european burden-eu of disease network

ESTIMATING THE RISK FACTOR ATTRIBUTABLE BURDEN IN EUROPE – A SYSTEMATIC LITERATURE REVIEW

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Background

The Global Burden of Disease study provides a comprehensive summary of the health burden attributable to risk factors

- Main method use is the comparative risk assessment

In addition, many national and subnational studies are being carried in the same framework

- Many methodological choices need to be made

The systematic literature review helps to identify and summarize methodological differences in European studies

Aims and objectives

- Identify available attributable BoD studies in Europe
- synthesize the current scope and quality of comparative risk assessments:
  - which are the most regarded risk factors?
  - what methods are used?
  - are there relevant differences?

Methods

- The same search strategy as the other searches + comparative risk assessment, or health impact assessment terms
- Databases:

Indexed, peer-reviewed literature

- PubMed
- Web of Science (login required)
- Embase (login required)

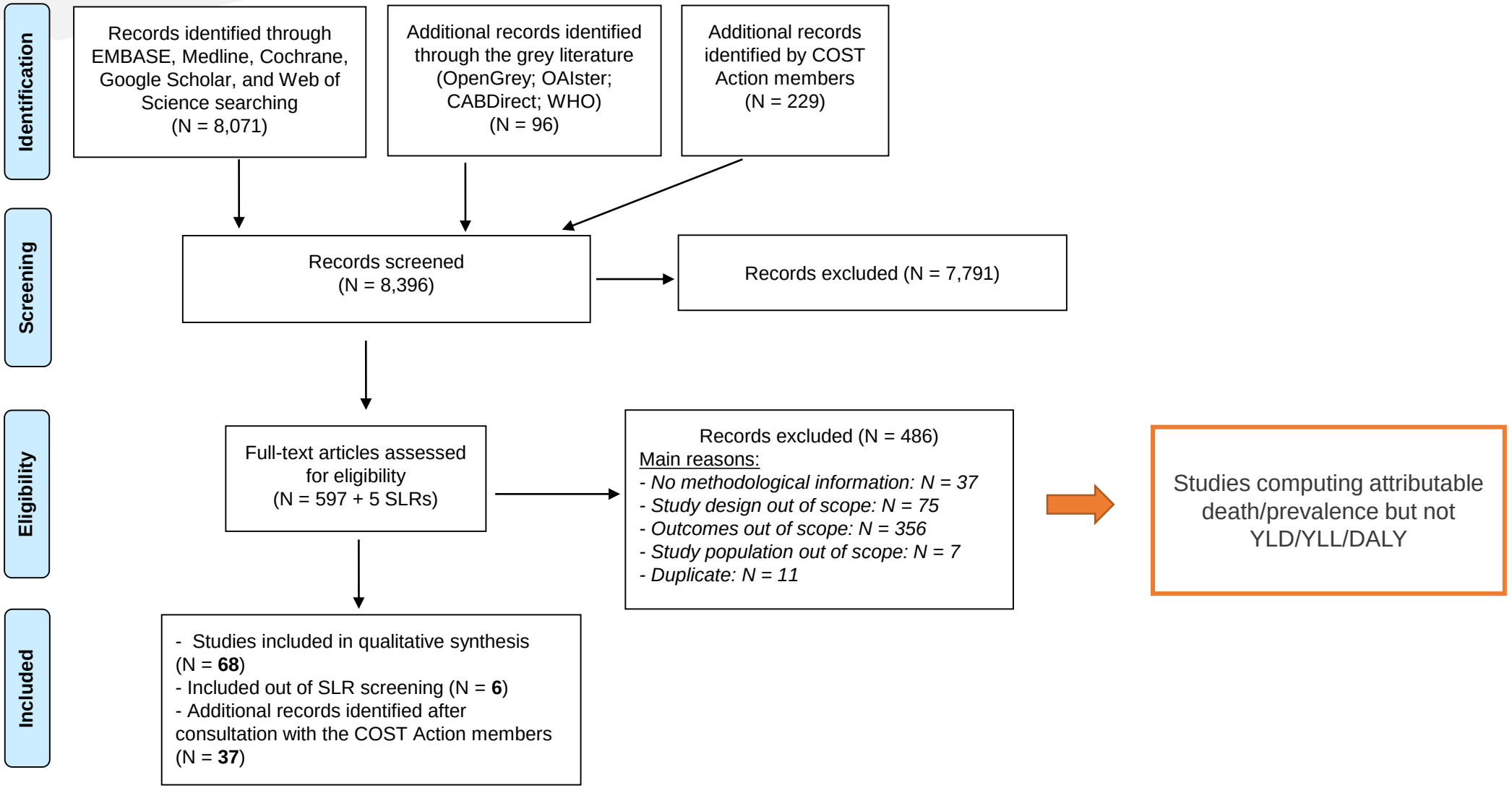
Indexed, grey literature

- OpenGrey (http://www.opengrey.eu/)
- OAIster (http://oaister.worldcat.org/)
- CABDirect (http://www.cabdirect.org/)
- WHO (https://www.who.int/)

Websites of public health agencies;

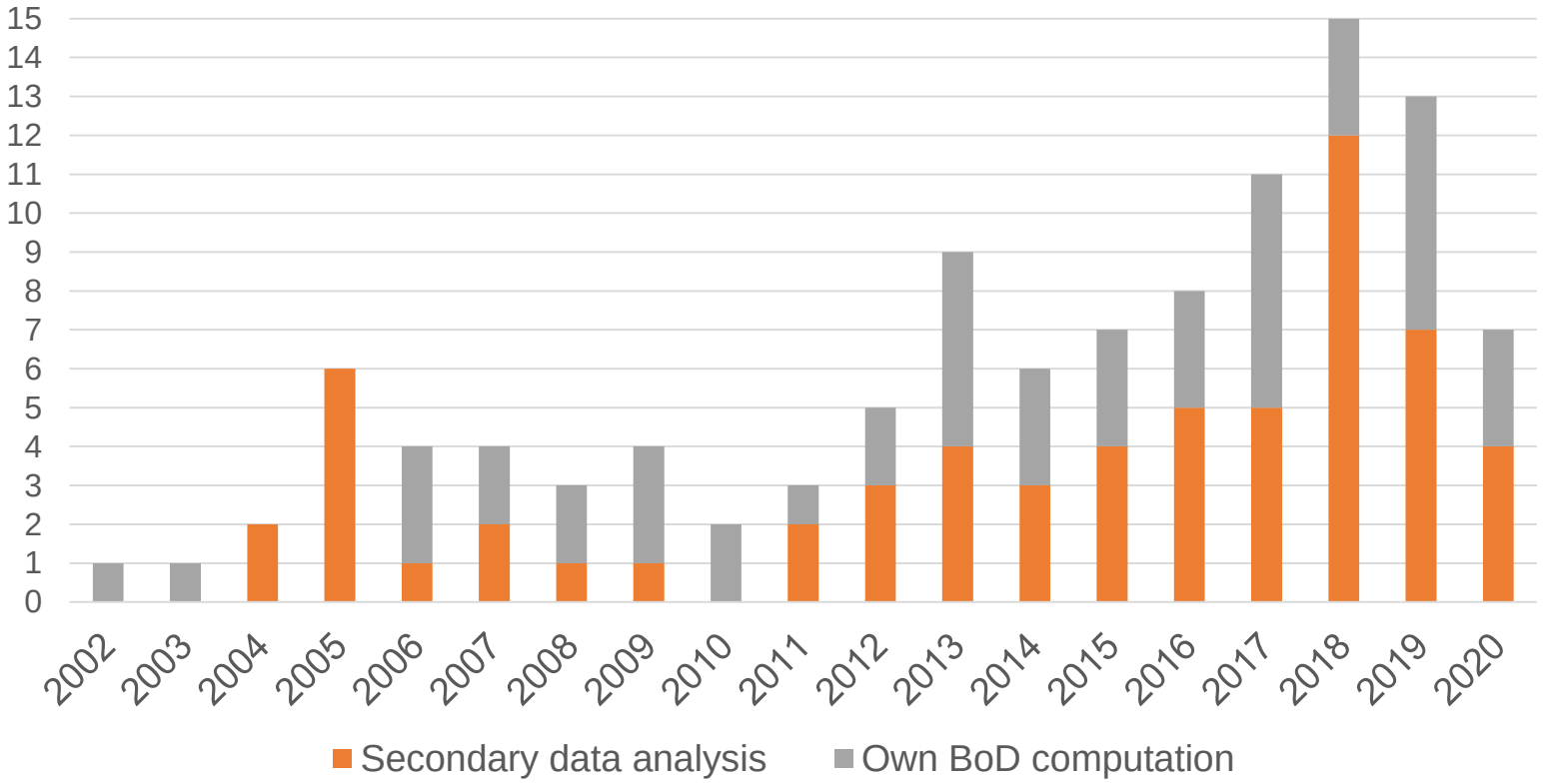
Literature from group members of the COST action

Results – PRISMA flow



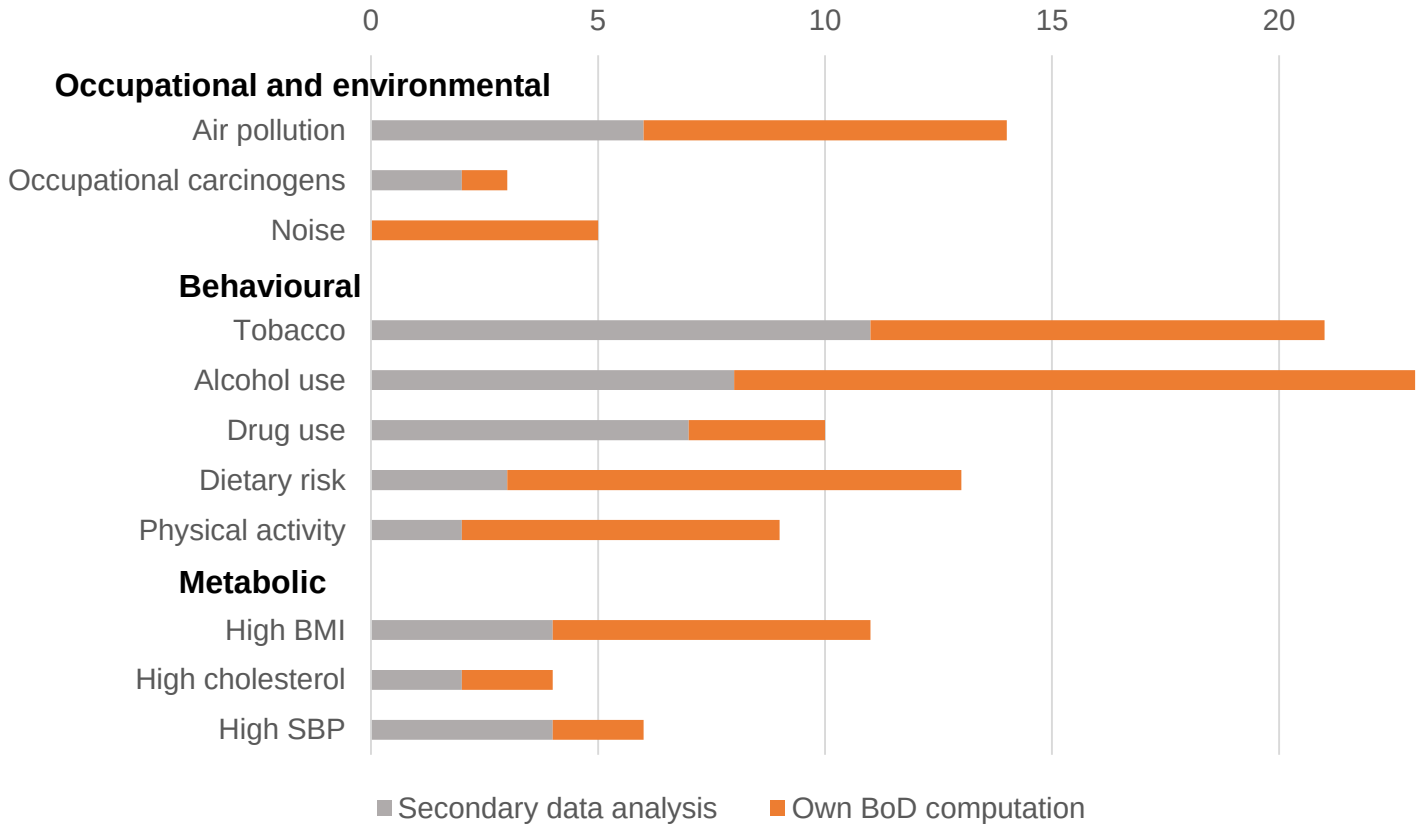
Results – basic information

- 111 studies
  - 54 national studies (21 countries)
  - 44 global studies
  - 10 European region*
  - 3 Nordic region**



* EU-28, EU-15, EU-10, WHO European region
** Denmark, Finland, Norway, Sweden (+Greenland)

Results – risk factors



- Behavioural risk factors are the most investigated – with the majority of publications being tobacco (including second-hand smoke) and alcohol use
    - Dietary risk, physical activity and alcohol use are more likely to be part of studies computing own BoD estimates
- Noise was investigated only within studies that developed own DALYs computations

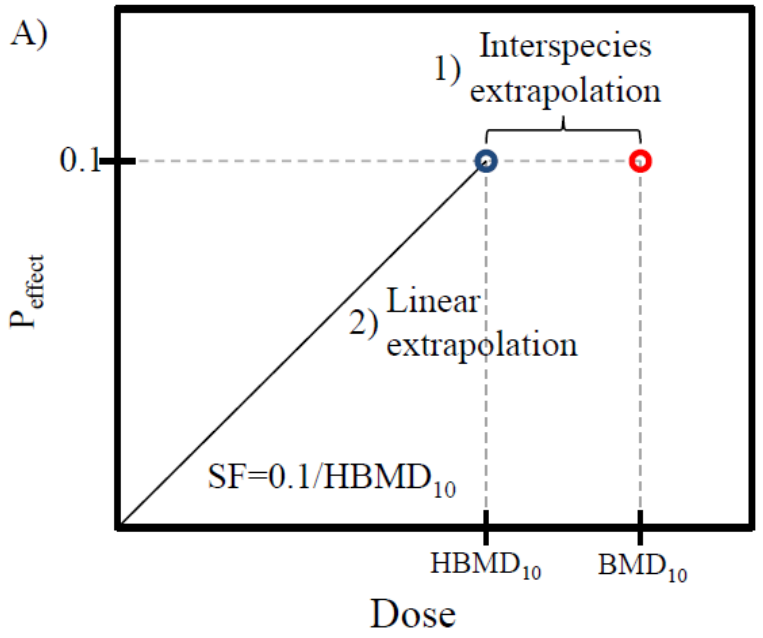
Results – risk factors

Use of relative risk functions

The great majority of the studies used relative risks to defined the link between exposure and outcome (88%). Other measures were hazard ratios, odds ratios, computation of slope factor (dose-response curve)

Pollutant	Health Endpoint	Ages	RR per 10 μg/m^3 (95% CI)
$PM_{2.5}$	Natural mortality	>30 year	1.062 (1.040–1.083)
	CVDs (hospital admissions)	all	1.0091 (1.0017–1.0166)
	Respiratory (hospital admissions)	all	1.0190 (0.9982–1.0402)
PM_{10}	Infant mortality	1–12 month	1.04 (1.02–1.07)
	Chronic bronchitis (children)	6–12 year	1.08 (0.98–1.19)
	Chronic bronchitis (adults)	>18 year	1.117 (1.040–1.189)
	Asthma symptoms (children)	5–19 year	1.028 (1.006–1.051)
NO_2	Natural mortality [b]	all	1.0027 (1.0016–1.0038)
	Natural mortality (>20 μg/m^3) [c]	>30 year	1.055 (1.031–1.080)
	Bronchitis symptoms	all	1.021 (0.990–1.060)
	Respiratory (hospital admission)	all	1.0180 (1.0115–1.0245)

Health endpoint	Risk point estimate	95% CI	Reference
LBW	OR = 1.38	(1.13–1.69)	Windham et al. (1999) [38]
SIDS, children < 1 year	OR = 1.94	(1.55–2.43)	Anderson & Cook (1997) [36]
LRI, children < 2 years	OR = 1.55	(1.42–1.69)	the United States Surgeon General (2006) [39]
OM, children < 3 years	IDR = 1.38	(1.21–1.56)	Etzel et al. 1992 [40]; Cal-EPA (2005) [41]
Asthma (onset), children < 15 years	OR = 1.32	(1.24–1.41)	Cal-EPA (2005) [41]
Asthma (prevalence), children < 15 years	OR = 1.23	(1.14–1.33)	the United States Surgeon General (2006) [39]



Example of dose-response curve (Jakobsen et al 2016)

Results – risk factors

Use of population attributable fractions

For the majority of the studies (89%), the attributable burden was computed by means of the PAF formula.
→ The name used for the function can vary – e.g. population average exposure, population-weighted average concentration (for air pollution studies)

$$\mathrm{PAF} = \frac{\int_{x=0}^{m} \mathrm{RR}(x)P(x)\mathrm{d}x - \int_{x=0}^{m} \mathrm{RR}(x)P'(x)\mathrm{d}x}{\int_{x=0}^{m} \mathrm{RR}(x)P(x)\mathrm{d}x}$$

$$\mathrm{PAF} = \frac{\mathrm{f} \times (RR_E - 1)}{\mathrm{f} \times (RR_E - 1) + 1}$$

$$\mathrm{AAF} = \frac{\sum_{j=0}^{3} P_j(\mathrm{RR}_j - 1)}{1 + \sum_{j=0}^{3} P_j(\mathrm{RR}_j - 1)}$$

$$\mathrm{PAF}_{\mathrm{SHS}} = [\mathrm{p}(\mathrm{OR}-1)]/[\mathrm{p}(\mathrm{OR}-1)+1]$$

Other methods include: Markov modelling, multivariate regression to estimate the association of the risk factors and DALYs (May et al 2015)

- No computation of attributable burden – e.g. burden of psychostimulant dependence

Conclusions

When it comes to computation of attributable burden:

- Relative risk ratios and population attributable factor are widely use within health risk assessments
  - Nevertheless, there is a variety of terms used to describe the same concept
- Burden of risk factors doesn’t always go through comparative risk assessment

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Thank you for your attention

Special thanks
To more than 100 COST Action CA18218 collaborators Please get in touch: info@burden-eu.net

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