

E4080
Demography and Social Determinants of Health

Spring 2024

Session 1: Introduction

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Objectives

At the end of the course students should be able to:

- Refresh the main concepts of epidemiological methods
- Understand main demographic concepts used in studying health, including indicators of population health
- Describe differences in health between populations, groups and individuals
- Describe the concept of social determinants of health
- Understand the concept of life course influences on health
- Describe measurement of socioeconomic status and other social domains used in social epidemiology
- Discuss main features of demographic and epidemiological transition
- Describe the main pathways linking socioeconomic factors with health, chains of causes (“causes of the causes”)

Epidemiology

- Measurement of health status
- Measurement of risk factors
- Associations between RF and health
- Types of studies
- Interpretation
 - ..
 - ..
 - ..
- Causality
- ...

Social epidemiology

= **branch of epidemiology focusing on:**

- Influences of societal, social and psychosocial factors on health
- Differences in health between socioeconomic groups
- Pathways linking social factors and health

- **Quantitative discipline**
- **Using epidemiological methods and concepts**

Demography

- “Statistical study of human populations” (Wikipedia)
- Quantitative discipline
- Uses statistical models to analyse the size, movement, and structure of populations.
- Draws on history, economics, anthropology, sociology
- To analyse and predict social, cultural, and economic trends related to population
- Mainly using routinely available data and registers (census, mortality, births, migration etc) but also conduct smaller studies.
- Significant overlaps with epidemiology

Why are some people healthier than others?

- Epidemiology:
 - Biological factors
 - Health behaviours
 - Environment (climate, contamination, pollution)
- Social epidemiology
 - Societal / social structure
 - Psychosocial / psychological factors

Determinants of health (vs. risk factors)

- ?

Determinants of health (vs. risk factors)

Social determinants of health

- “the conditions (context) in the places where people live, learn, work and play”
- Overlap with but extend beyond socio-demographic risk factors

Risk factor

- An aspect of personal behaviour or lifestyle, an environmental exposure, or an inborn or inherited characteristic known to be associated with health-related condition(s).

Risk factor

- An aspect of personal behaviour or lifestyle, an environmental exposure, or an inborn or inherited characteristic that, on the basis of scientific evidence, is known to be associated with meaningful health-related condition(s).
- An attribute or exposure that is associated with an increased / reduced probability of a specified outcome, such as the occurrence of a disease.
- Not necessarily a causal factor: it may be a risk marker.
- Often used as synonymous with determinant acting at the individual level.

Outline of introductory session

- Population health
 - Basic measures of population health
 - How to study influences on health
 - Large differences in health between groups of people
- Risk factors and causes
 - Factors influencing health of individuals (risk factors)
 - Chains of causes

Introduction to population health

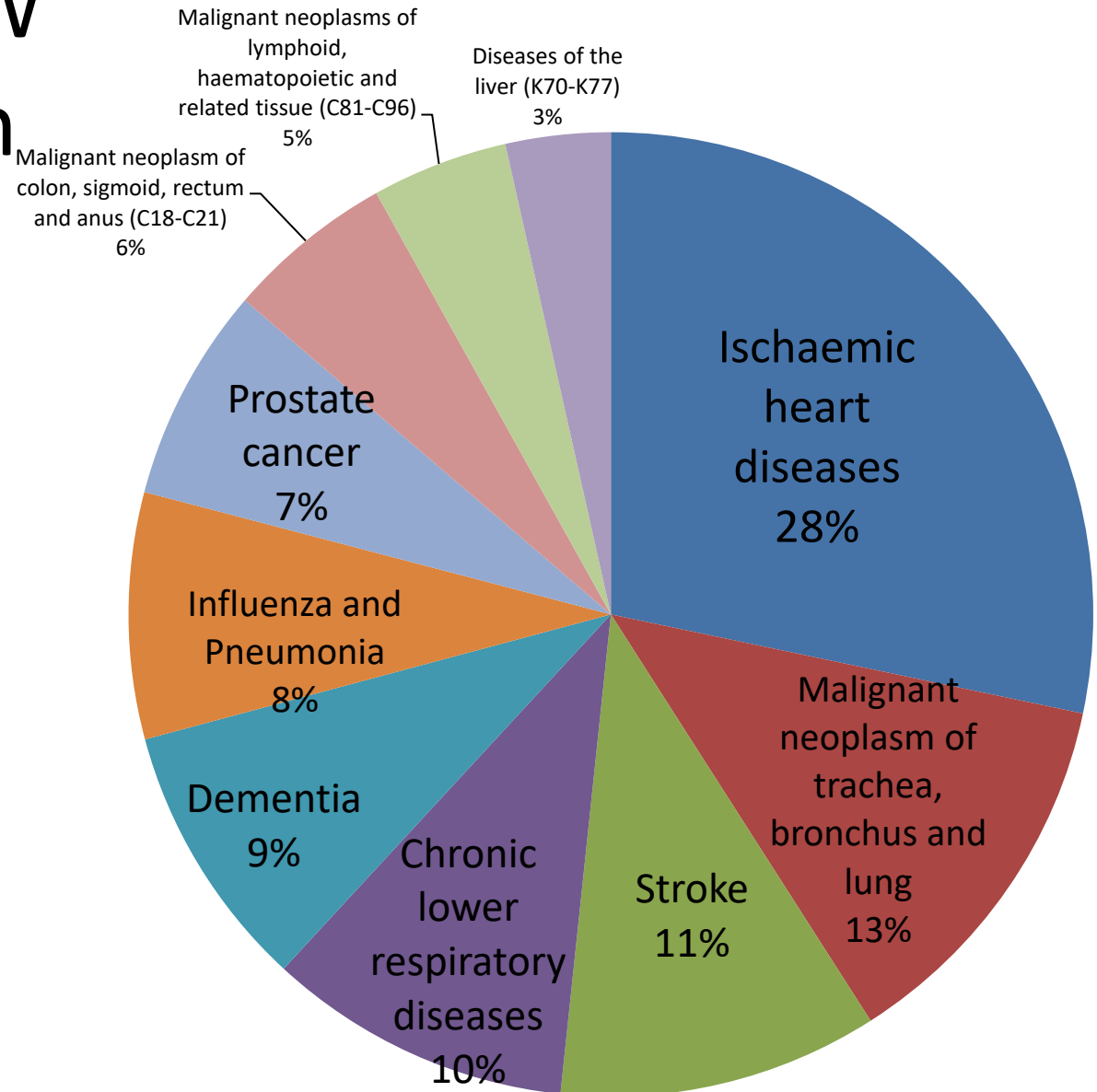
Measures of population health

- **Mortality:** rates (deaths / total number of people, per 100,000 persons)
- **Life expectancy:** average number of subsequent years of life for someone now aged x if current mortality rates apply (years)
- **Morbidity:** rates or proportions (number with disease / total number of people, per 100 persons, %)
 - Incidence (risk of new disease)
 - Prevalence (proportion with existing disease)

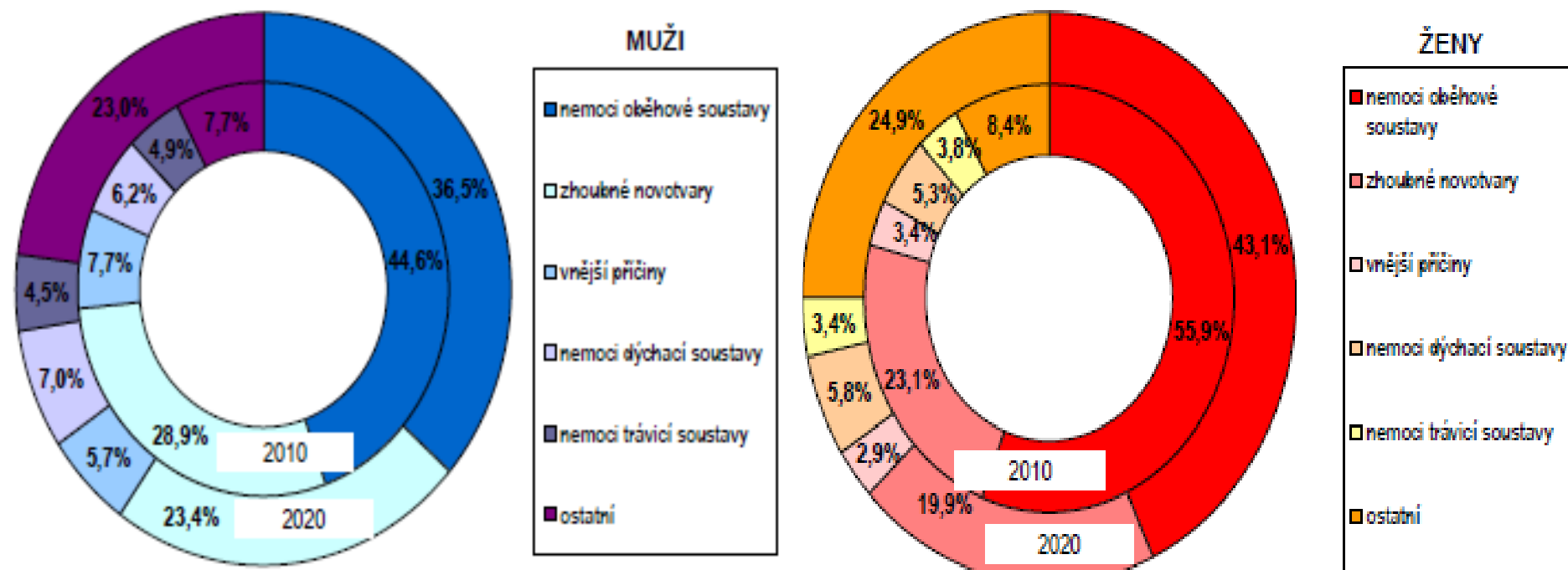
How long people live

Era	Life Expectancy at Birth (years)
Upper Paleolithic	33
Neolithic	20
Bronze Age and Iron Age	26
Classical Greece	28
Classical Rome	28
Pre-Columbian North America	25–30
Medieval Islamic Caliphate	35+
Medieval Britain	30
Early Modern Britain	25–40
Early 20th Century	31
2010 world average	67
2020 Japan	84.5

Causes of death, E&W 2011, men

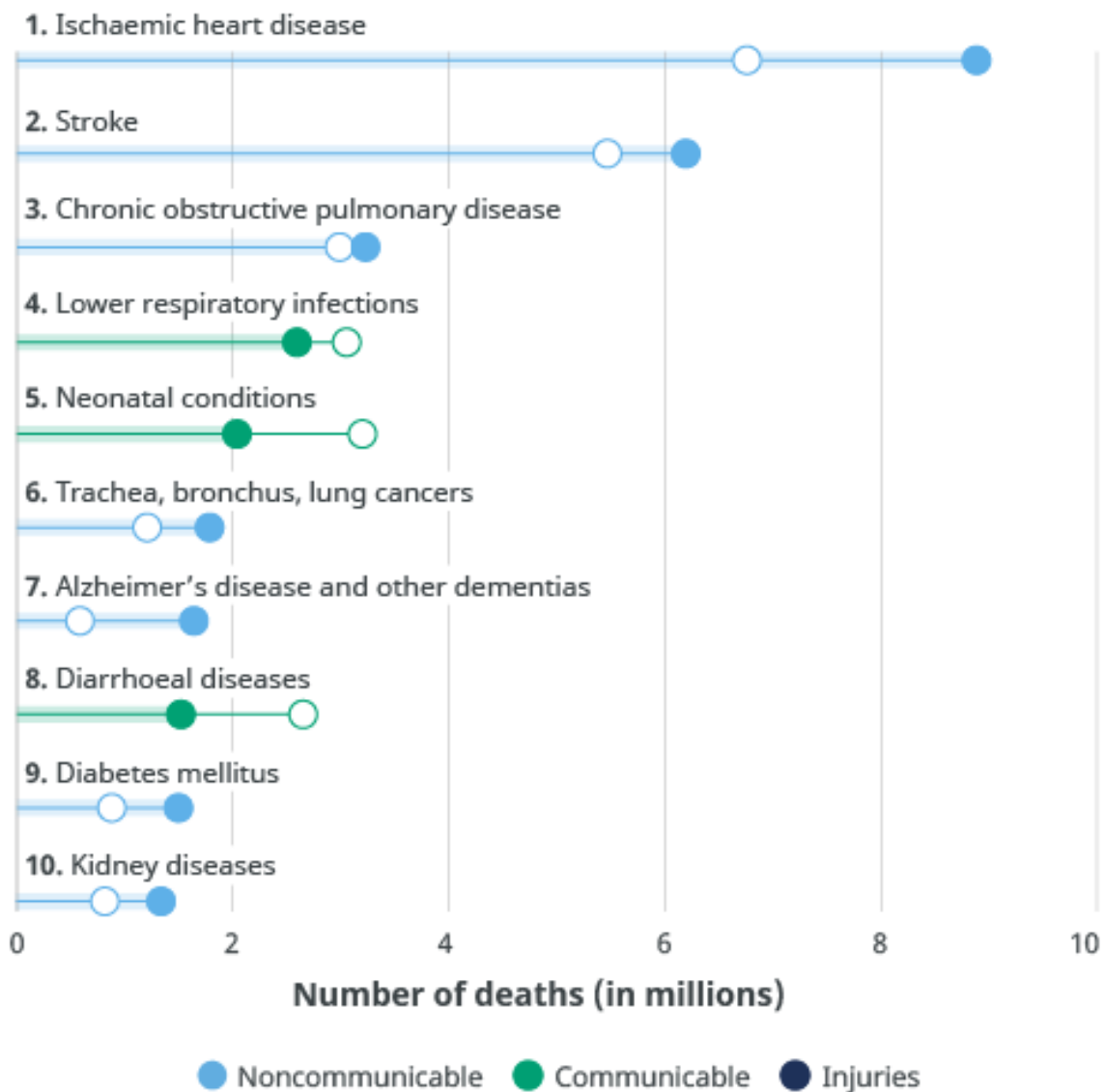


Causes of death in Czech Republic, 2010 and 2020



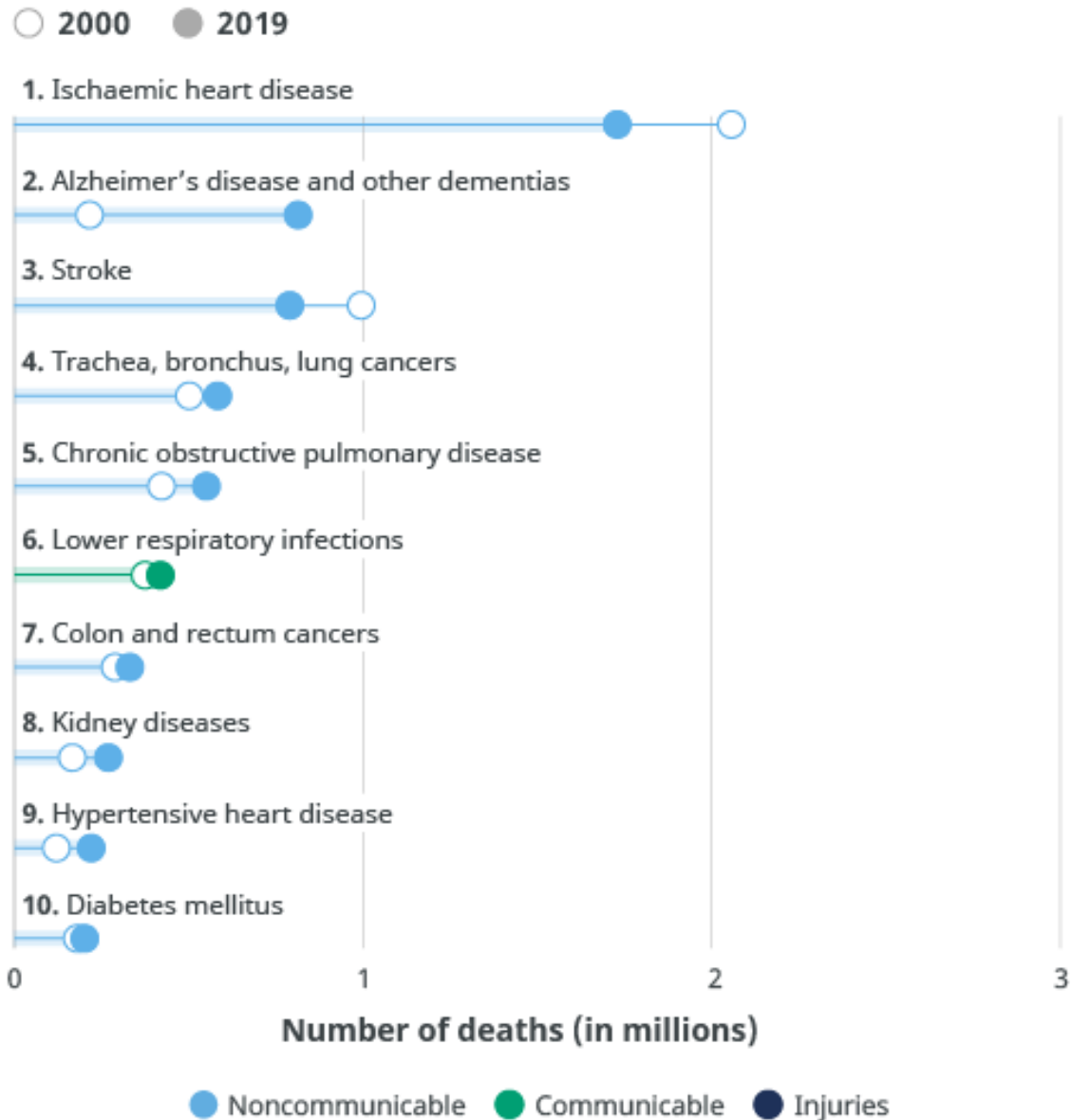
Leading causes of death globally

○ 2000 ● 2019



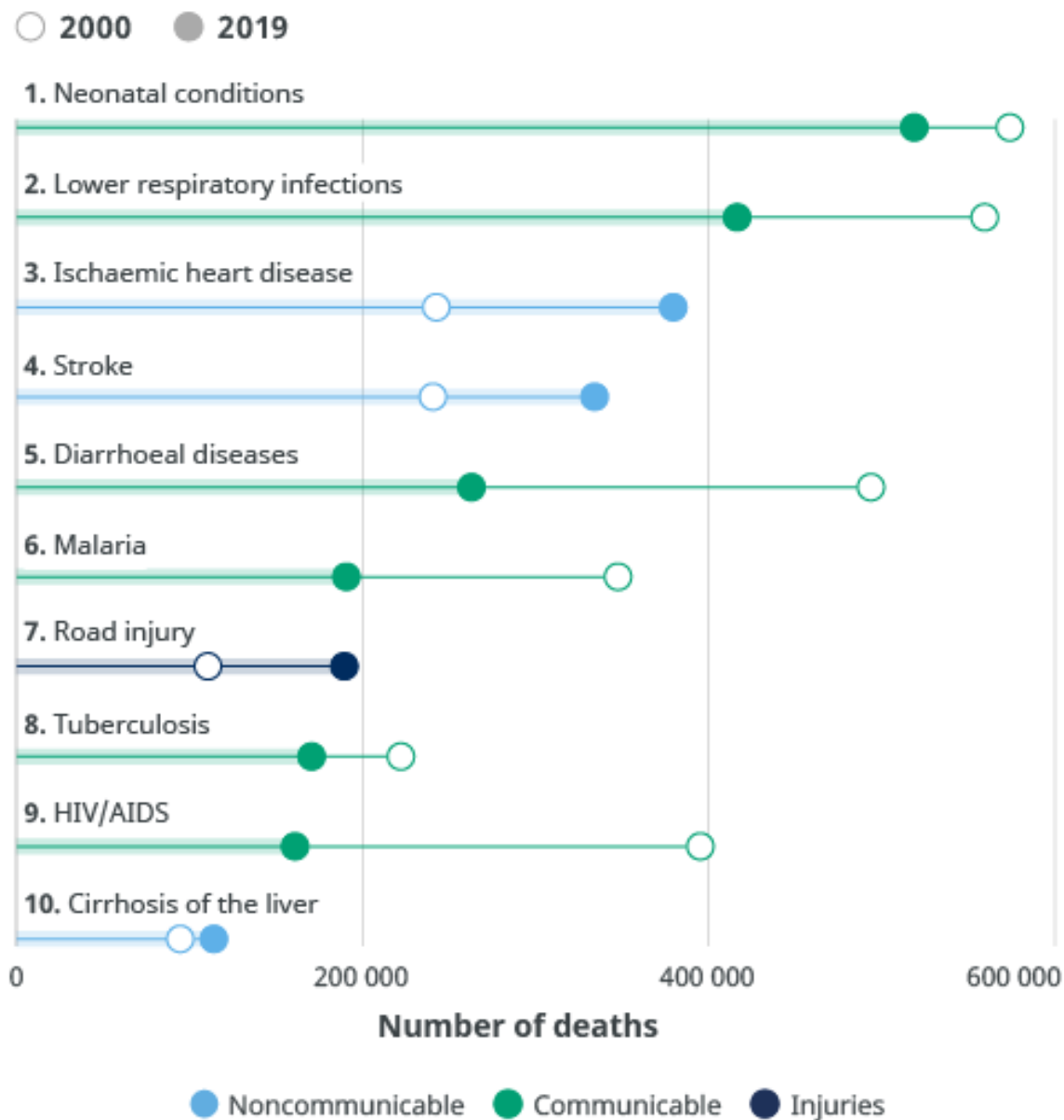
Source: WHO Global Health Estimates.

Leading causes of death in high-income countries



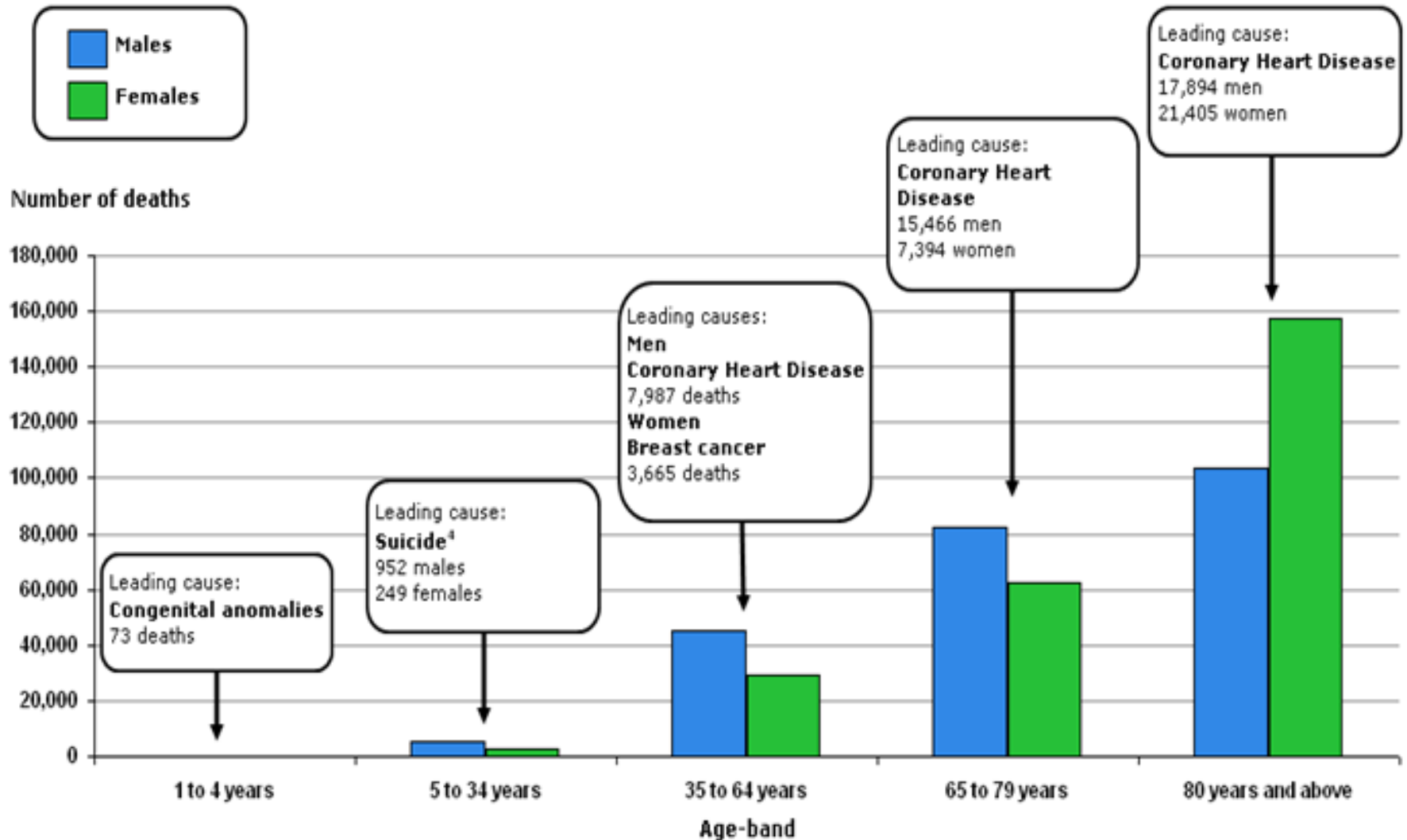
Source: WHO Global Health Estimates. Note: World Bank 2020 income classification.

Leading causes of death in low-income countries

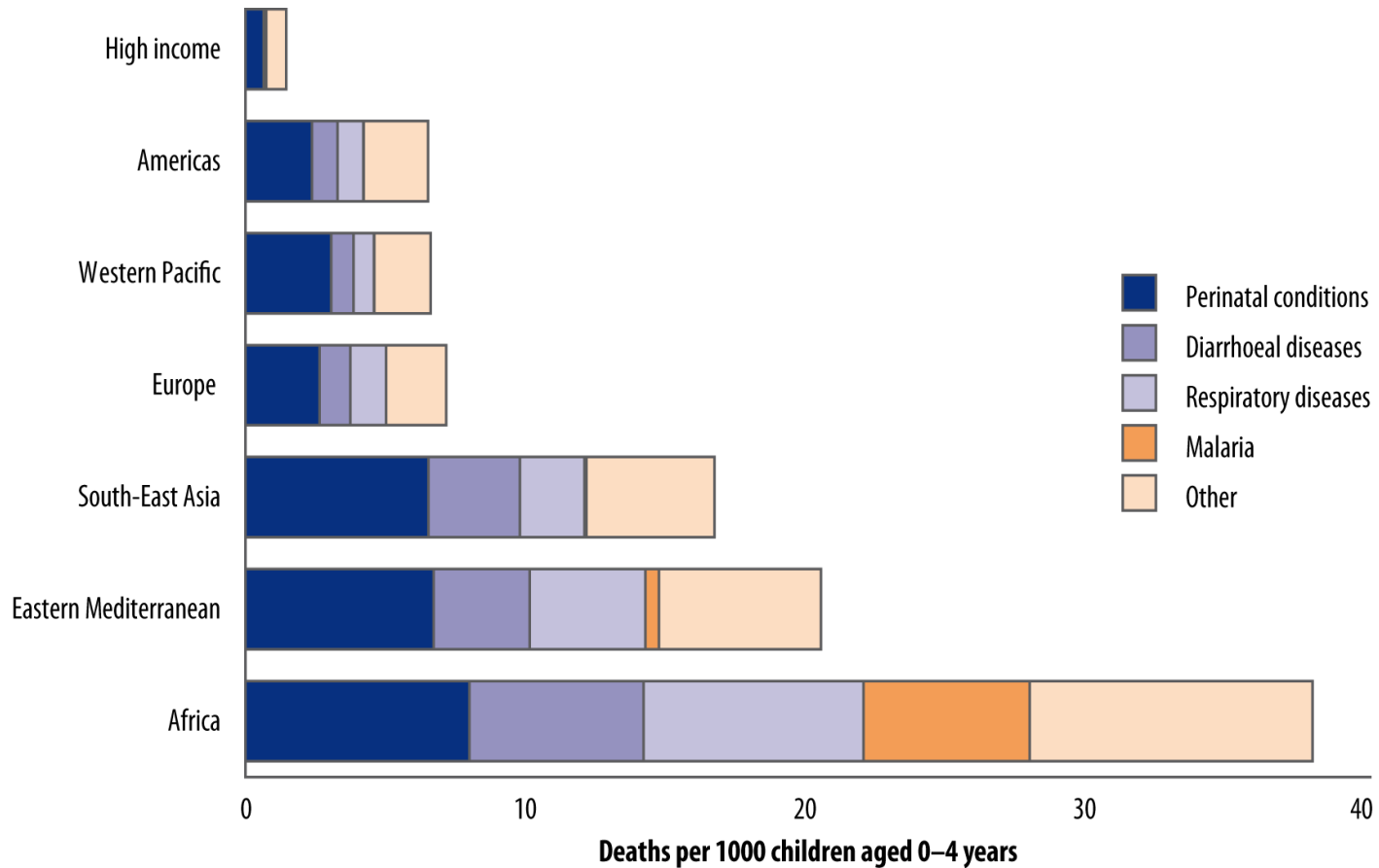


Source: WHO Global Health Estimates. Note: World Bank 2020 income classification.

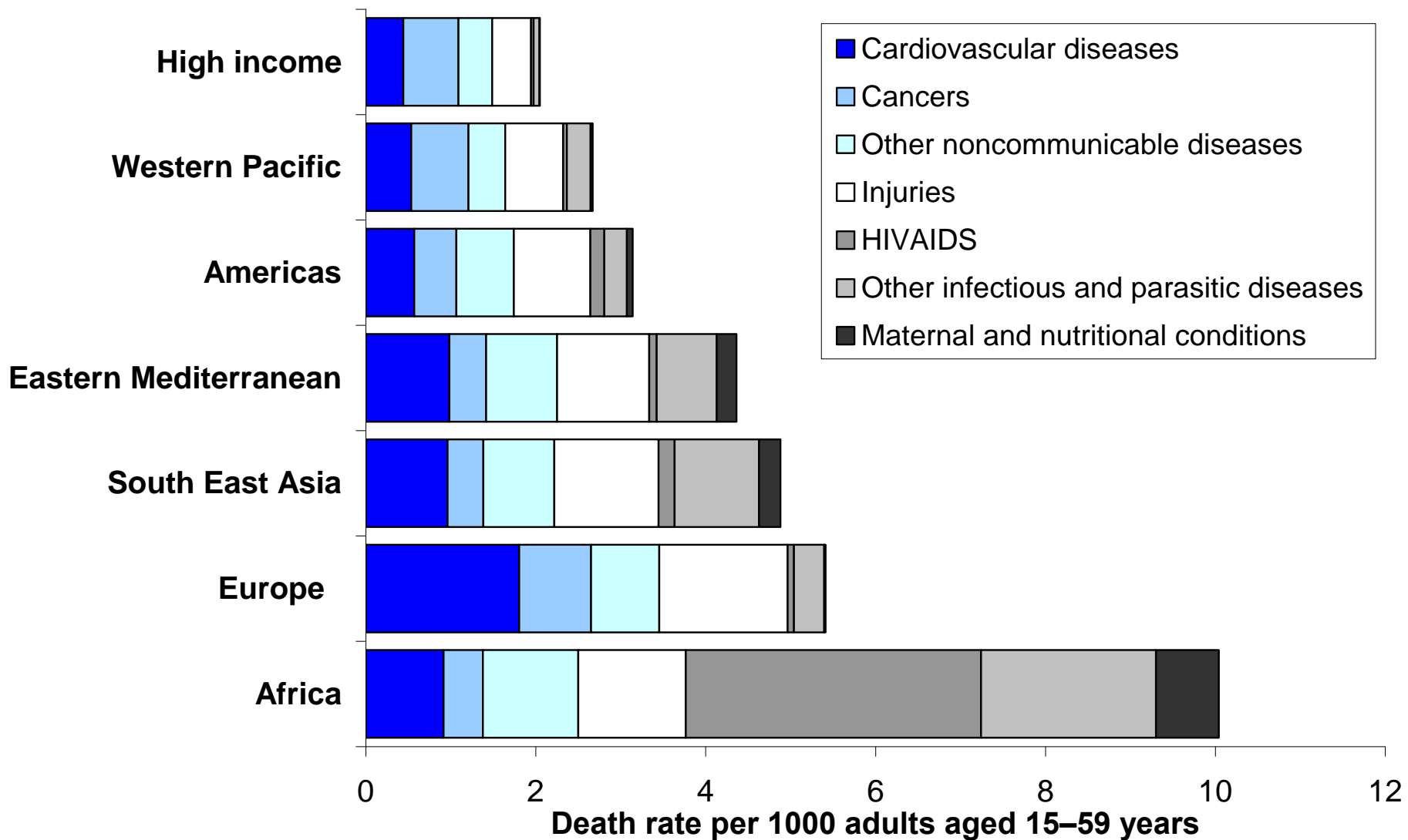
Leading causes of death by age group, England & Wales 2009



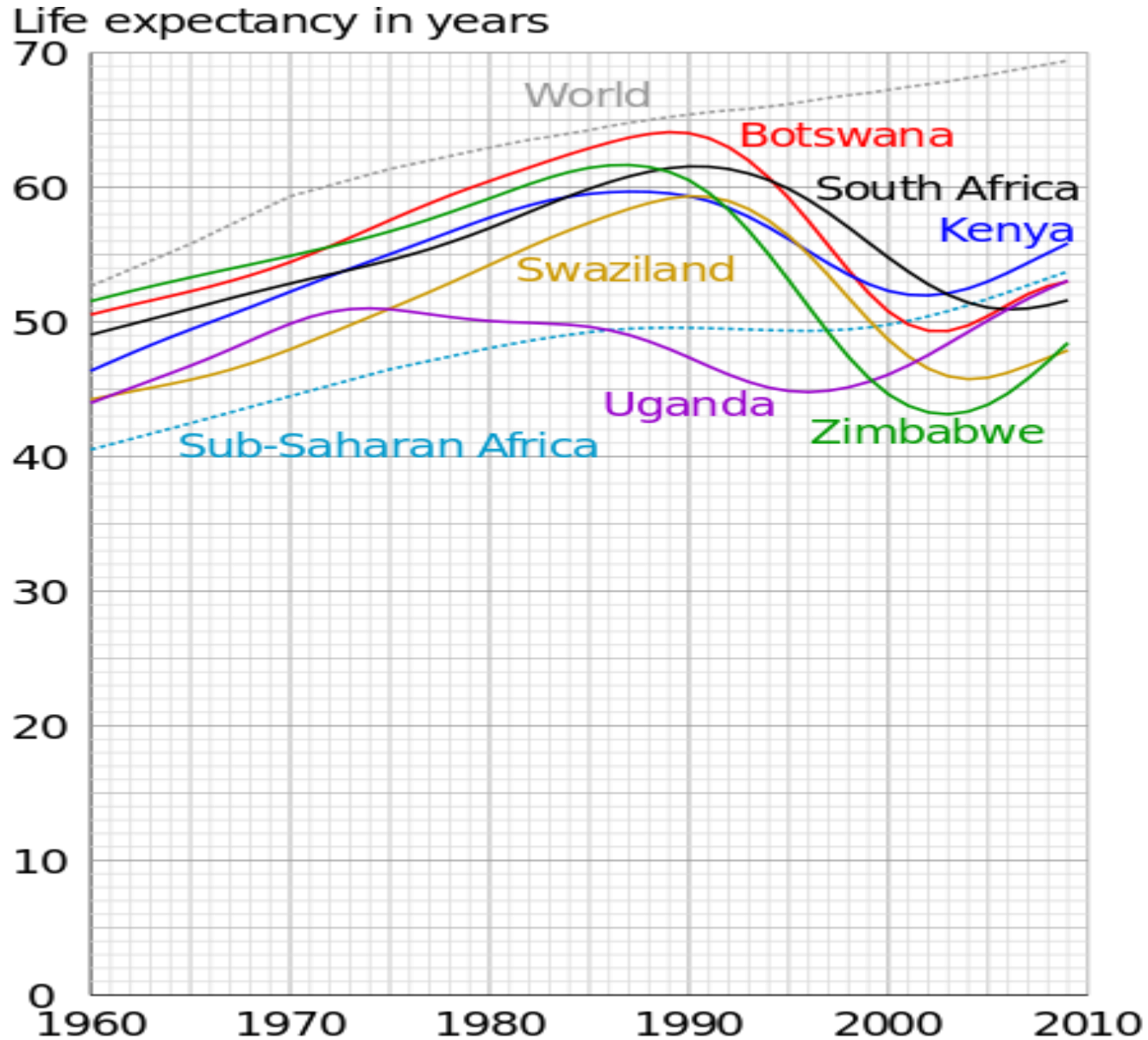
Child mortality rates by cause and region, 2004



Adult mortality rates by major cause group and region, 2004

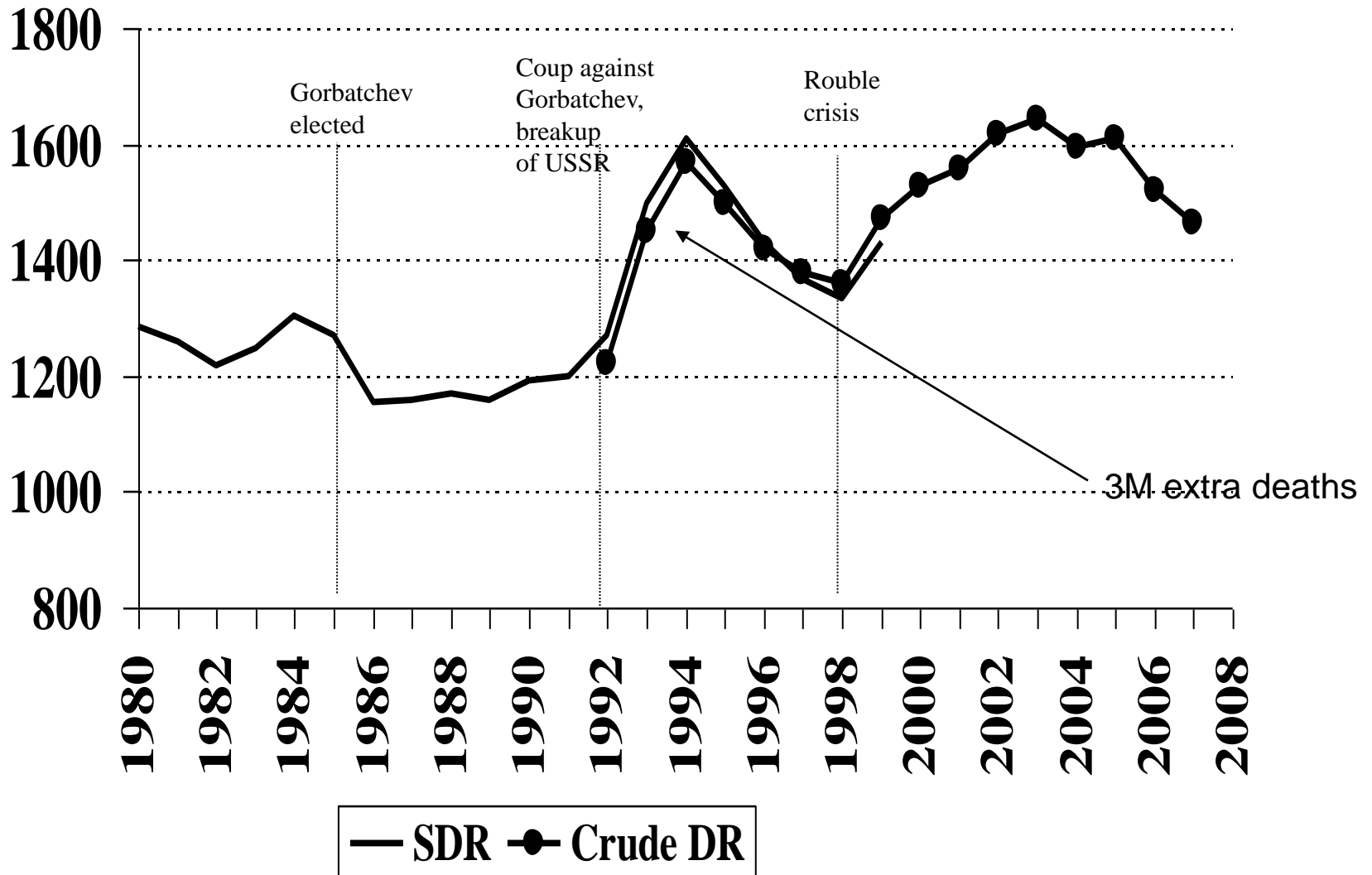


Life expectancy in Sub-Saharan Africa



Death rates in Russia 1980-2007

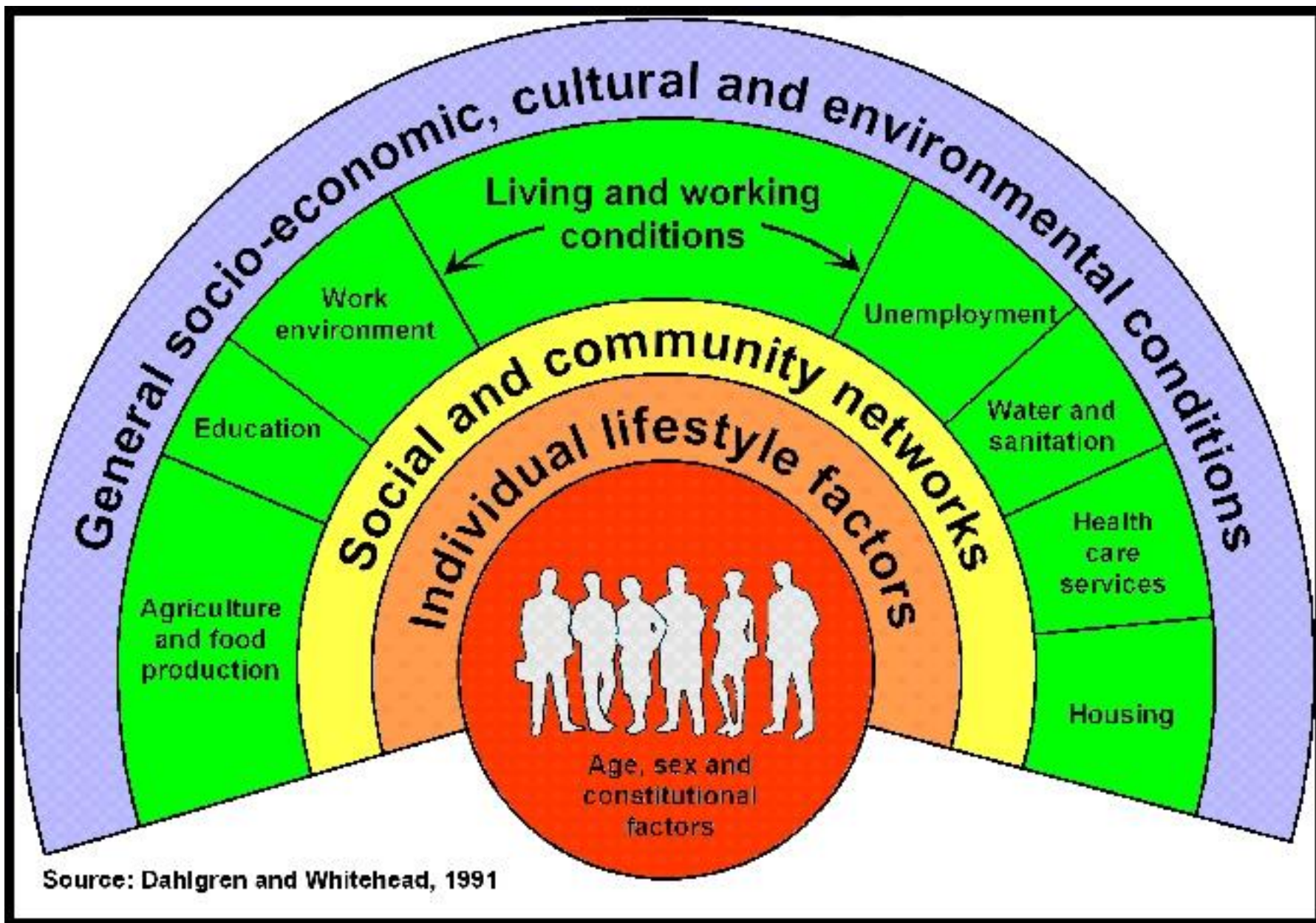
both genders, per 100,000



Why does health differ so much
between people, places, times...?

- ?

Factors influencing health

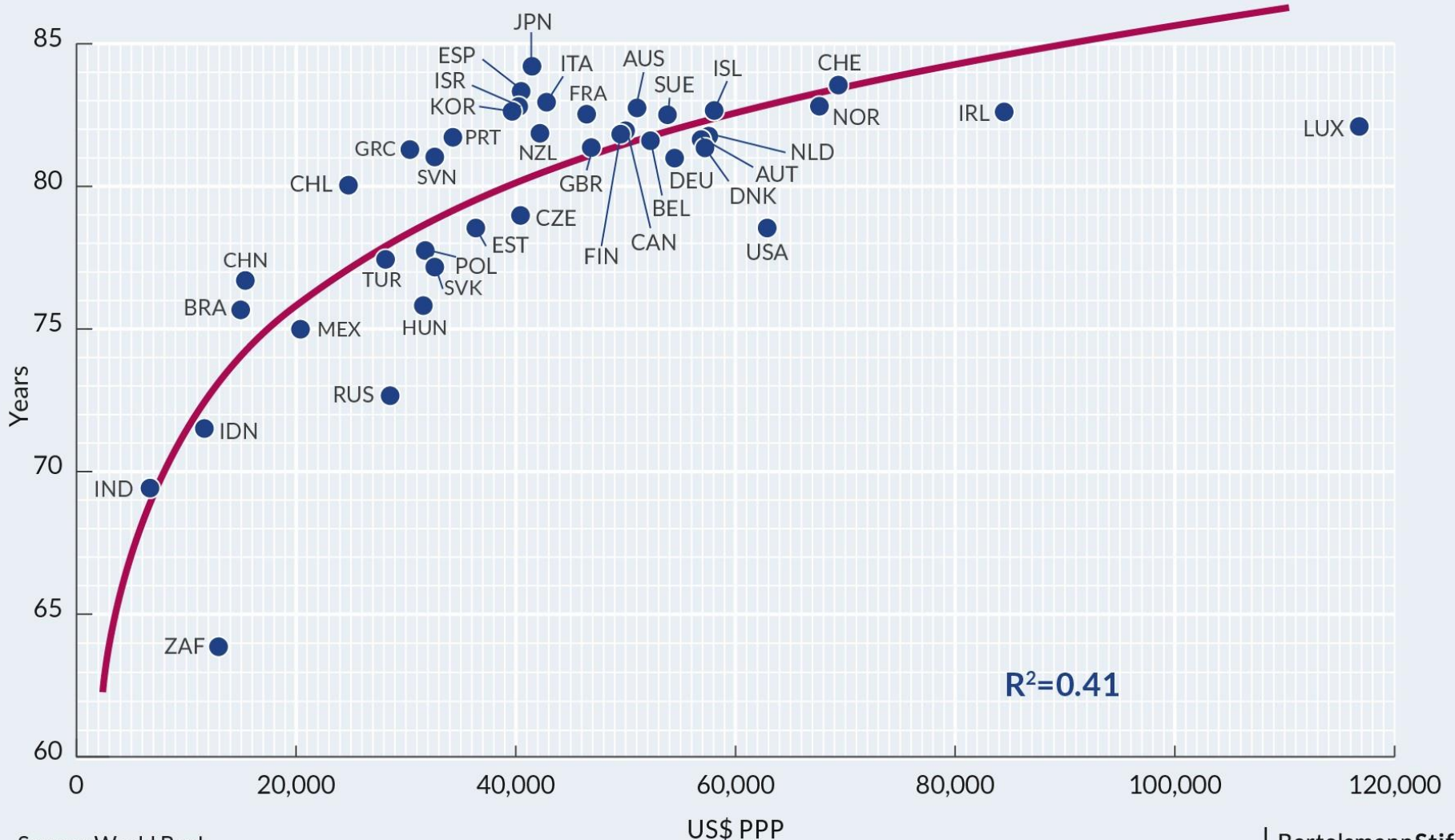


Source: Dahlgren and Whitehead, 1991

Differences between groups of people

Life expectancy at birth and income

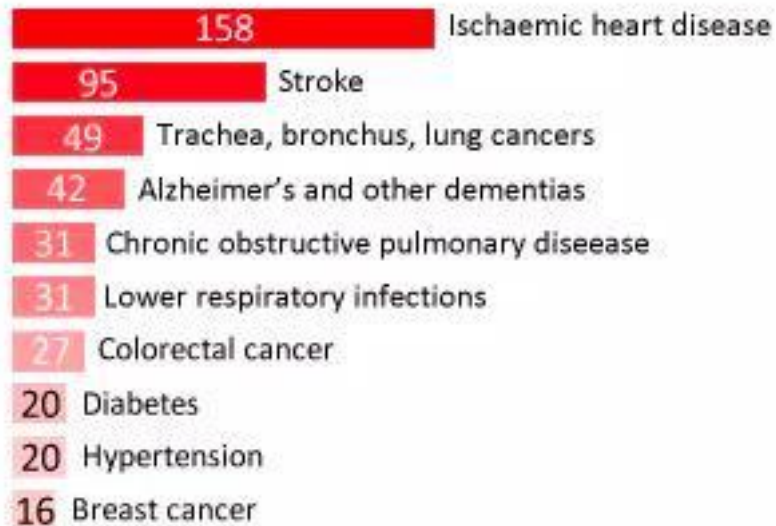
FIGURE 2: Life expectancy at birth and GDP per capita (2018)



Deaths in high-income countries



Deaths per 100,000 (2012)

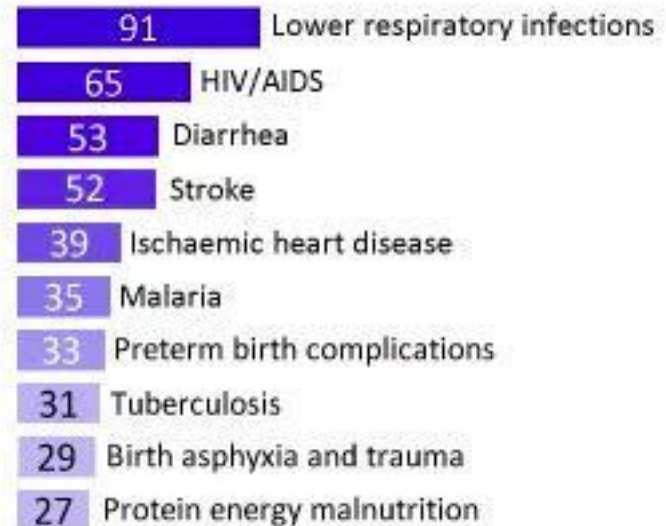


Life expectancy at birth: 81 years

Deaths in low-income countries



Deaths per 100,000 (2012)

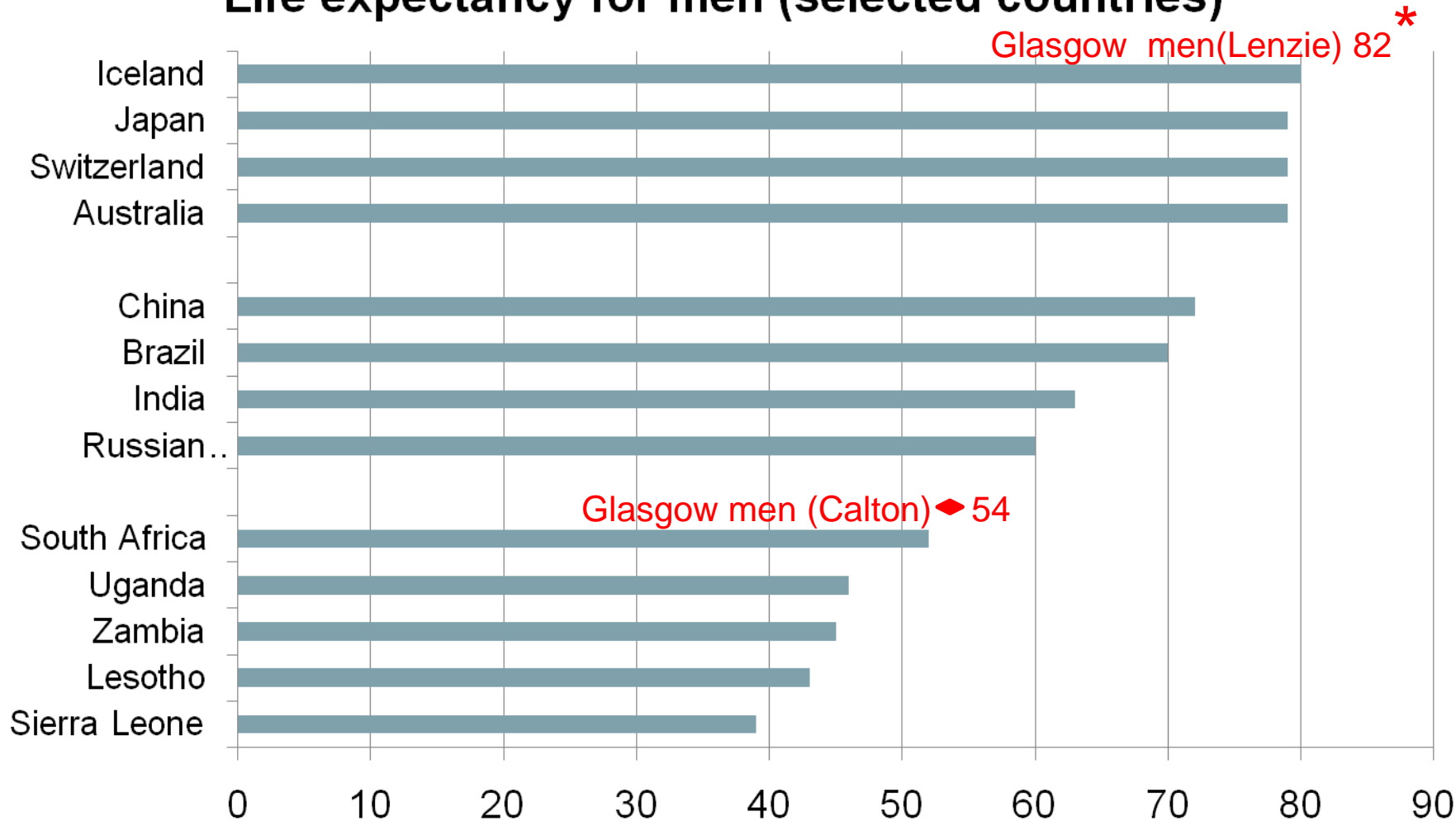


Life expectancy at birth: 59 years

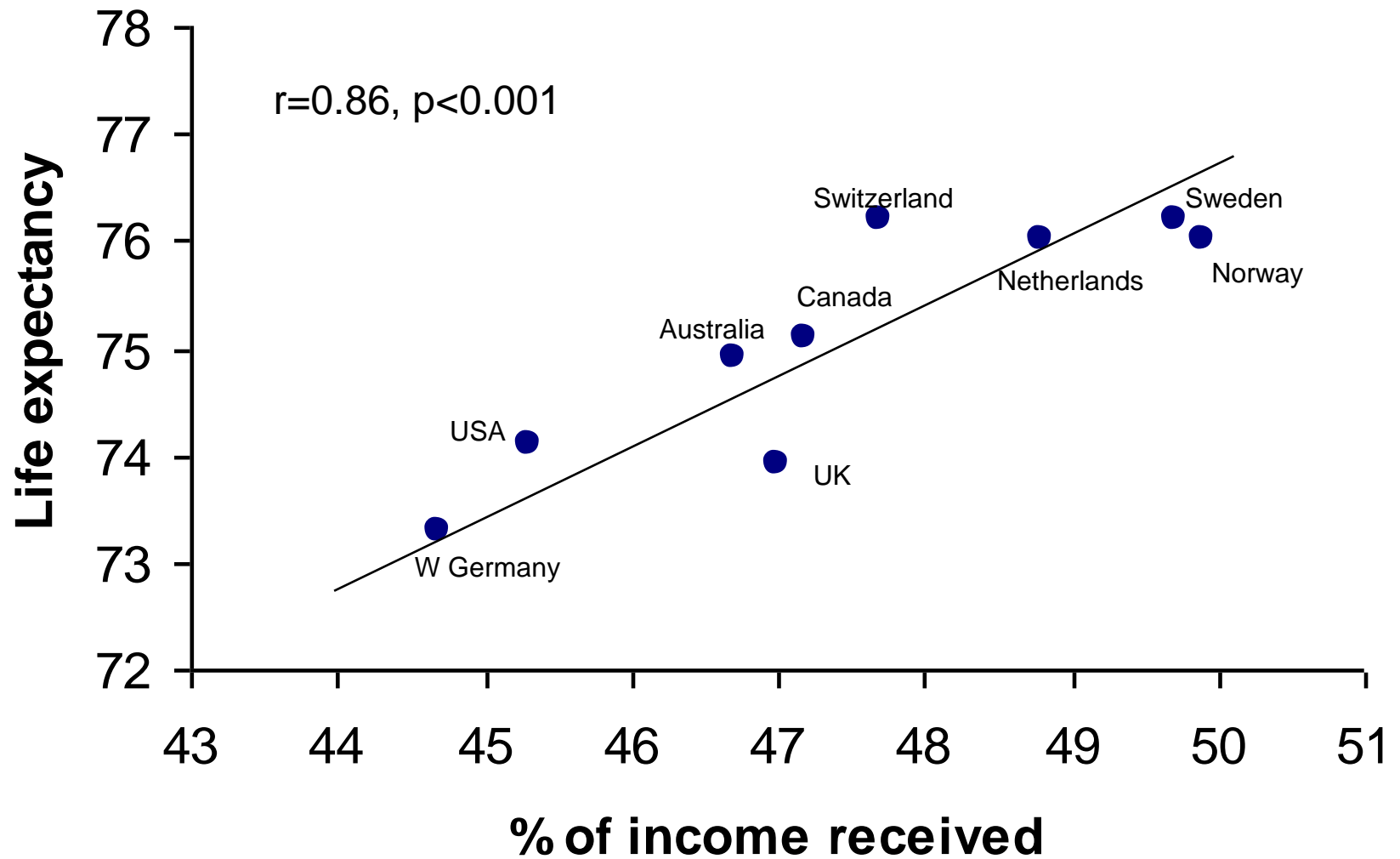
Sources: World Health Organization; World Bank.
Graphic by Dan Diamond (@ddiamond)

Differences between countries

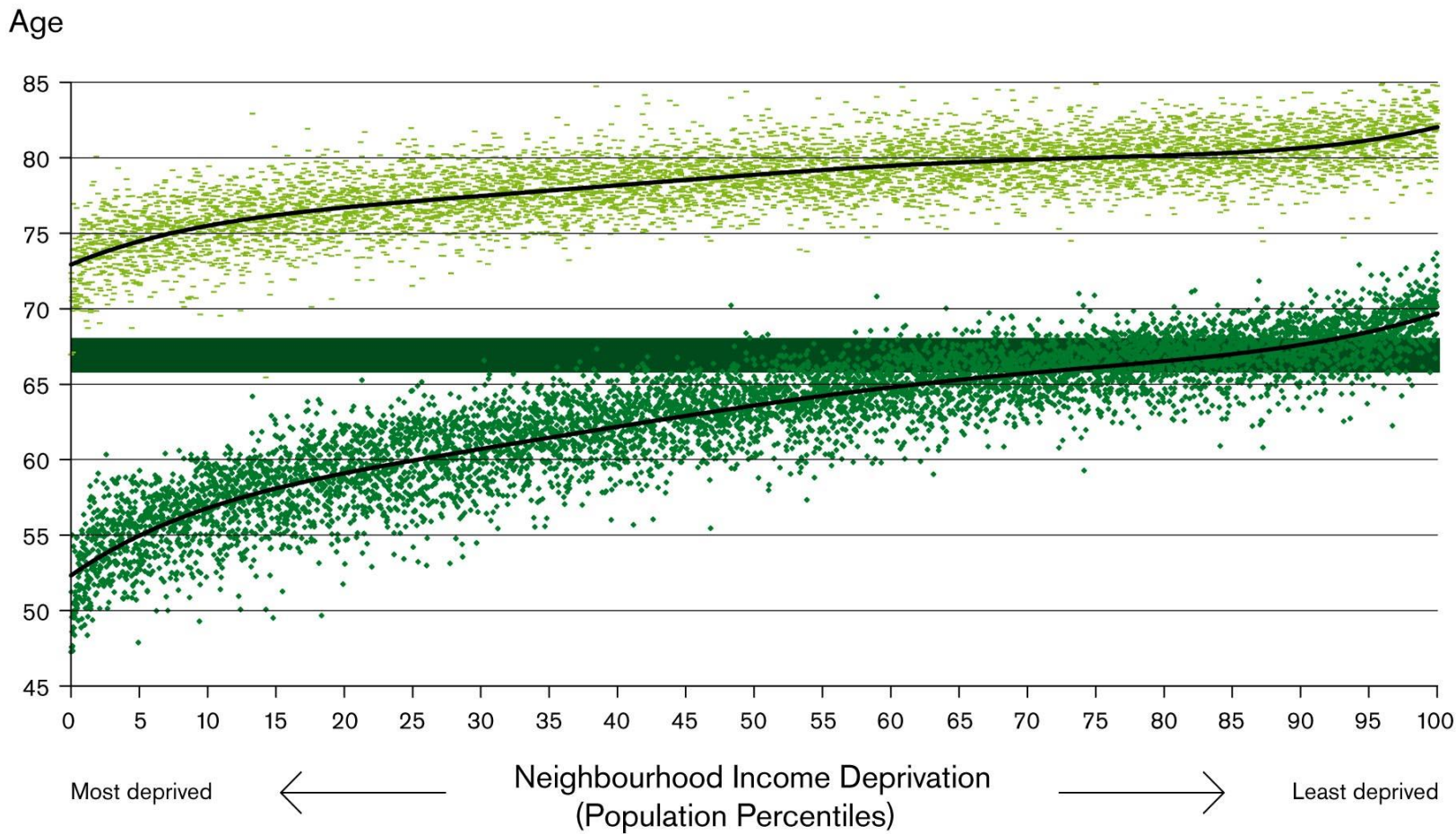
Life expectancy for men (selected countries)



Life expectancy at birth and percentage of income received by least well off 70% of families, 1981 (Wilkinson, BMJ 1992)



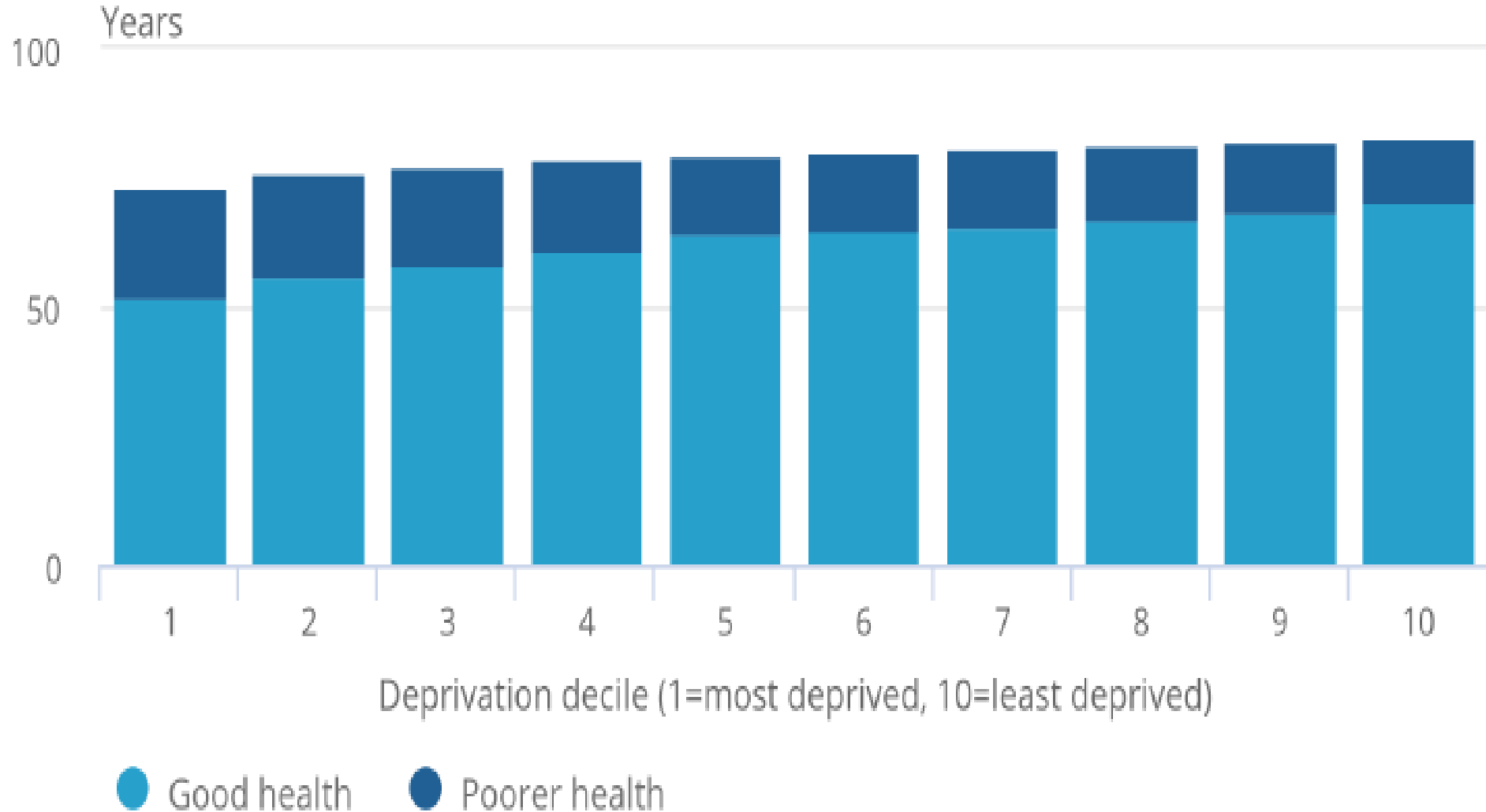
Life expectancy and disability-free life expectancy at birth by neighbourhood income deprivation, 1999-2003



- Life expectancy
- DFLE
- Pension age increase 2026–2046

Source: Office for National Statistics⁵

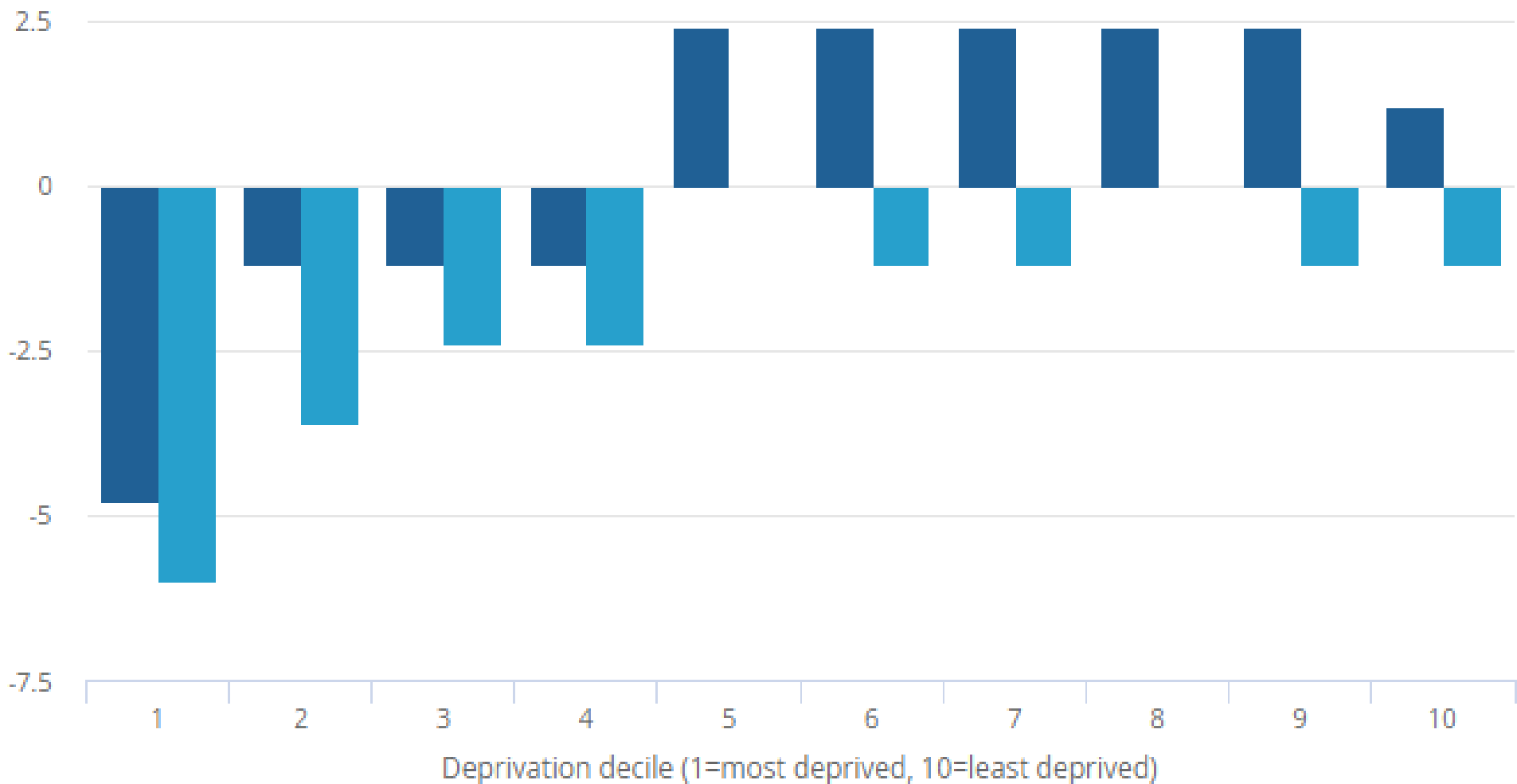
Healthy life expectancy at birth by IMD decile, England, 2018 to 2020



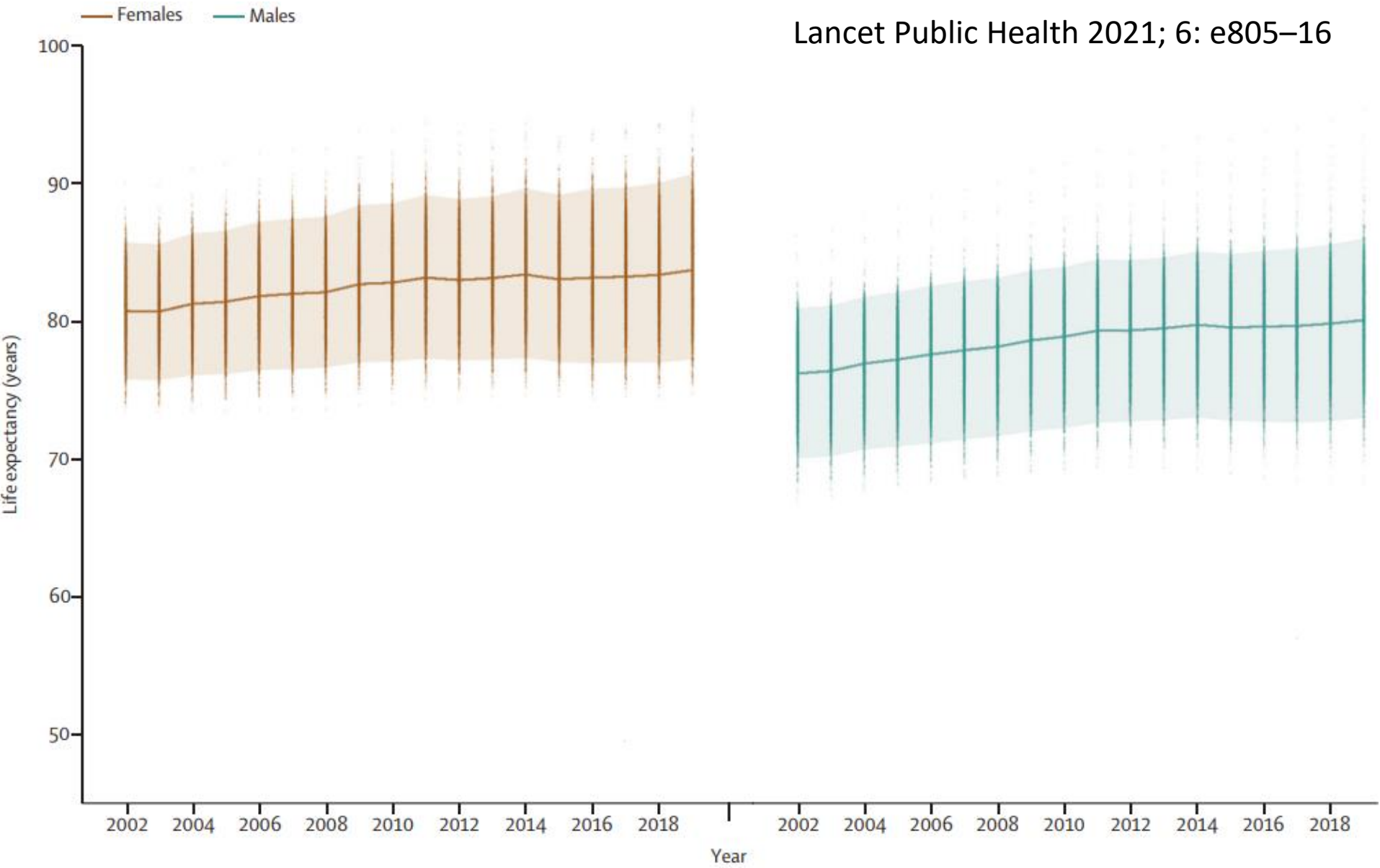
Change in life expectancy at birth, England, between 2015 to 2017 and 2018 to 2020

● Females ● Males

Months

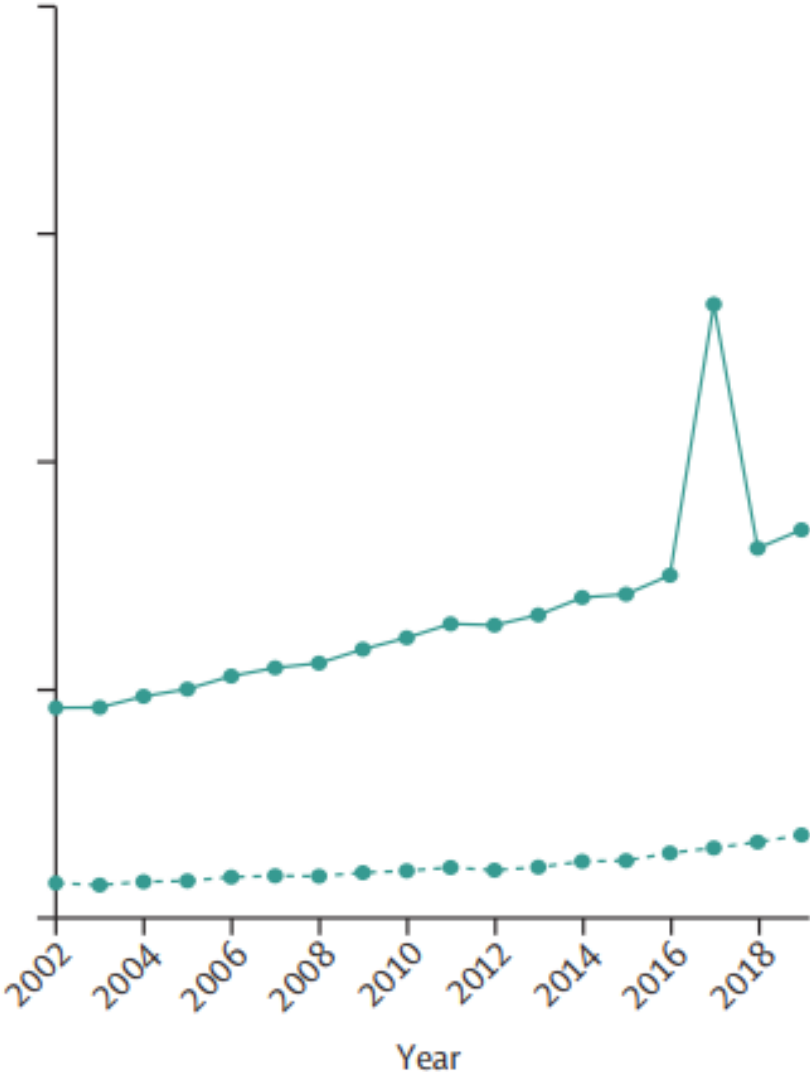
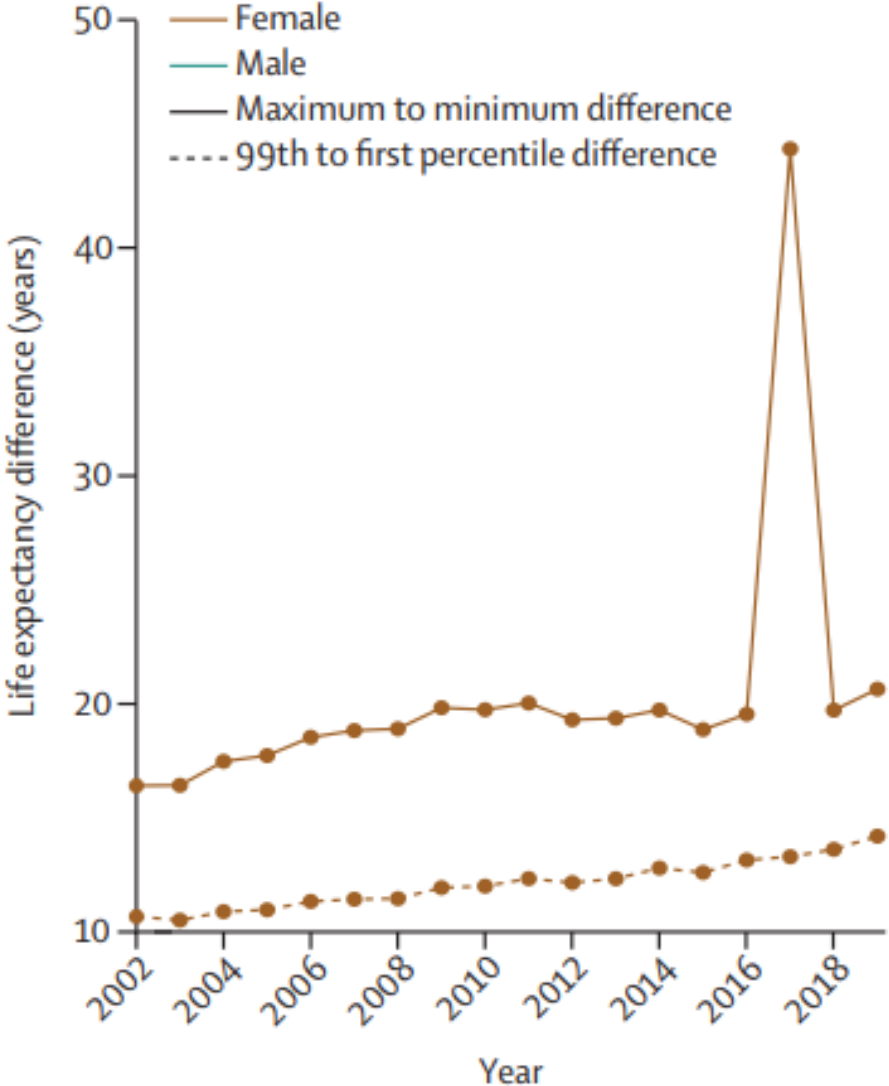


Distribution of MSOA life expectancies in each year from 2002 to 2019, England



Maximum to minimum and 99th to first percentile differences in life expectancy across 6791 MSOAs, 2002–19

Lancet Public Health 2021; 6: e805–16



Influences on health of individuals

Risk factors for major diseases

Risk factors for major diseases


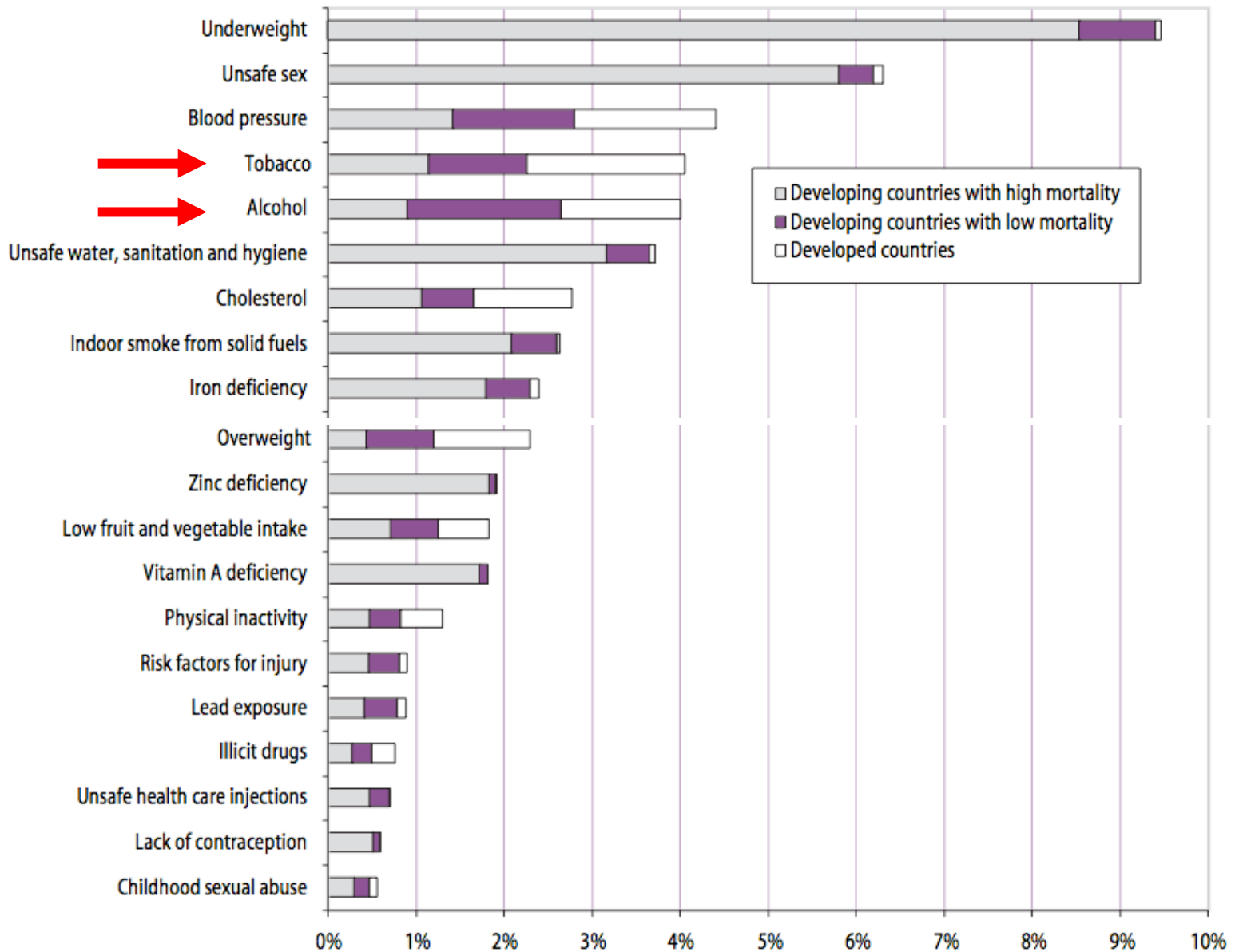
- Age
 - Gender
 - Genetic factors
 - Smoking
 - Excessive alcohol consumption
 - Obesity
 - High blood pressure
 - High cholesterol
 - Poor diet
 - Low physical activity
 - Poor access to medical care
 - Drug misuse
 - Poor hygiene
 - ... and many other factors
- 
- Not modifiable

Figure 4.9 Global distribution of burden of disease attributable to 20 leading selected risk factors



Leading causes of DALYs, GBD 2017, Lancet 2018

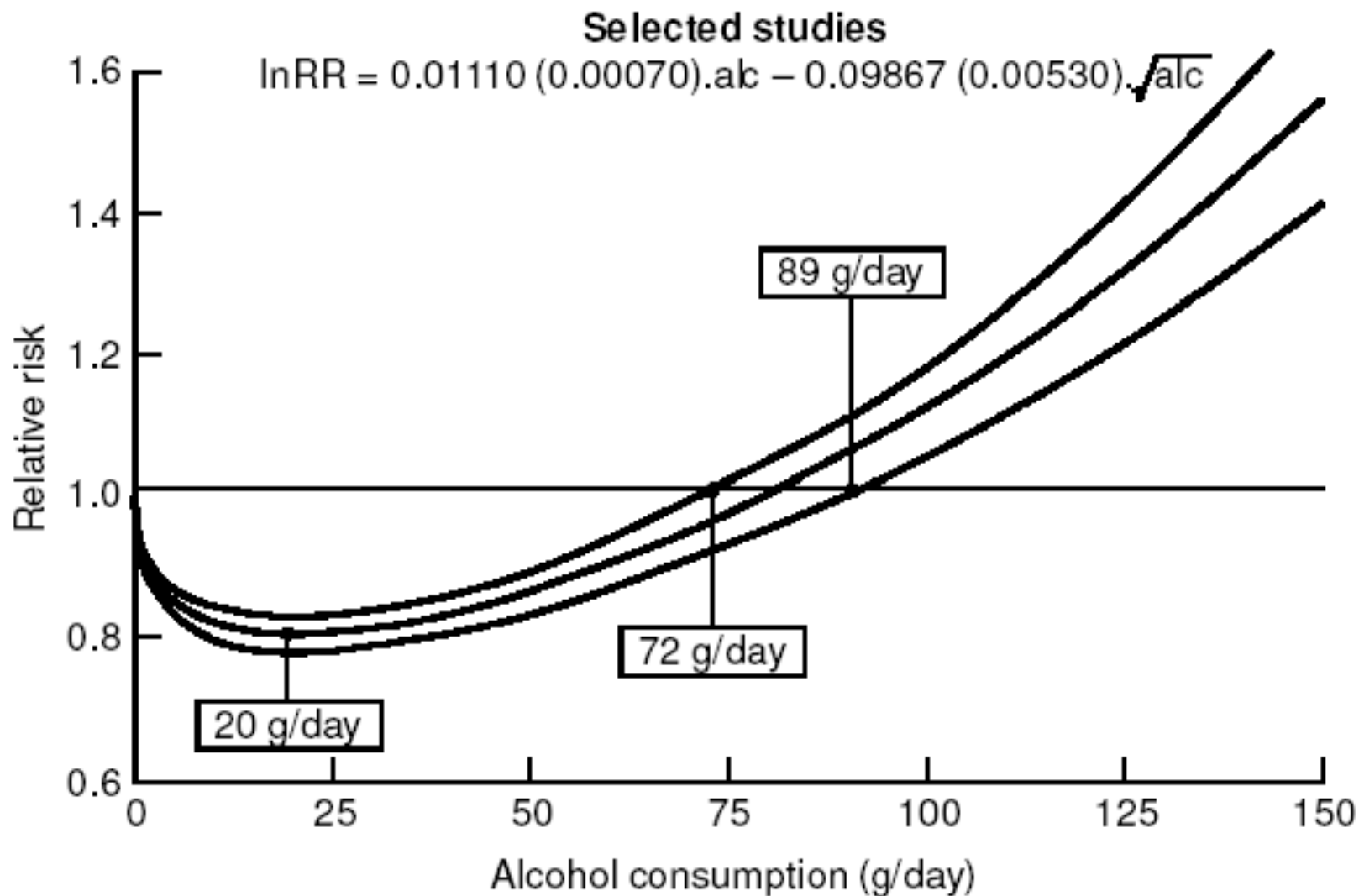
A Both sexes

Leading risks 1990	Leading risks 2007	Mean percentage change in number of DALYs, 2007-17	Mean percentage change in all-age DALY rate, 2007-17	Mean percentage change in age-standardised DALY rate, 2007-17	Leading risks 2017	Mean percentage change in number of DALYs, 2007-17	Mean percentage change in all-age DALY rate, 2007-17	Mean percentage change in age-standardised DALY rate, 2007-17
1 Child wasting	1 High systolic blood pressure	22.0	-2.8	-19.4	1 High systolic blood pressure	20.0	6.3	-8.0
2 Short gestation for birthweight	2 Short gestation for birthweight	-24.2	-39.6	-24.2	2 Smoking	8.2	-4.1	-16.4
3 Low birthweight for gestation	3 Smoking	10.3	-12.1	-25.8	3 High fasting plasma glucose	25.5	11.2	-3.2
4 Smoking	4 Child wasting	-47.7	-58.3	-47.9	4 High body-mass index	36.7	21.1	6.8
5 High systolic blood pressure	5 Low birthweight for gestation	-22.5	-38.2	-22.7	5 Short gestation for birthweight	-21.3	-30.3	-24.0
6 Unsafe water source	6 High fasting plasma glucose	51.4	20.7	0.8	6 Low birthweight for gestation	-21.8	-30.8	-24.7
7 Household air pollution	7 High body-mass index	66.2	32.5	11.7	7 Alcohol use	5.5	-6.6	-13.1
8 Child underweight	8 Alcohol use	37.4	9.5	-2.9	8 High LDL cholesterol	17.2	3.8	-9.3
9 Unsafe sanitation	9 Unsafe water source	-38.2	-50.7	-41.8	9 Child wasting	-40.1	-46.9	-43.1
10 Vitamin A deficiency	10 Unsafe sex	302.2	220.6	187.4	10 Ambient particulate matter	12.8	-0.1	-9.3
11 High fasting plasma glucose	11 High LDL cholesterol	17.2	-6.6	-22.8	11 Low whole grains	15.5	2.3	-9.7
12 No access to handwashing facility	12 Household air pollution	-37.1	-49.9	-47.0	12 High sodium	22.7	8.7	-5.9
13 Child stunting	13 Ambient particulate matter	17.3	-6.5	-8.8	13 Low fruit	7.7	-4.6	-15.7
14 Alcohol use	14 Low whole grains	23.4	-1.6	-17.0	14 Unsafe water source	-29.1	-37.2	-35.7
15 High LDL cholesterol	15 Unsafe sanitation	-41.2	-53.1	-44.6	15 Impaired kidney function	20.3	6.6	-5.4
16 High body-mass index	16 Low fruit				16 Household air pollution			
17 Ambient particulate matter	17 Child underweight				17 Unsafe sex			
18 Low whole grains	18 High sodium				20 Unsafe sanitation			
20 Low fruit	19 No access to handwashing facility							
30 Unsafe sex	20 Impaired kidney function							
	21 Vitamin A deficiency							
	23 Child stunting							

Smoking

- Compared to never-smokers, smokers have
 - About twice higher mortality from all causes
 - About twice higher mortality from CVD
 - About 20 times higher mortality from lung cancer
- The more and the longer you smoke, the higher the risk
- It takes several years for the risk to get down after quitting smoking
- Strong social gradient in smoking

Risk of heart diseases by alcohol consumption in 28 high quality cohort studies (Corrao et al 2000)

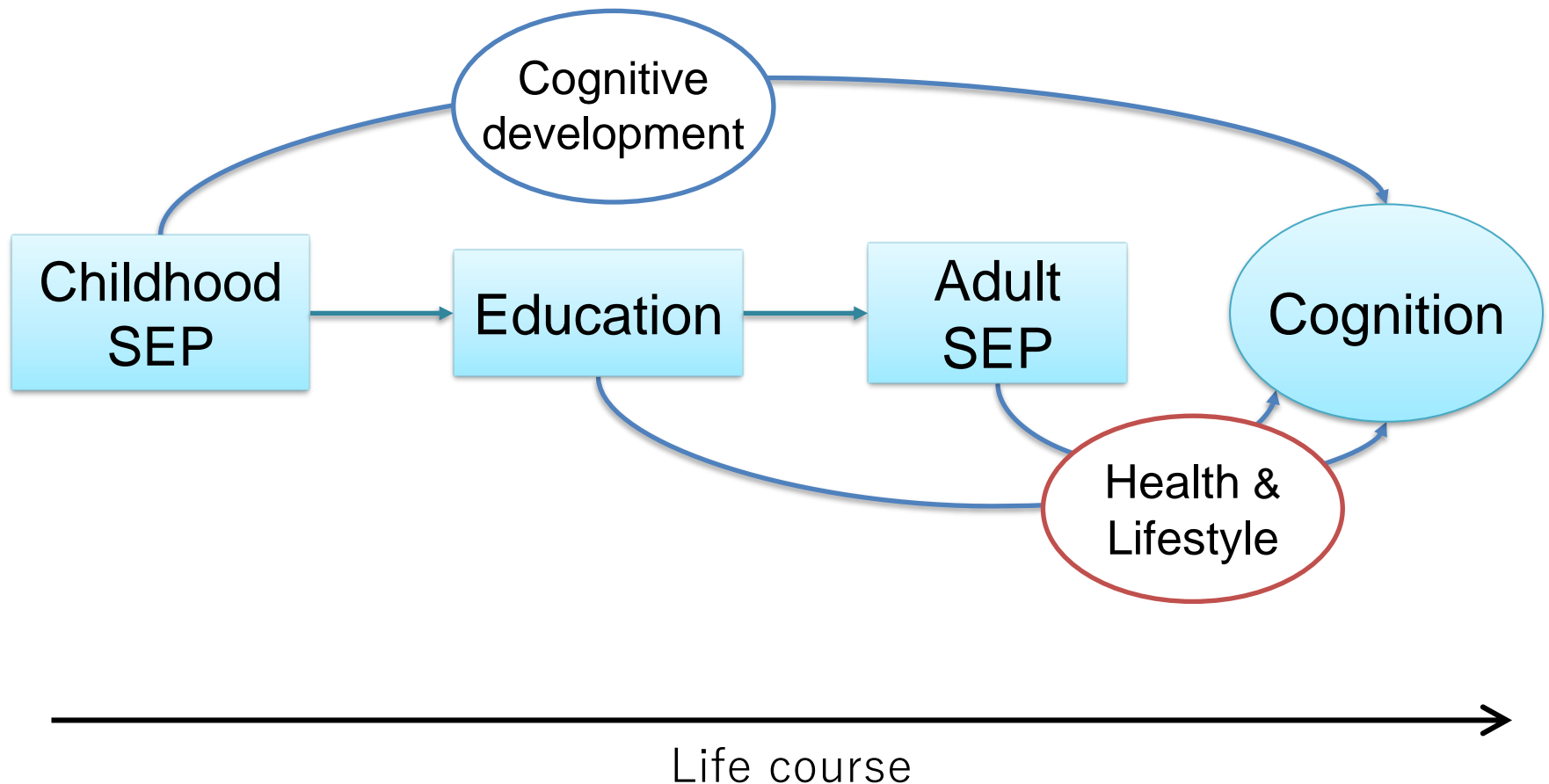


Chains of causes

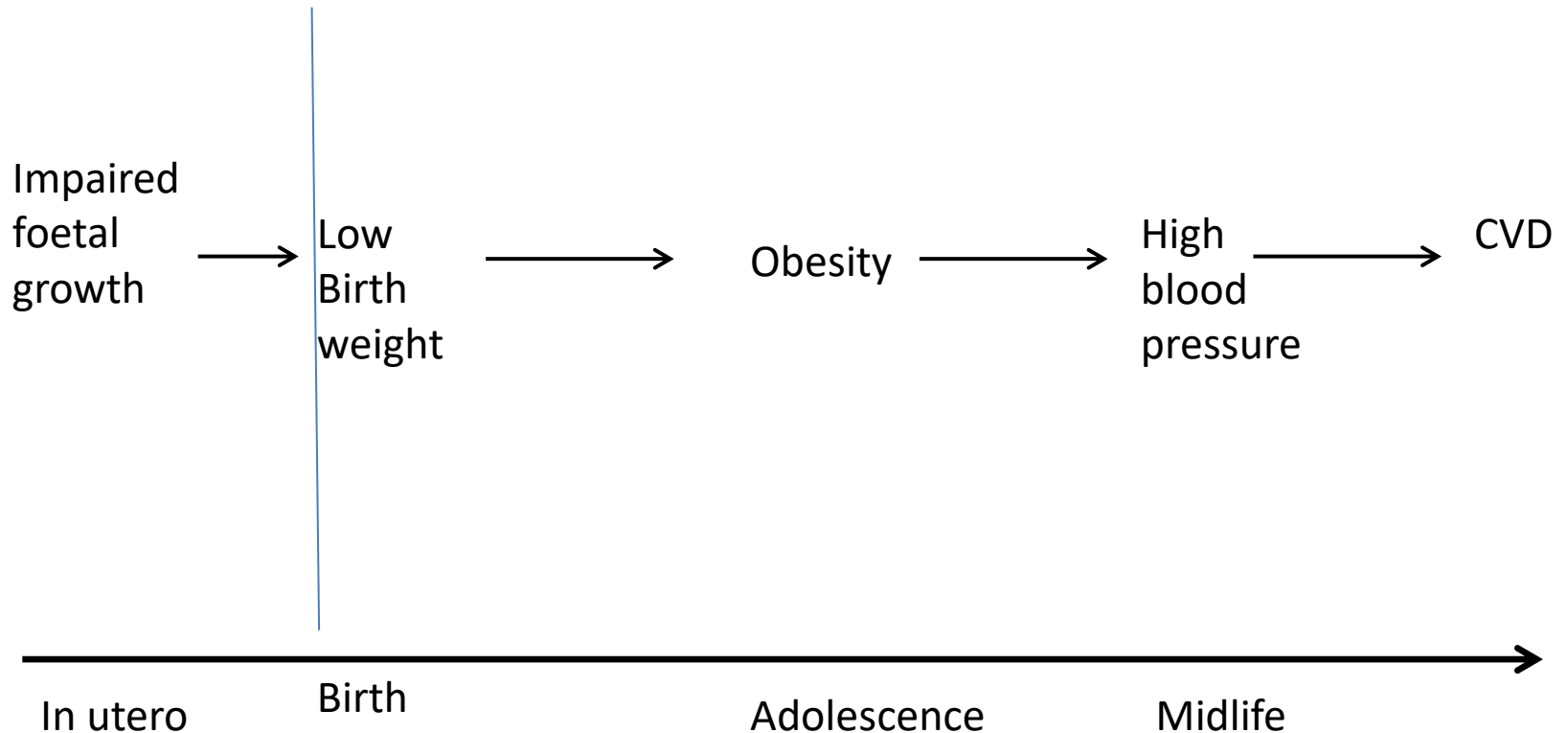
Chains of causes

- Temporal
- Psychosocial pathways
- Behavioural mechanisms
- Biological mechanisms
- Social causation (“causes of the causes”)

Tracking of causes of the life course: social position and cognition in later life



Critical periods (foetal programming)



Psychosocial and behavioural pathways

- Direct effects:
 - mental health (depression, anxiety, quality of life etc)
 - Suicides, violence
- Indirect effects
 - Behaviours (smoking, drinking, substance misuse)
 - Diet and nutrition (leading to obesity, dislipidemias, diabetes)

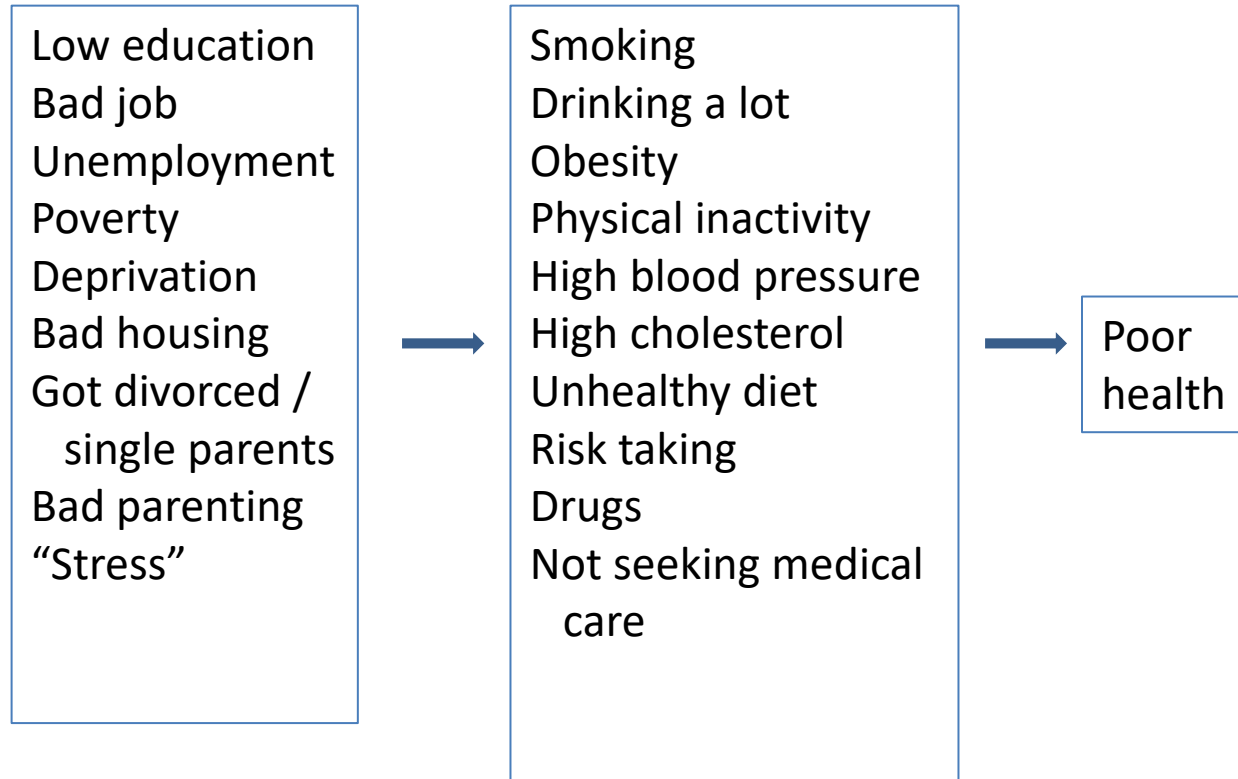
“causes of the causes”

Smoking
Drinking a lot
Obesity
Physical inactivity
High blood pressure
High cholesterol
Unhealthy diet
Risk taking
Drugs
Not seeking medical
care

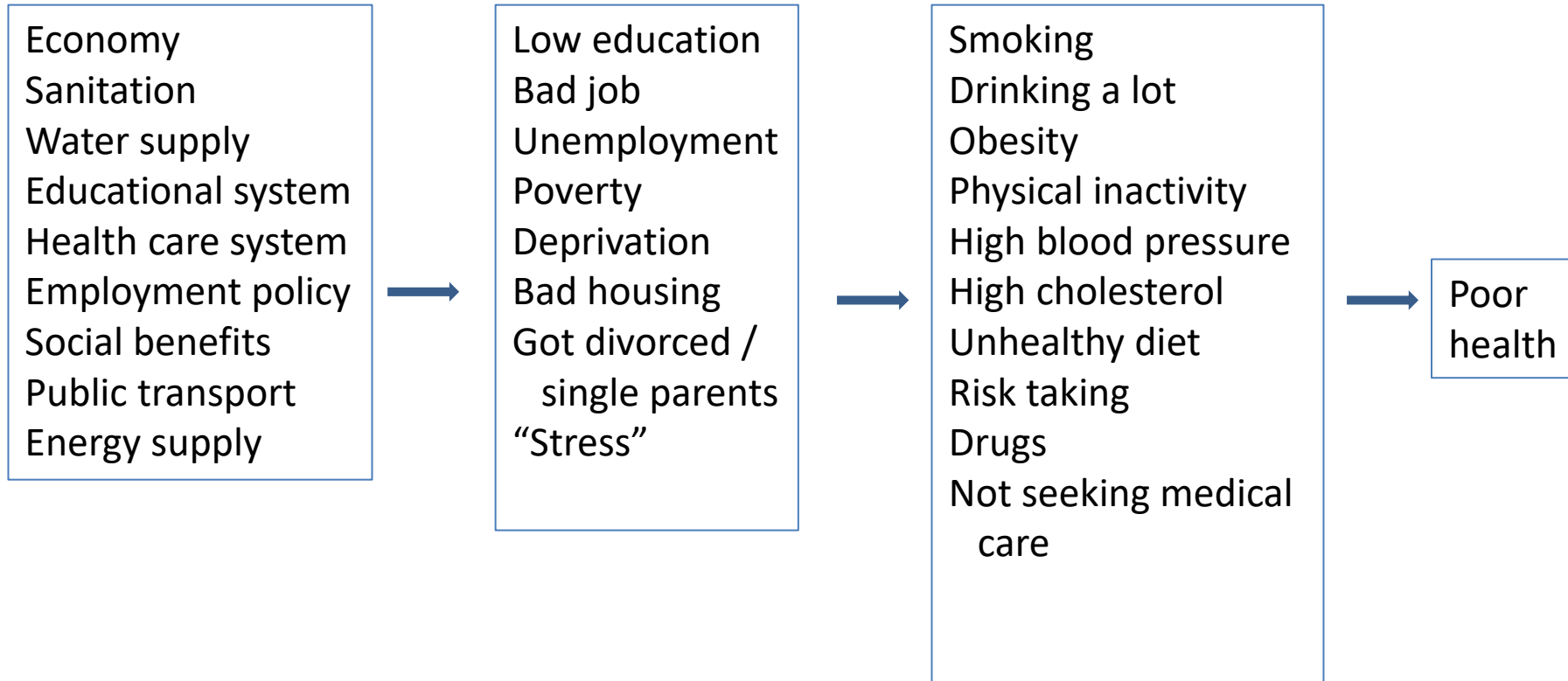


Poor
health

Chain of causes (“causes of the causes”)



Chain of causes (“causes of the causes”)



Chain of causes (“causes of the causes”)

National

Economy
Sanitation
Water supply
Educational system
Health care system
Employment policy
Social benefits
Public transport
Energy supply

International

Economy & development
Trade
War & conflict
History

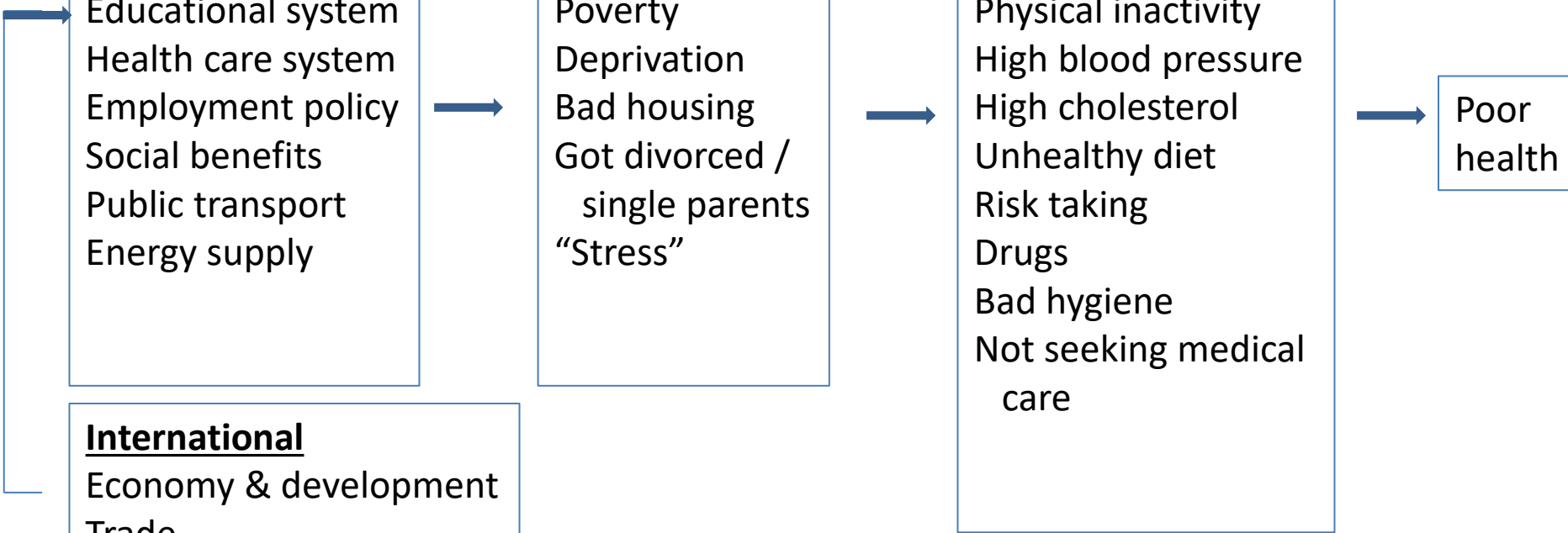
Group level

Low education
Bad job
Unemployment
Poverty
Deprivation
Bad housing
Got divorced /
single parents
“Stress”

Personal level

Smoking
Drinking a lot
Obesity
Physical inactivity
High blood pressure
High cholesterol
Unhealthy diet
Risk taking
Drugs
Bad hygiene
Not seeking medical
care

Poor
health



Conclusions

- Mortality and morbidity are distributed unequally between countries, groups and people
- Health is best in high income countries and high income groups and worst in low income countries and low income groups
- Similar differentials apply to individuals
- Associations often follow a gradient
- Proximal risk factors are important (prevention!)
- But proximal factors are powerfully influenced by more distant forces (social position, national and international environment)