Redistributing ill-defined deaths in the German Burden of Disease study BURDEN 2020

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Causes of death data in Germany

- Complete registration of all deaths with

  - Age, sex, and place of residency

- One (underlying) cause of death

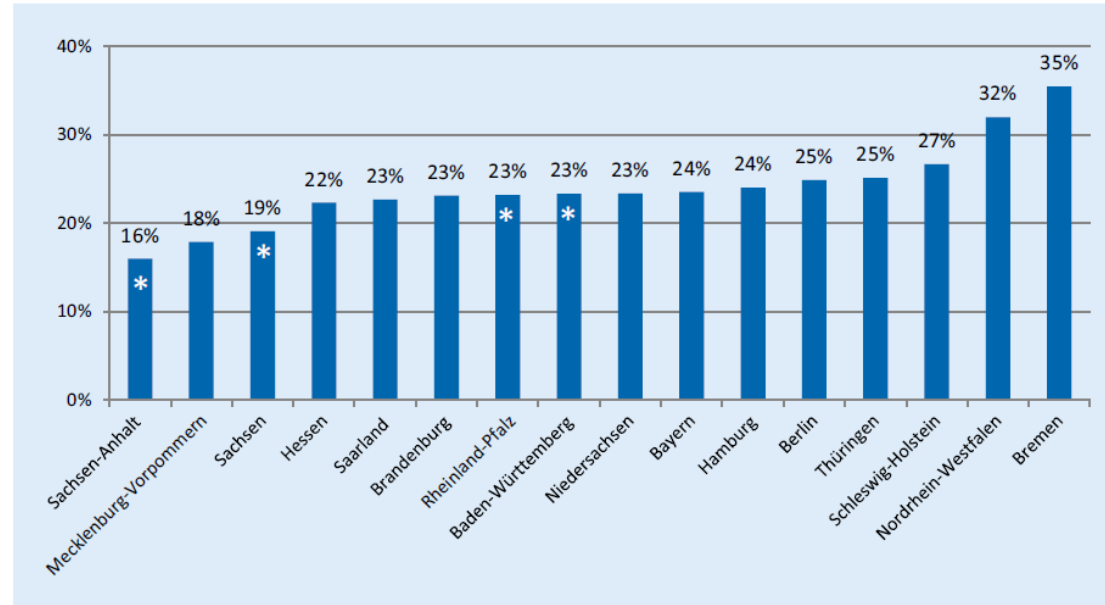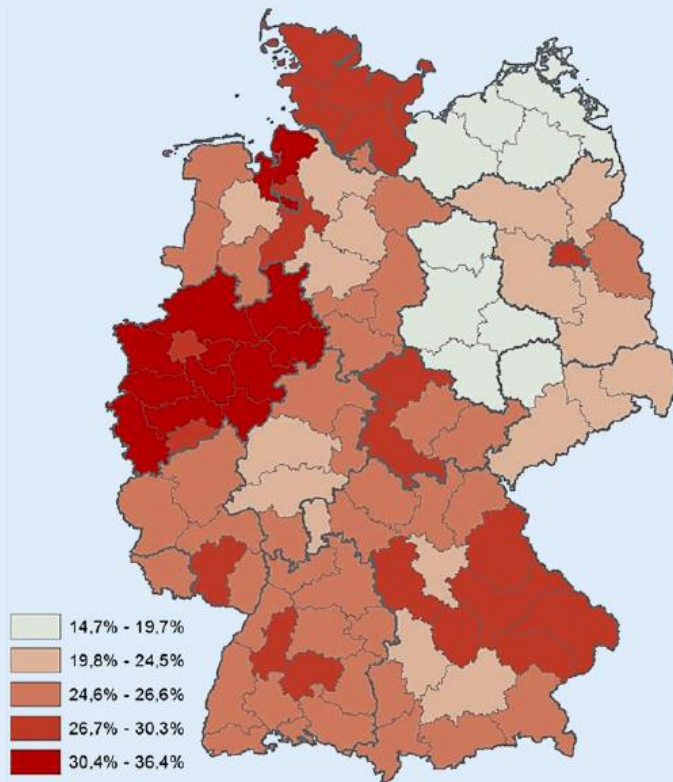- No data linkage → no further information

Ill-defined deaths (IDD) definition

- Following GBD methodology (2019)

- IDD can be:

  - Impossible cause

  - Unspecified causes

  - Symptoms

  - Intermediate causes

  - Unknown causes

Example Germany: share of ill-defined deaths

Source: Wengler et al. 2019 [Causes of death data, 2015]

Possible ways of handling IDD

- Analyze date without IDD

- Redistribution

  - Necessary when: relatively high share of IDD

  - Different methodological choices to be made
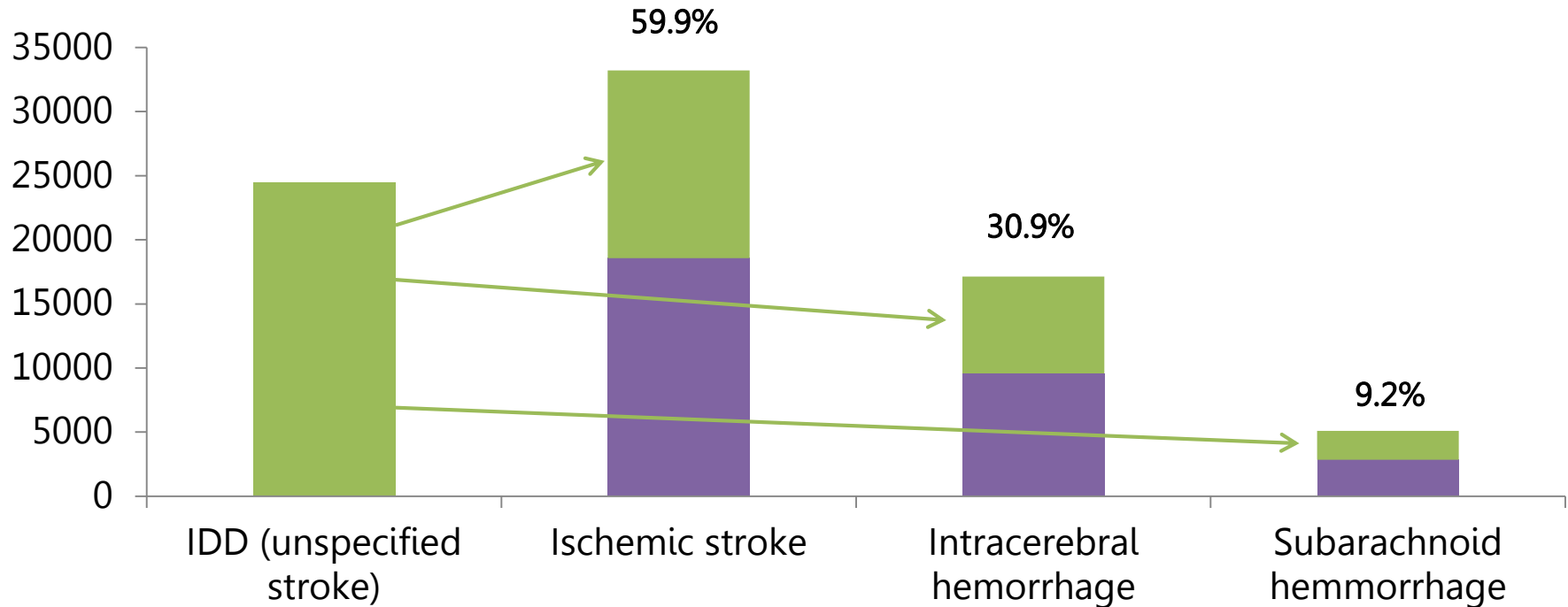
    for Germany:

  - Only one underlying cause of death

Redistribution I

Provided by IHME

- ~150 IDD packages
- Target codes for each package

- Proportional redistribution

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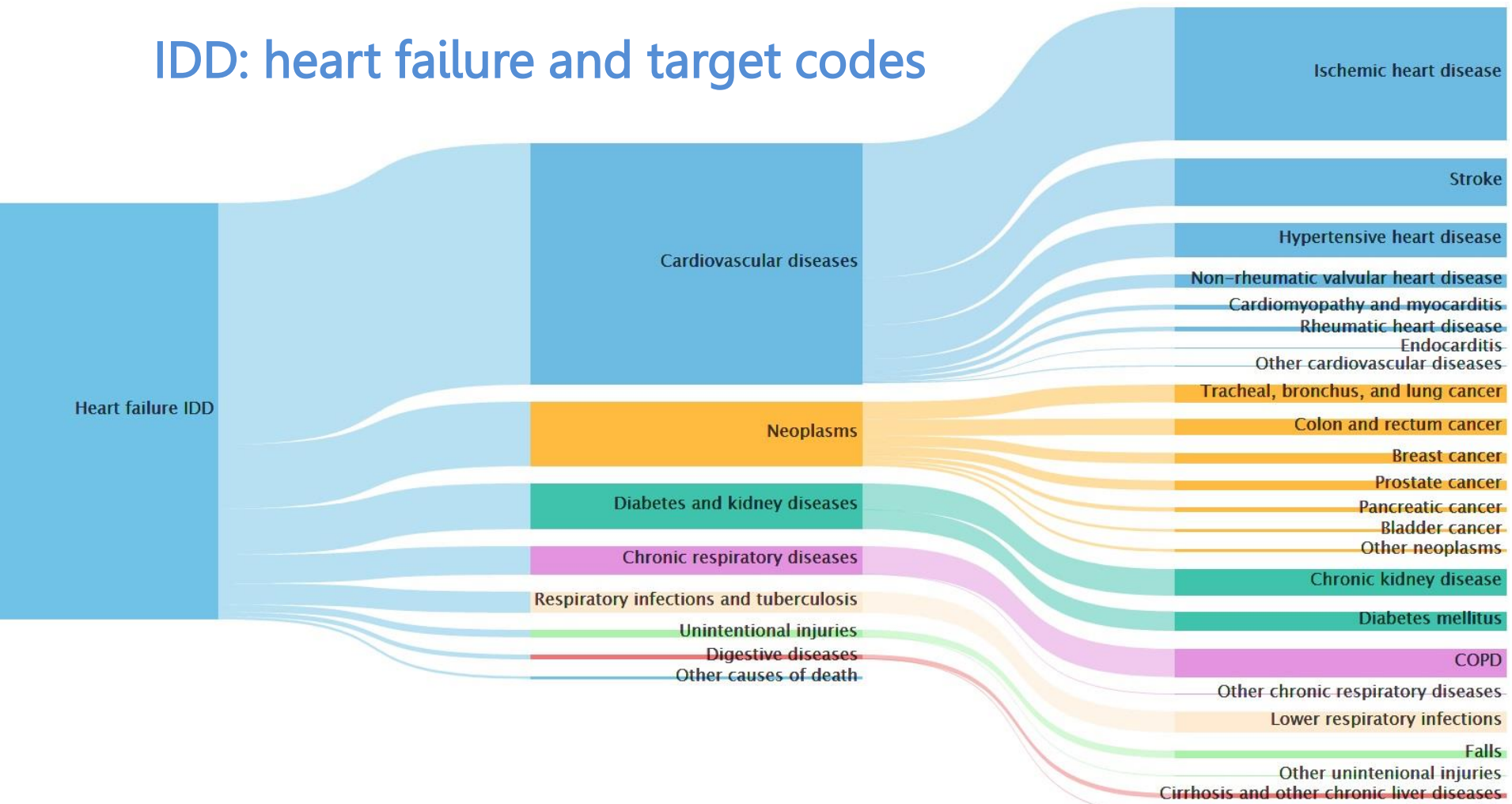- Individual with an IDD assigned new ICD code 1,000 times → uncertainty interval

Redistribution II

- New distribution (of valid ICD codes) after each redistributed package

- Proportional redistribution of each IDD package by
  - Age
  - Sex
  - Region

Redistribution

IDD: heart failure and target codes

Grouping of causes of death

Causes of death grouping
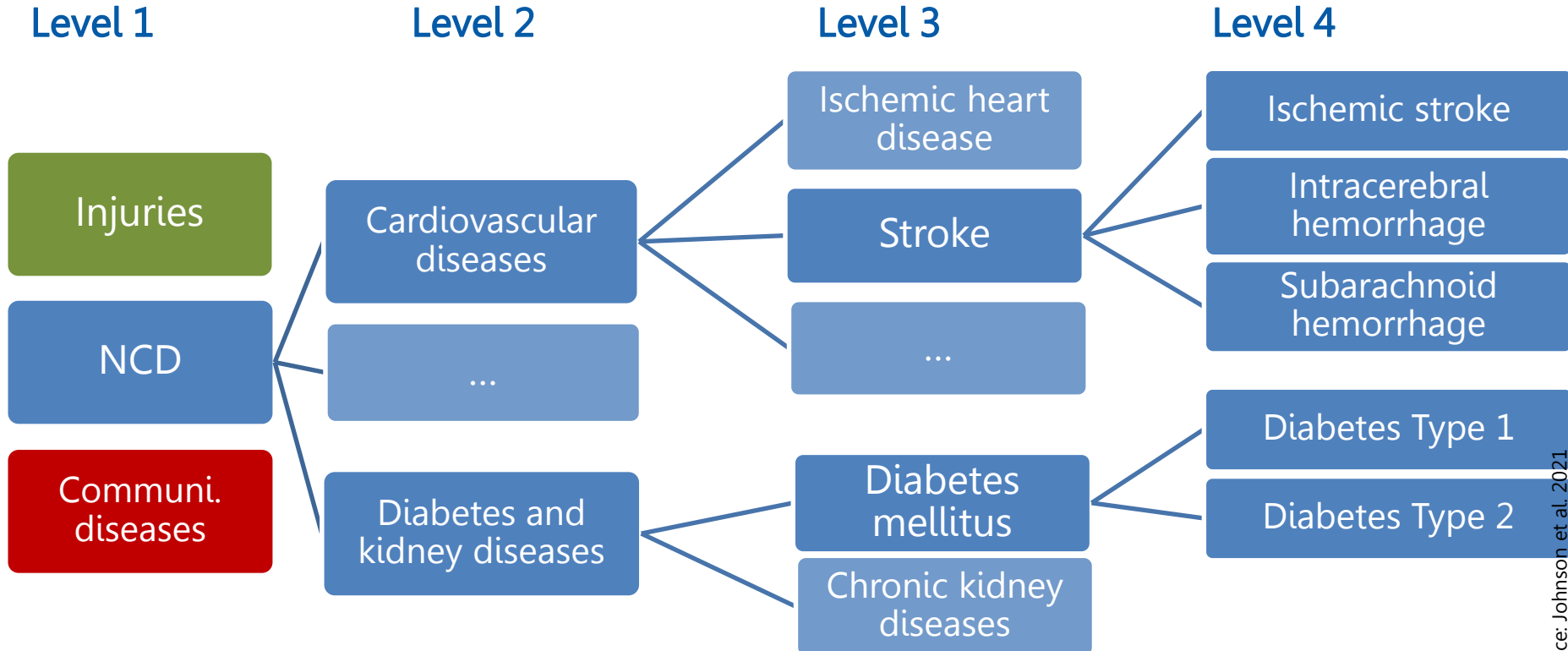
Results

Deaths before and after redistribution (level 1)

Level 1 cause of death	number of deaths				YLL after redistribution	
	before redistribution		after redistribution			
Communicable, maternal, neonatal, and nutritional diseases	10,091	*1.5%*	36,929	*4.0%*	469,638	*4.0%*
Injuries	31,718	*4.6%*	44,805	*4.8%*	847,836	*7.3%*
Non-communicable diseases	649,658	*94.0%*	850,534	*91.2%*	10,310,505	*88.7%*
	691,467		**932,269**		11.627.979	

IDD and their contribution to causes of death on level 1
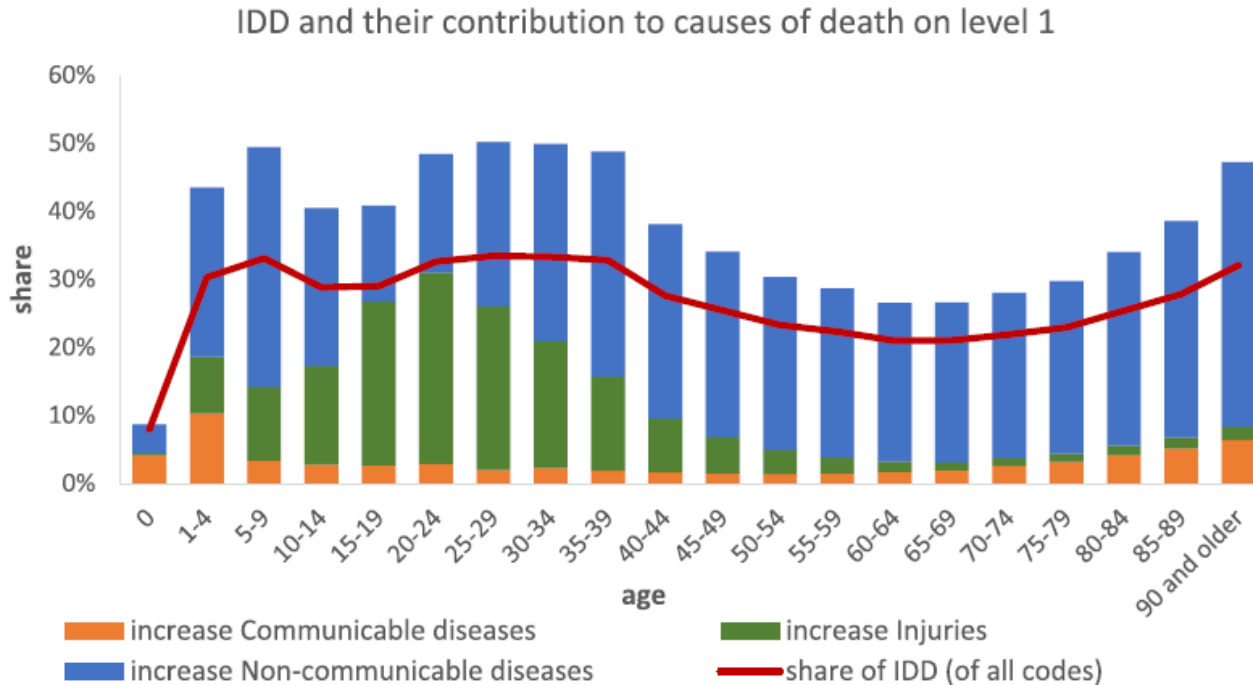
Fig. 11 Redistribution of cases classified as IDD to Diabetes mellitus tType 1 and 2 on level 4, all IDD packages contributing

Legend:
- increase Communicable diseases
- increase Injuries
- increase Non-communicable diseases
- share of IDD (of all codes)

Deaths before & after redistribution (level 2) – more than 10,000 deaths

Level 2 cause	number of deaths					
	before redistribution		after redistribution		YLL after redistribution	
Cardiovascular diseases	234,673	*33,9%*	333,185	*35,7%*	320,5649	27,6%
Neoplasms	214,720	*31,1%*	267,717	*28,7%*	409,5795	35,2%
Neurological disorders	72,407	*10,5%*	76,193	*8,2%*	666,484	5,7%
Diabetes and kidney diseases	29,797	*4,3%*	53,471	*5,7%*	479,688	4,1%
Chronic respiratory diseases	39,924	*5,8%*	49,522	*5,3%*	600,699	5,2%
Digestive diseases	33,974	*4,9%*	41,921	*4,5%*	671,887	5,8%
Unintentional injuries	19,758	*2,9%*	28,112	*3,0%*	327,905	2,8%
Respiratory infections & tuberculosis	2,030	*0,3%*	25,060	*2,7%*	225,781	1,9%
Other non-communicable diseases	13,984	*2,0%*	15,611	*1,7%*	310,261	2,7%
Self-harm and interpersonal violence	9,128	*1,3%*	12,240	*1,3%*	369,960	3,2%
...		...	...	...	...	...

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¡GRACIAS
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Back-up

Summing up

Access data

1. Check data quality

2. Decide on how to handle ill-defined deaths

   if applicable: redistribute

3. Chose grouping of deaths (ICD-codes) to causes

4. Chose life expectancy

   Chose standard population

5. Calculate YLL and rates

Years of life lost due to death

$$DALY = \boxed{YLL} + YLD$$

$$\sum_{i=1}^{n} d_i * l_i$$

i = each age (group) from 1 to n
d = number of deaths in each age (group) i
l = standard life expectancy at age of death i (in years)

-> number of deaths for certain cause, age, sex and region
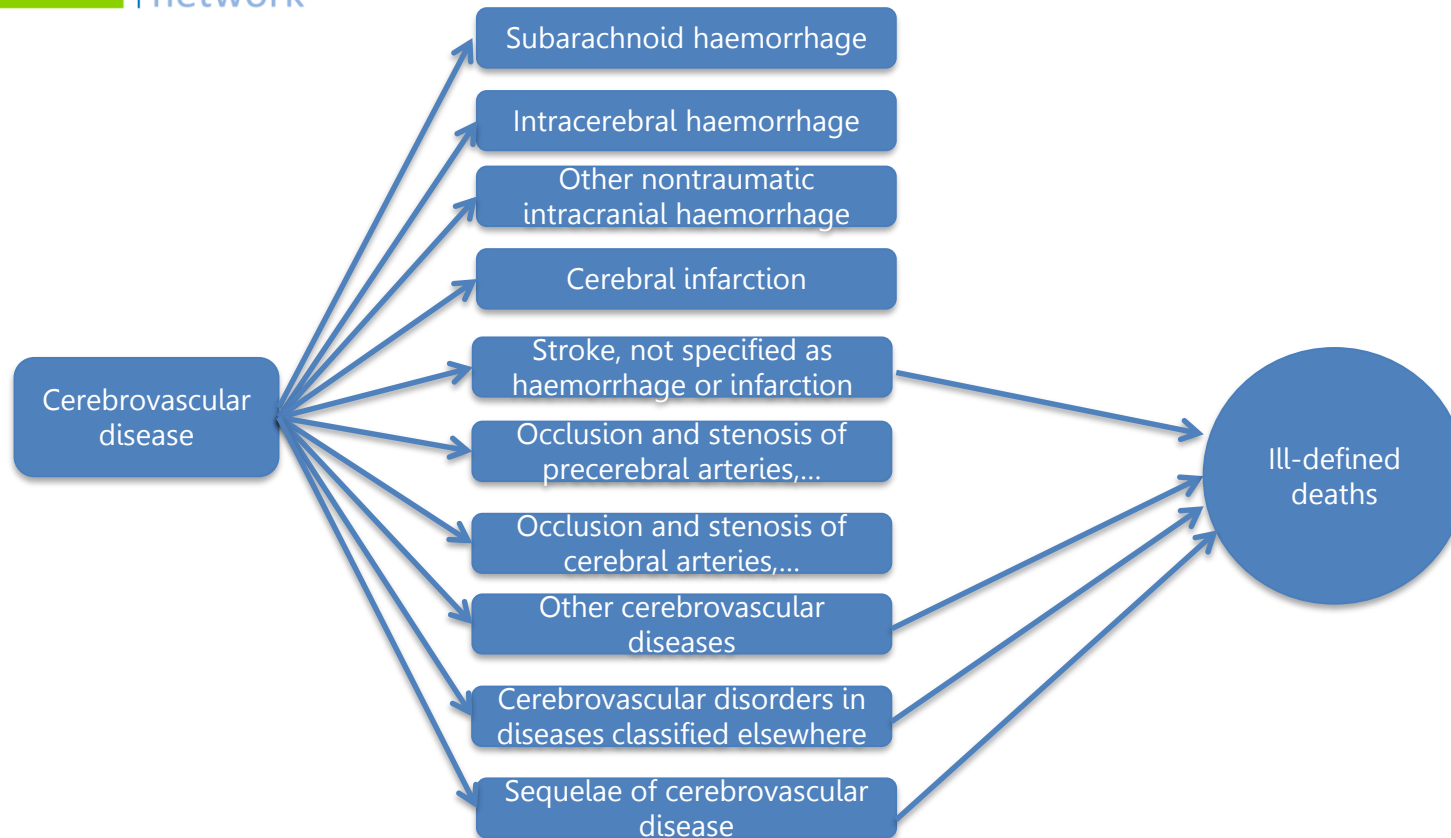
-> life expectancy at age of death

Causes of death statistics

- Information on causes of death (ICD coding)
- age/sex/region/year

- Possible data sources:
  - mortality registers / vital registration
  - Census / surveys
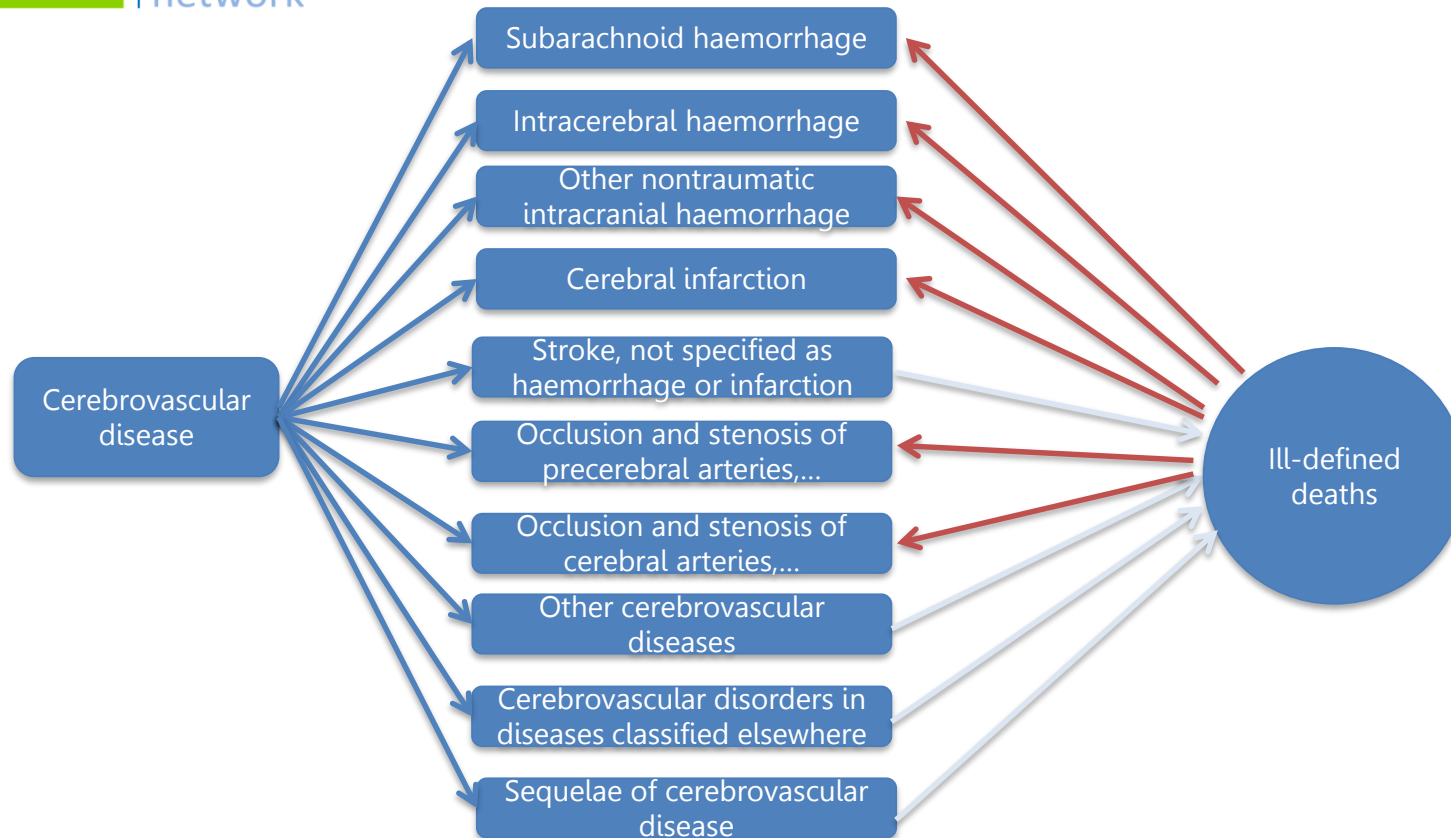 - Disease registries
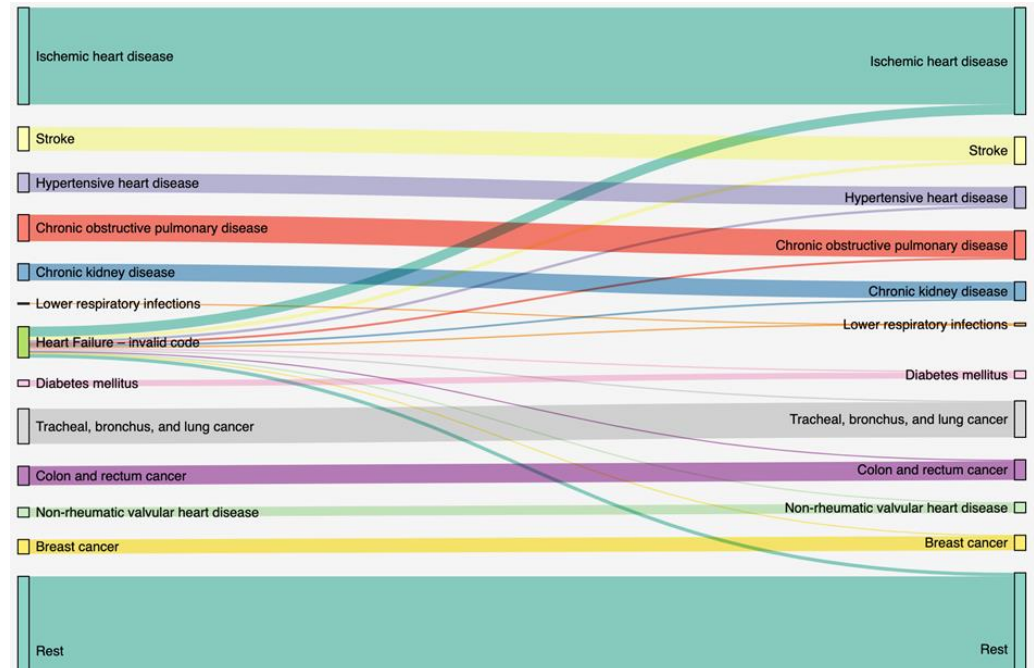 - Verbal autopsy
  - Surveillance, etc.

Example of IDDs

EPHC 2022 - Redistribution of ill-defined deaths - A.Wengler

IDDs and target codes

Groups of plausible codes to which the IDDs are redistributed

Methods of redistribution of ill-defined deaths

- Proportopnal redistribution
- Fixed proportions
- Regression models
- Experts' opinion
- etc