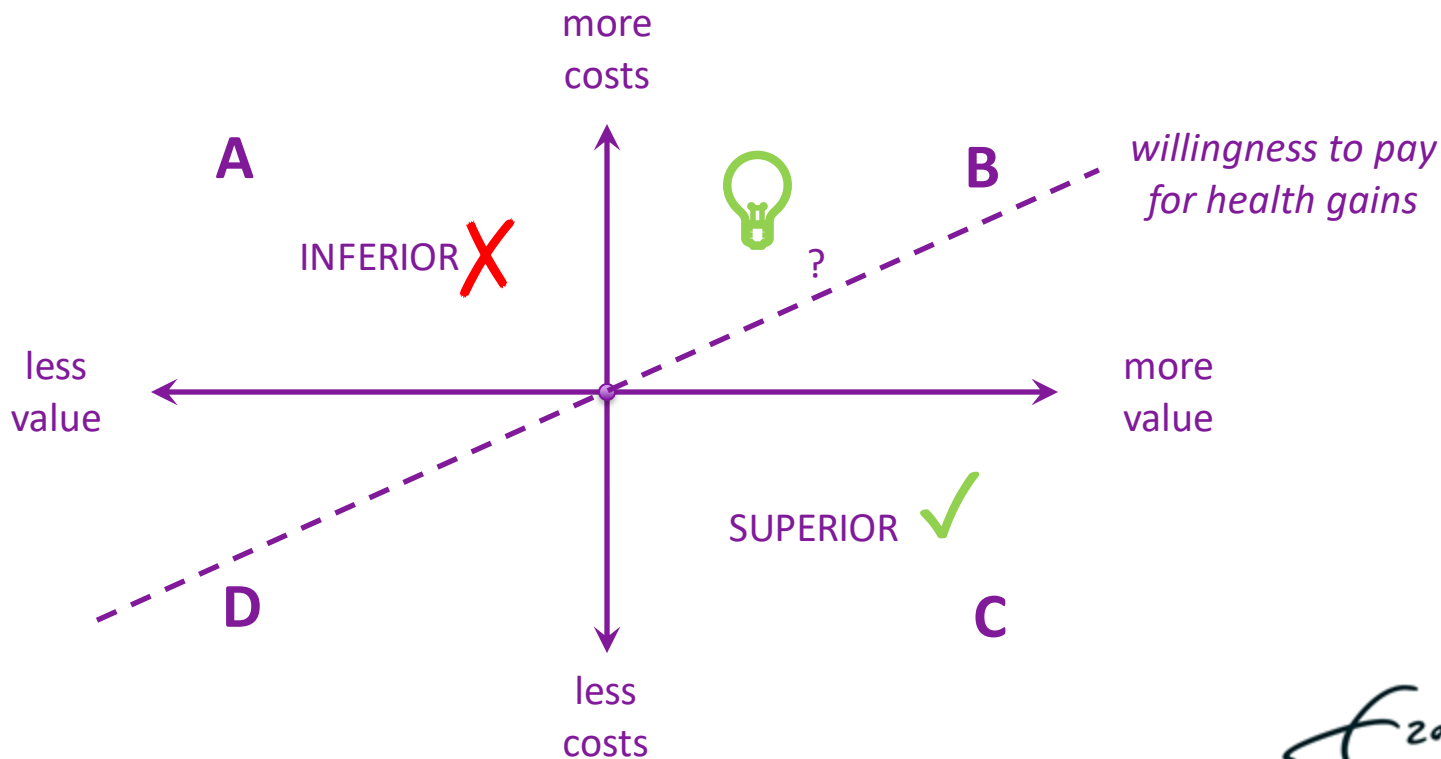
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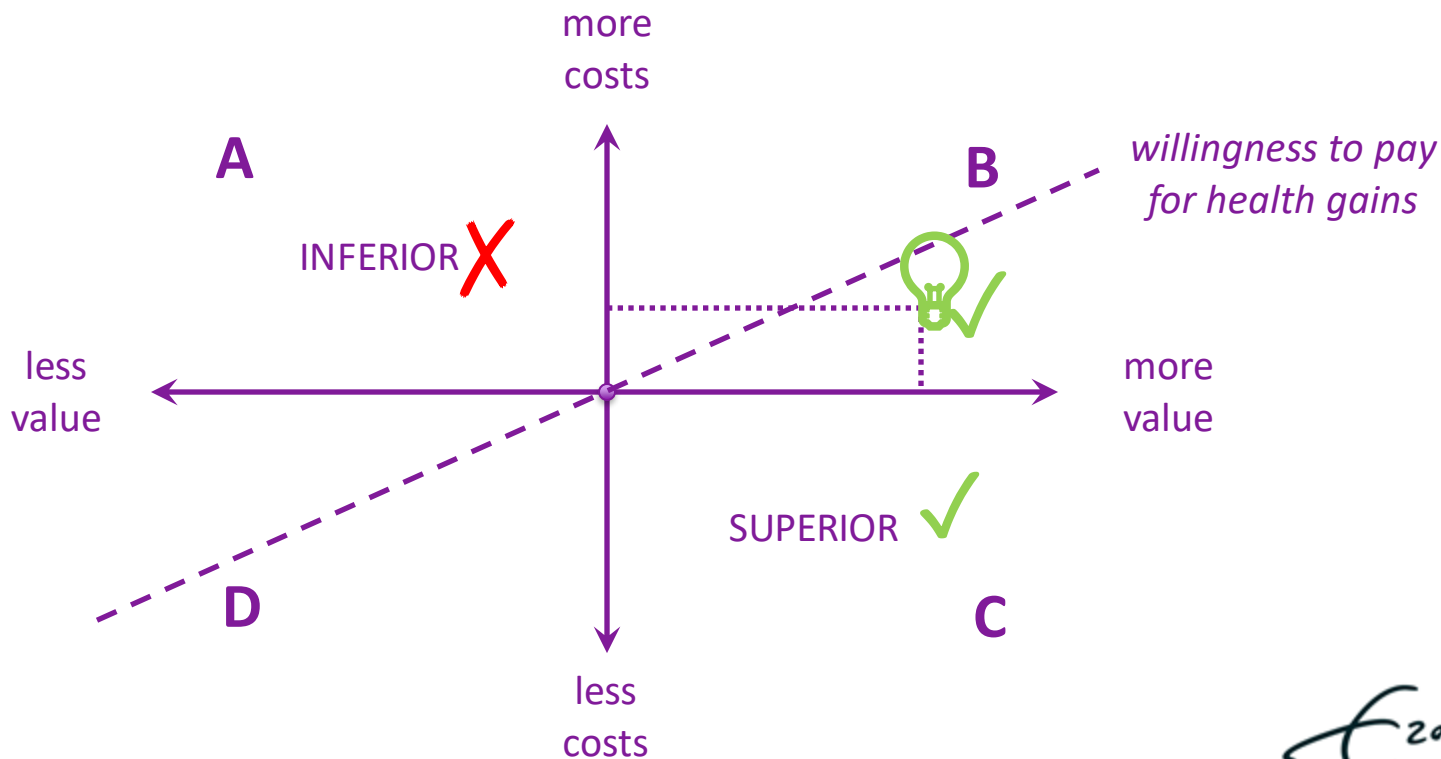
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Efficiency: value for money



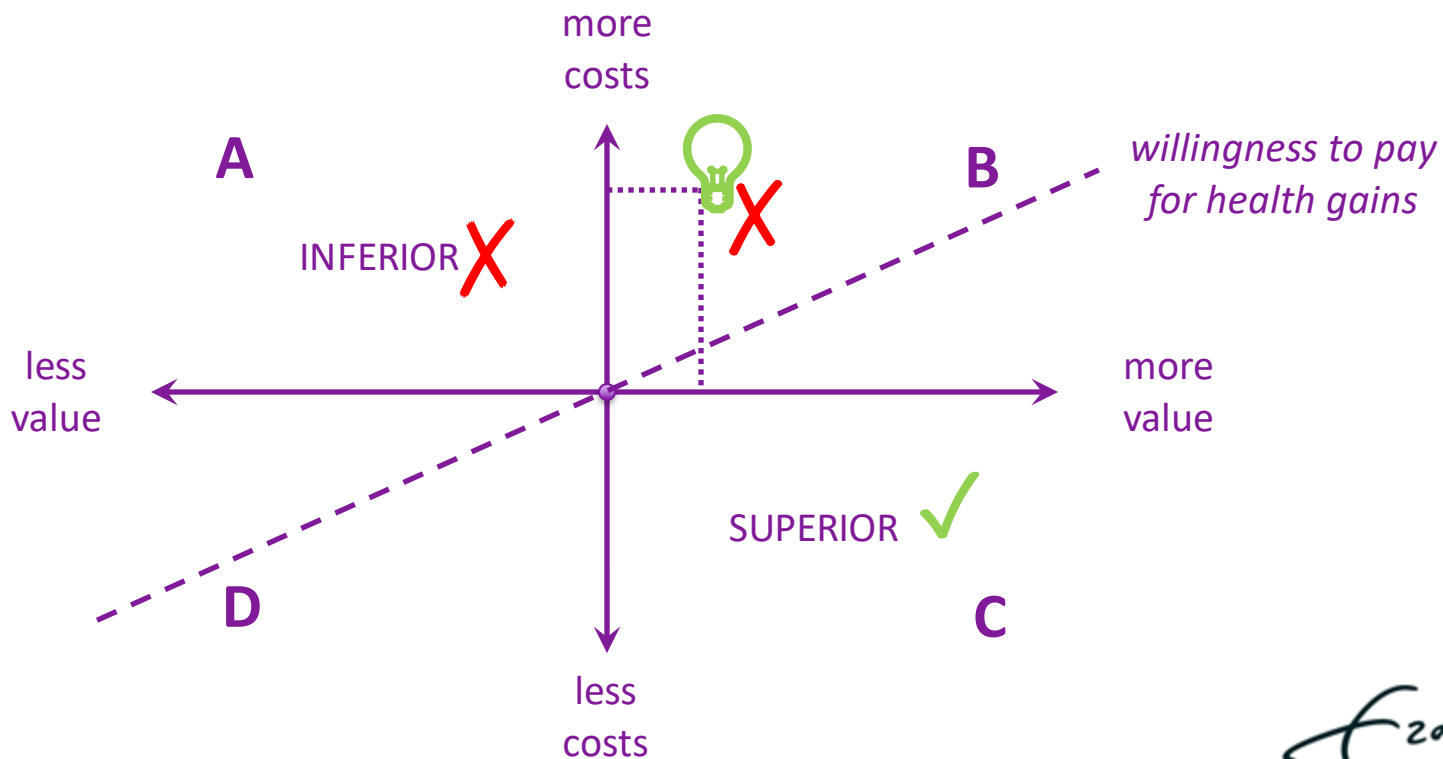
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Efficiency: value for money



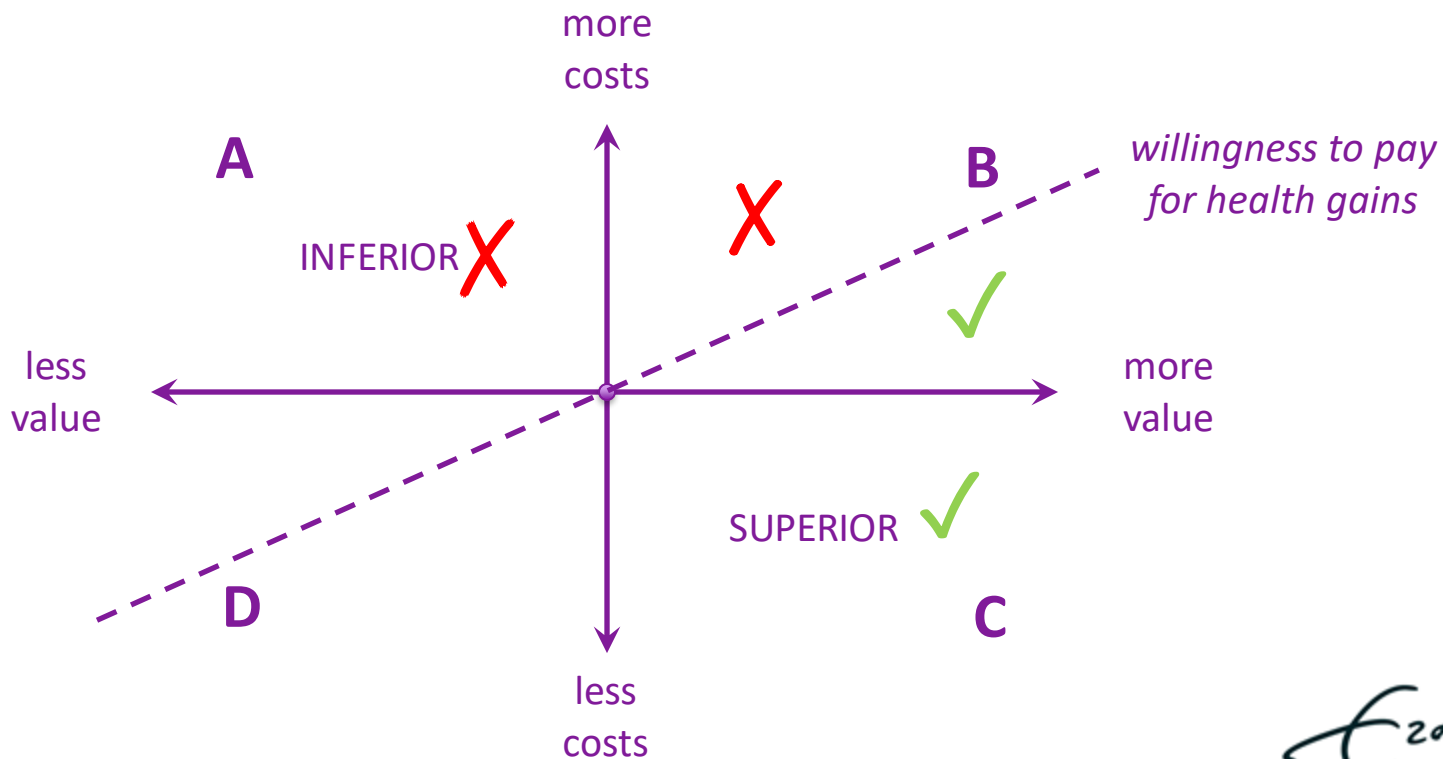
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Efficiency: value for money



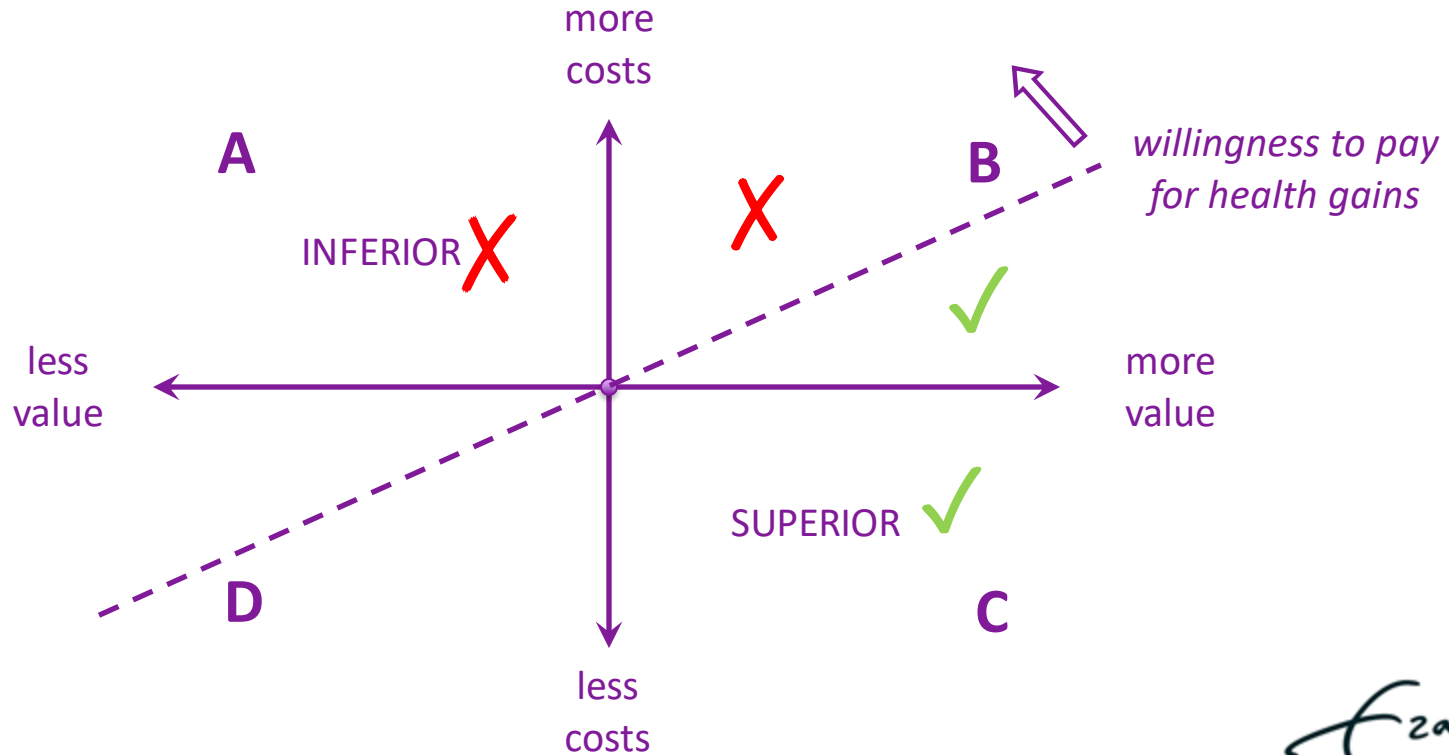
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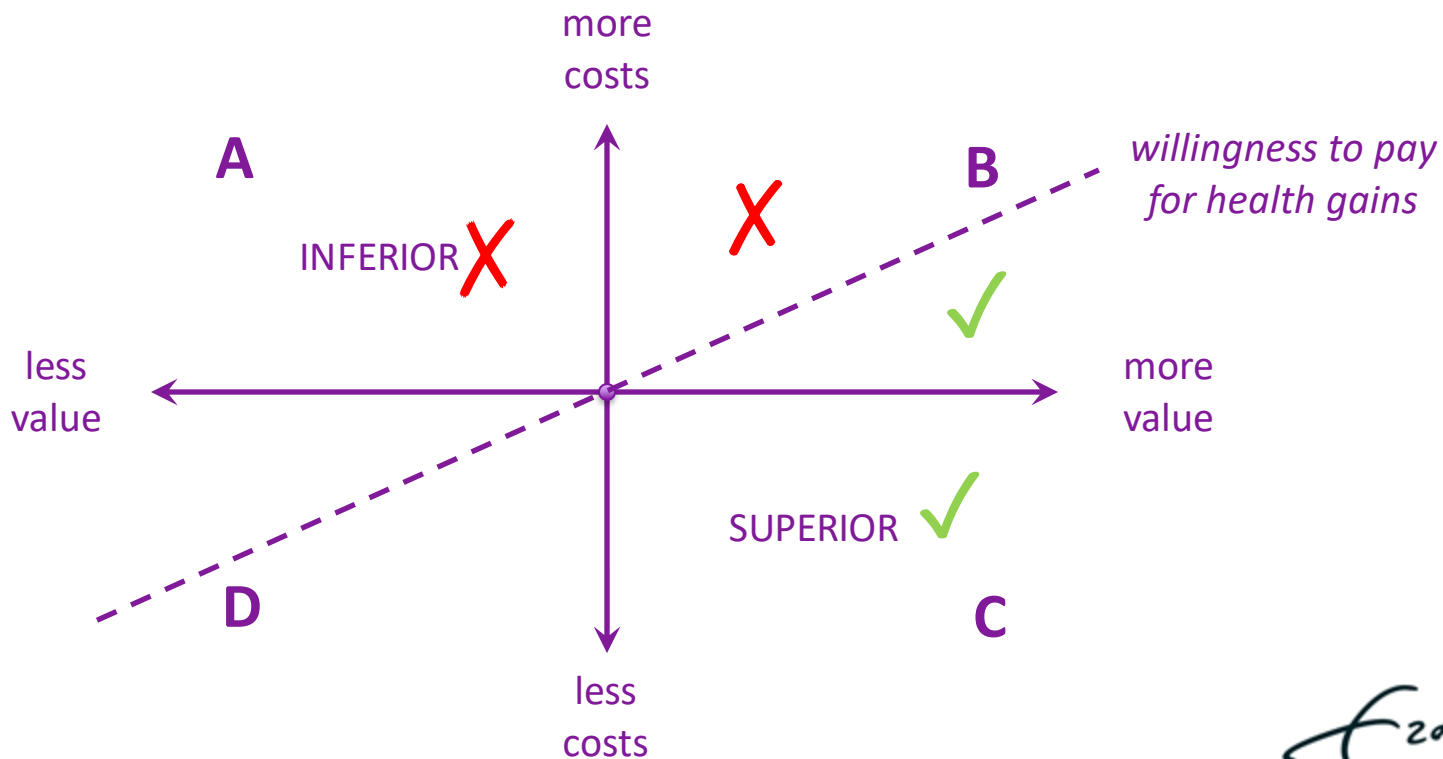
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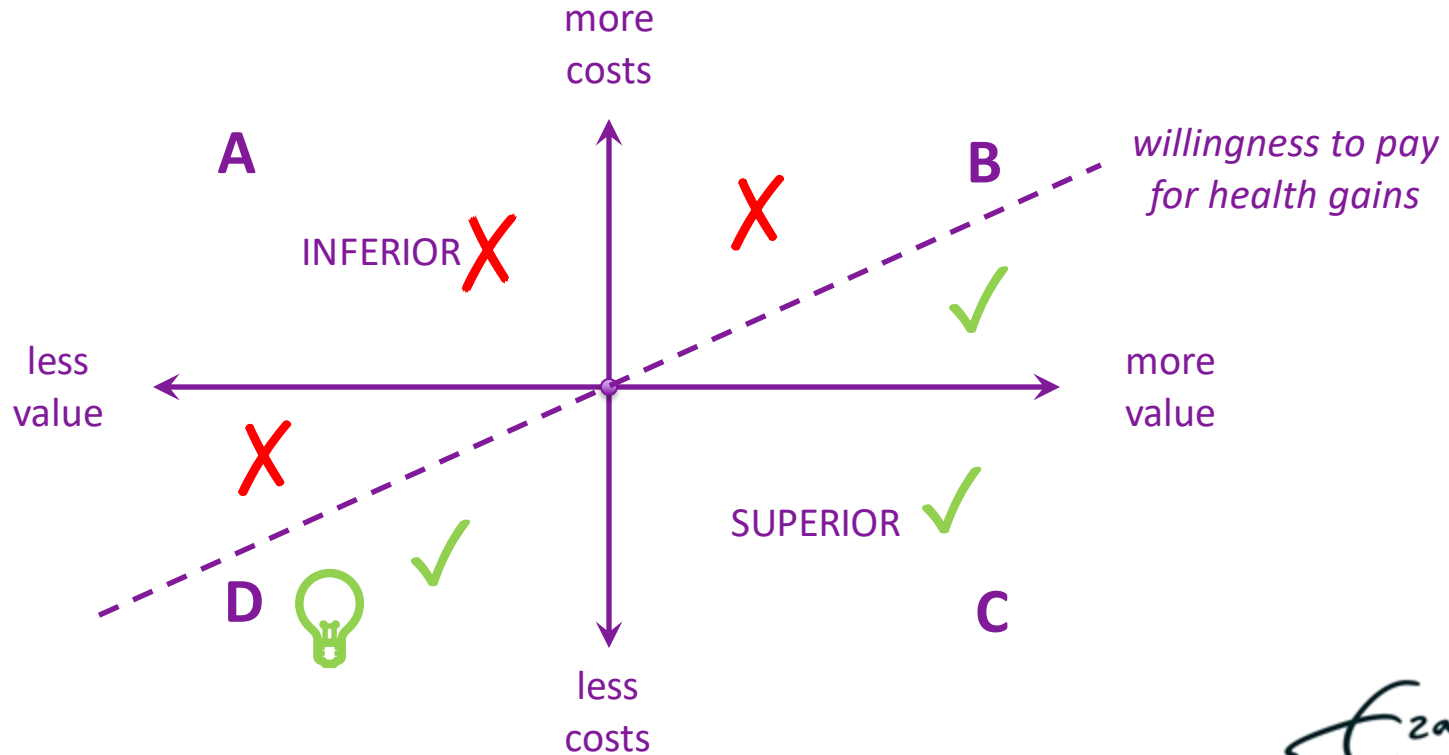
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Efficiency: value for money



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Efficiency: value for money



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Efficiency: value for money



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European value of a quality adjusted life year

Fact Sheet

Objective

A major issue in cost effectiveness analysis is that of the value to place on a quality adjusted life year (QALY), commonly used as a measure of health effectiveness across Europe. This has come to the fore in several European countries, resulting from the creation of national health technology and pharmaceutical assessment agencies. Such agencies were established to make recommendations on technology adoption, addressing issues of affordability and sustainability of publicly funded health care systems. Recommendations are most often made on the basis of QALYs produced relative to costs incurred. Methods of estimating cost per QALY, based on rigorous decision analytic models, are now very sophisticated. However, 'threshold' values adopted (such as £20-40,000 per QALY above or below which a new therapy will be rejected or recommended for adoption in England) are essentially arbitrary, with little or no economic foundation.

This critical policy issue is reflected in growing interest across Europe in development of more sound methods to elicit such a value. The aim of this project would, therefore, be to develop robust methods to determine the monetary value of a QALY across a number of European Member States. This would be addressed in two ways: through 'modelling' such a value based on values of statistical lives currently used (or implicit values from adoption decisions in various fields) across Member States; and through survey research to test two methods of deriving a societal willingness-to-pay (WTP) based monetary value of a QALY. A European-level research initiative is required in the interests of subsidiarity and coherence. Different Member States will have different levels of affordability of QALY production. Country-specific values would lead to improve decision- making and efficiency. But it is crucial that WTP-based values generated have been rigorously tested across cultures using a consistent methodological approach.

Project Information

EUROVAQ
Grant agreement ID: 44172

Start date
1 March 2007

End date
31 August 2010

Funded under
FP6-POLICIES

Overall budget
€ 1 399 171

EU contribution
€ 1 399 171

Coordinated by
UNIVERSITY OF NEWCASTLE UPON TYNE
 United Kingdom



willingness to pay
for health gains

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Efficiency: patient preferences

- Factors that influence adoption and adherence
 - Important to ensure that the full benefits of technologies are realized
- Preferences
 - Mode of treatment
 - Acceptability of health states
 - Policies
 - Willingness to pay

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Efficiency: pa

- Factors that influence
– Important to ensure
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“Please, you go first!” preferences for a COVID-19 vaccine among adults in the Netherlands

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^d Roskilde University, Pandemix Center, Department of Science and Environment Universitetsvej 1, 4000, Roskilde, Denmark
^e Erasmus University Rotterdam Erasmus School of Health Policy & Management, the Netherlands
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ARTICLE INFO

Keywords:
Vaccination
COVID-19
SARS-CoV-2
Public preferences
Health policy
Discrete choice experiment

ABSTRACT

Background: Vaccination is generally considered the most direct way to restoring normal life after the outbreak of COVID-19, but the available COVID-19 vaccines are simultaneously embraced and dismissed. Mapping factors for vaccine hesitancy may help the roll-out of COVID-19 vaccines and provide valuable insights for future pandemics.

Objectives: We investigate how characteristics of a COVID-19 vaccine affect the preferences of adult citizens in the Netherlands to take the vaccine directly, to refuse it outright, or to wait a few months and first look at the experiences of others.

Methods: An online sample of 895 respondents participated between November 4th and November 10th, 2020 in a discrete choice experiment including the attributes: percentage of vaccinated individuals protected against COVID-19, month in which the vaccine would become available and the number of cases of mild and severe side effects. The data was analysed by means of panel mixed logit models.

Results: Respondents found it important that a safe and effective COVID-19 vaccine becomes available as soon as possible. However, the majority did not want to be the first in line and would rather wait for the experiences of others. The predicted uptake of a vaccine with the optimal combination of attributes was 87%, of whom 55% preferred to take the vaccine after a waiting period. This latter group tends to be lower-educated. Older respondents gave more weight to vaccine effectiveness than younger respondents.

Conclusions: The willingness to take a COVID-19 vaccine is high among adults in the Netherlands, but a considerable proportion prefers to delay their decision to vaccinate until experiences of others are known. Offering this wait-and-see group the opportunity to accept the invitation at a later moment may stimulate vaccination uptake. Our results further suggest that vaccination campaigns targeted at older citizens should focus on the effectiveness of the vaccine.

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- Factors that influence
 - Important to ensure
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ELSEVIER

Péntek et al. *Health Qual Life Outcomes* (2020) 18:346
<https://doi.org/10.1186/s12955-020-01568-w>

Health and Quality of Life Outcomes

RESEARCH Open Access

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Acceptable health and ageing: results of a cross-sectional study from Hungary

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^a Delft University of Technology
^b National Institute for Public Health and the Environment
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Abstract

Background: We aimed to investigate the acceptability of imperfect health states in relation to age in Hungary and analyse its determinants. Results are contrasted to age-matched actual population health scores and to findings from a previous study in The Netherlands.

Methods: A cross-sectional online survey was performed. The same survey questions were applied as in a previous study in The Netherlands in order to enable inter-country comparisons. The descriptive system of the EQ-5D-3L health status questionnaire was used to assess the acceptability of moderate and severe health problems at ages from 30 to 80 by 10-year age-groups. Descriptive statistics were performed and linear regression analysis was used to investigate the determinants of acceptability.

Results: Altogether 9281 (female 32.8%) were involved with mean age 36.0 years and EQ-5D-3L index score of 0.852 (SD 0.177). Acceptability of health problems increased with age, differed per health domain and with severity of the problems. Except for 'Self-care', moderate health problems were acceptable by the majority from age 70 and acceptability scores were lower than EQ-5D-3L population norms from that age. The lowest average acceptability age was found in the 'Anxiety/depression' and dimension the highest in the 'Self-care' dimension. Respondents' age, current health, and lifestyle were significant determinants (R^2 : 0.041–0.130). With a few minor exceptions in some health dimensions, acceptability levels and patterns were strikingly similar to the Dutch findings.

Conclusion: In Hungary, acceptability of health problems increases with age and the majority found severe problems never acceptable. Views on acceptability of health problems seem to be fairly generalizable across European countries with different health and economic indicators.

Keywords: Acceptability, Ageing, Health-related quality of life, EQ-5D-3L, Hungary, The Netherlands

ARTICLE

Keywords: Vaccination, COVID-19, SARS-CoV-2, Public preference, Health policy, Discrete choice

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Efficiency: pa

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Health economists can help provide insights

- Costs and benefits of new technologies
- Preferences of patients
- Value of health
 - help policy makers to decide which technologies to fund from their budget
- Innovations in medical technology
 - provide great benefits to patients: longer and healthier lives
 - threat to the financial sustainability of the healthcare sector
- To face this societal challenge, closer collaboration between engineers and health economists is important

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Health

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Health & Technology

We are on a mission to improve life-long health for all

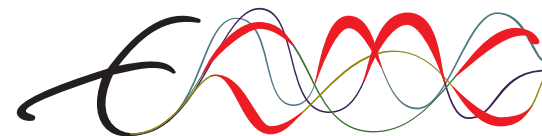
TU Delft, Erasmus University Rotterdam and Erasmus MC are joining forces and integrating knowledge, expertise and methodology. Through convergence, we will form novel frameworks that foster scientific discovery and technological innovation in the field of health and healthcare.



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& Management

Thank you!

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