A blue-tinted background image showing a large crowd of people from an overhead perspective, walking in various directions.

Estimating severity distributions for  
cancer disease models. Example  
from the German BoD study

Dr Elena von der Lippe

# Outline



- German BoD Study
- Cancer disease models
  - Prevalence
  - Severity distributions
- Results
- Outlook



# *German BoD Study*



- BURDEN 2020 (Pilotstudy) 2018-2021 -> estimations for 2017
- Coordinator: RKI, Partners: WIdO (AOK), German Environment Agency (UBA)
- Important Data sources
  - Mortality
    - Causes of death statistics
  - Morbidity 18 Diseases (4 cancers)
    - Claims data AOK (WIdO)
    - Survey data
    - Vital statistics



- Stratifications:
  - Sex
  - Age (five years age groups)
  - Region (16 federal states;  
96 spacial planning regions)

- Results and publications:

[daly.rki.de](https://daly.rki.de)



# *Cancer disease models*

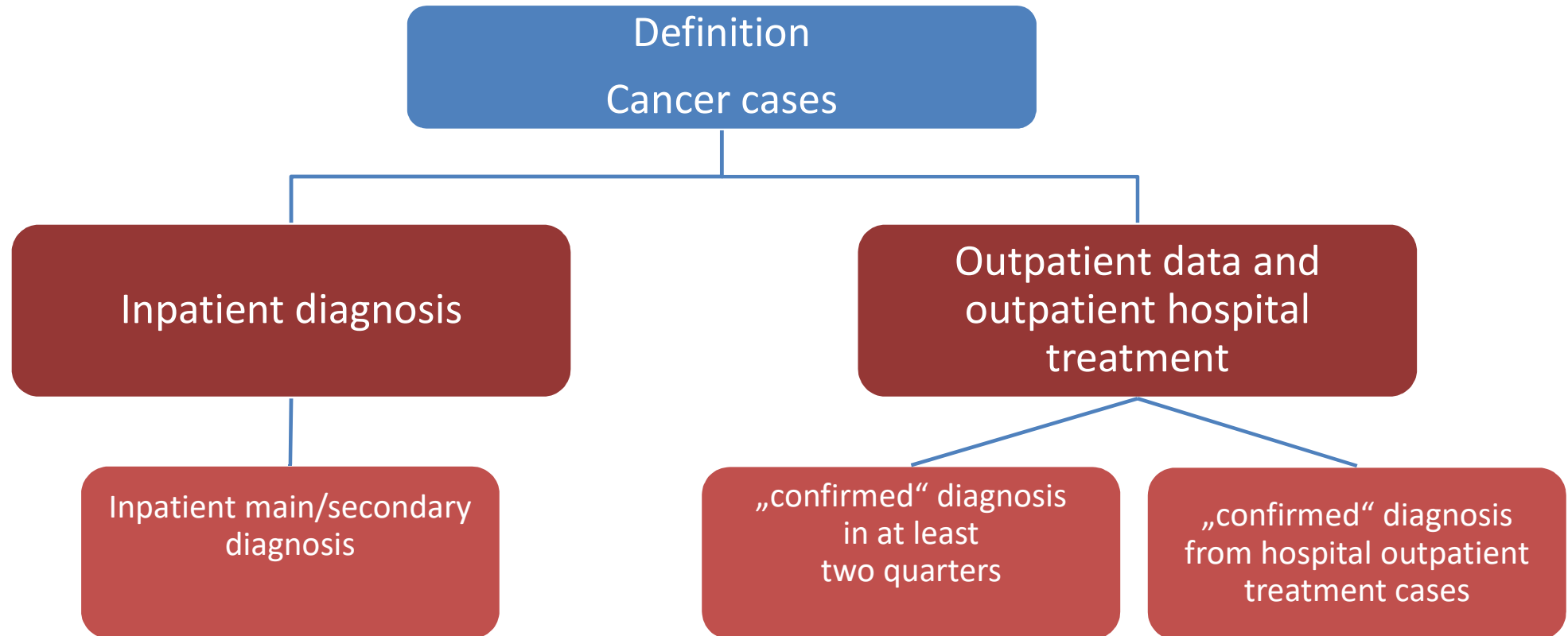


# Disease definition

| Disease                             | ICD-10 code   |
|-------------------------------------|---|
| Colon and rectum cancer             | C18-C19.0, C20, C21-C21.8, Z12.1- Z12.13, Z85.03-<br>Z85.048, Z86.010 |
| Tracheal, bronchus, and lung cancer | C33, C34-C34.92, Z12.2, Z80.1-Z80.2, Z85.1-Z85.20                     |
| Breast cancer                       | C50-C50.629, C50.8-C50.929, Z12.3-Z12.39, Z80.3,<br>Z85.3, Z86.000    |
| Prostate cancer                     | C61-C61.9, Z12.5, Z80.42, Z85.46                                      |

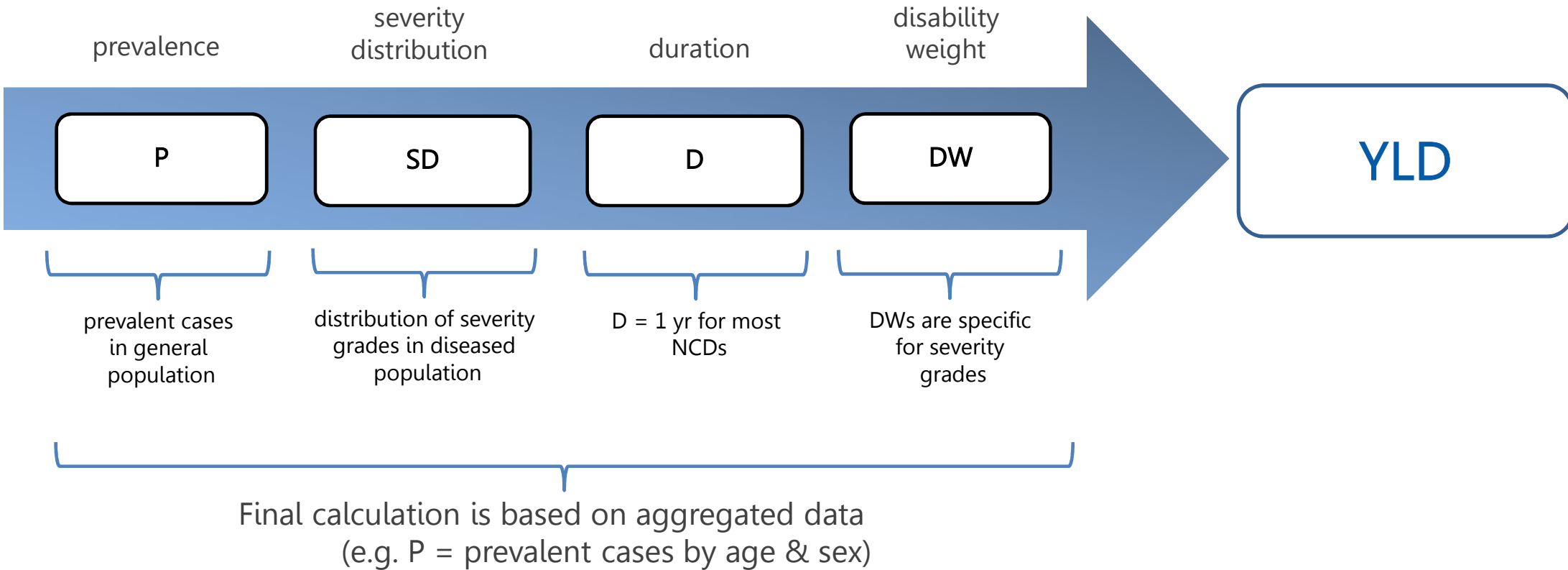


# Definition of cancer cases



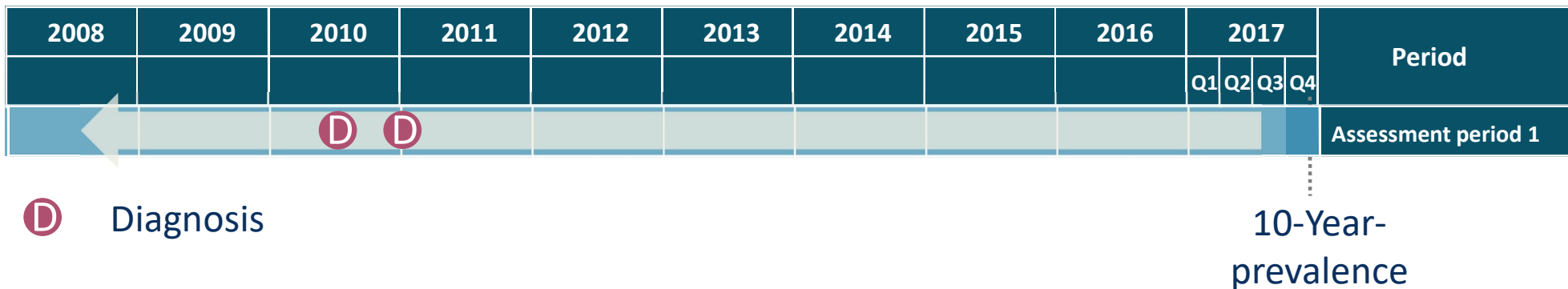


# Input parameters - for YLD -



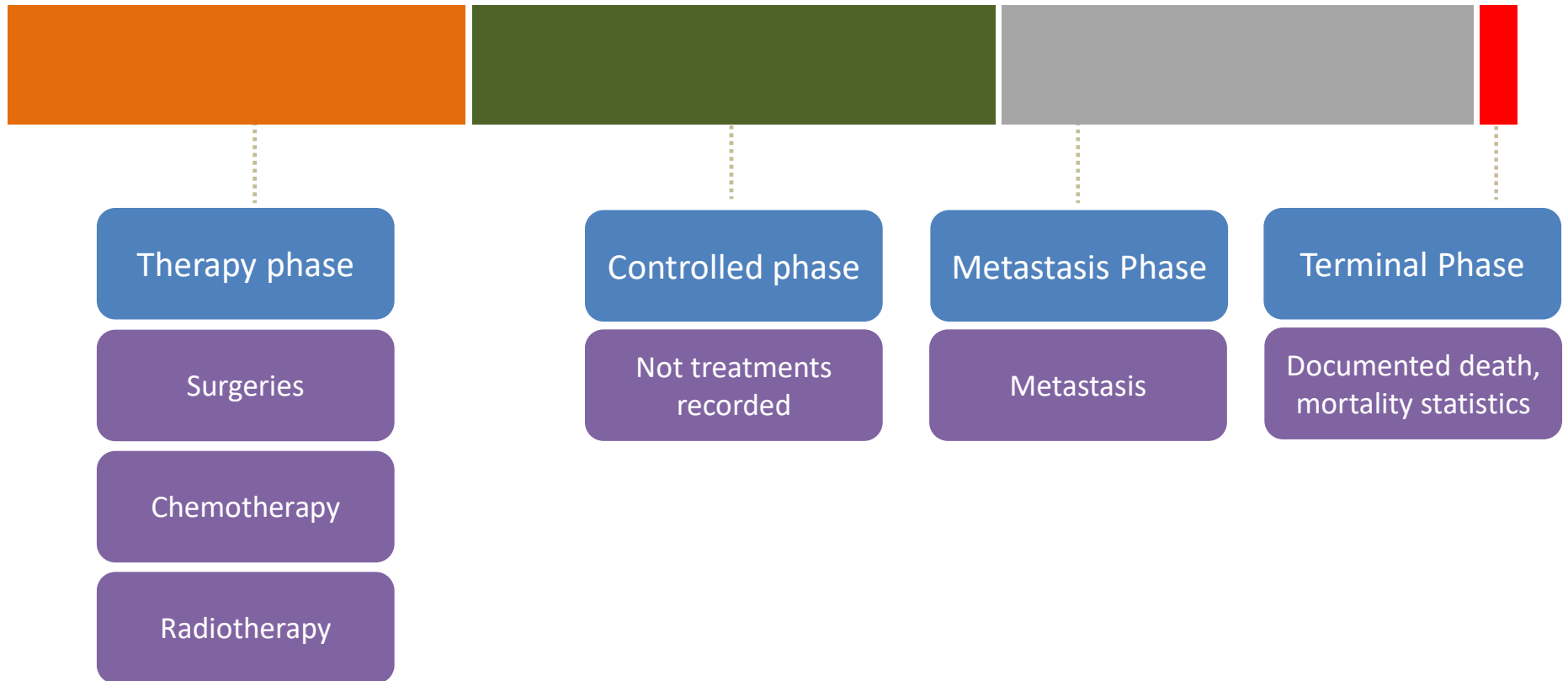


# 10-Year prevalence



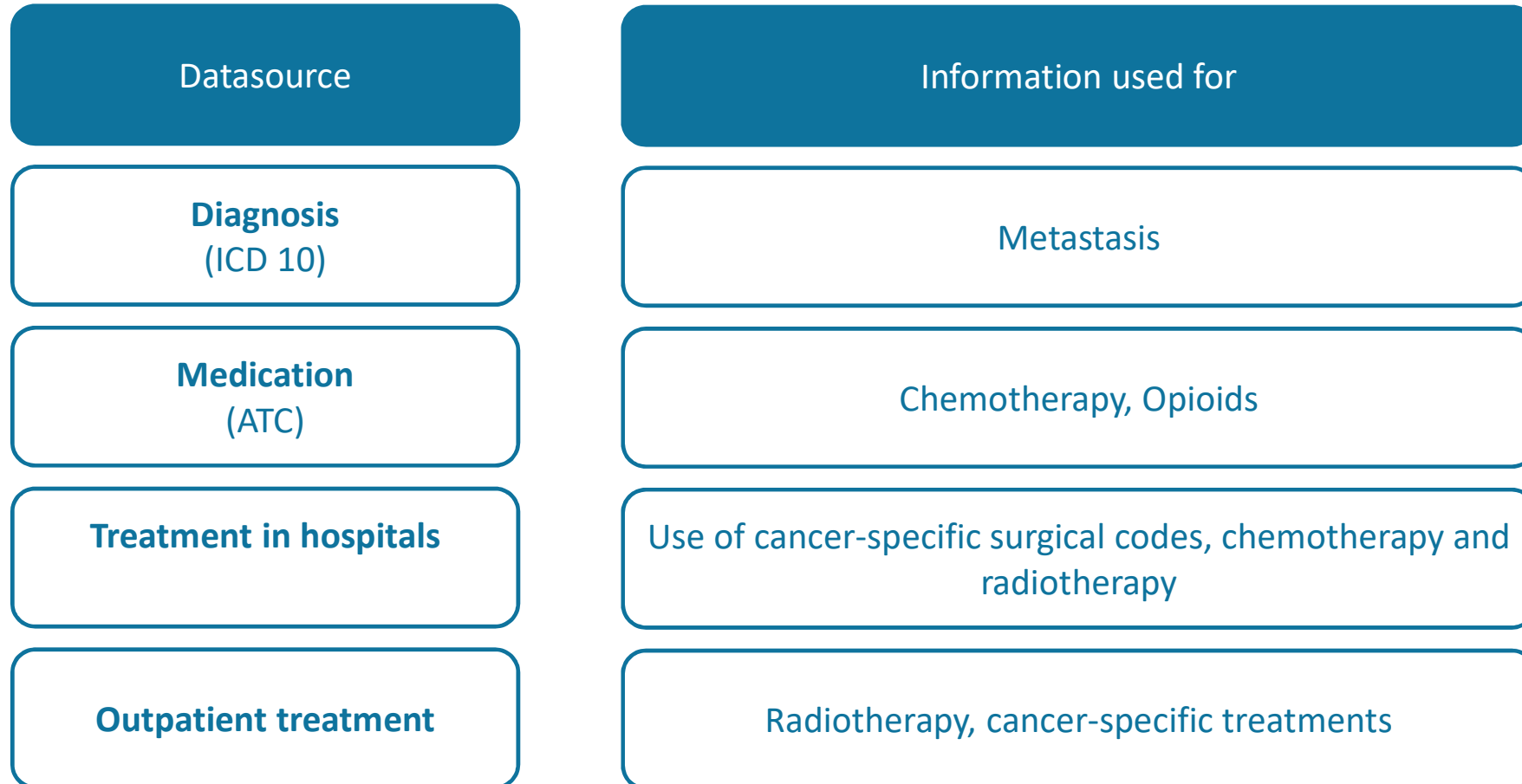
All insured persons in one of the 2017 quarters are tracked back and the ICD-10 diagnoses are validated. If any of the disease definitions apply at any time, the case is considered as "prevalent".

# Phases definition – an example





# Data





# Determination of severity

## Operationalisation with claims data

For each cancer disease, the phases are determined on a daily basis for the reported period

Metastasis are determined for the reported quarter and the three preceding quarters

Multiple therapy phases (Phase 1) are possible

Extrapolation of the distribution of the AOK-insured to the whole population



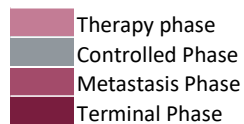
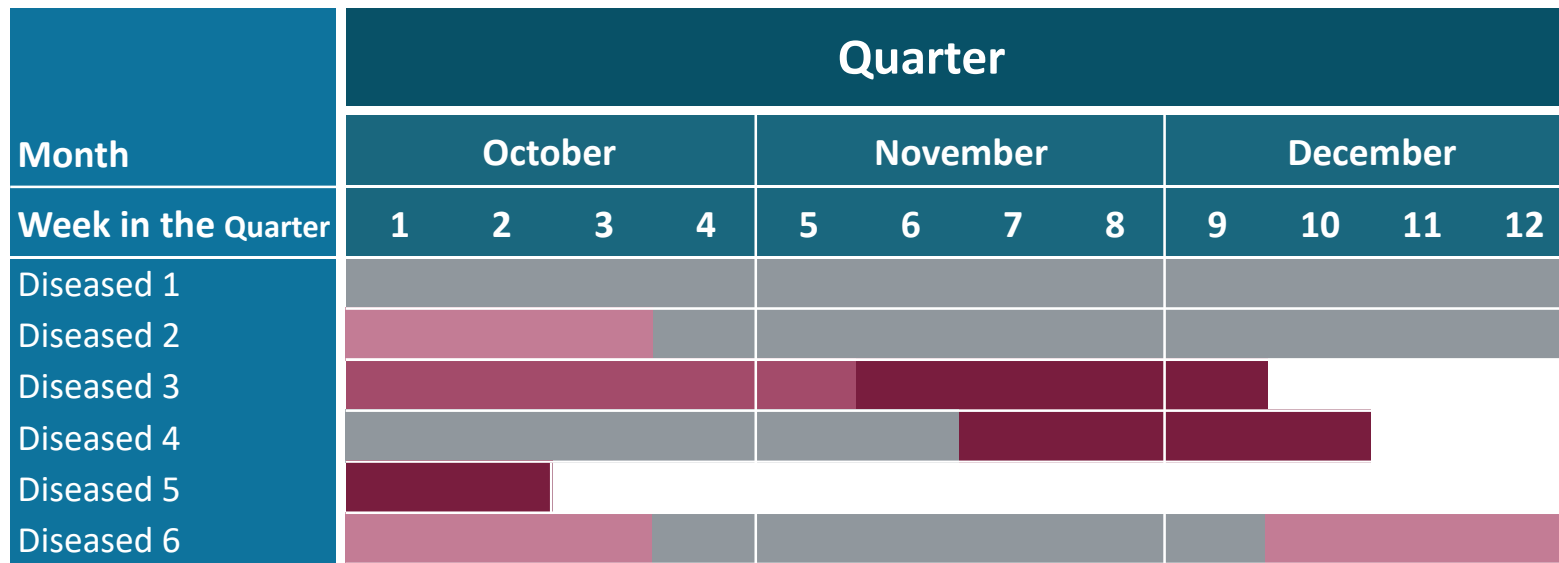
## Usage of external data sources

Therapy phase: Cancer-specific durations taken over from GBD

Terminal Phase: Duration of 4 weeks (GBD) Usage of the death date



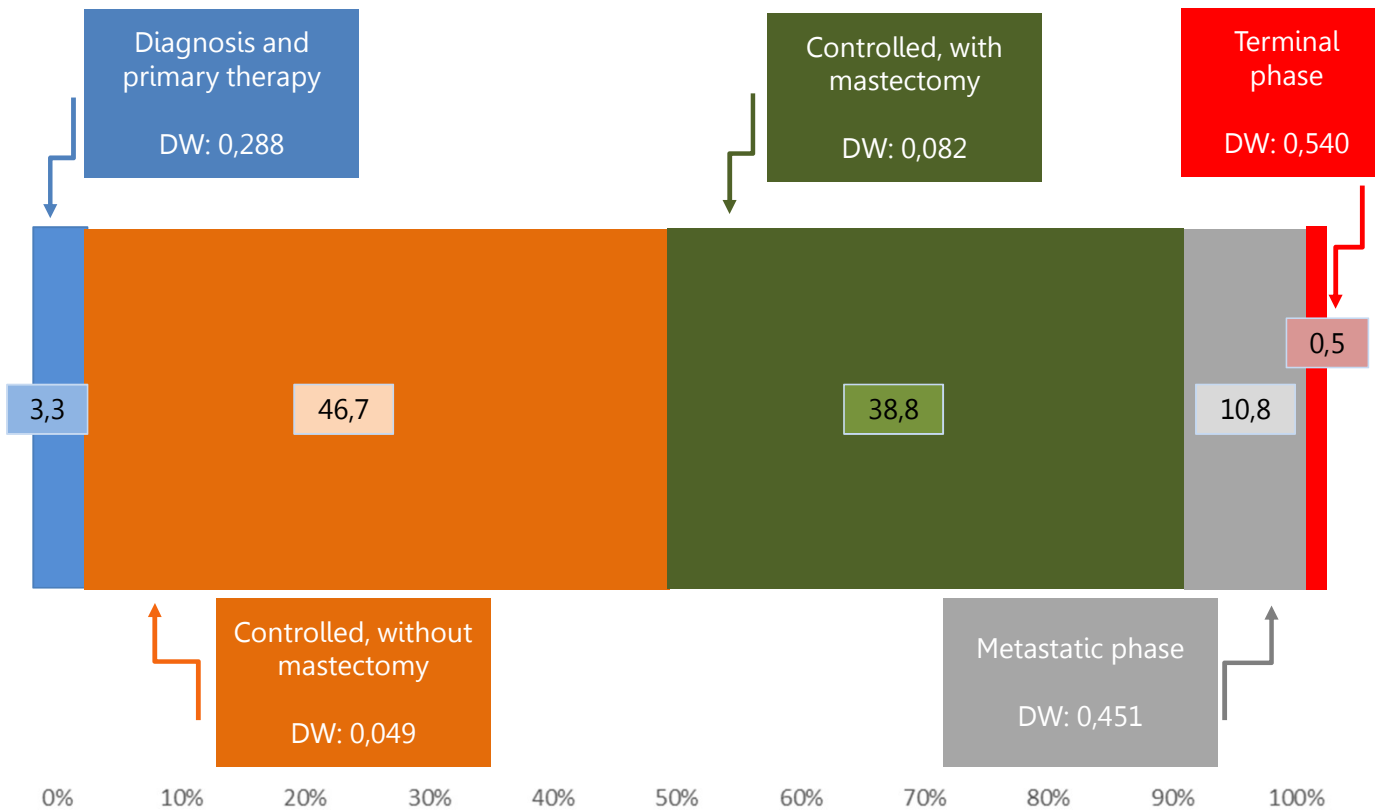
# Determination of the cancer phases according to the actual duration





# Severity distributions und Disability weights (DW)

## Example Breast cancer



## Further Disability Weights

| Neoplasms                                   | DW    |
|---|-------|
| <b>Alle</b>                                 |       |
| Controlled phase, no complications          | 0,049 |
| Diagnosis and primary therapy phase         | 0,288 |
| Metastatic phase                            | 0,451 |
| Terminal phase                              | 0,540 |
| <b>Prostate</b>                             |       |
| Controlled, with impotence                  | 0,065 |
| Controlled, with incontinence               | 0,180 |
| Controlled, with impotence and incontinence | 0,194 |
| <b>Colon</b>                                |       |
| Controlled, with stoma                      | 0,139 |
| <b>Lung</b>                                 |       |
| <i>No specific severity distributions</i>   | /     |

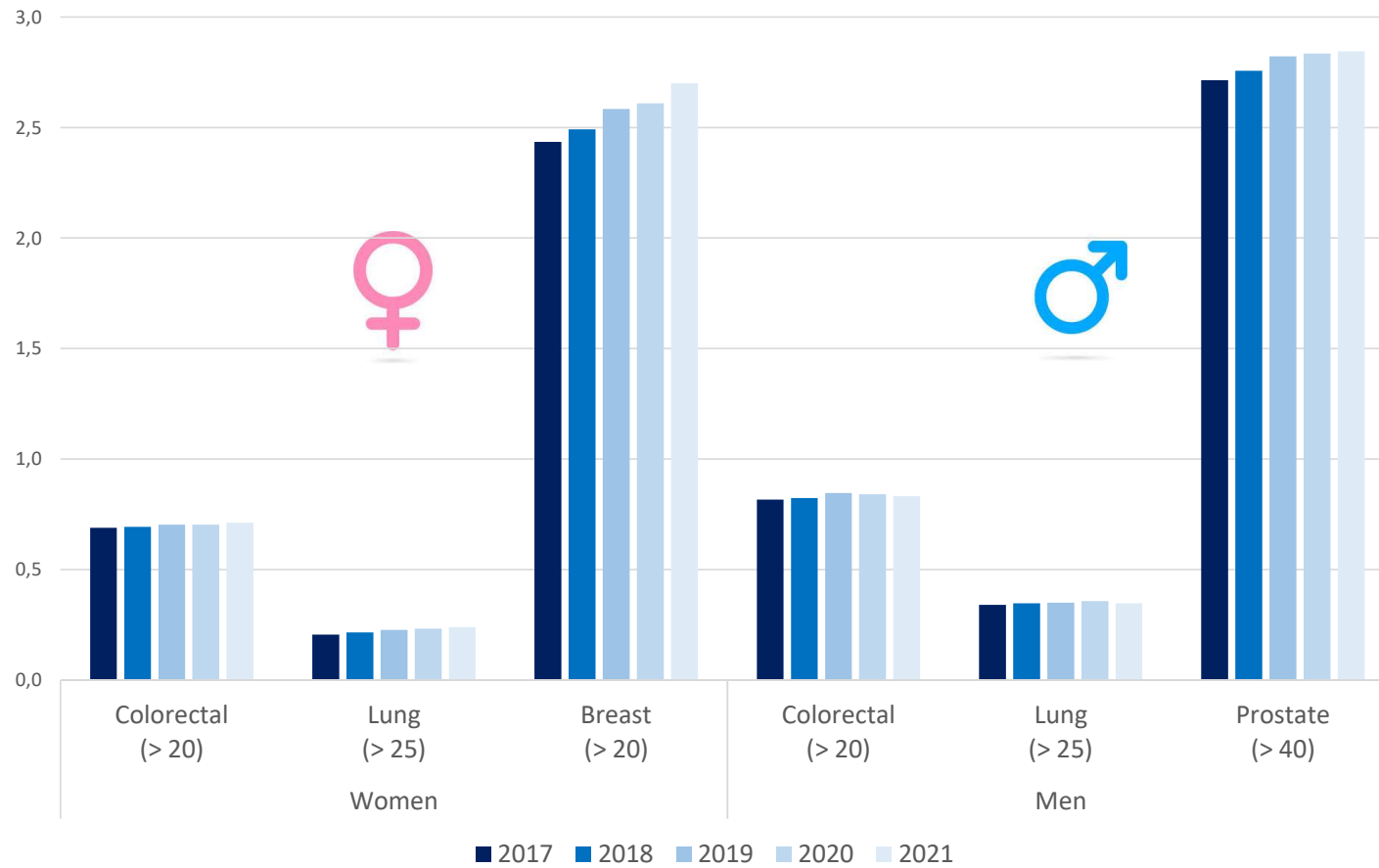




# *Results*

# Prevalence (10 Years )

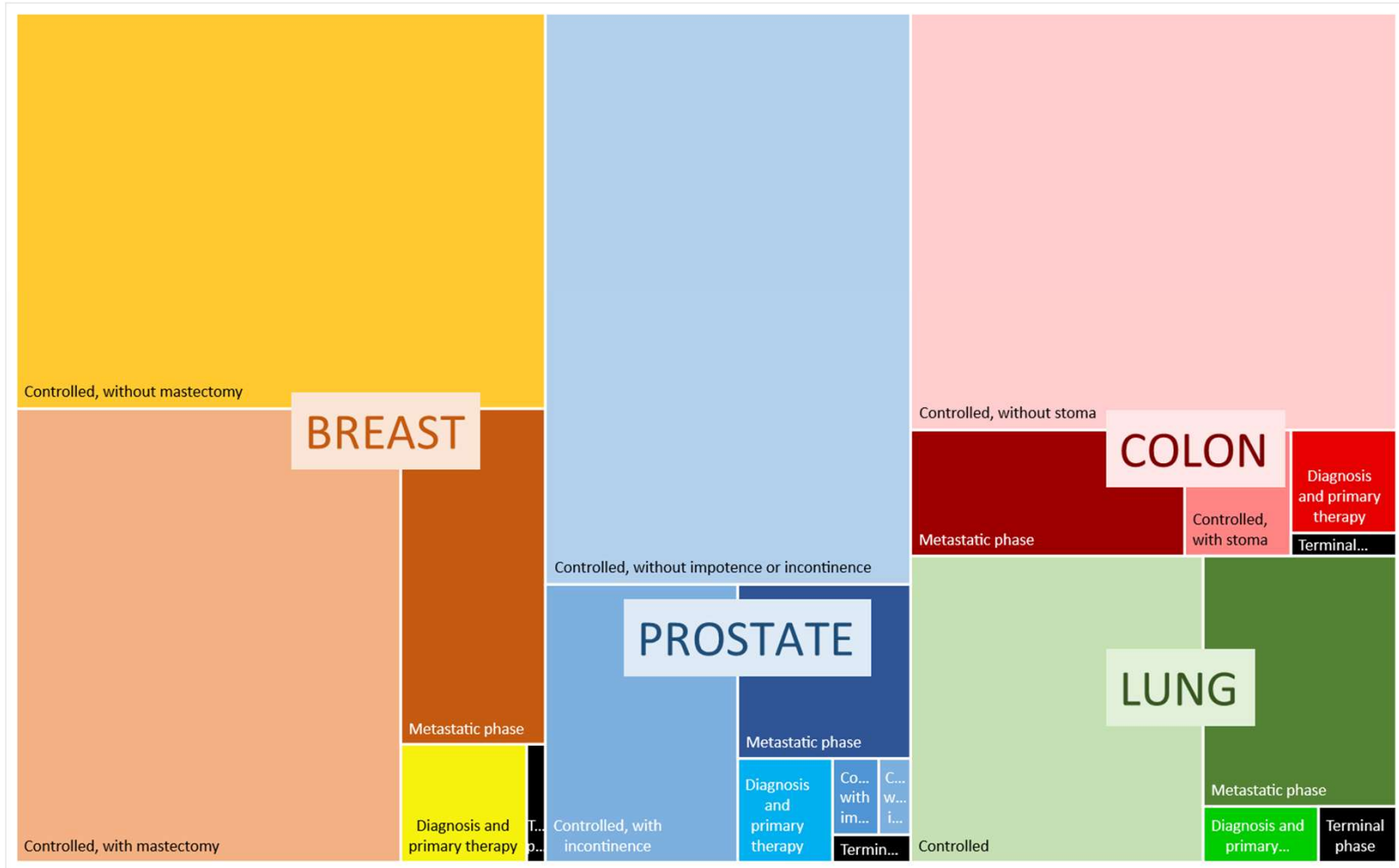
age, sex - & morbidity adjusted



Source: WIdO, preliminary results

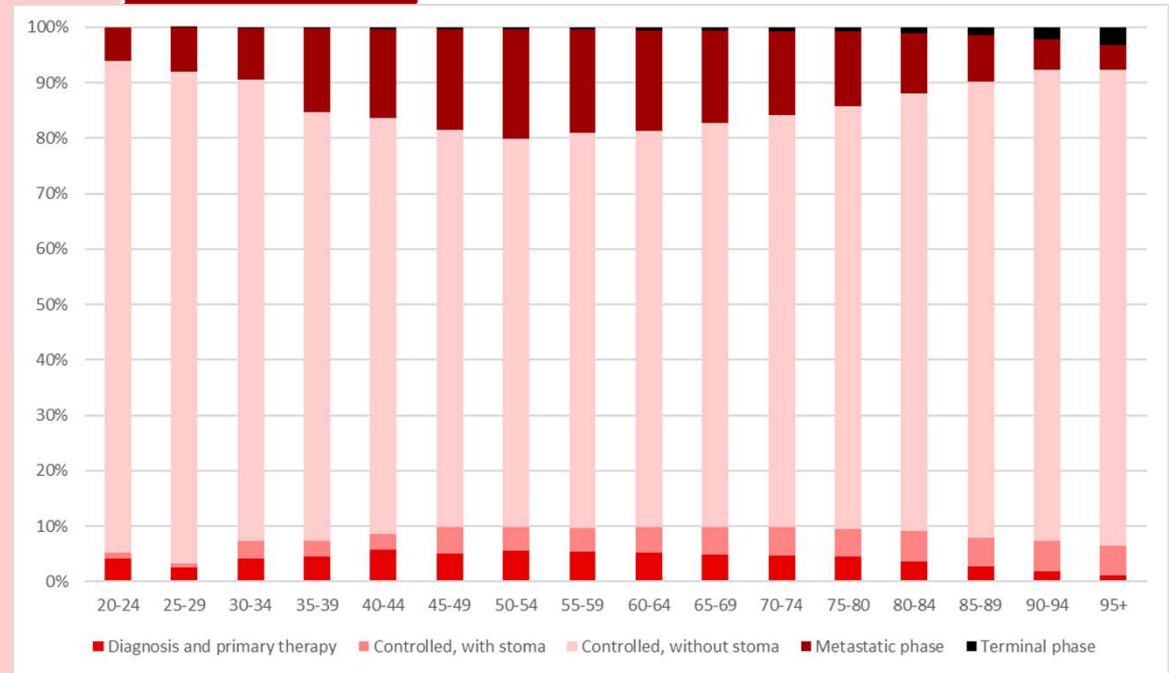


# Years lived with disability (Morbidity)





## SD Colon cancer



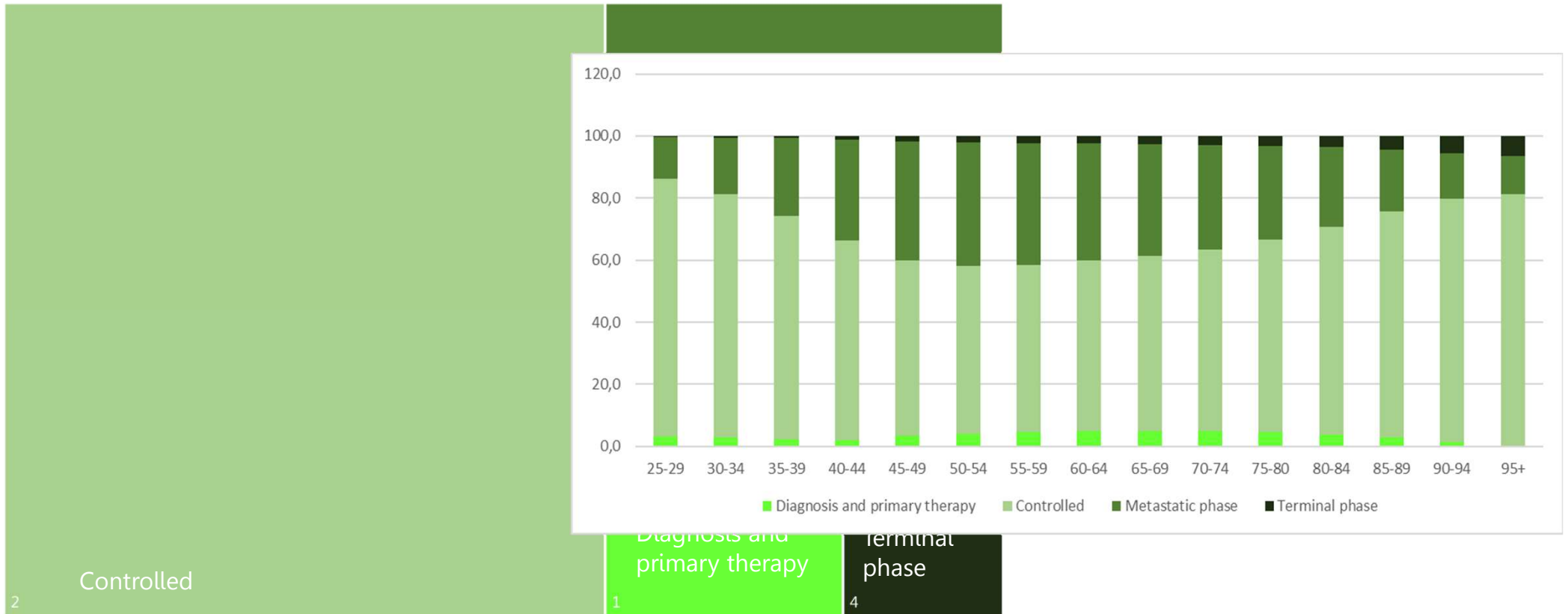
Controlled, without stoma

Diagnosis and primary therapy

al phase

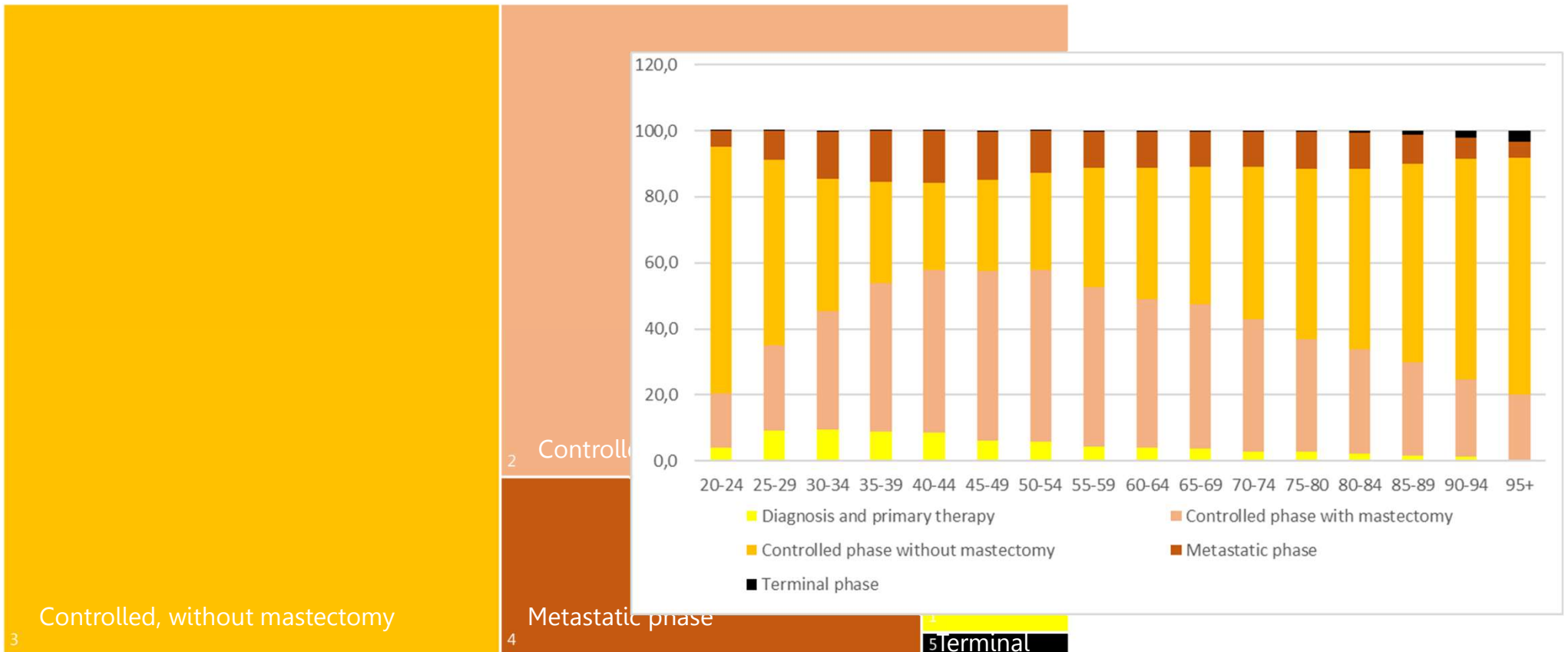


# SD Lung cancer



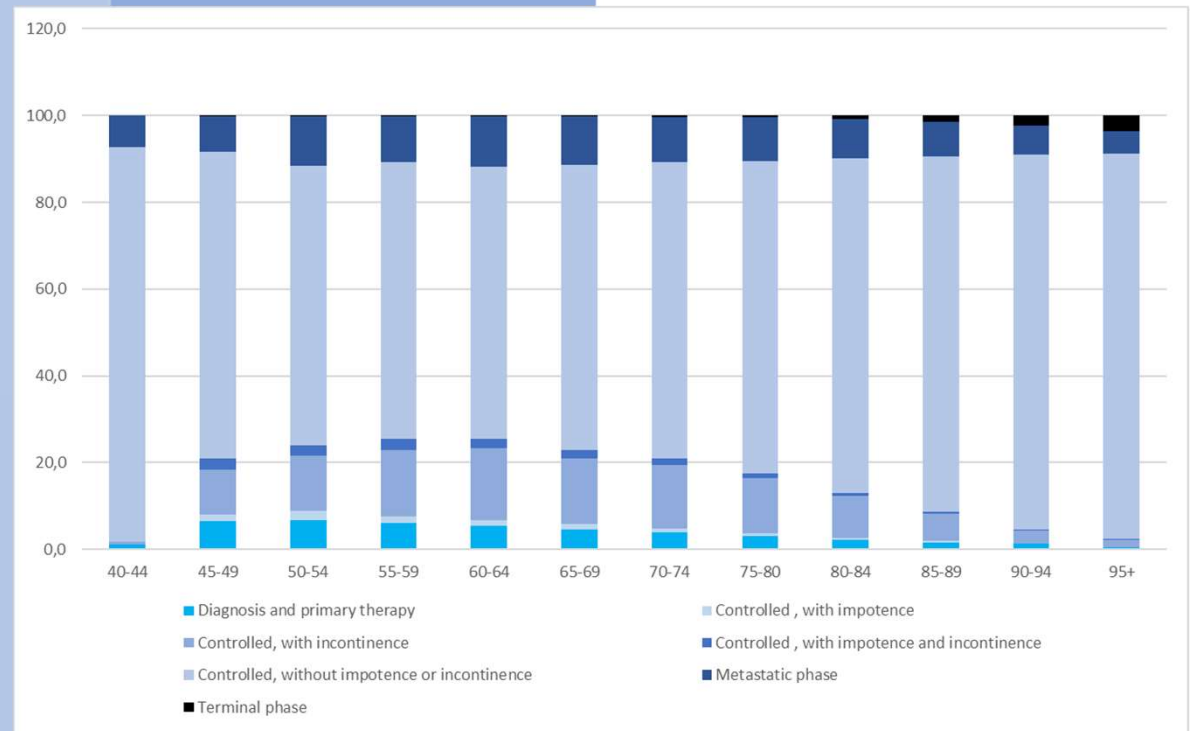


# SD Breast cancer





# SD Prostate cancer



5

Controlled, without impotence or incontinence

6

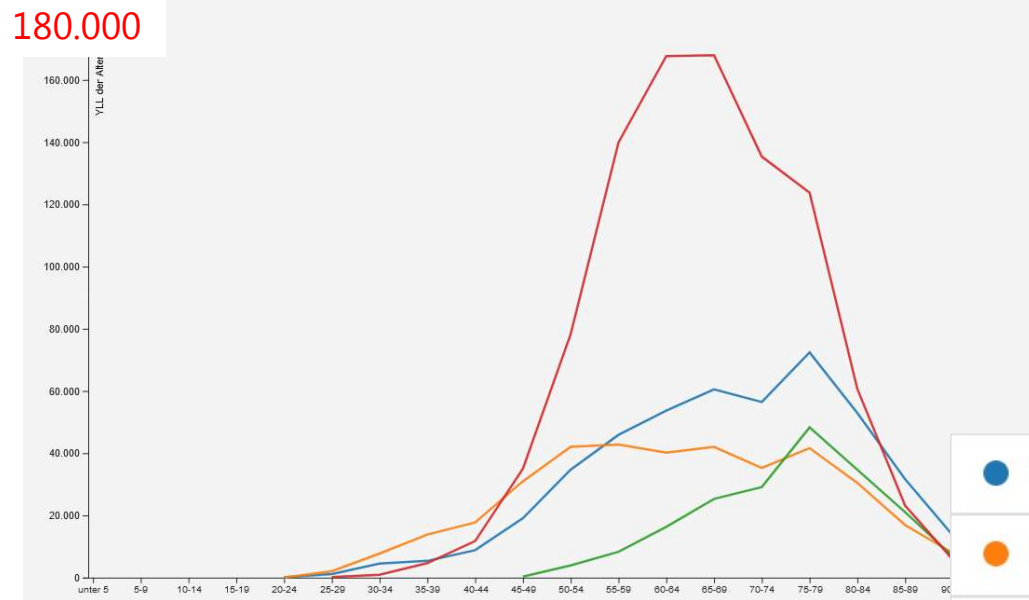
Metastatic phase

7

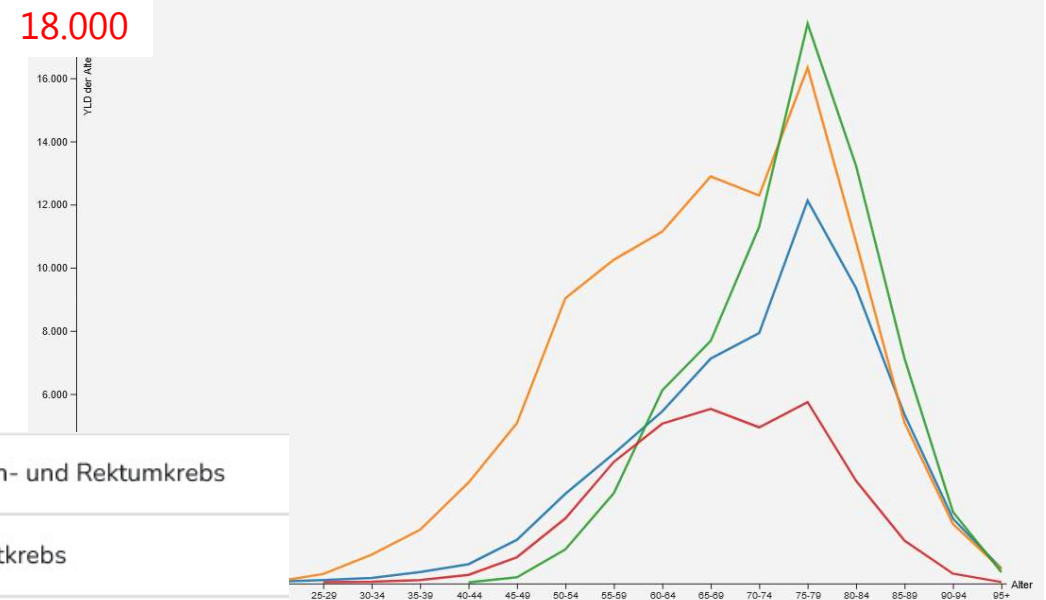
Terminal ph.



Mortality / Years of life lost (YLL)



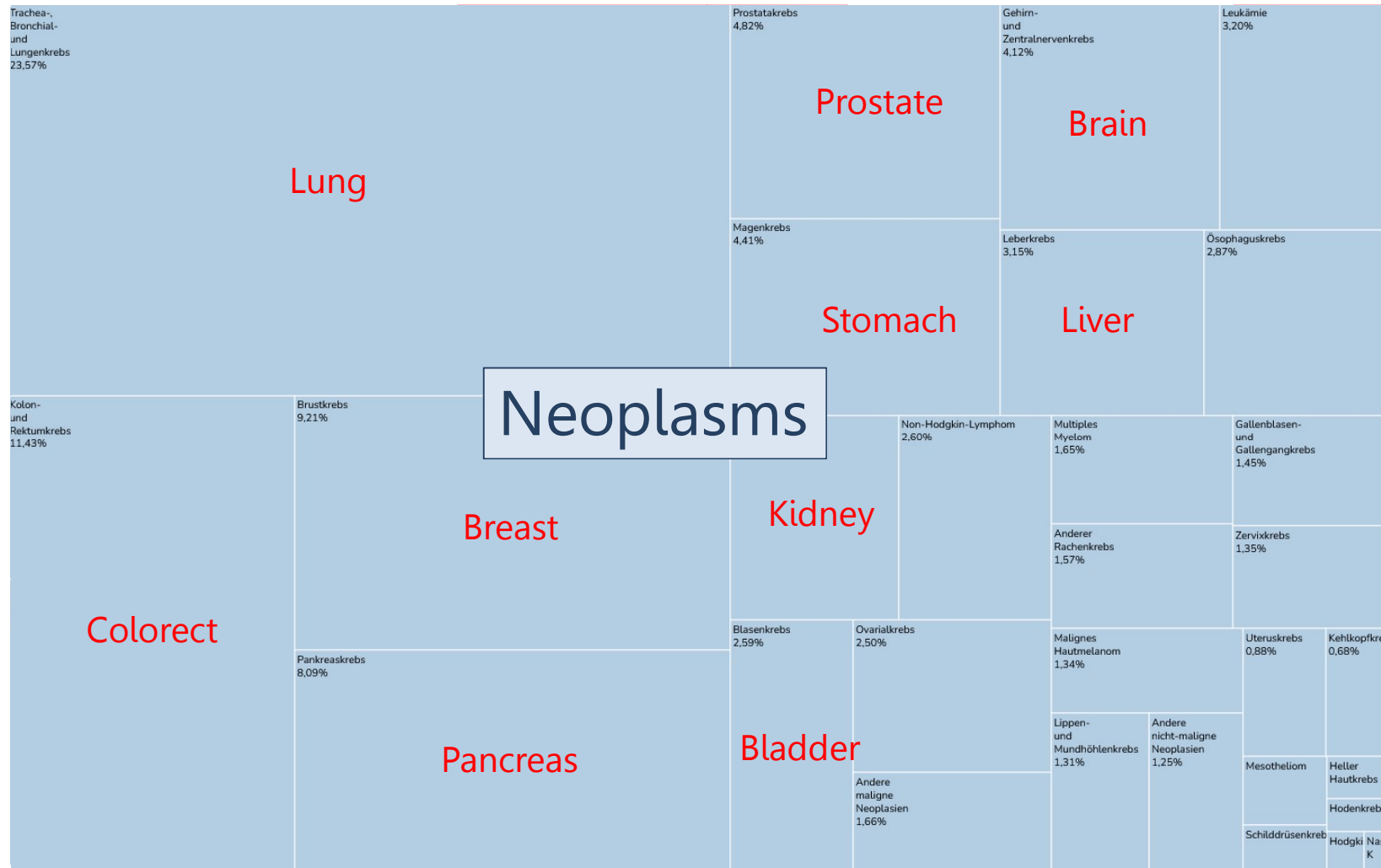
Morbidity / Years lived with disability (YLD)



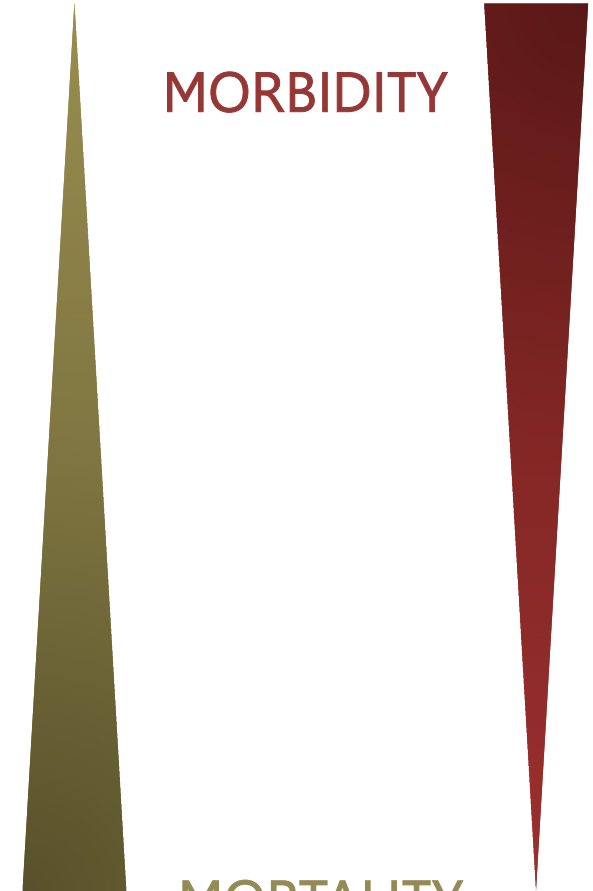
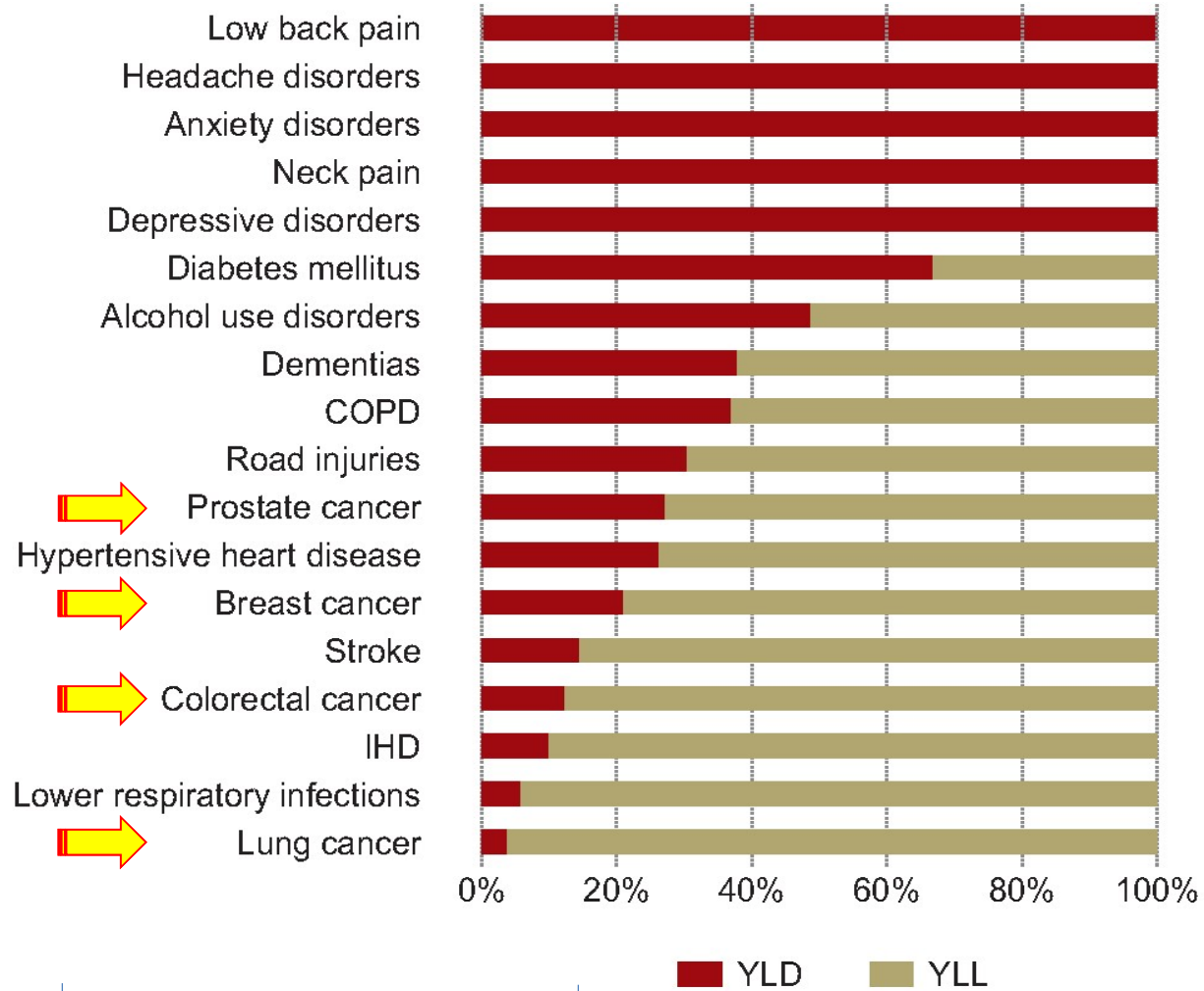
- Kolon- und Rektumkrebs
- Brustkrebs
- Prostatakrebs
- Trachea-, Bronchial- und Lungenkrebs



# Years of Life Lost (Mortality)

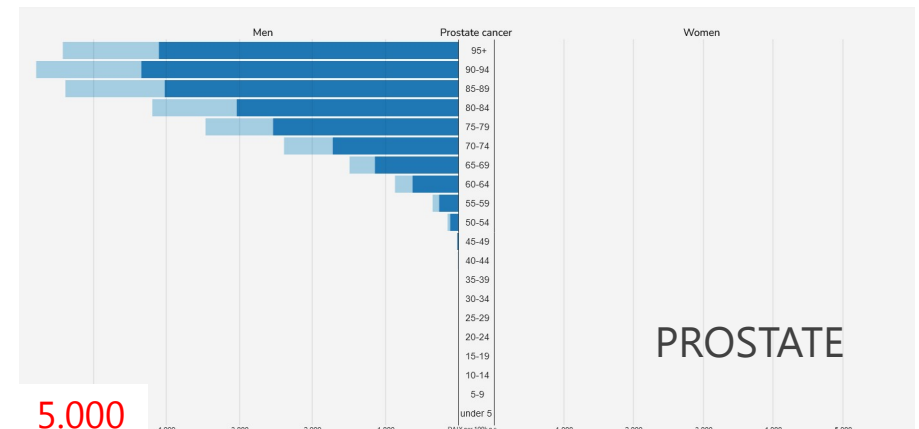
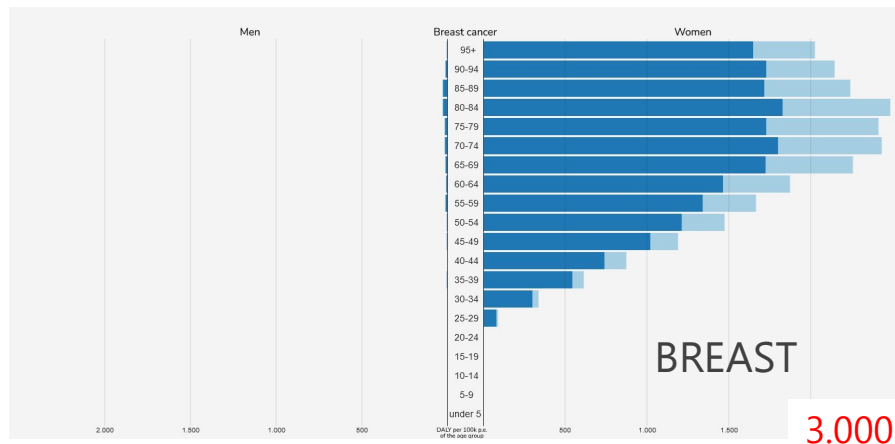
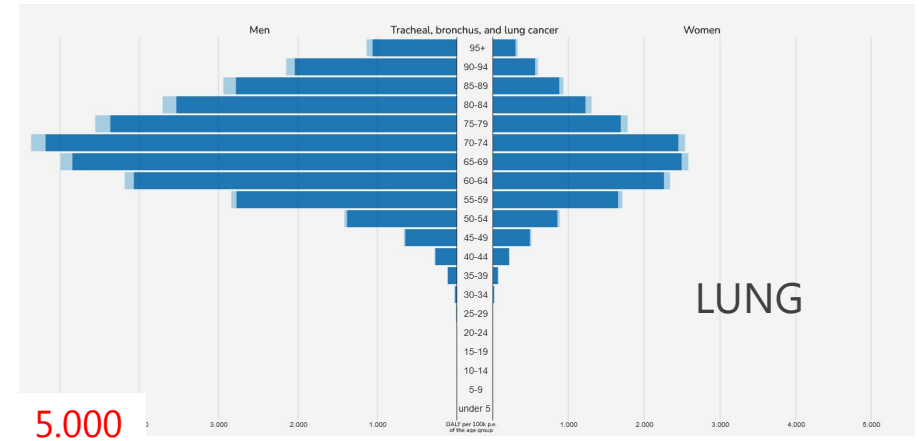
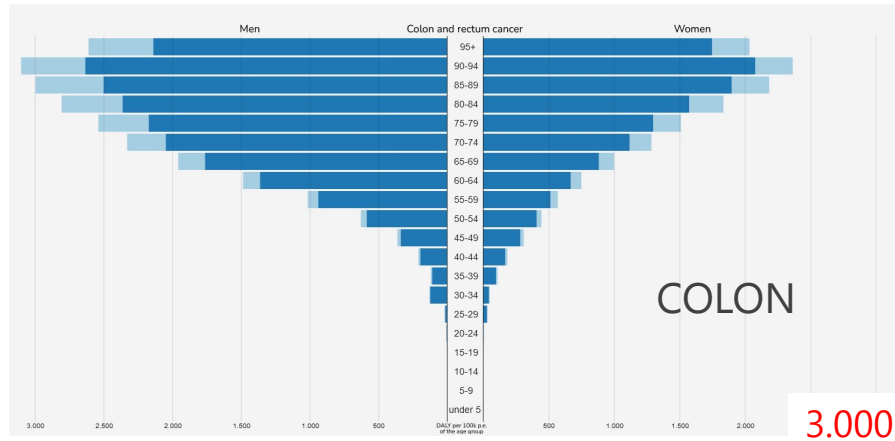


## Share of YLL and YLD



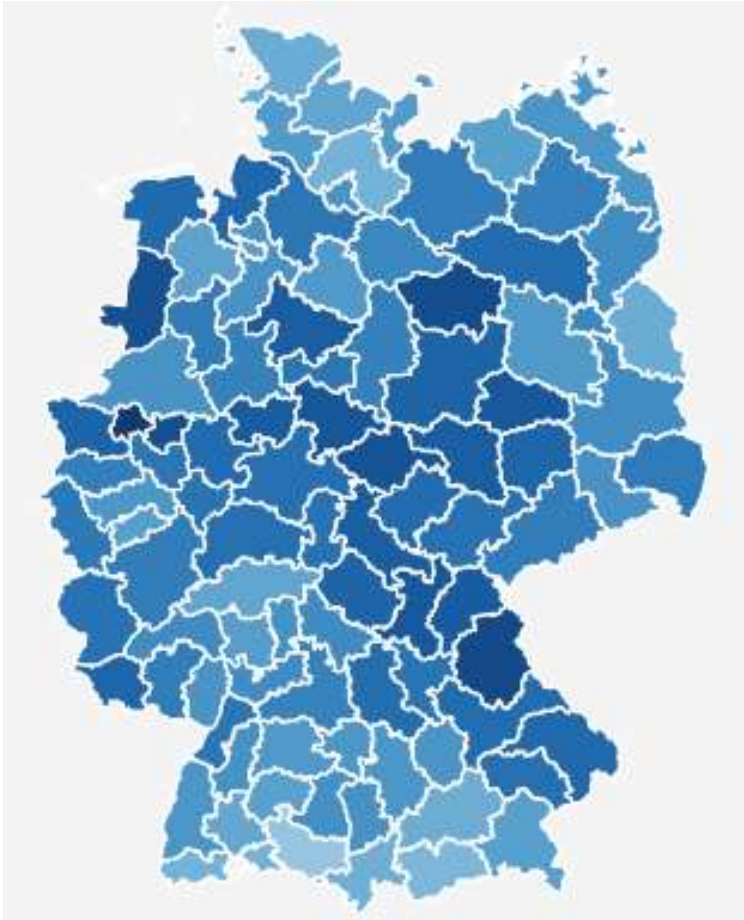


# Total burden



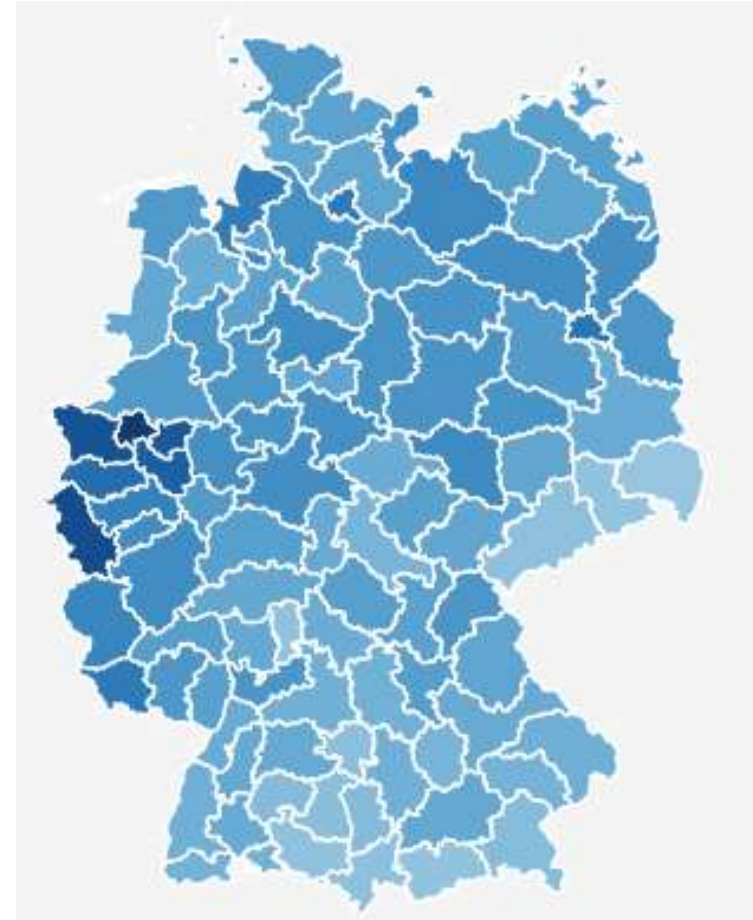
YLD YLL

# Regional estimates

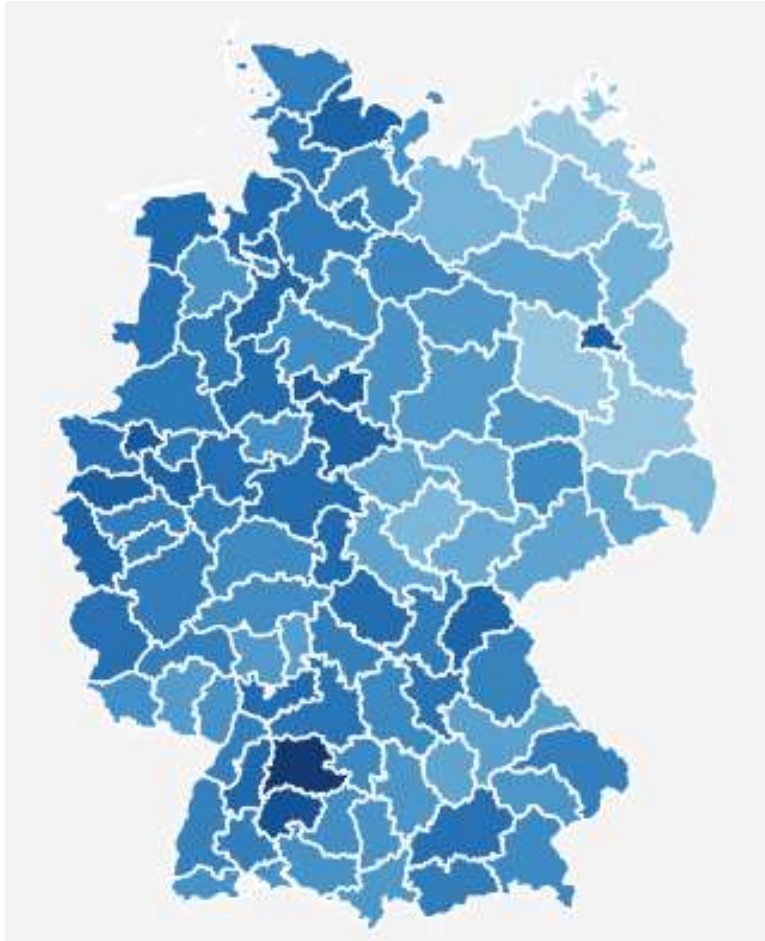


YLD colon cancer (age standardised)

12 June 2024

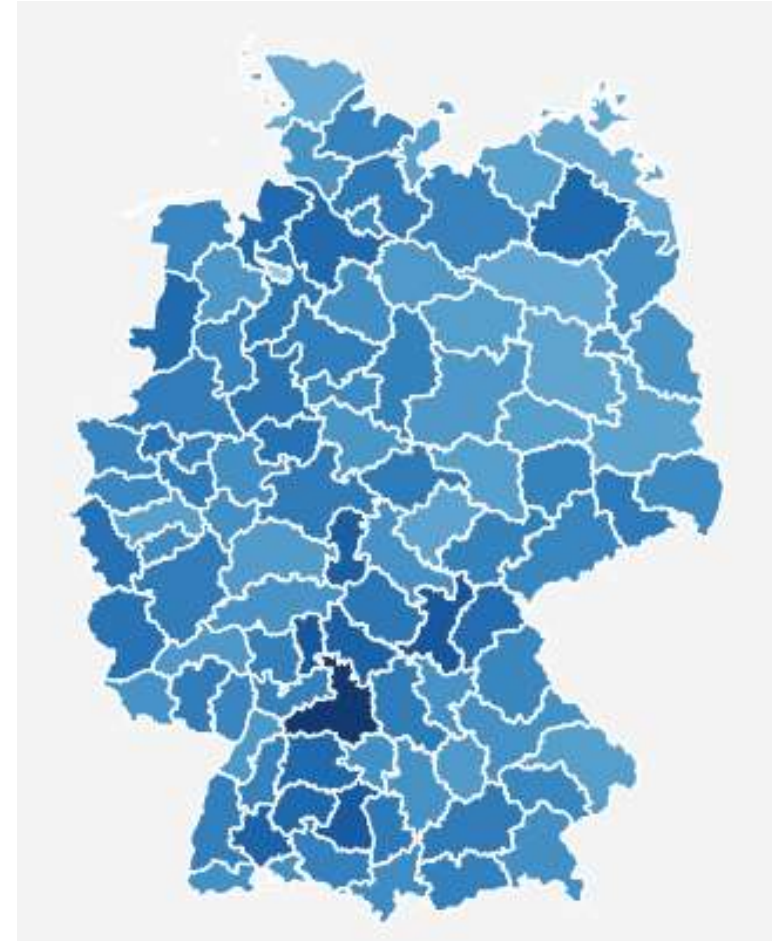


YLD lung cancer (age standardised)



YLD breast cancer (age standardised)

12 June 2024



YLD prostate cancer (age standardised)





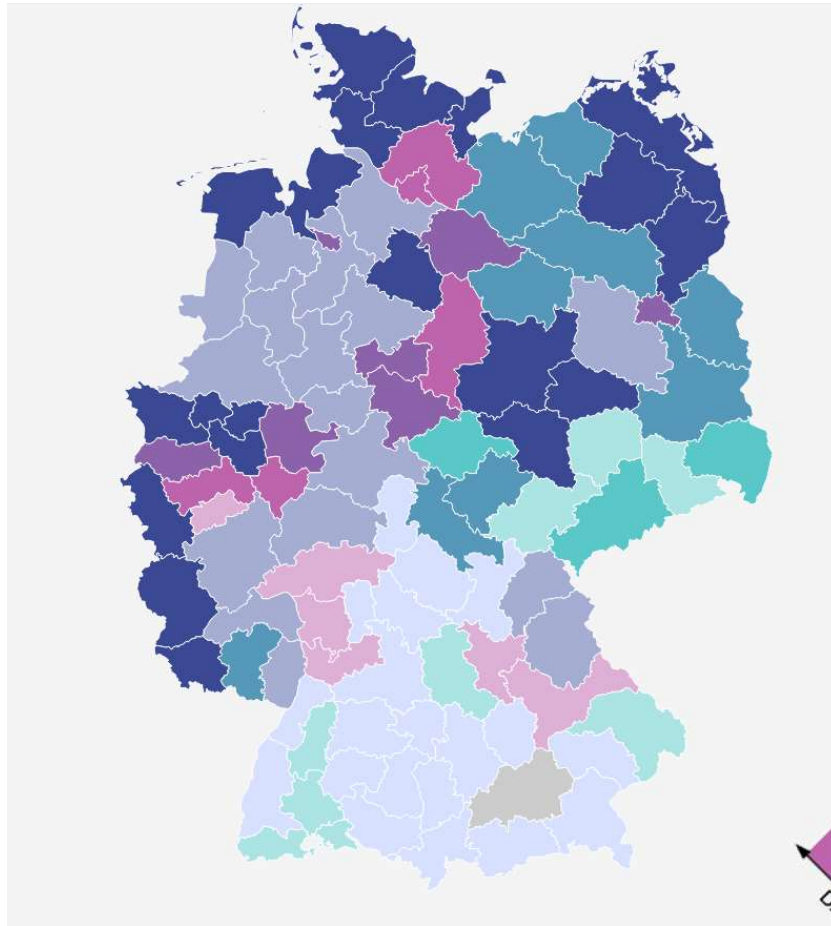
# *Outlook*



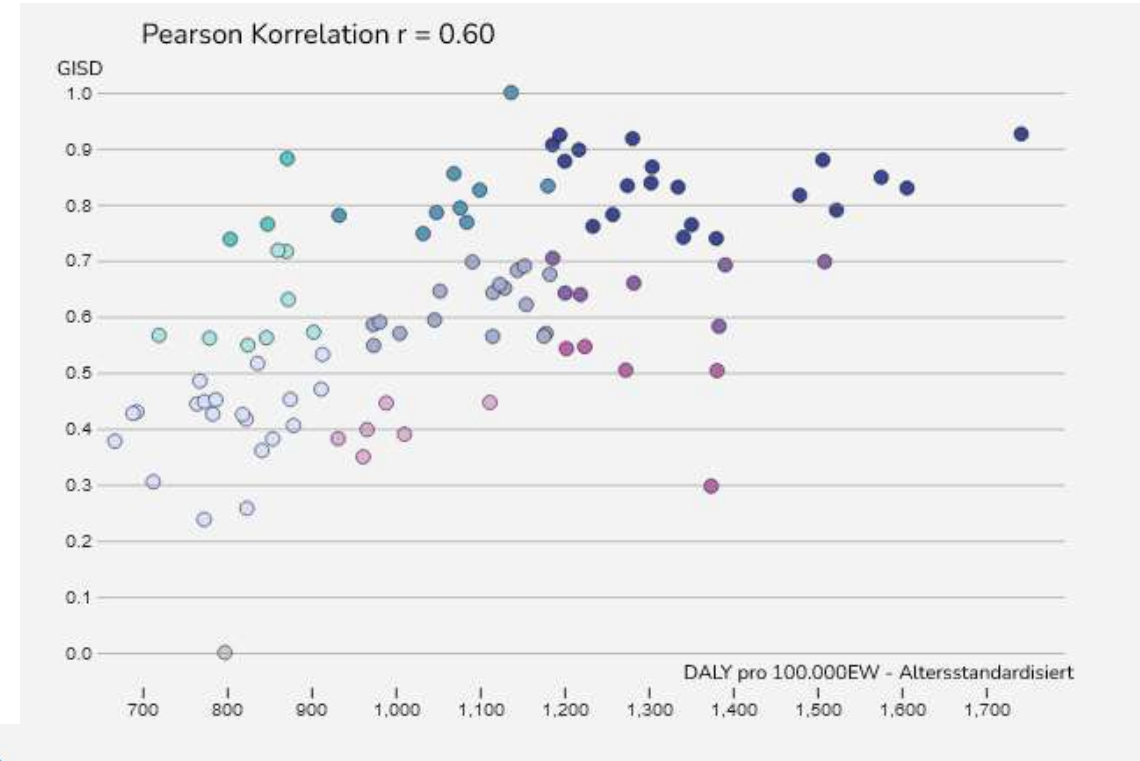
- Estimations for 2015 - 2022
- Inclusion of six further diseases (NCD + CD)
- Deprivation areas (GISD)
- Multimorbidity adjustment (from independent to dependent assignment)
- Forecast
- Risk attribution



## Bivariate maps



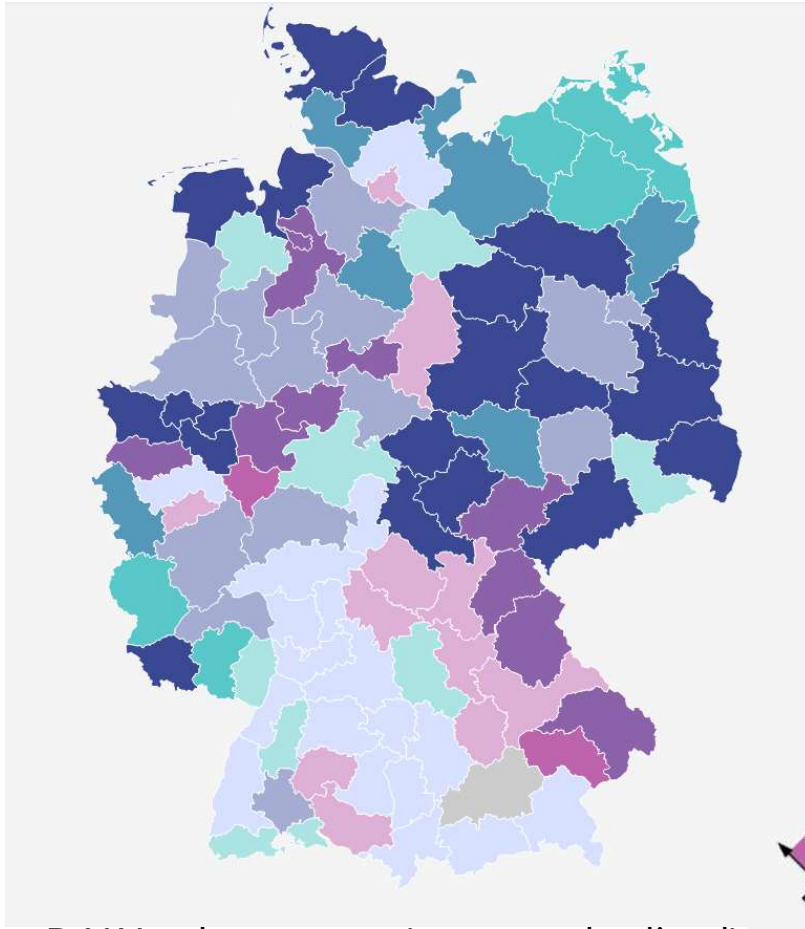
DALY lung cancer (age standardised)



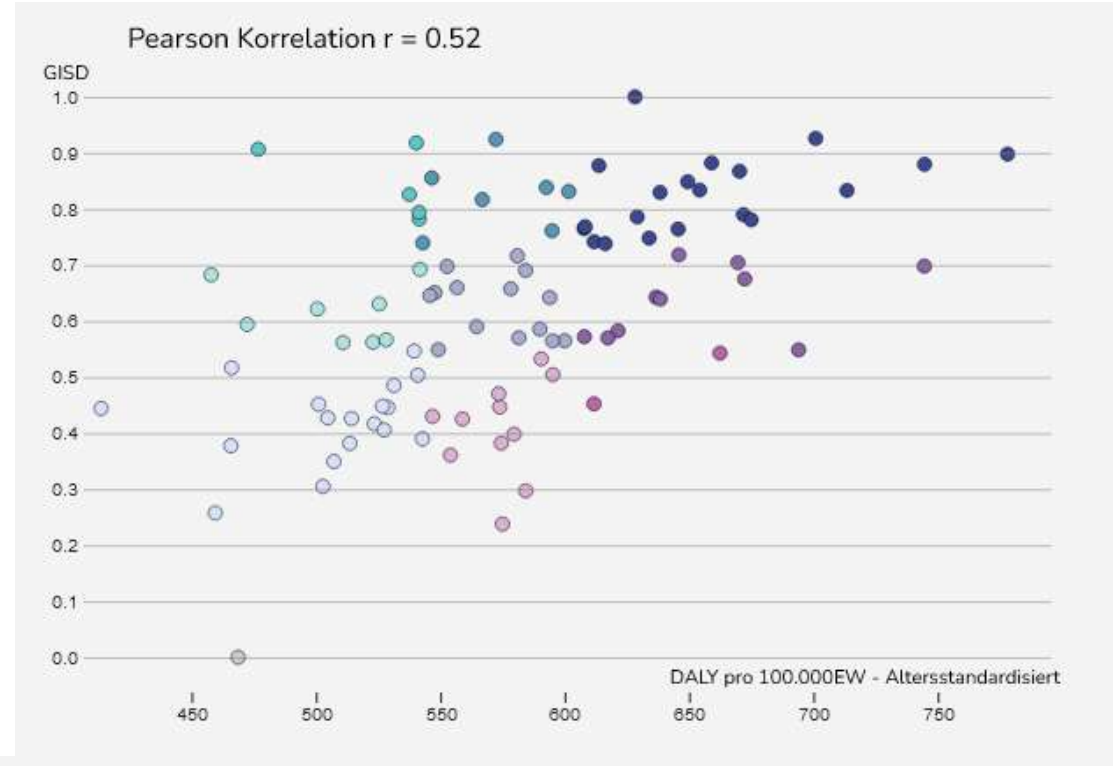




## Bivariate maps



DALY colon cancer (age standardised)





**RKI** Alexander Rommel, Elena von der Lippe, Annelene Wengler, Michael Porst,  
Janko Leddin, Aline Anton, Caoimhe Cawley & Thomas Ziese

**UBA** Dietrich Plaß & Heike Gruhl

**WIdO** Katrin Schüssel, Gabriela Brückner, Jan Breitzkreuz & Helmut Schröder

**WIdO** Wissenschaftliches  
Institut der AOK

**Umwelt  
Bundesamt**