For our Environment

Umwelt Bundesamt

Workshop:

Environmental burden of disease: methods and applications

Introduction to the Environmental Burden of Disease concept

History, methods and selected results

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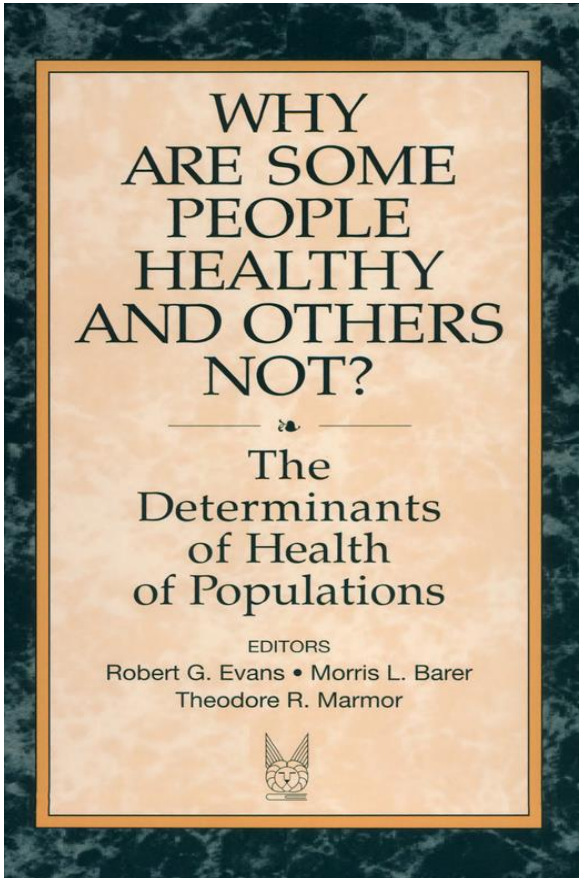
German Environment Agency

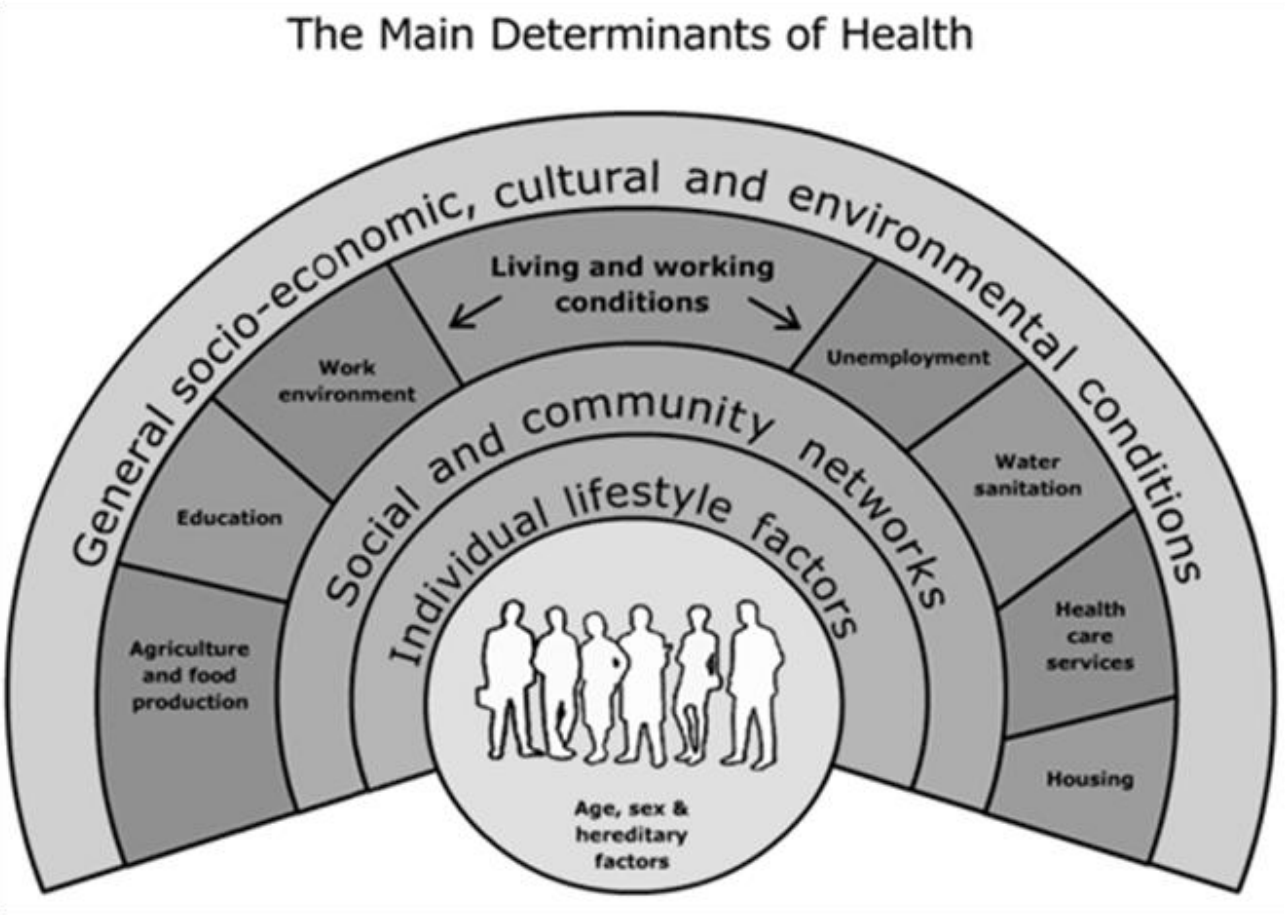
Section: Exposure Assessment and Environmental Health Indicators

Population Health



(Evans et al. 1994)

(Population) Health Determinants



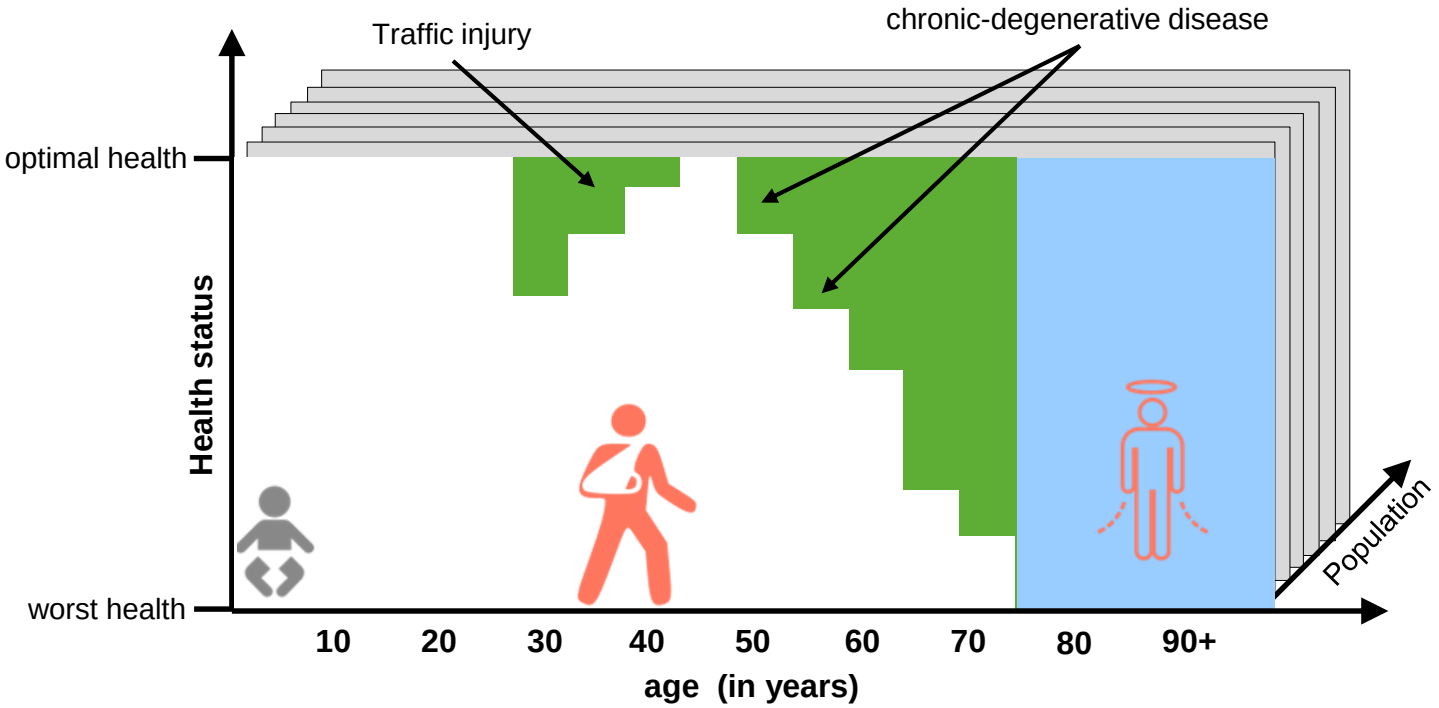
(Dahlgren und Whitehead 1991)

Burden of Disease – a necessary prerequisite

> *BoD analysis provides a **standardized framework for integrating all available information** on mortality, causes of death, individual health status, and condition-specific epidemiology **to provide an overview of the levels of population health** and the causes of loss of health*
>
> (Mathers 2006)

- Consistent and comprehensive assessment of disease and injury consequences
- Use of a single metric for mortality + morbidity outcomes
  - **D**isability-**A**djusted **L**ife **Y**ear (DALY)
- Estimates of the overall level of population health

Disability-Adjusted Life Year (DALY)



Years lived with disability (YLD)

Years of life lost due to premature mortality (YLL)

(Based on: https://en.wikipedia.org/wiki/Disability-adjusted_life_year)

The Global Burden of Disease (GBD) Framework

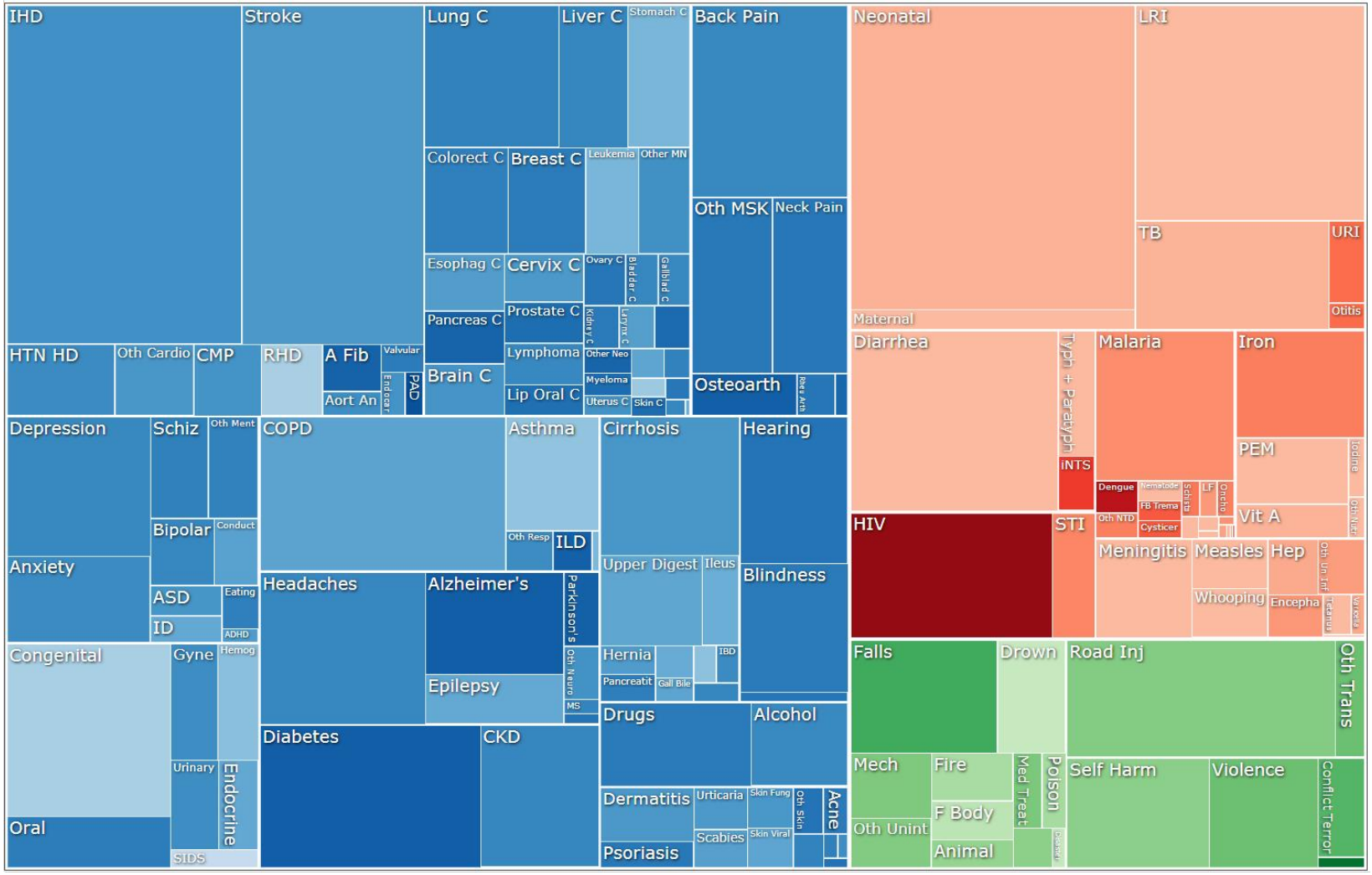
- First comprehensive GBD-Study published in 1996
  - Introduced by WHO, World Bank and Harvard School of Public Health
  - DALY used as the core measure for population health
  - Ten major risk factors covered

- Several updates of the GBD-Study followed

- Since 2007 the Institute for Health Metrics and Evaluation is responsible for regular updates of the GBD-Study

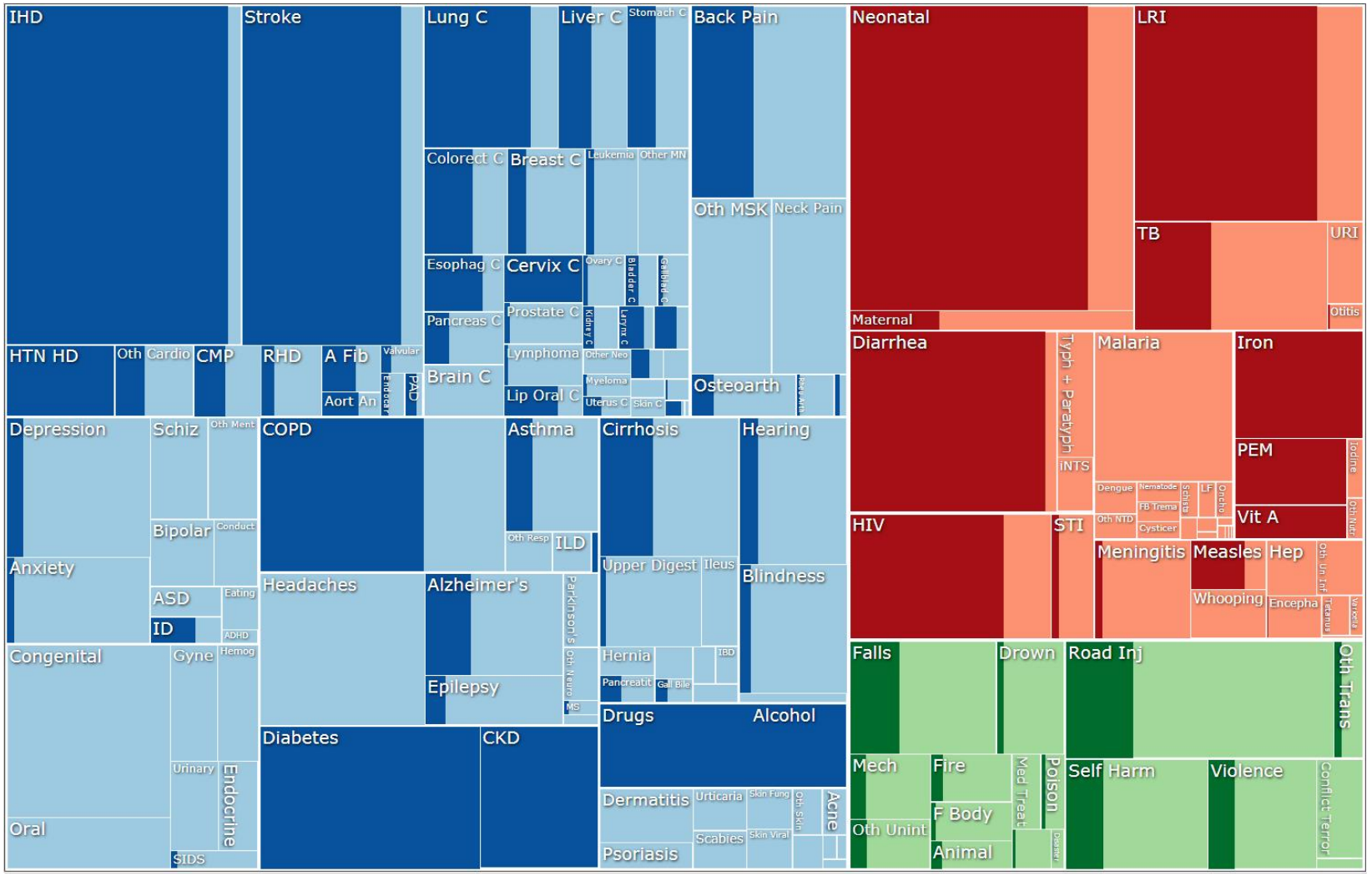
- BoD currently estimated for the year 2017 and…
  - 354 diseases and injuries
  - 84 risk factors

Global Burden of Disease Study 2017 (DALY)



(https://vizhub.healthdata.org/gbd-compare/)

Global Burden of Disease 2017 DALY - attributable to risk factors



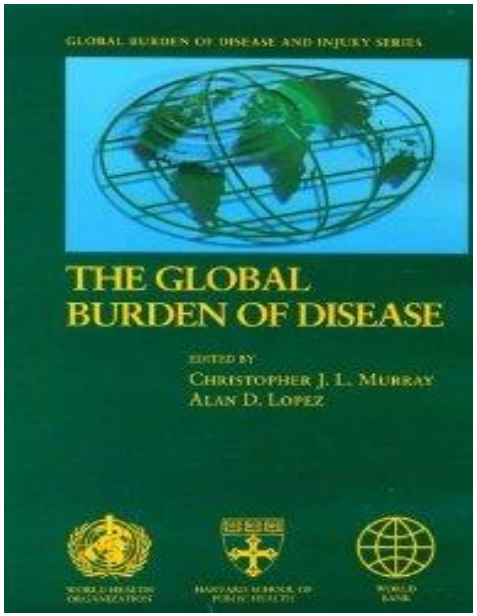
(https://vizhub.healthdata.org/gbd-compare/)

Comparative Risk Assessment (CRA) – Introduction and objectives

- Quantifying disease burden is important to present the current population health status
- Identification of risk factors which are major drivers of global disease burden to uncover potential measures
- Attributing disease burden to risk factors is the essential step to take
- Comparative Risk Assessment as a part of the GBD study aims at standardized assessments of risk factor effects on population health

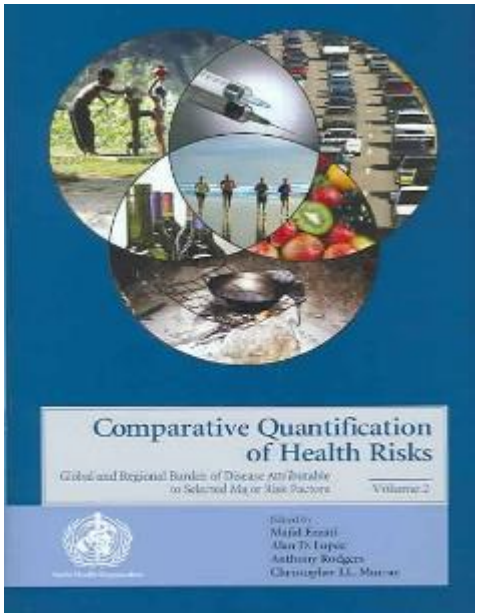
Comparative Risk Assessment (CRA) – first estimates within the burden of disease framework

WHO, World Bank, Harvard School of Public Health 1996



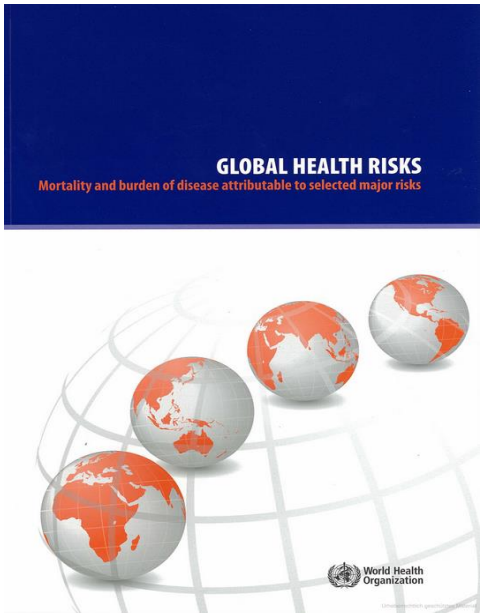
→ 10 risk factors
→ Baseline year 1990

WHO 2004



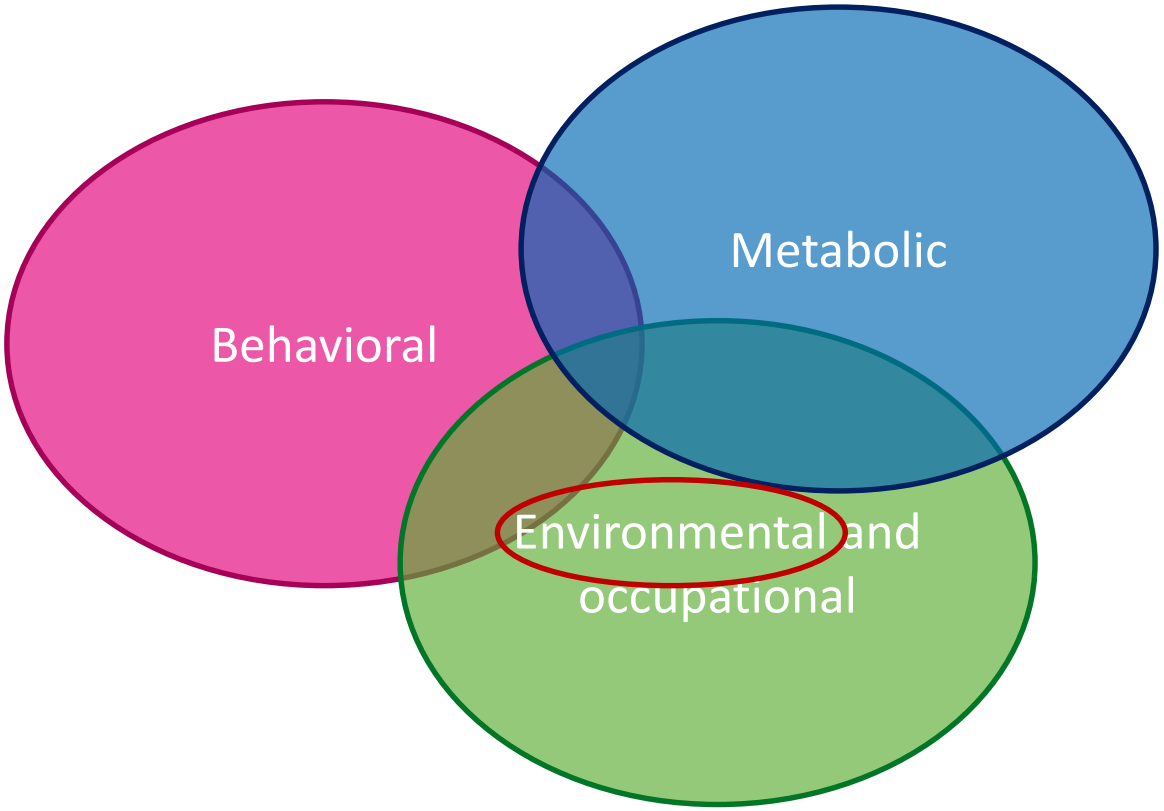
→ 26 risk factors
→ Baseline year 2000

WHO 2009



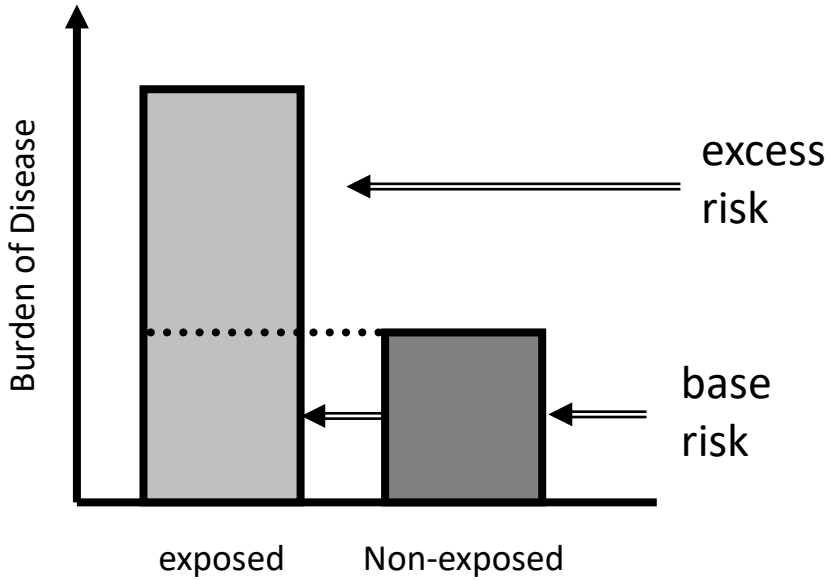
→ 24 risk factors
→ Baseline year 2004

CRA – Risk groups according to the GBD-Study

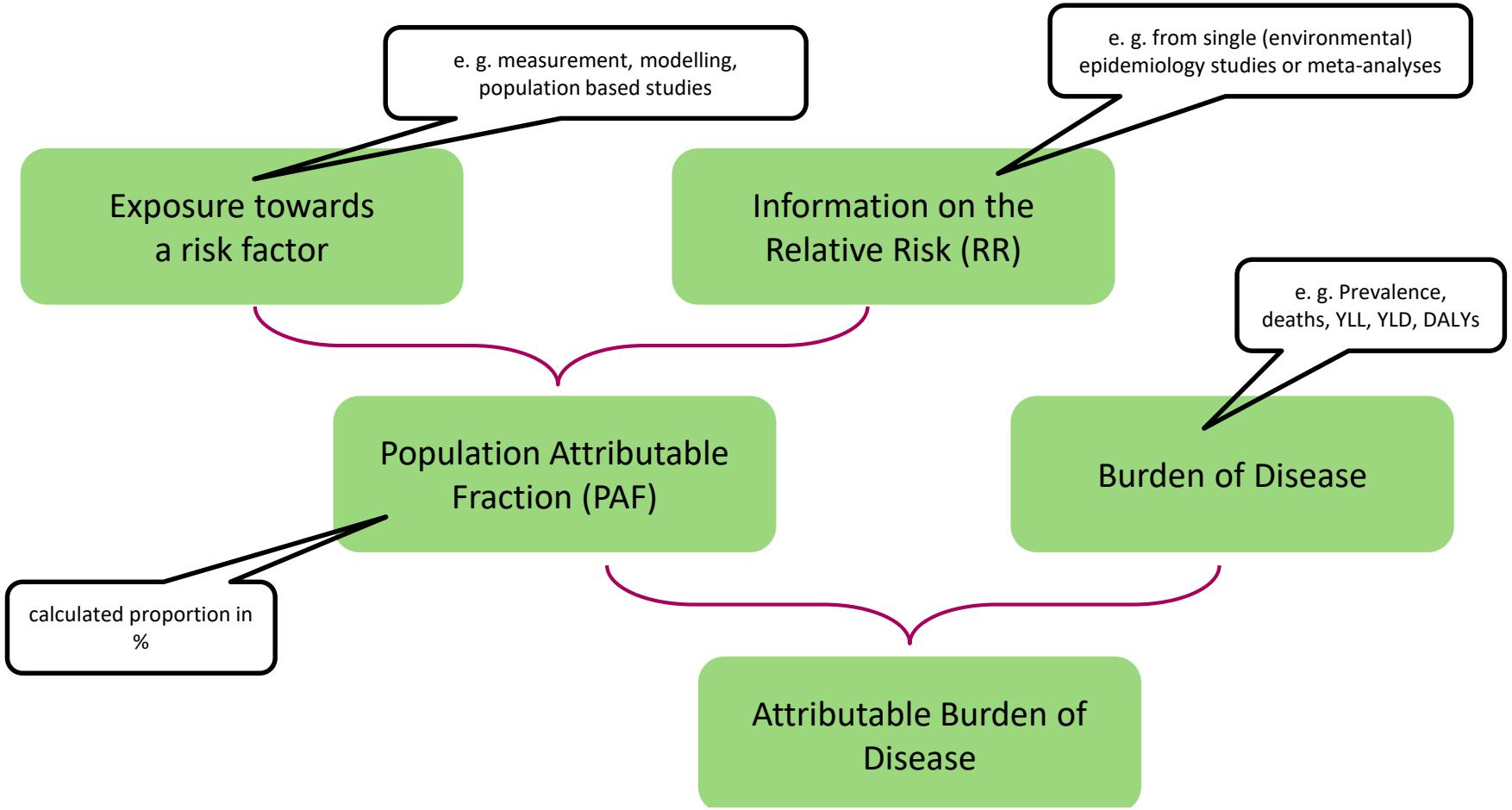


Environmental Burden of Disease approach

- Developed as an extension of the CRA-approach
- Introduced by the WHO in 2003
- Special focus on environmental risk factors
- Emphasizes the link between environment and health
- Population Attributable Fraction as the core component



Pathway of an EBD-Assessment



→ **More details on the estimation processes in the upcoming presentations**

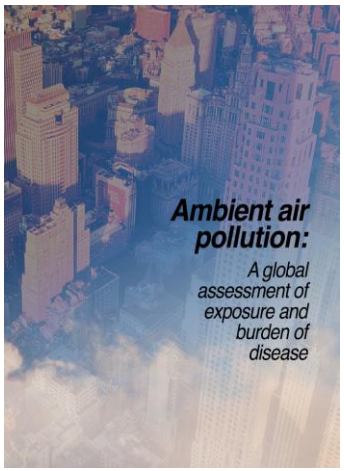
Selected results I – WHO (2012)

- Globally around 3 million deaths attributable to ambient particulate matter pollution in 2012 (outdoor air pollution, $PM_{2.5}$)

- 26% of DALYs due to lung cancer
- 16% of DALYs due to ischemic heart diseases
- 17% of DALYs due to stroke
- 8% of DALYs due to COPD

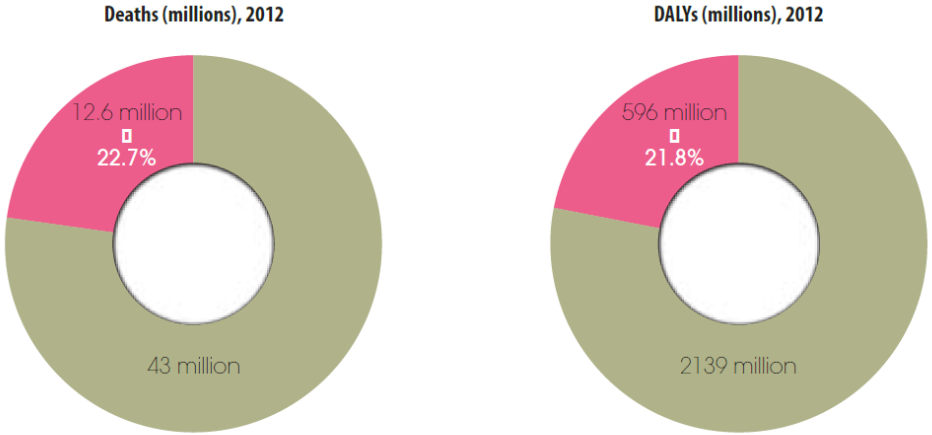
→ Attributable to ambient particulate matter pollution

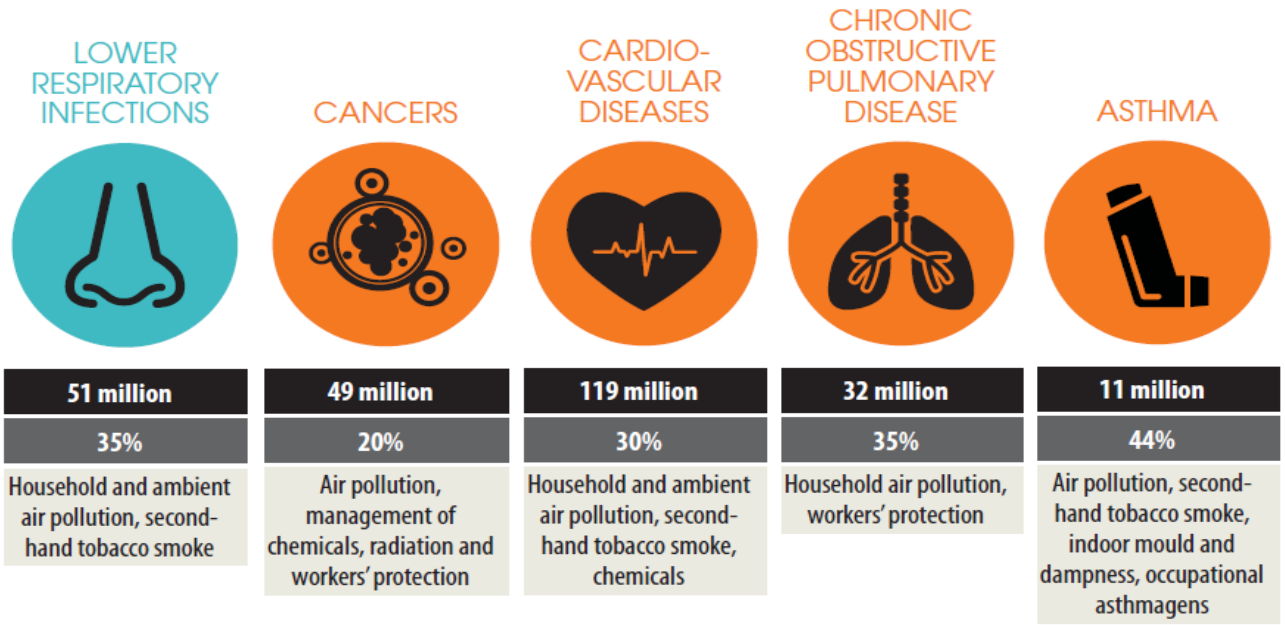
- Reported as conservative figures
  - Only particulate matter effects considered
  - Only health outcomes with strong evidence included



(WHO 2016)

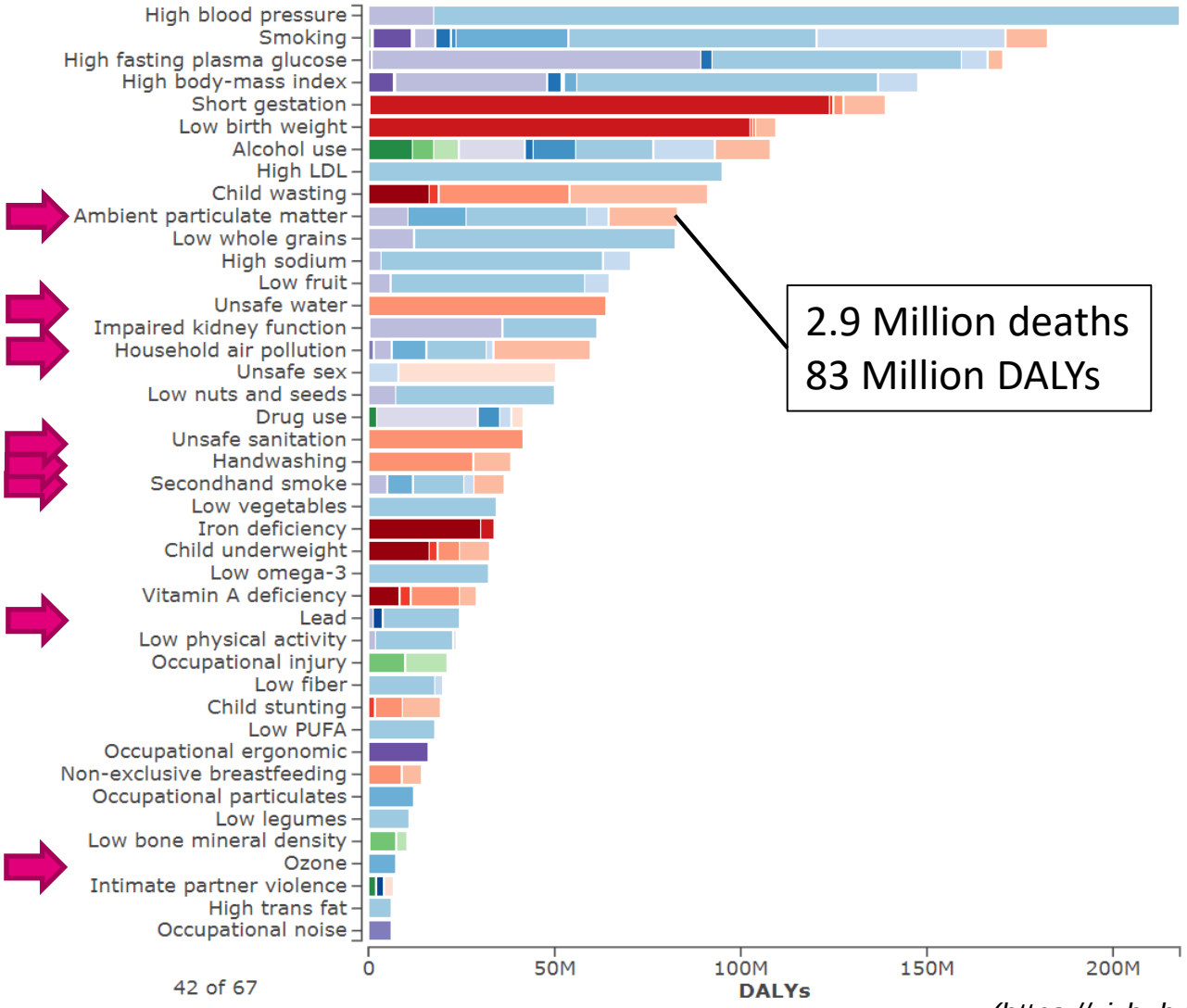
Selected results II – WHO (2012)





(WHO 2016)

Selected results III – IHME (2017)



(https://vizhub.healthdata.org/gbd-compare/)

Take home…

- CRA as the underlying concept allows comparisons between:
  - Countries, years, populations, risk factors
- Tool to identify important drivers of population health
- Additional information for environmental health policy decision making processes
- Data availability and quality crucial for significance and interpretation of EBD-findings
- EBD-findings only relevant at population level and have no direct meaning for single individuals
- EBD-findings only valid when interpreted in relative terms
- Transparency on assumptions and input data crucial

Merci beaucoup pour votre aimable attention

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