

Current approaches to Risk-Benefit Assessment – Experience gained

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Scientific Colloquium N°26 on Risk Benefit Assessment of
combined exposure to Nutrients and Contaminants through food,
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Risk and Benefit Assessment

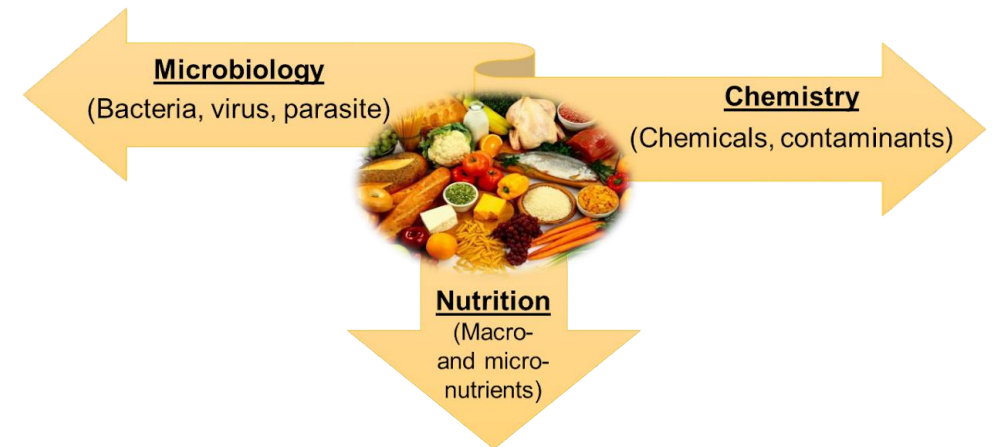
Usually our research focus in estimating the health impact on food is on:

- only risks **or** benefits
- one hazard **or** benefit
- one food
- one health effect

Food can be associated with benefits and risks

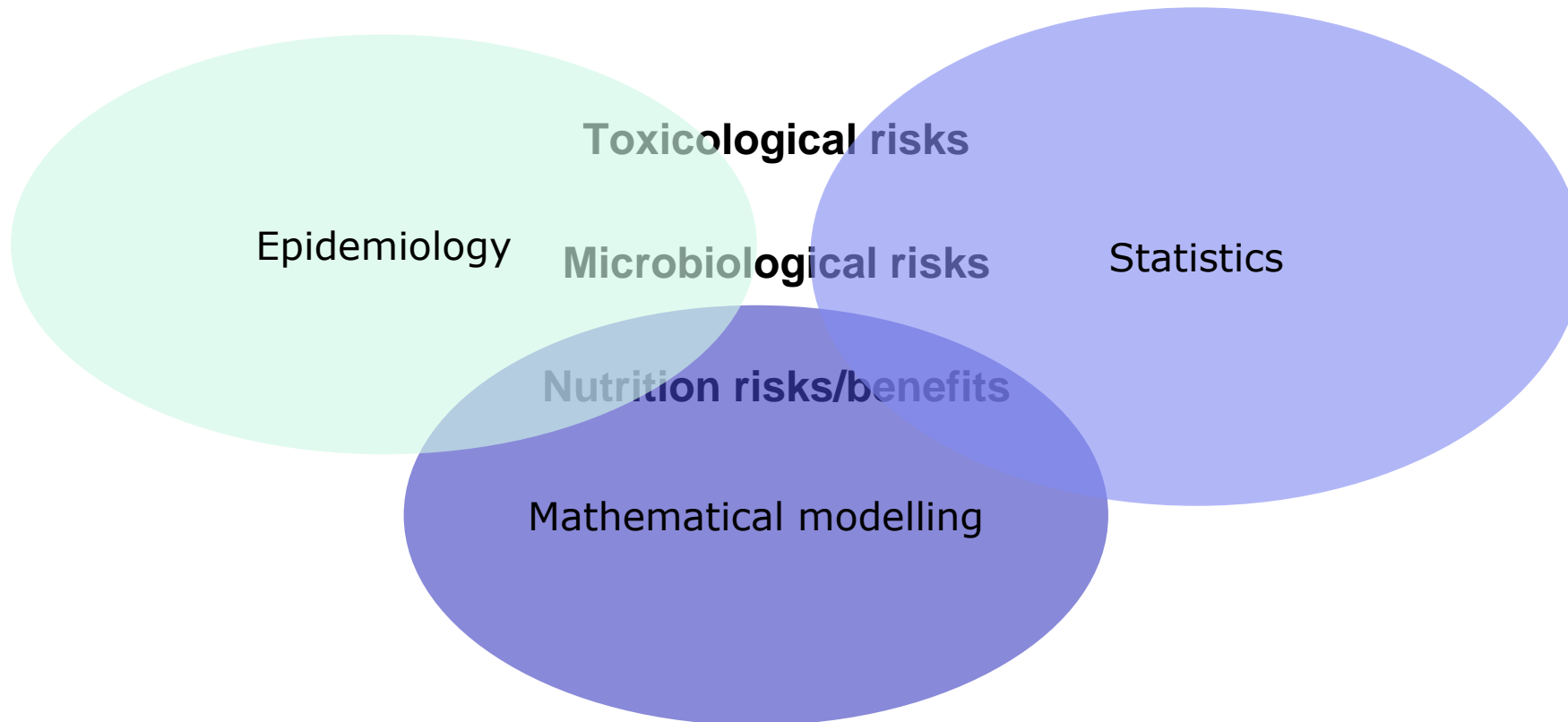
- This requires an integrated approach

= Risk-Benefit Assessment of foods (RBA)

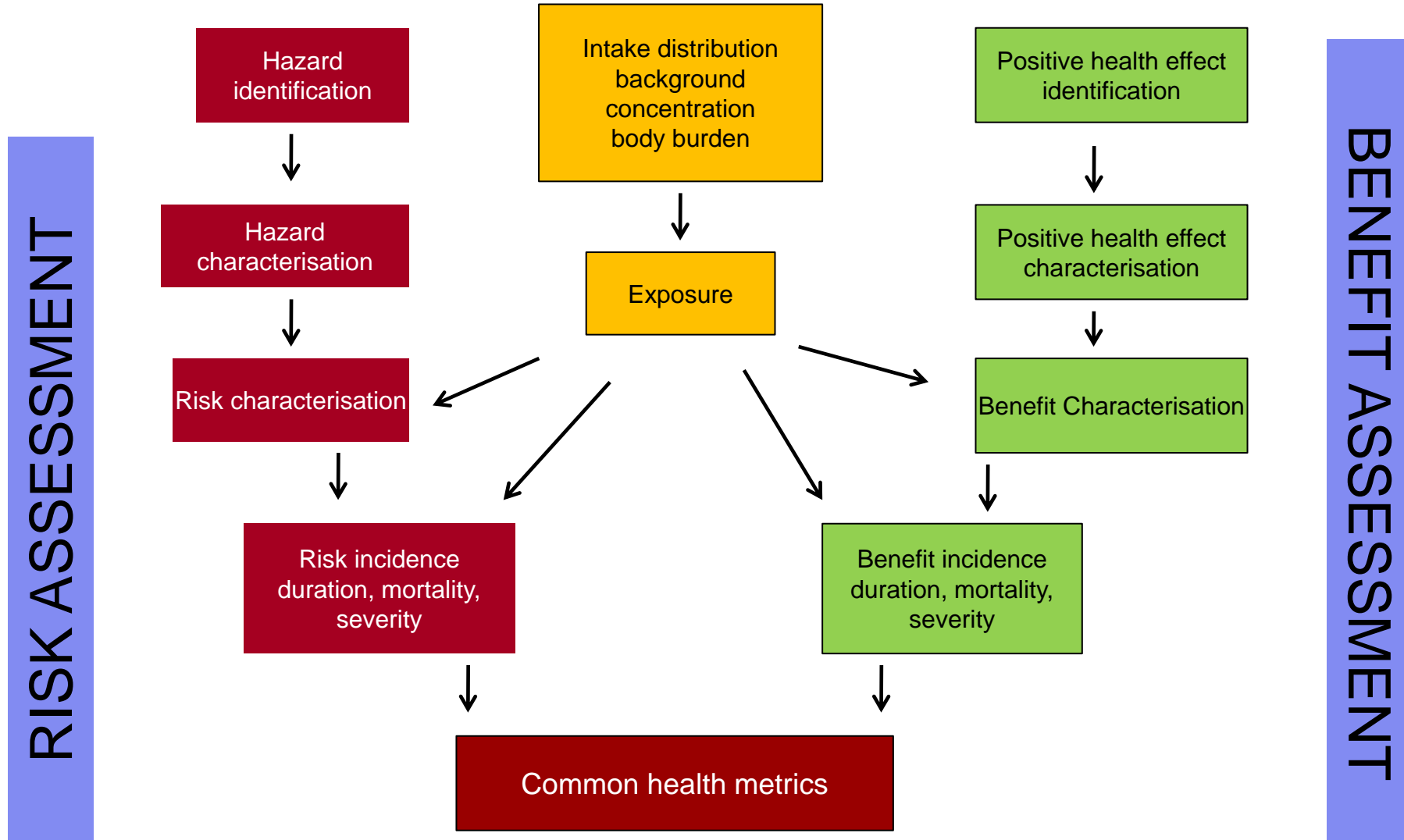


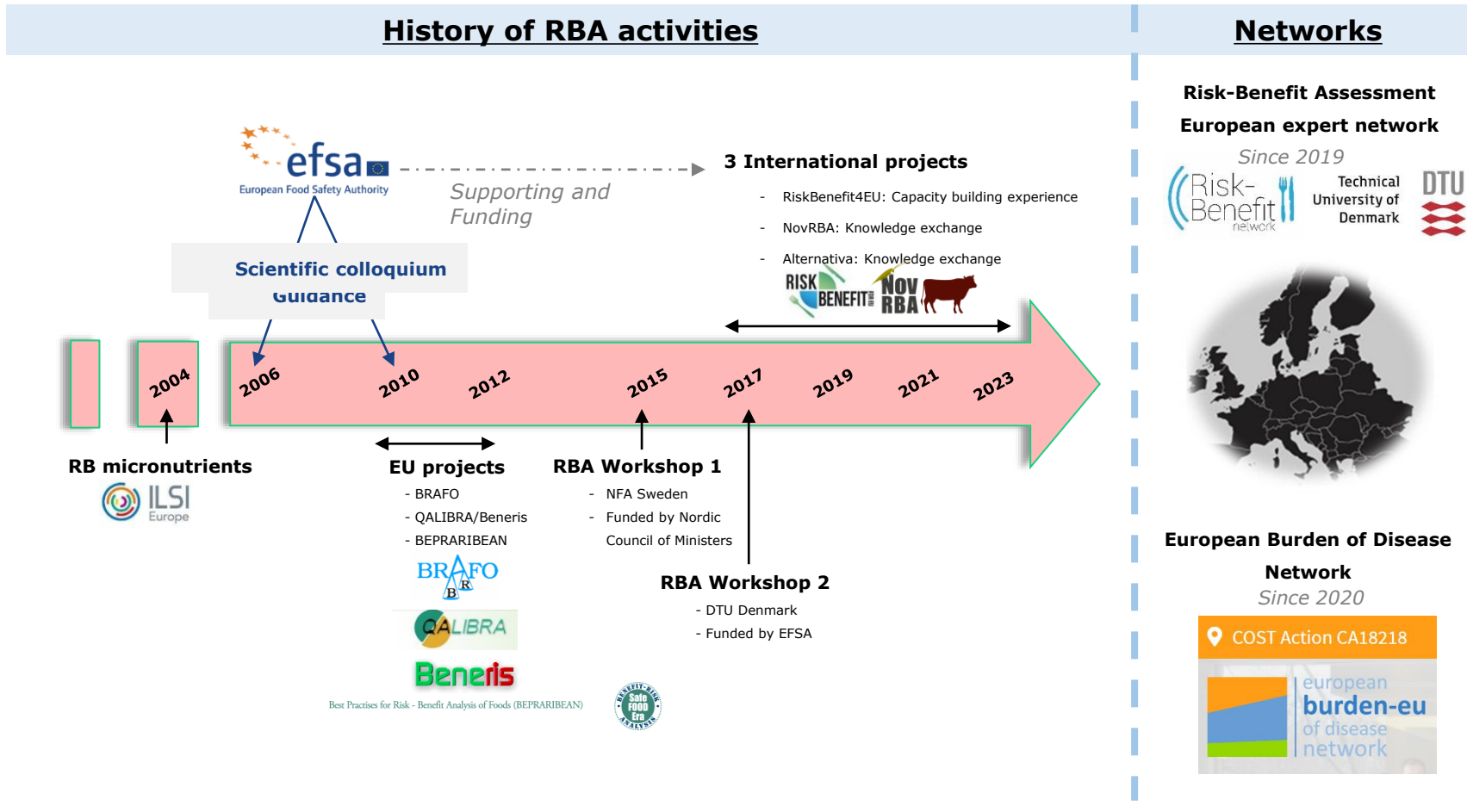
Risk-benefit assessment is multidisciplinary

Assessing food risks and benefits requires a multidisciplinary approach:



The Risk-Benefit Assessment





Networks

Risk-Benefit Assessment European expert network

Since 2019

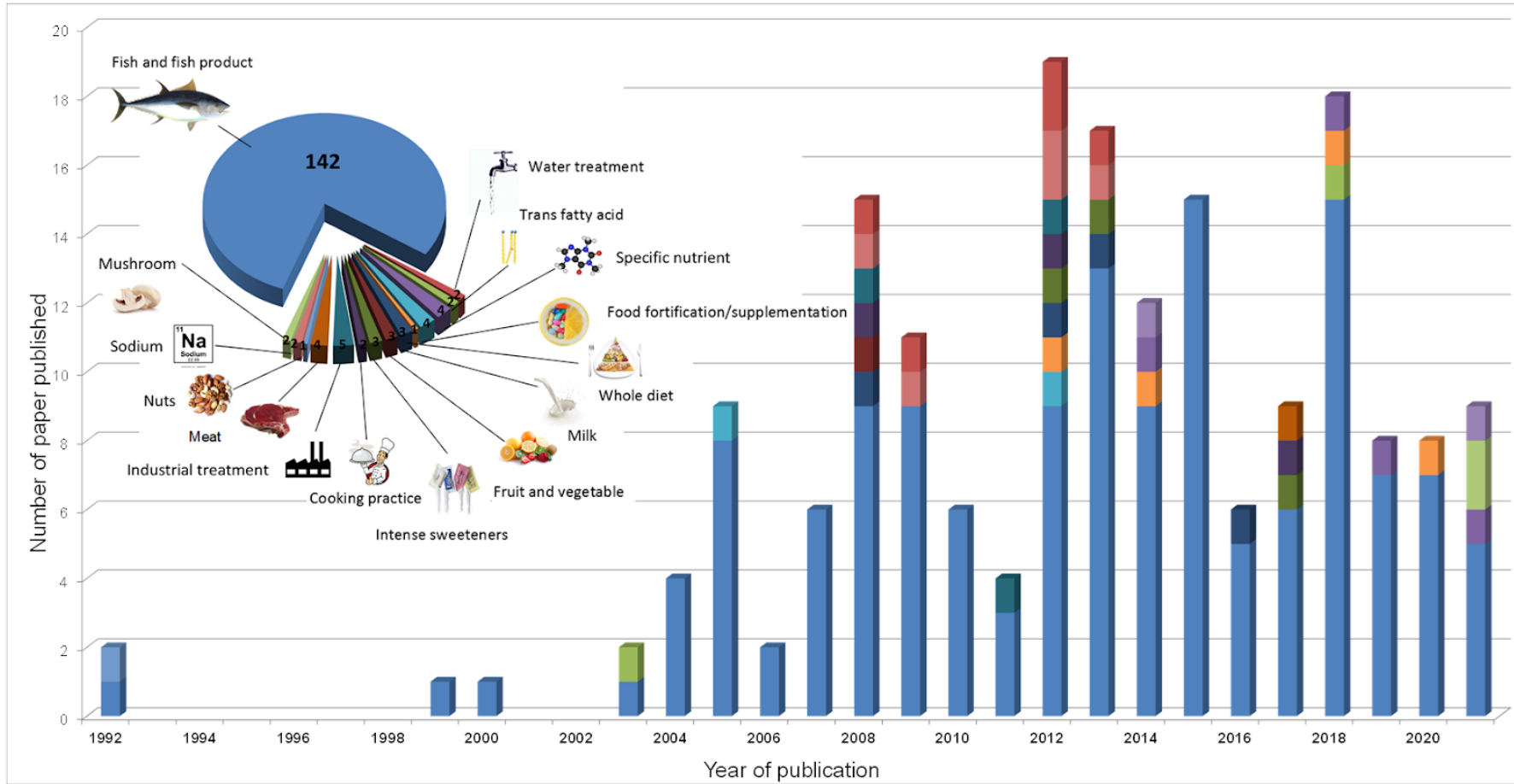
European Burden of Disease Network

Since 2020

COST Action CA18218

(Modified from Boué *et al.* 2015)

What has been assessed?







Modified from Boué et al., 2015



REVIEW

Human health risk–benefit assessment of fish and other seafood: a scoping review

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ABSTRACT

Fish and other seafood are important sources of nutrients, but they are also sources of chemical contaminants that may cause adverse health effects. This article aimed to identify existing risk–benefit assessments (RBA) of fish, shellfish, and other seafood, compare methodologies, discuss differences and commonalities in findings, and identify limitations and ways forward for future studies. We conducted a scoping review of the scientific literature of studies in all languages published from 2000 through April 2019. We identified 106 RBA of fish and other seafood across Europe, Asia, North America, Africa, and at the global level. Studies were heterogeneous in terms of types of fish and other seafood considered, beneficial and adverse compounds assessed, and overall methodology. Collected data showed that a diet consisting of a variety of lean and fatty fish and other seafood is recommended for the overall population and that women of childbearing age and children should limit the consumption of fish and other seafood types that have a high likelihood of contamination. Our review emphasizes the need for evidence-based, up-to-date, and harmonized approaches in RBA in general.

KEYWORDS

Health effects; adverse; beneficial; nutrients; contaminants; fish; seafood; impact assessment

Human health risk–benefit assessment of fish and other seafood: a scoping review - Key findings

106 RBAs of fish and other seafood published after the year 2000

Most studies made conclusions relevant to the general population or women of childbearing age

The conclusions of the studies included were heterogeneous, but consensus that a diet consisting of a variety of lean fish, fatty fish, and other seafood is recommended. Moreover, particular women of childbearing age, especially pregnant or nursing, and children, should limit the consumption of contaminated fish/seafood

More than 80% of the published studies focused on the richest 15% of the world population

Components included in the studies

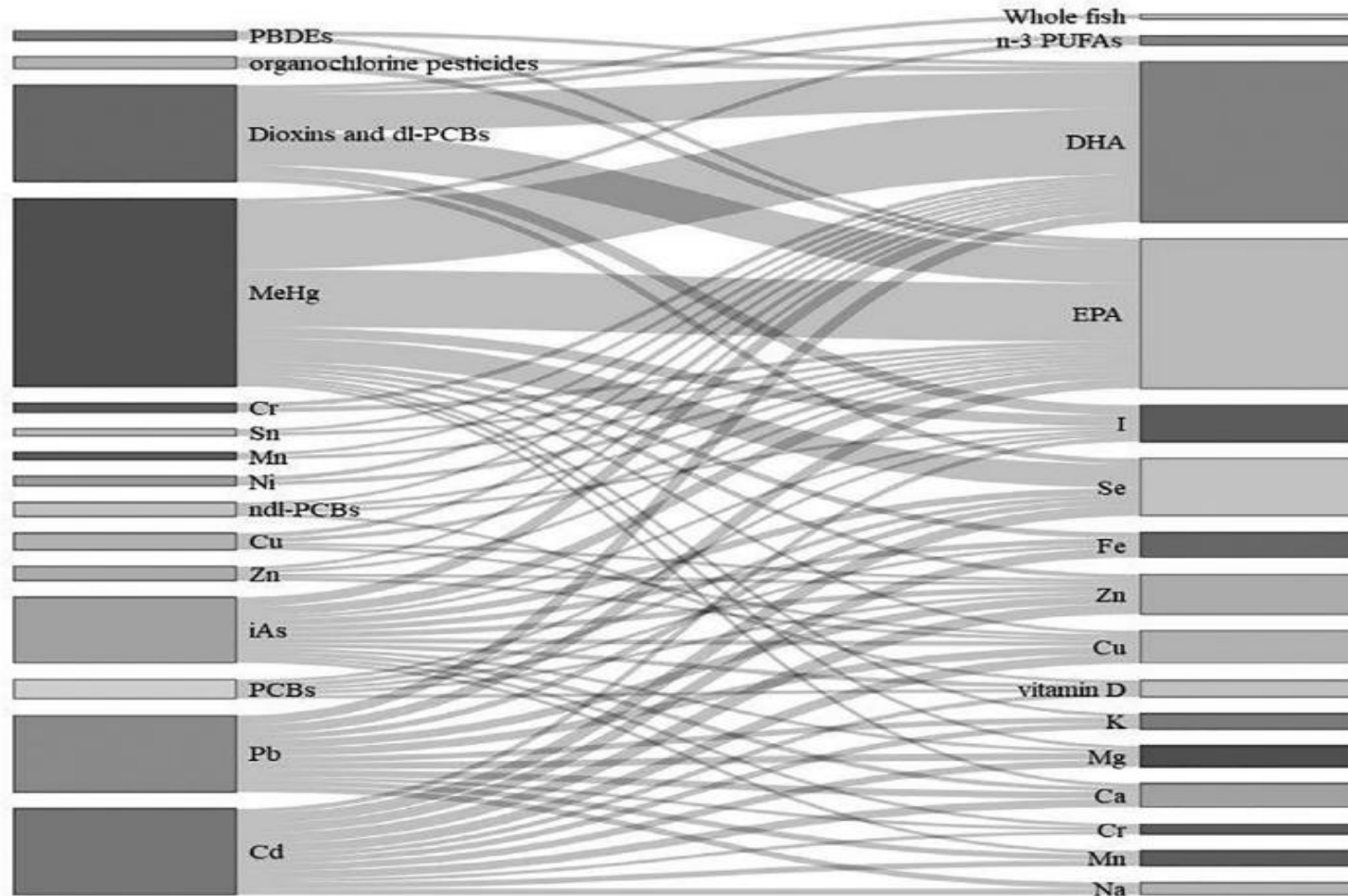


Figure 4. Sankey plot of hazardous (left) – beneficial component (right) pairs considered in at least three published risk–benefit assessments of fish and other seafood. Abbreviations: DHA: docosahexaenoic acid; EPA: eicopentaenoic acid; dl-PCBs, dioxin-like polychlorinated biphenyls; ndl-PCBs, non-dioxin like polychlorinated biphenyls; MeHg, methylmercury; PBDEs, polybrominated diphenyl ethers; PCBs, polychlorinated biphenyls; PUFAs: polyunsaturated fatty acids.

Human health risk–benefit assessment of fish and other seafood: a scoping review - Key findings

The majority of RBAs estimated risks and benefits by comparing exposure to nutrients and contaminants with established thresholds (DRVs and HBGVs) - useful to provide a screening of the safety of fish/seafood consumption, but inherent differences in risk assessment in nutrition and toxicology is a challenge

Several studies compared and integrated risks and benefits in terms of a common health metric, such as IQ, CHD and cancer incidence or mortality, or a composite health metric as the DALY or QALY - useful to compare the effect sizes of potential changes in fish/seafood consumption patterns, but can be comprehensive and often include few endpoints

Need for evidence-based, up-to-date and harmonized approaches in the field of RBA

BRAFO tiered approach

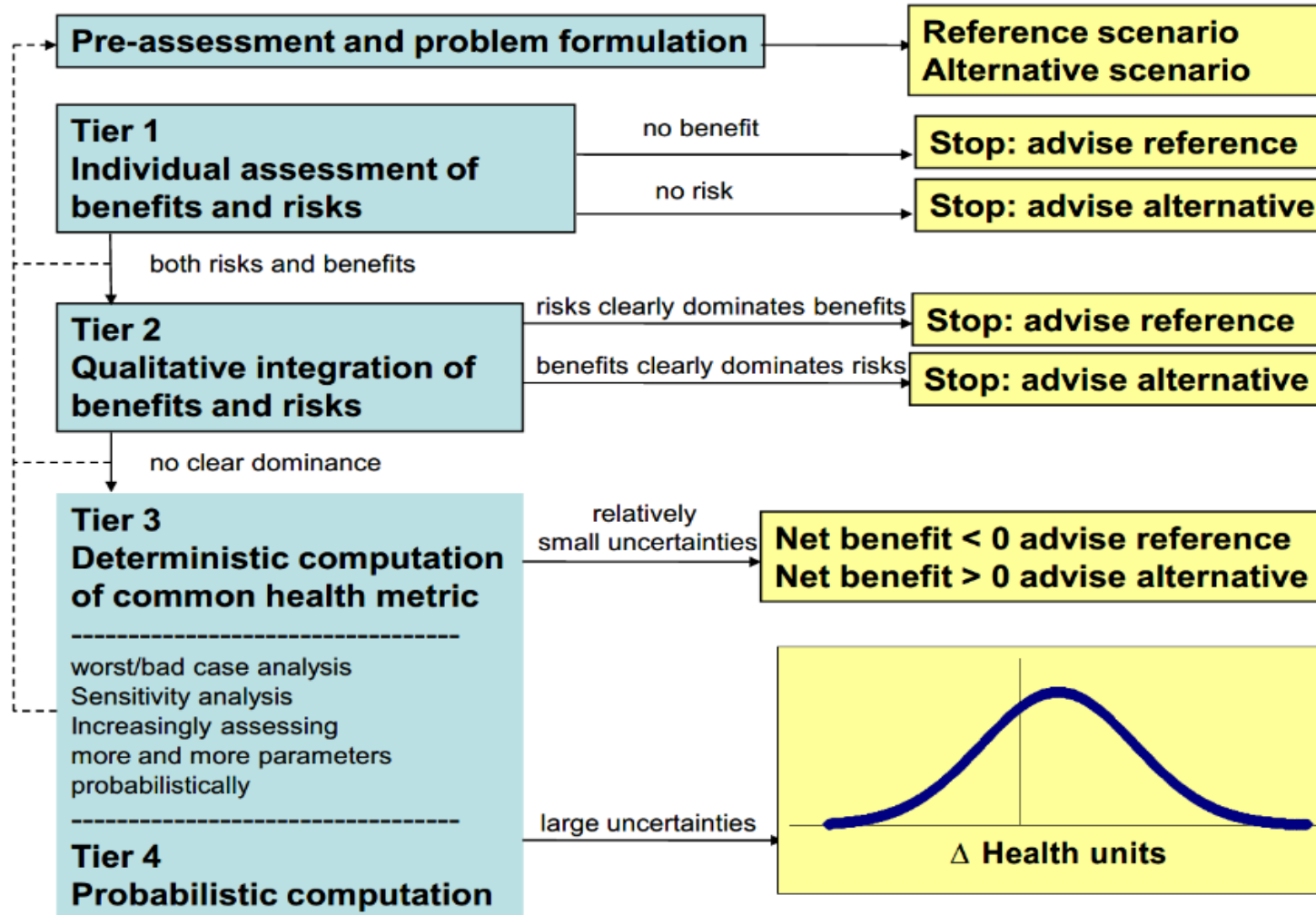


Fig. 1. A flow-chart of the BRAFO tiered approach.

Substituting red and processed meat by fish intake scenarios

Scenario:

Reference: **Current intake of fish** in the Danish population

Alternative 1: **350 g/week** of *mix of lean and fat fish*

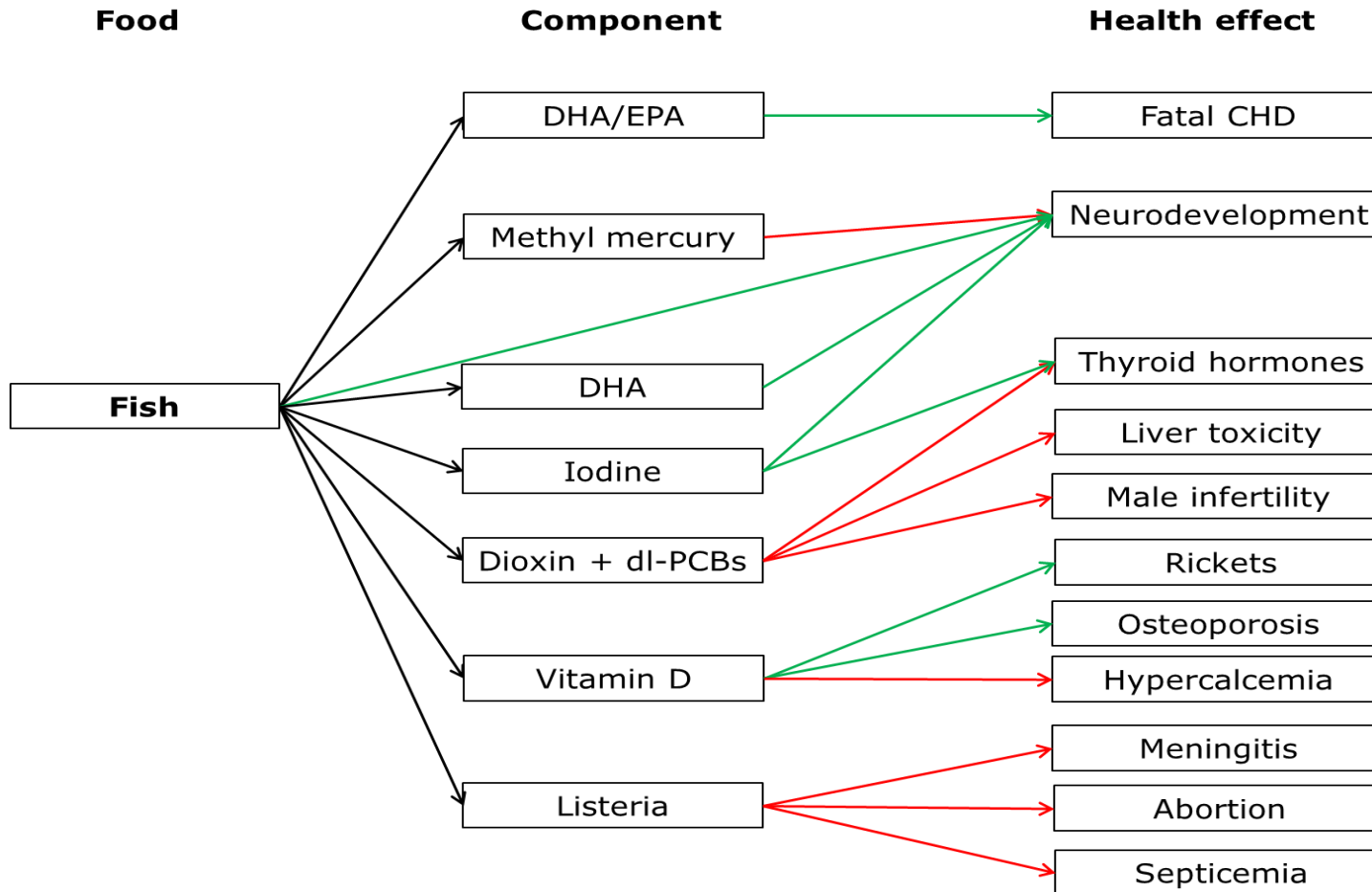
Alternative 2: **350 g/week** of *fat fish*

Alternative 3: **350 g/week** of *lean fish*

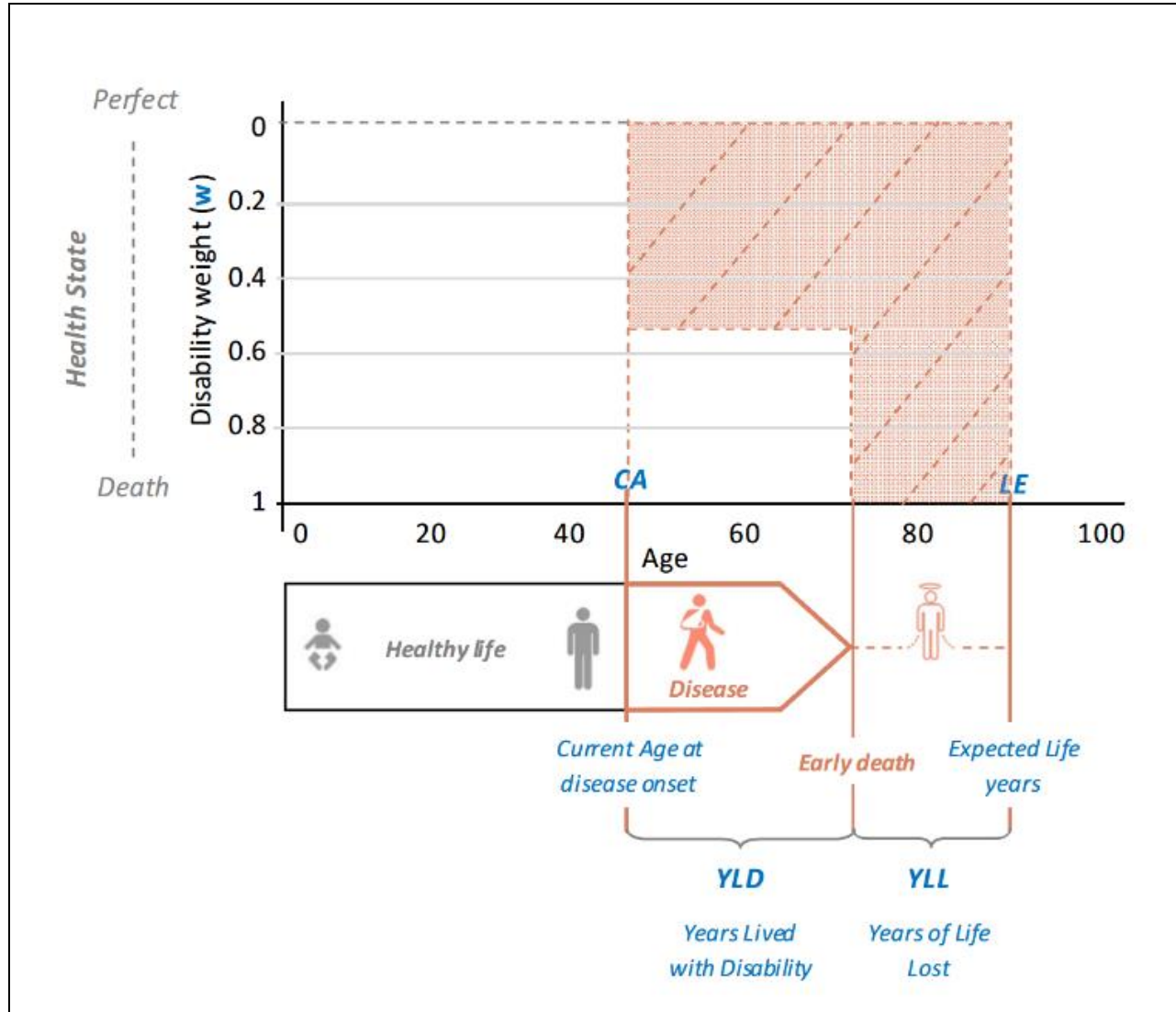
Alternative 4: **350 g/week** of *tuna*

Increased fish intake is on behalf of decreased meat intake

Thomsen et al., 2018

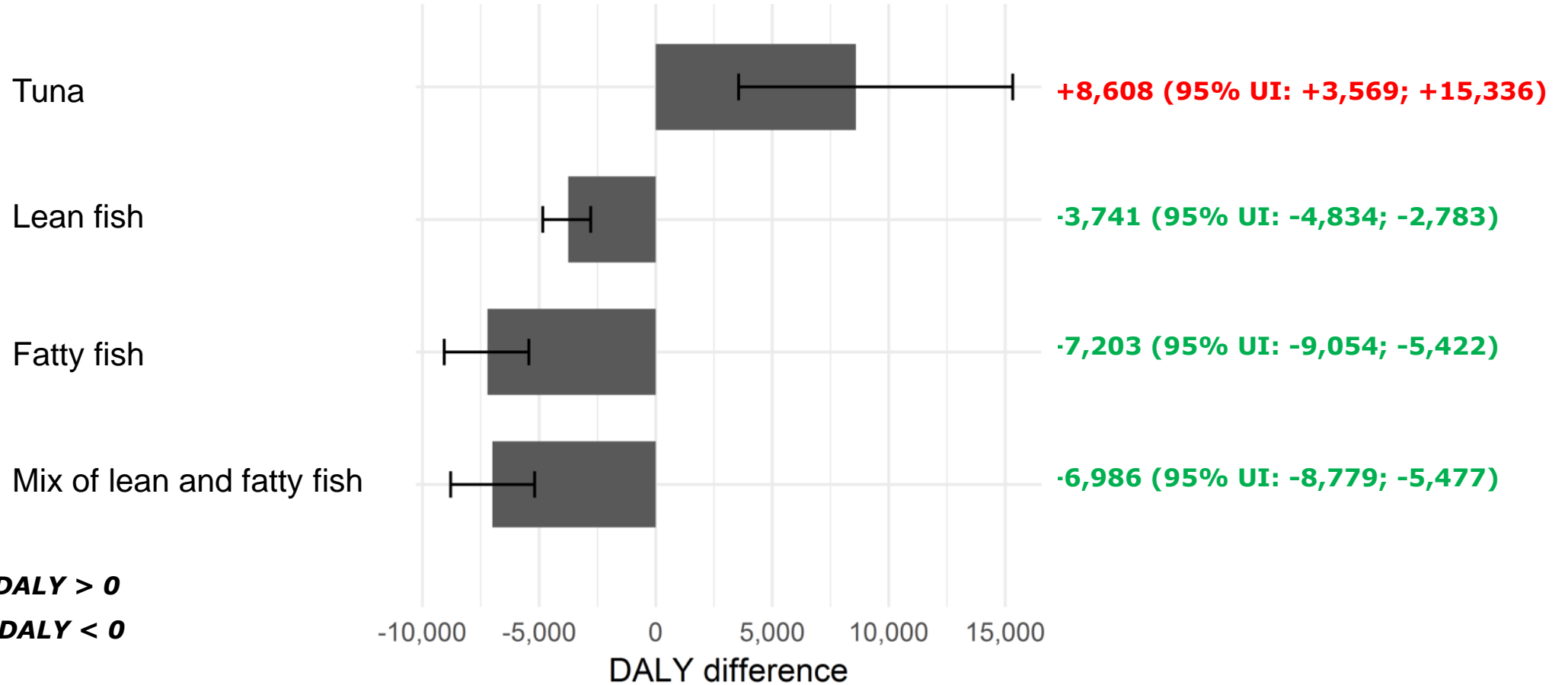


Disability-Adjusted life years (DALY)



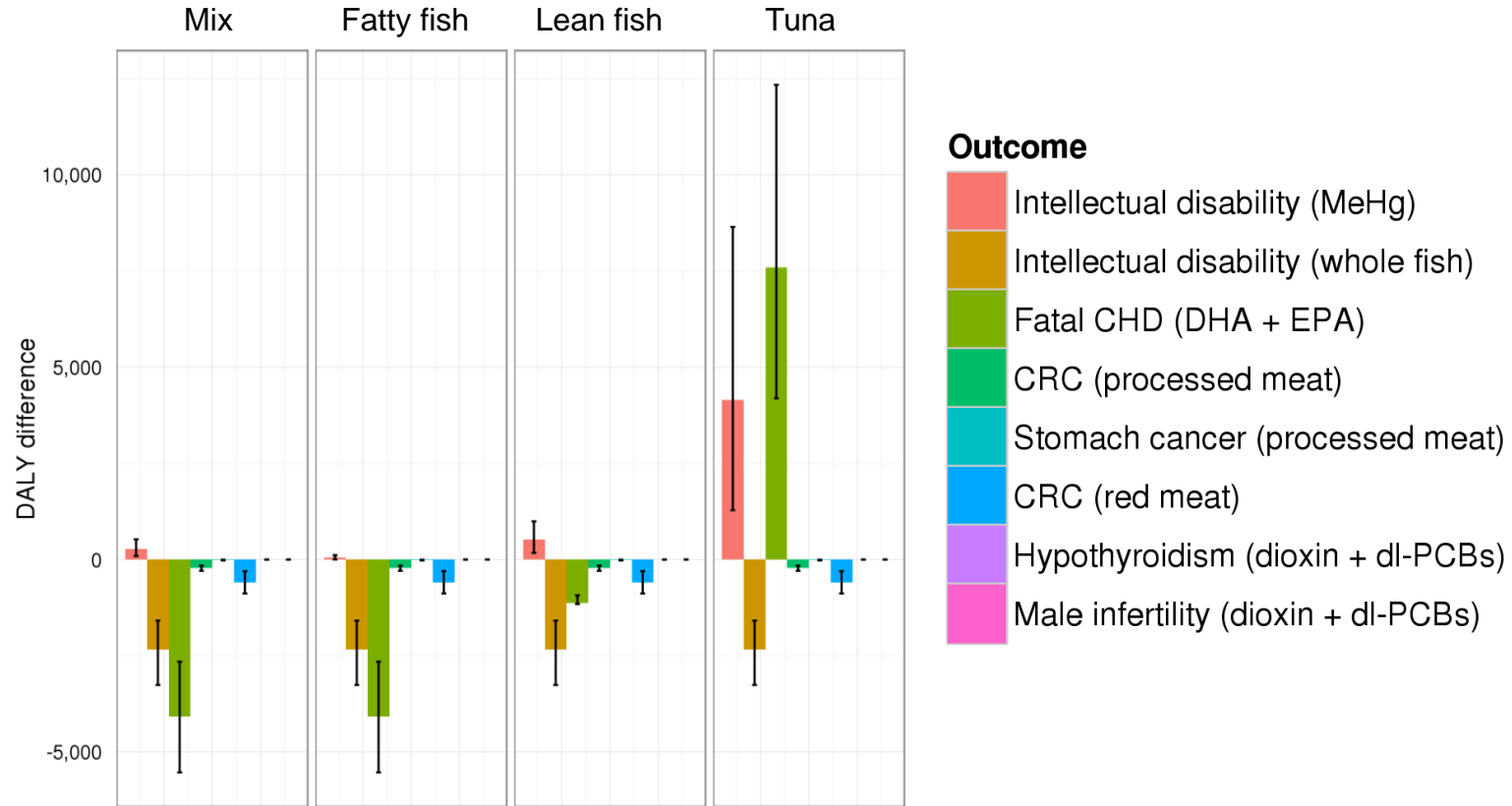
Substituting red and processed meat by fish

Change in disease burden compared with current consumption (DALY difference)



Substituting red and processed meat by fish

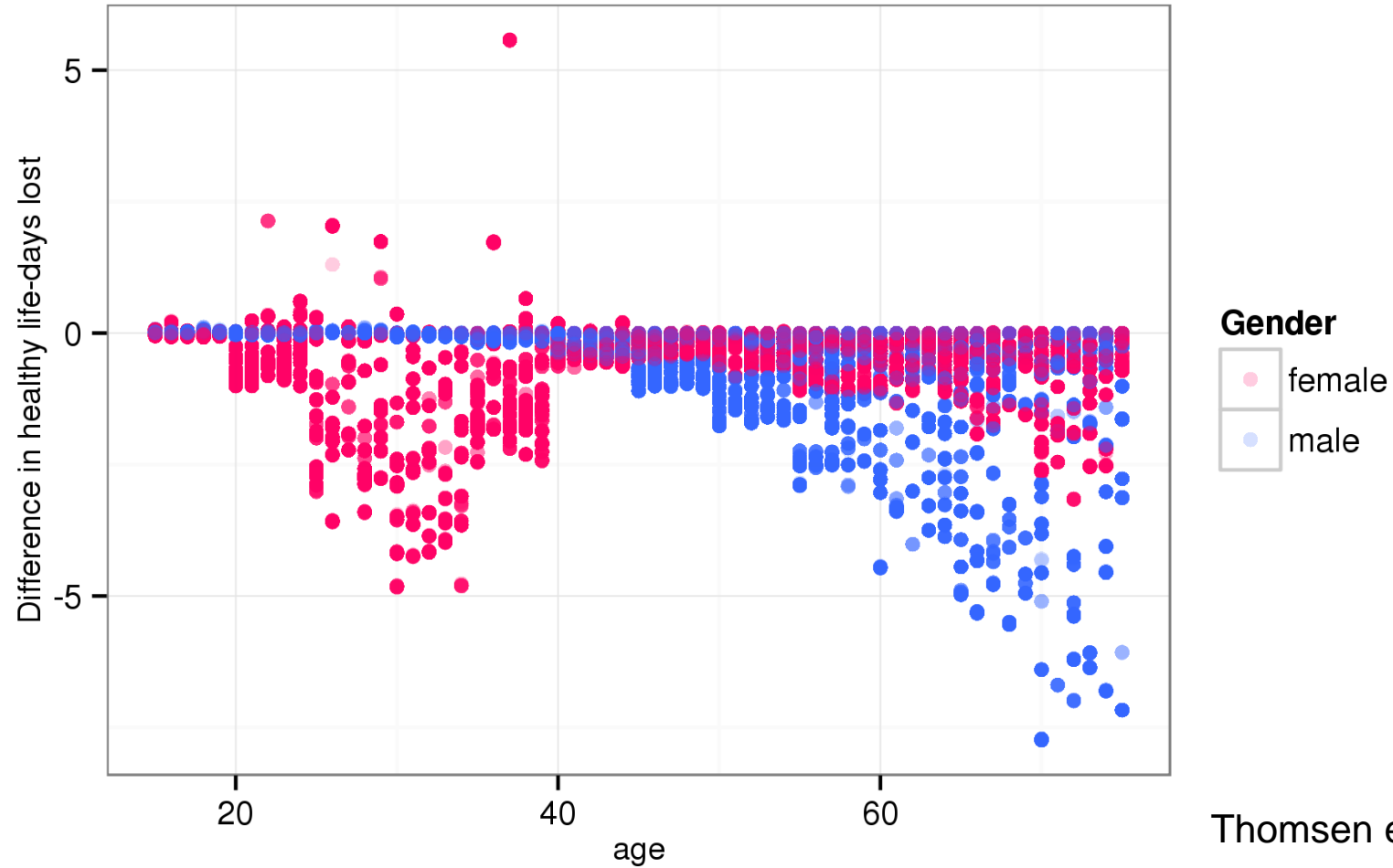
Changes in DALY for endpoint



Thomsen et al., 2019

Substituting red and processed meat by fish

Changes in DALY for age and gender



Thomsen et al., 2019

Challenges in risk-benefit assessment

Risk-benefit question

Lack of data and knowledge; uncertainty

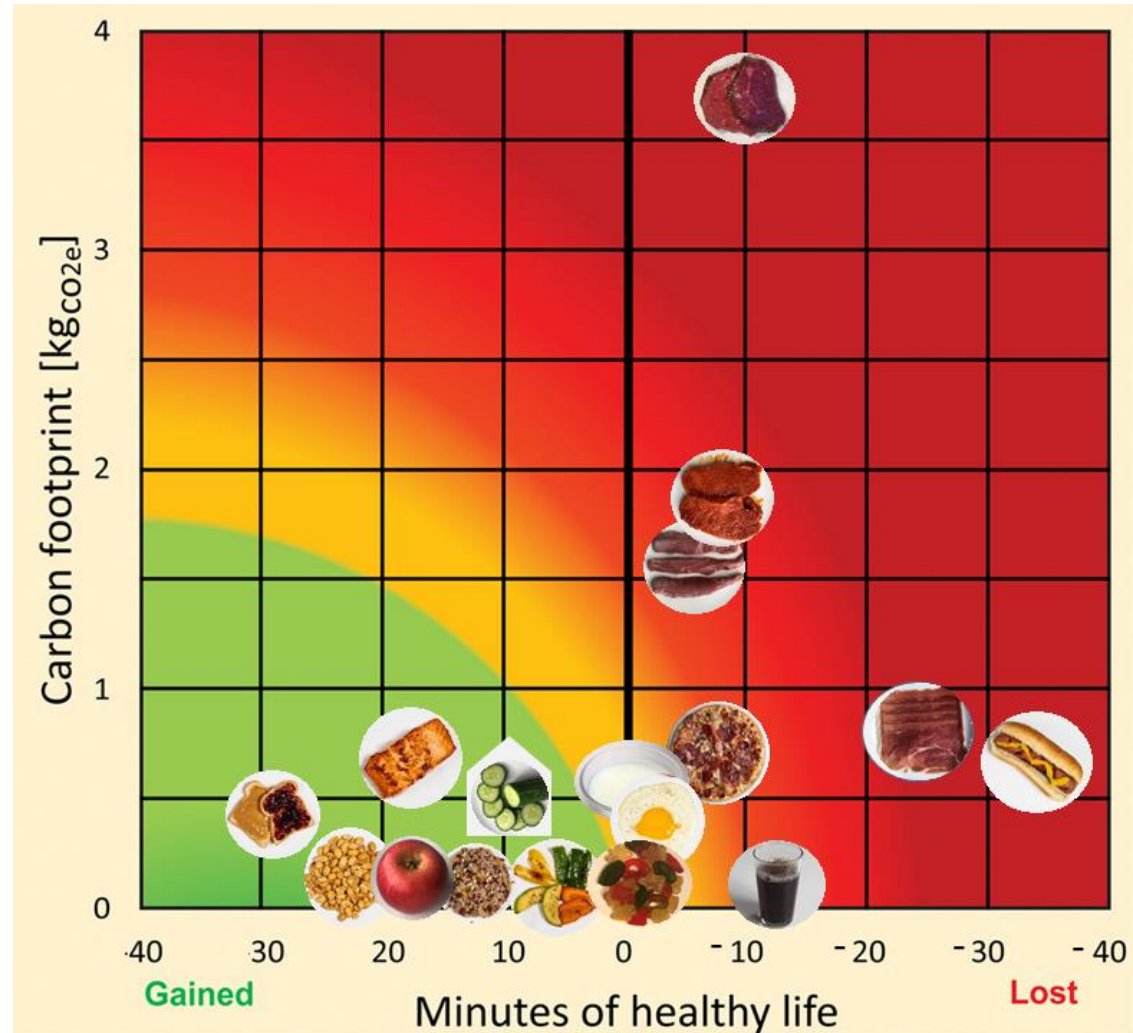
Imbalance of level of evidence

Substitutions

Quantitative or qualitative metrics

Integration in the regulatory system

Risk-benefit and sustainability



Olivier Jolliet, 2021

Thank you