

# A Systematic Review of the Methodological Considerations in *Campylobacter* Burden of Disease Studies

M. Tumulty, Z. Kabir, C. Di Bari, B. Devleeschauwer

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# Overview of the Problem

## Campylobacteriosis

- Dual burden
- Gastrointestinal illness
- Long-term sequelae (Guillain-Barré syndrome, reactive arthritis)



## Epidemiology

- Campylobacteriosis incidence increased worldwide
- 127,840 cases confirmed across EU in 2021
- Data incomplete in lower-income nations despite being endemic in many regions of the southern hemisphere

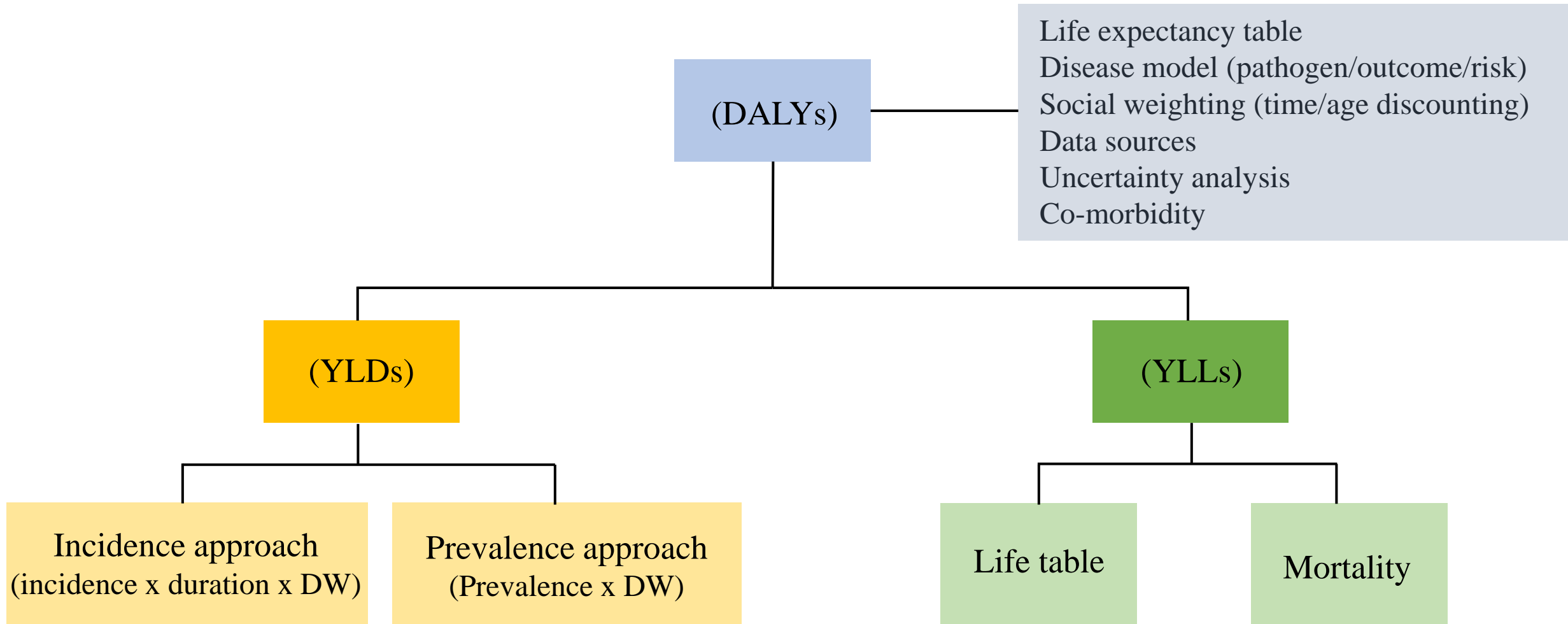


## Quantifying disease

- Burden of disease (BoD) studies and disability-adjusted life years (DALYs)  
[  $DALY = YLL + YLD$  ]
- DALYs come with a price; several methodological choices
- Uncertainties across researchers, institutes, and policymakers



# DALY Estimation Approaches



**Figure 1.1:** Some of the different methodological considerations used to quantify DALYs

# Summary of the Different Methodological Choices

**Table 1.1:** Summary of the different methodological design choices used to quantify DALYs as outlined in the GBD, BCoDE, and WHO/FERG studies

|  | Design choice of YLD calculations | Disease model           |
|--|-----------------------------------|-------------------------|
| Global Burden of Disease (GBD) study                                 | Prevalence- based approach        | Outcome-based approach  |
| WHO Foodborne Disease Burden Epidemiology Reference Group (WHO/FERG) | Incidence-based approach          | Pathogen-based approach |
| Burden of Communicable Diseases in Europe (BCoDE)                    | Incidence-based approach          | Pathogen-based approach |

# Research Question

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“How does the use of different methodological choices impact the quantification of *Campylobacter* BoD?”



# **Research Methodology and Literature Search**



## PROSPERO

Research protocol registered which can be accessed under registration number (CRD42023414973)



## Eligibility criteria

Studies employing the DALYs framework for BoD methodology and calculations (from 1990-2023)



## Key terms

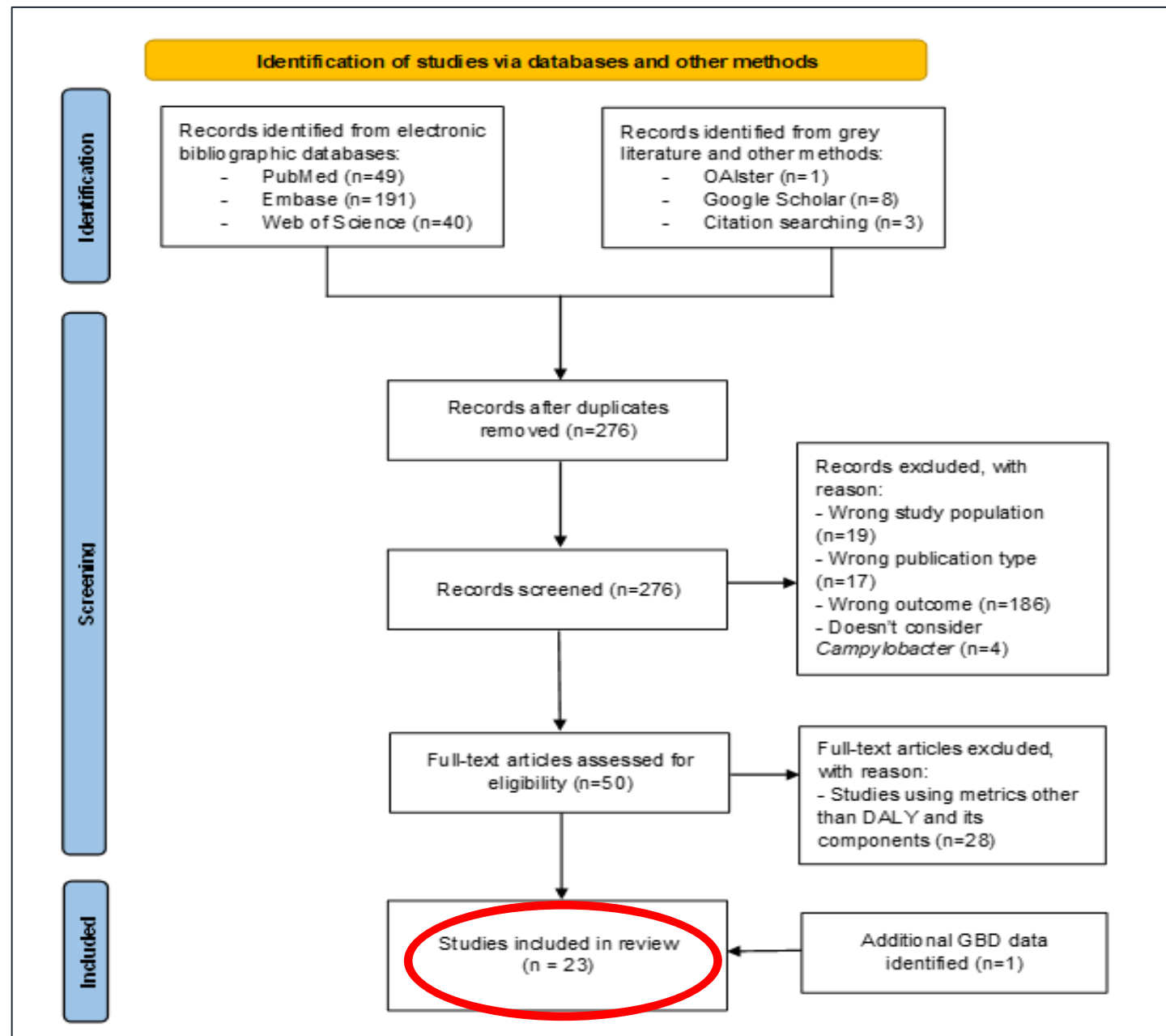
*Campylobacter*,  
Campylobacteraceae,  
burden of disease,  
disability-adjusted life  
year, years of life lost,  
years lived with  
disability, cost  
effectiveness and cost of  
illness



## Screening & data abstraction

Articles screened for eligibility on preselected databases (PubMed, EMBASE, Web of Science) and grey literature.

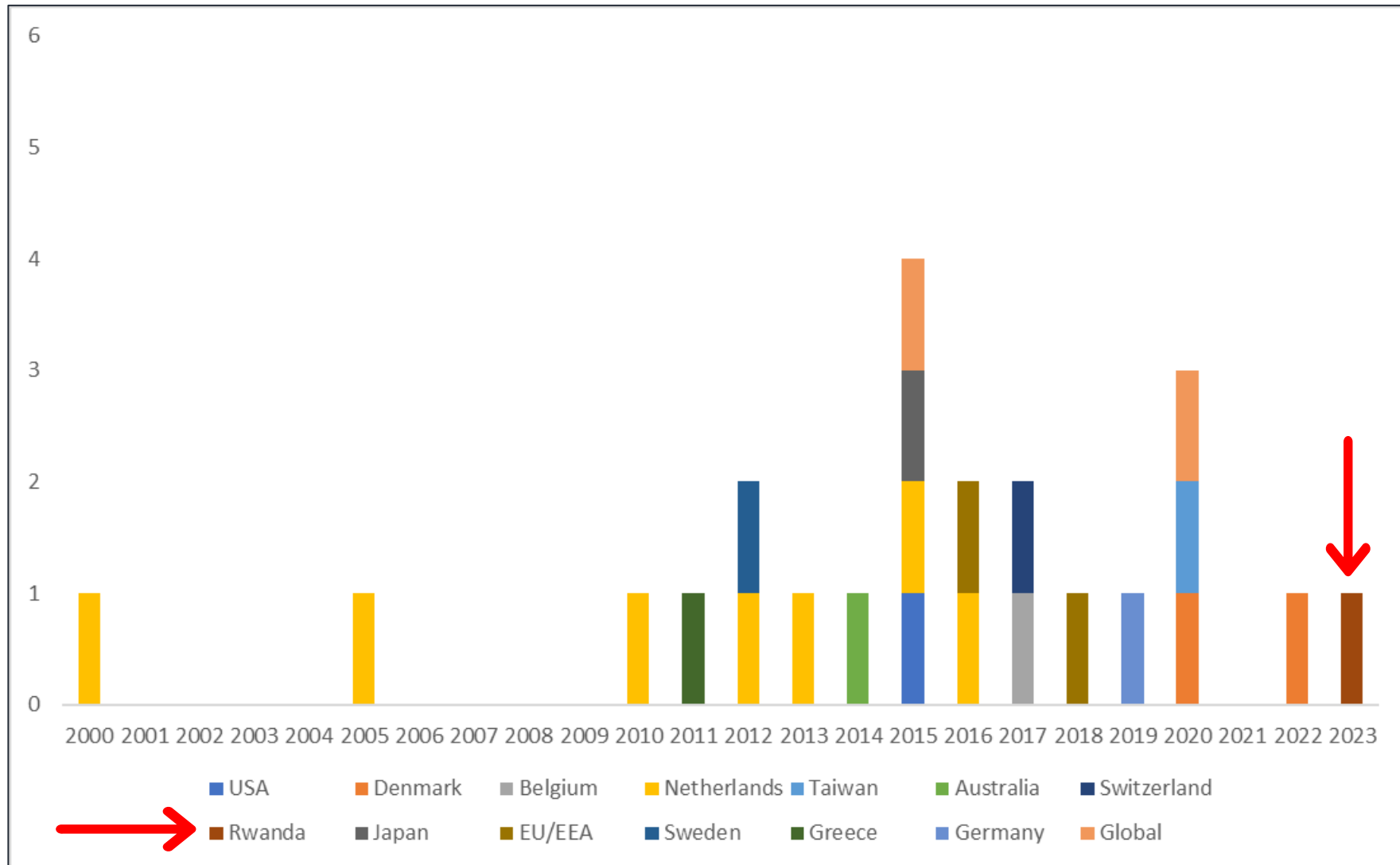
Data abstracted using standardised data abstraction form



**Figure 1.2:** Flow diagram illustrating the literature search and study selection, which has been adapted from the PRISMA 2020 guidelines for systematic reviews.

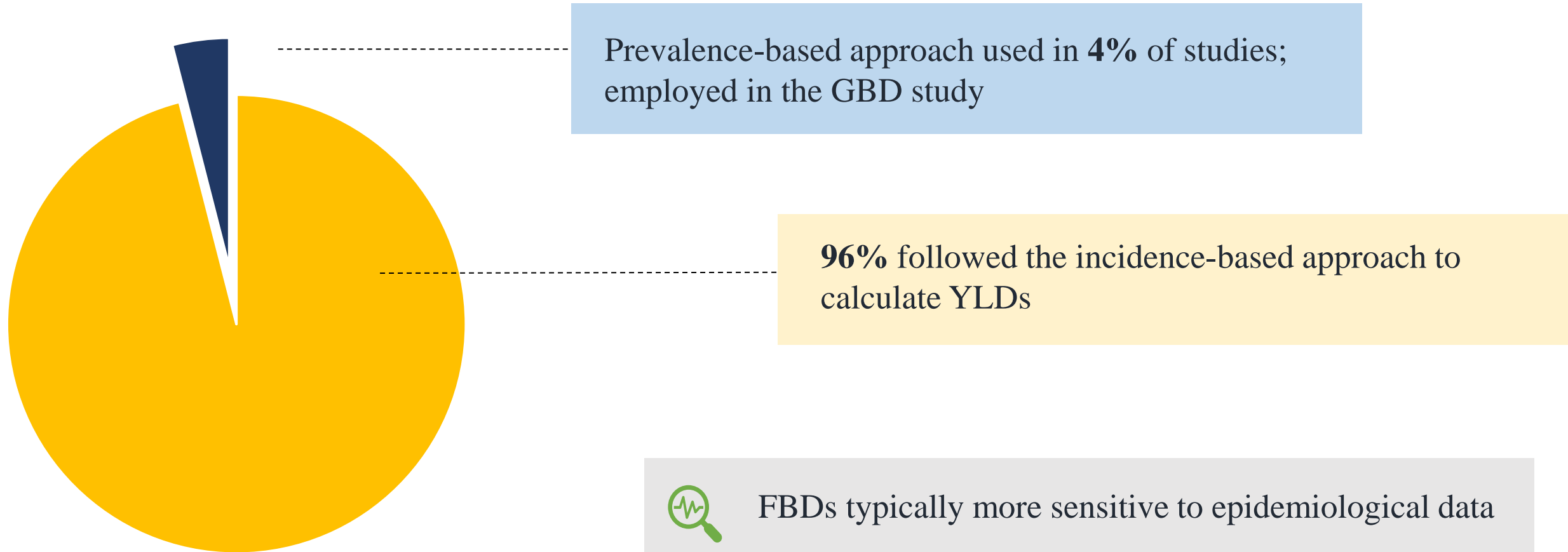


# Results: Study Characteristics




**Figure 1.3:** Existing *Campylobacter* burden of disease studies compiled from published literature based on year of publication.


# Results: Incidence- vs. Prevalence-Based Approach



Prevalence-based approach used in **4%** of studies; employed in the GBD study

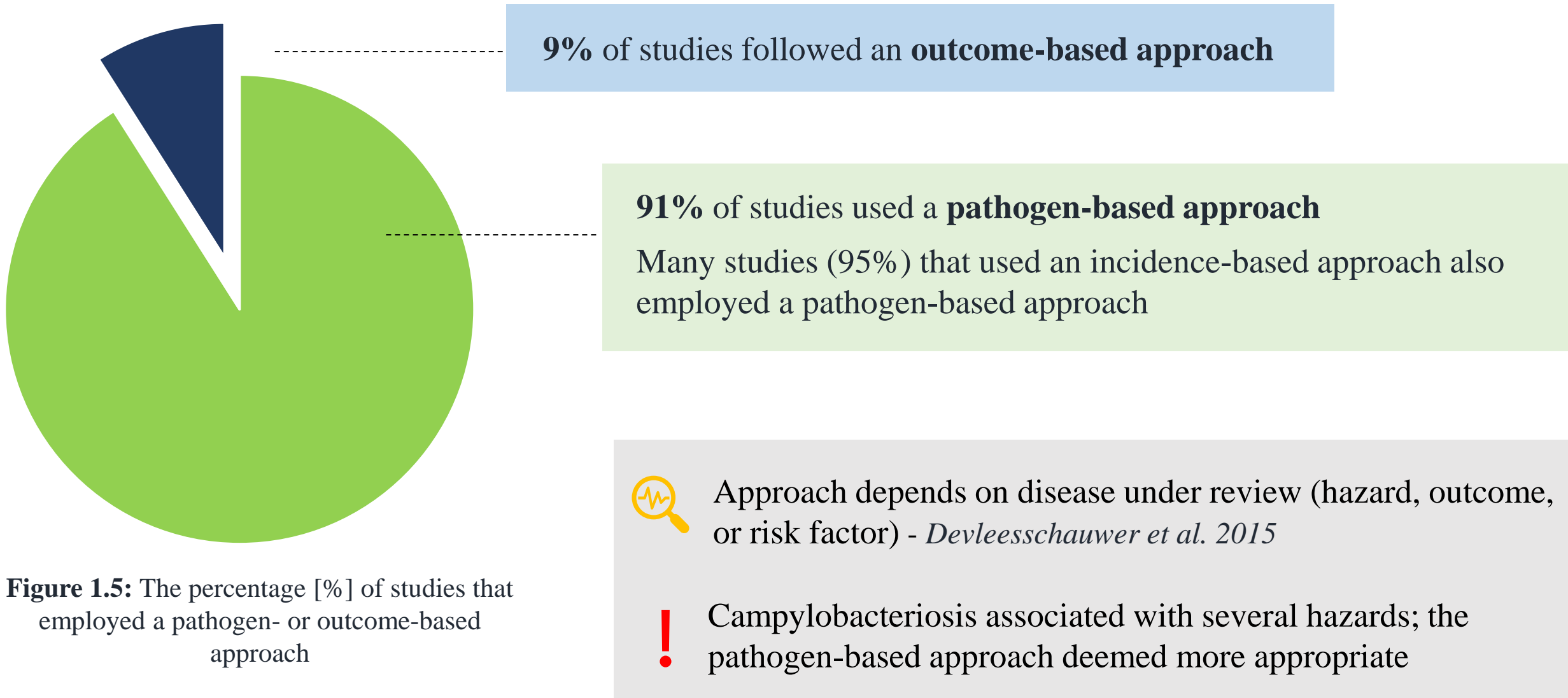
**96%** followed the incidence-based approach to calculate YLDs

 FBDs typically more sensitive to epidemiological data

 Incidence-based approach dominantly used. Prevalence-based approach may underestimate YLD

**Figure 1.4:** The percentage [%] of studies that employed an incidence- or prevalence-based approach

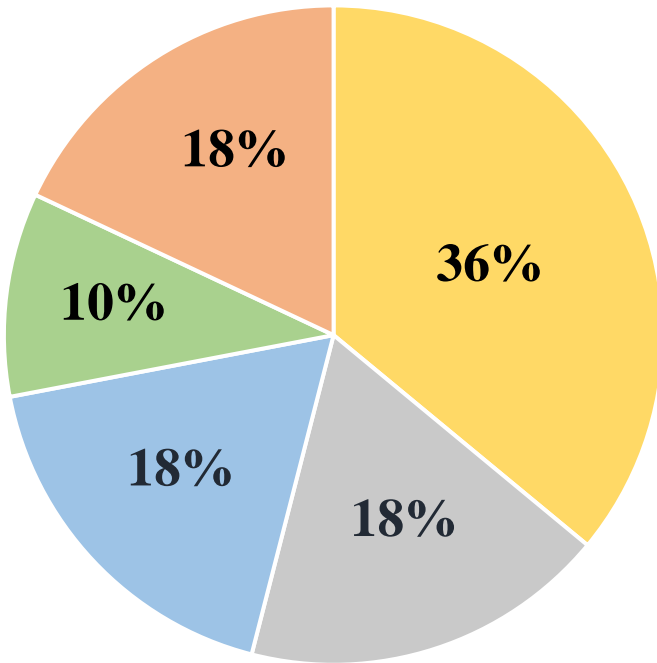
# Results: Pathogen- vs. Outcome-Based Approach



**Figure 1.5:** The percentage [%] of studies that employed a pathogen- or outcome-based approach

# Results: Choice of Life Expectancy Table

- National life tables
- Coale-Demeny (West level 25 or 26) life tables
- Aspirational life tables (GBD)
- Standard life tables (WHO)
- Combined life tables



**Figure 1.6:** The different choice of life expectancy tables employed by authors, expressed as a percentage [%]

\*Based on 22 (of 23) studies that considered YLL

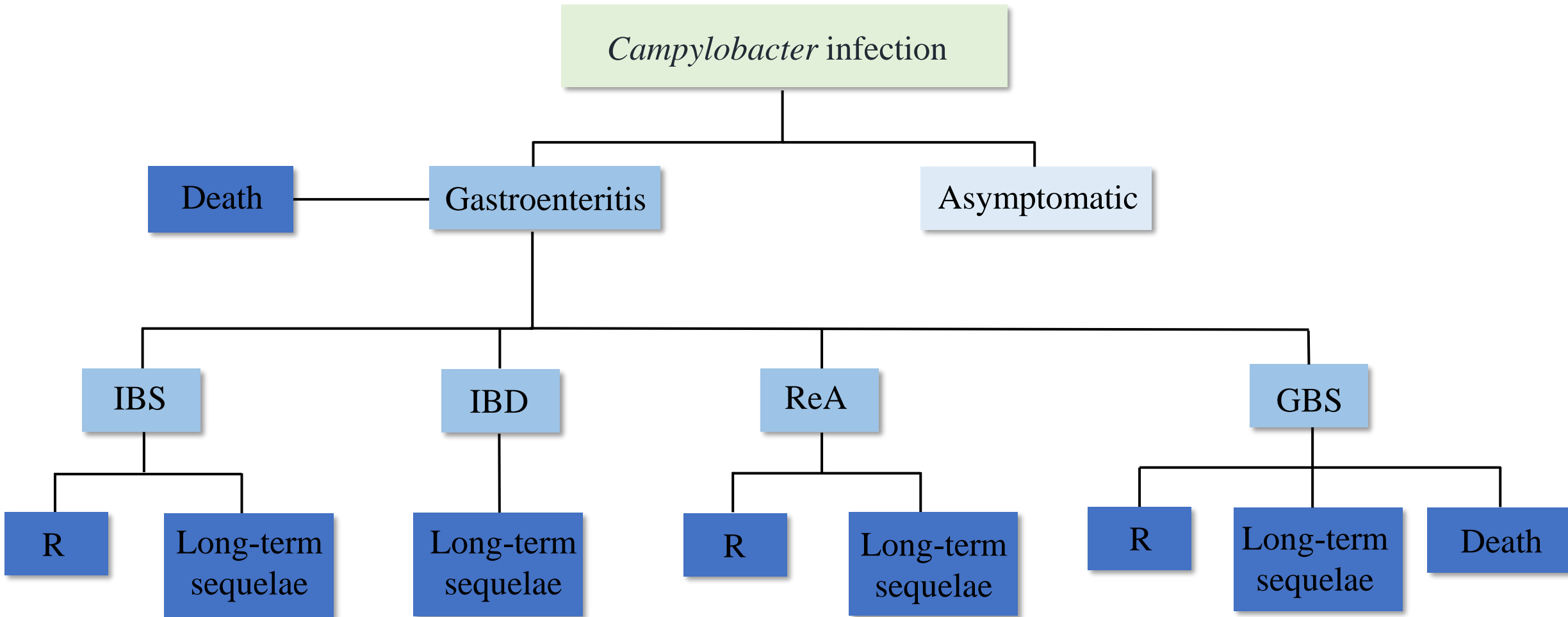
Local or universal life expectancy tables?

National life tables may be unfavourable due to issues in comparability between countries

Universal life expectancy tables have an ‘egalitarian nature’. Aspirational life tables (GBD) exclude stillbirths from the DALY model

*“At what ages should DALYs be counted?”*

# Results: Health States (1)



\*R= recovery; IBS= irritable bowel syndrome; IBD= inflammatory bowel disease; ReA= reactive arthritis; GBS= Guillain-Barré syndrome

**Figure 1.7:** Illustration of the perceived outcome tree for *Campylobacter* infection in humans

# Results: Health States (2)



## Health States

- 22 studies analysed campylobacteriosis health states
  - Only 7 studies reported all of the health states (GE, IBS, IBD, ReA, GBS, and death)
- 



## Variance

- Literature varies significantly on classifying IBD and IBS as a health state of *Campylobacter*
- 



## Health States Excluded

- 27% of published studies excluded IBD in their health outcome tree
  - 9% excluded IBS
  - 13% of studies omitted both health states
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*“Is the perceived association between IBD and campylobacteriosis from detection bias in recurrent stool testing rather than aetiology?” – Pires et al. 2017*

# Conclusion

Campylobacteriosis BoD studies are **understudied** in low- and middle-income nations

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**Incidence- and pathogen-based approach** more dominantly used in BoD studies

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Considerable **variation** and a lack of harmonisation exist in the choice of life expectancy tables, and health states in published campylobacteriosis BoD studies

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**Harmonizing DALY estimation** for campylobacteriosis BoD studies is essential for public health and policy prioritisation



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**Thanks for your attention!**



# Sources

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