Global Burden of Disease 2010 (GBD 2010)

January 15, 2014

Kenji Shibuya, MD, DrPH
Department of Global Health Policy
University of Tokyo
www.ghp.m.u-tokyo.ac.jp

Outline

1. Summary measures of population health

2. Quantifying burden of disease

3. Global Burden of Disease 2010 (GBD 2010)

How to measure the magnitude of disease?

How would you set priorities?

Drivers of current intervention choice

1. Inertia – fund this year what was funded last year.

2. Past capital investments – recurrent costs to sustain past investments such as hospitals can be large.

3. Donor and advocacy group agendas – international groups whether bilateral agencies, multilaterals like the World Bank or NGOs can have a disproportionate effect on intervention choice.

4. Political voice – urban elites demand and often receive health resources.

5. Perceived health priorities – often with a time lag, perception of major problems influences agendas.

Why do we need good measures of health?

1. Set research and development priorities

2. Establish health agendas

3. Manage program implementation

4. Monitor progress

5. Evaluate what works and what does not

Core measurements

1. Understanding health problems and how health systems respond to these problems is based on some core health and health system measurements.

2. Controversies and alternative interpretations over these measurements underlie a major fraction of global health debates.

Outline

1. Summary measures of population health

2. Quantifying burden of disease

3. Global Burden of Disease 2010 (GBD 2010)

WHO Constitution

"Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."

Domains of health

Population health: aggregating health domains

1. Overall judgment needed.

2. Aggregation functions may vary across populations and cultures, etc.

3. How do you ask? Who do you ask? Whose health status, respondent's health or hypothetical individuals?

Global epidemiology around late 1980s

1. Focusing on a single disease/condition.

2. No consistent set of estimates of mortality, incidence, prevalence by cause.

3. WHO, UNICEF and other organizations provided disease-specific data driven by need to raise funds.

4. Sum of deaths by cause claimed by different groups exceeded total global deaths by a factor of 2-3.

Global Burden of Disease (GBD) Study

World Development Report 1993: Investing in Health
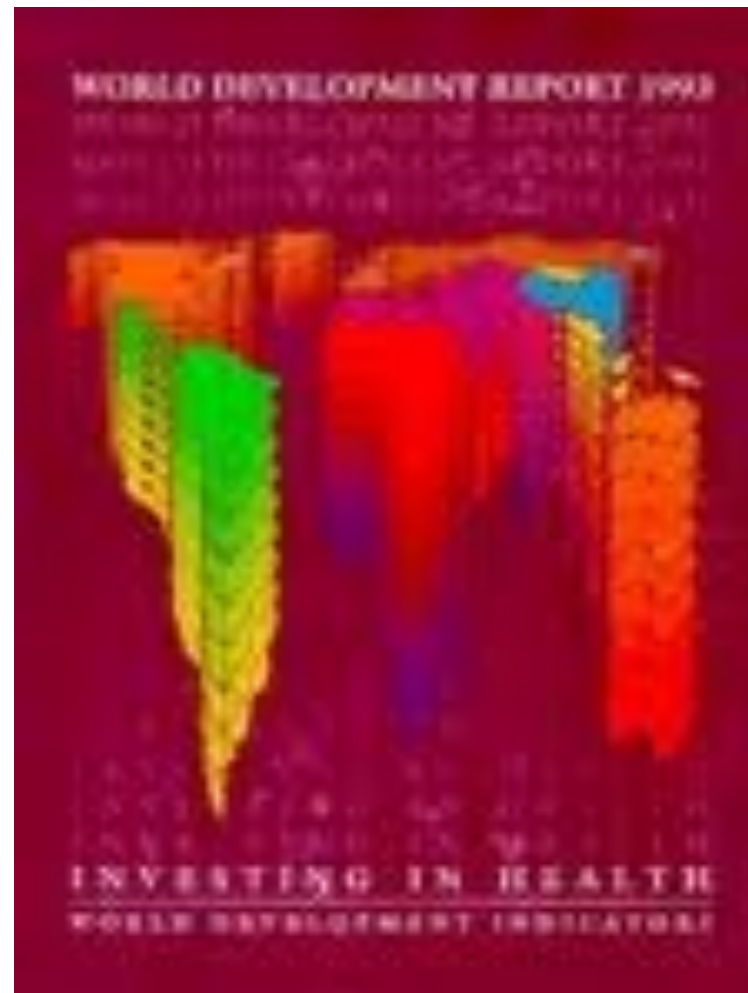
GBD Goals

1. Decouple epidemiological assessment and advocacy

2. Inject non-fatal health outcomes into health policy debate

3. Use a common metric for burden of disease assessment using summary measure of population health

4. 3Cs: comparability, consistency, and comprehensiveness

Global Burden of Disease 2010 (GBD 2010)

1. Continuation of work initiated by the World Bank, World Health Organization and Harvard University in 1991.

2. 2010 Revision systematically assesses all the available evidence on mortality and morbidity from 291 causes and 55 risk factors. 1163 disease and injury sequelae.

3. Results for 187 countries, 21 regions, three years 1990, 2005 and 2010.

4. GBD 2010 provides uncertainty intervals for all quantities of interest.

5. New computationally intensive tools developed to support statistical analysis required for the GBD.

Key inputs to summary measures

1. Mortality by age, sex and cause

2. Epidemiological data on non-fatal health outcomes by age, sex and cause

3. Valuations of health states

A typology of summary measures
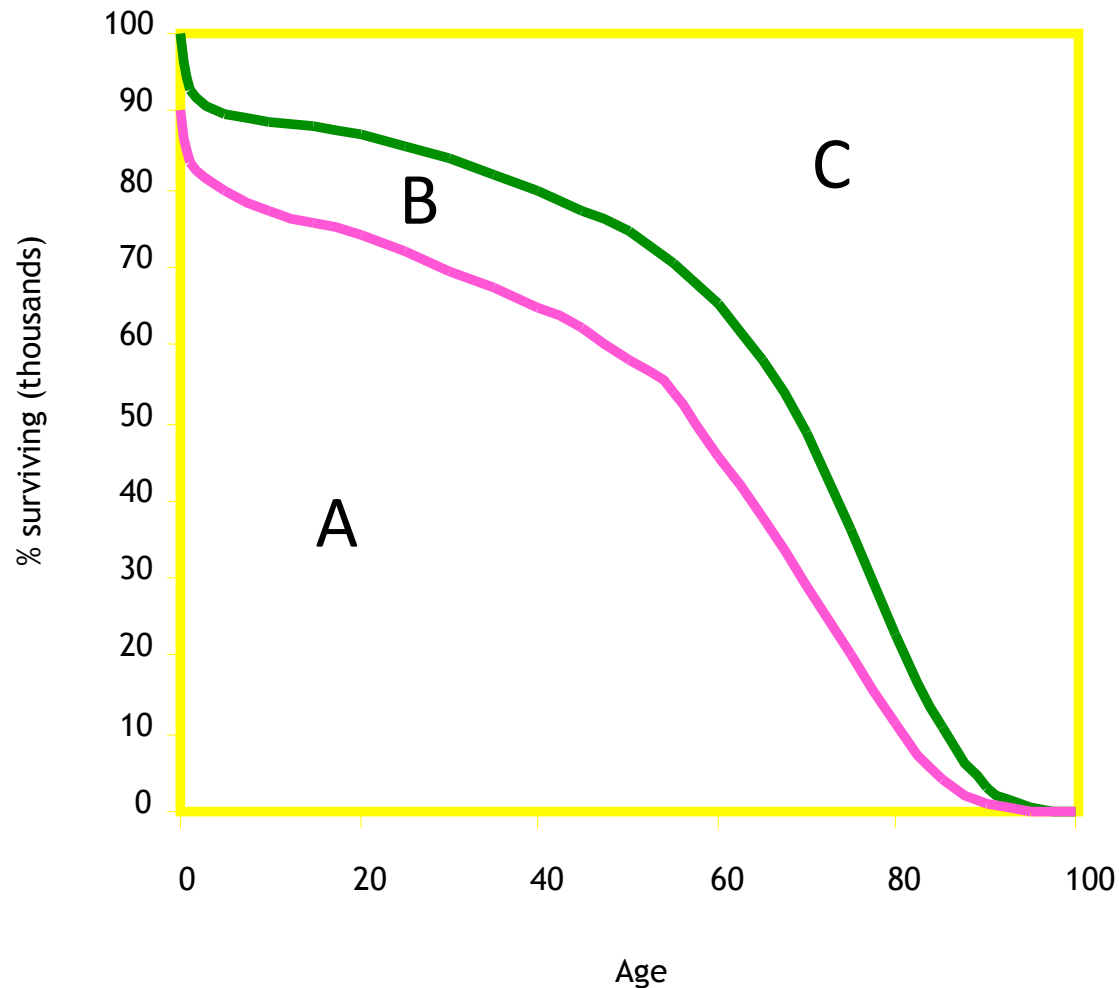
Health Gain

= A + f(B)

Health Gap

= C + g(B)

DALYs in Review

1. DALYs = Years of life lost due to premature mortality (YLLs) and years lived with disability (YLDs).

2. Years of life lost due to premature mortality due to a death at age x is the standard life expectancy at age x.

3. Years lived with disability for a cause in an age-sex group equals the prevalence of the condition times the disability weight for that condition.

4. In the GBD, disability refers to any short-term or long-term health loss.

Social value choices in DALYs

1. How long "should" people live (i.e. *standard life expectancy*)? Should it differ between men and women and/or by country? [relevant to YLLs only]

2. How can we compare years of life lost due to premature death with years of life lived with health problems of different severity levels (i.e. *disability weights*)?

3. Are years of healthy life *now* worth more to society than years of healthy life in the future (i.e. *discounting*) ?

4. Do years of healthy life have different value at different stages in life (i.e. *age-weighting*)?
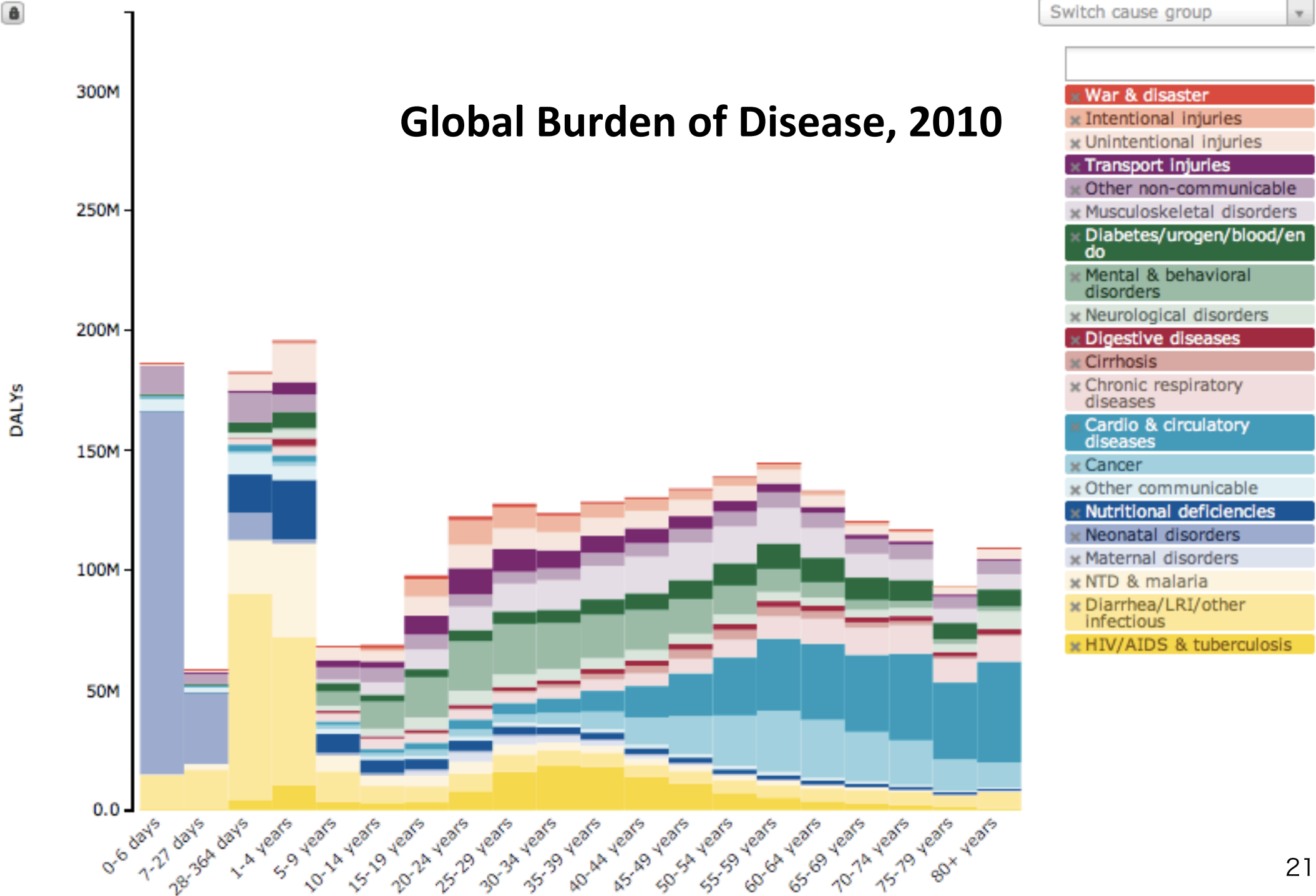
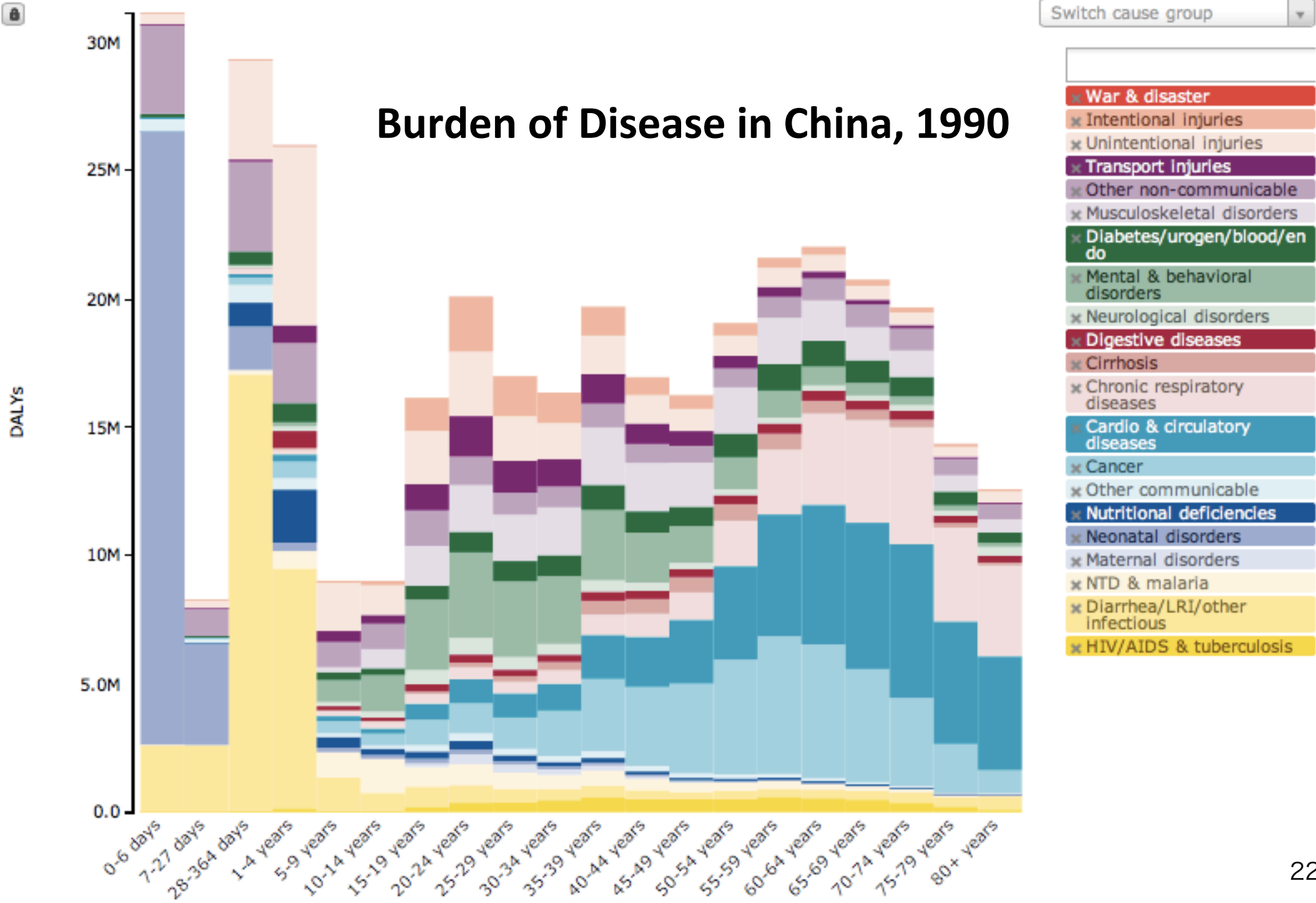Global Burden of Disease 2010: Data and Model Flow Chart
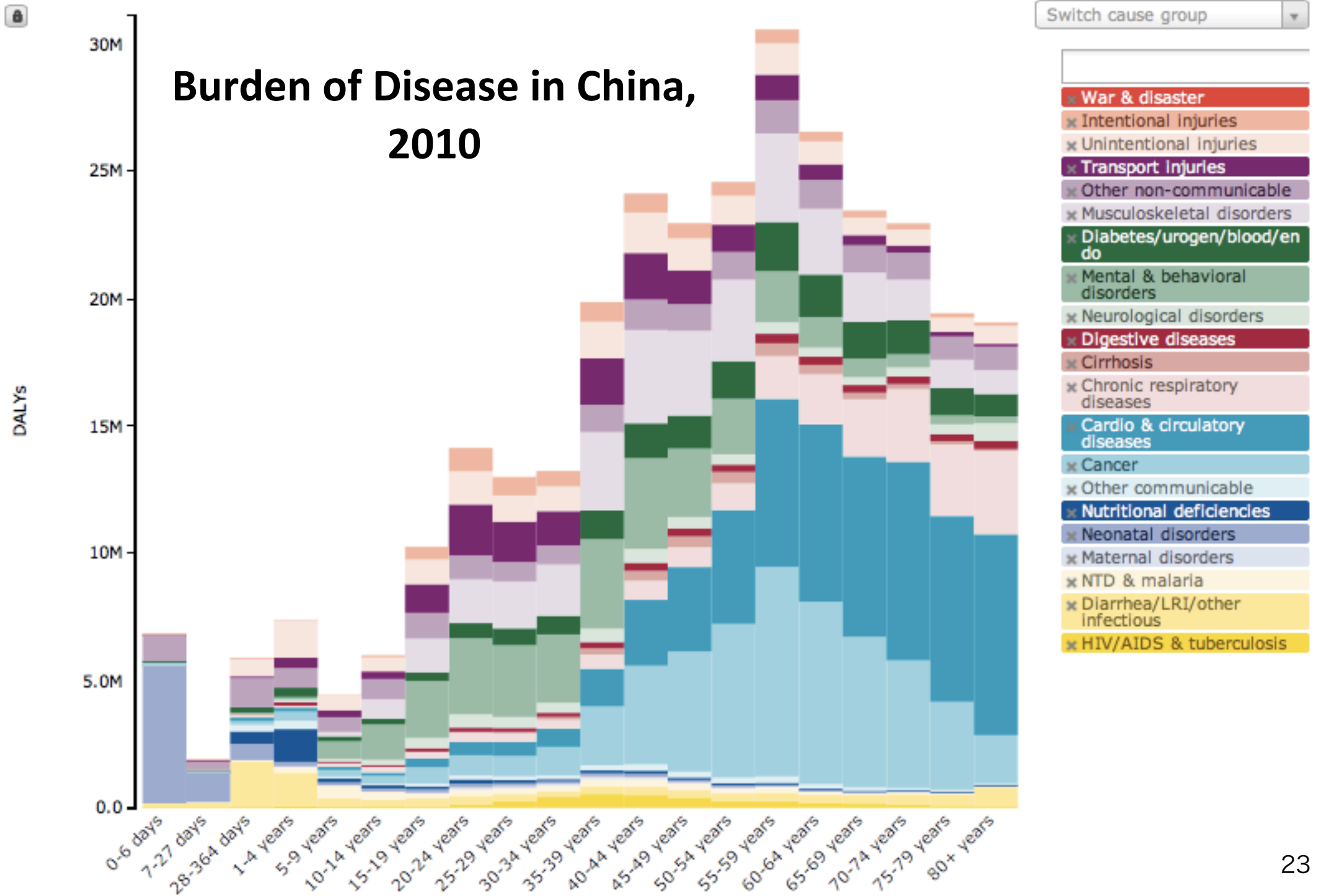
19
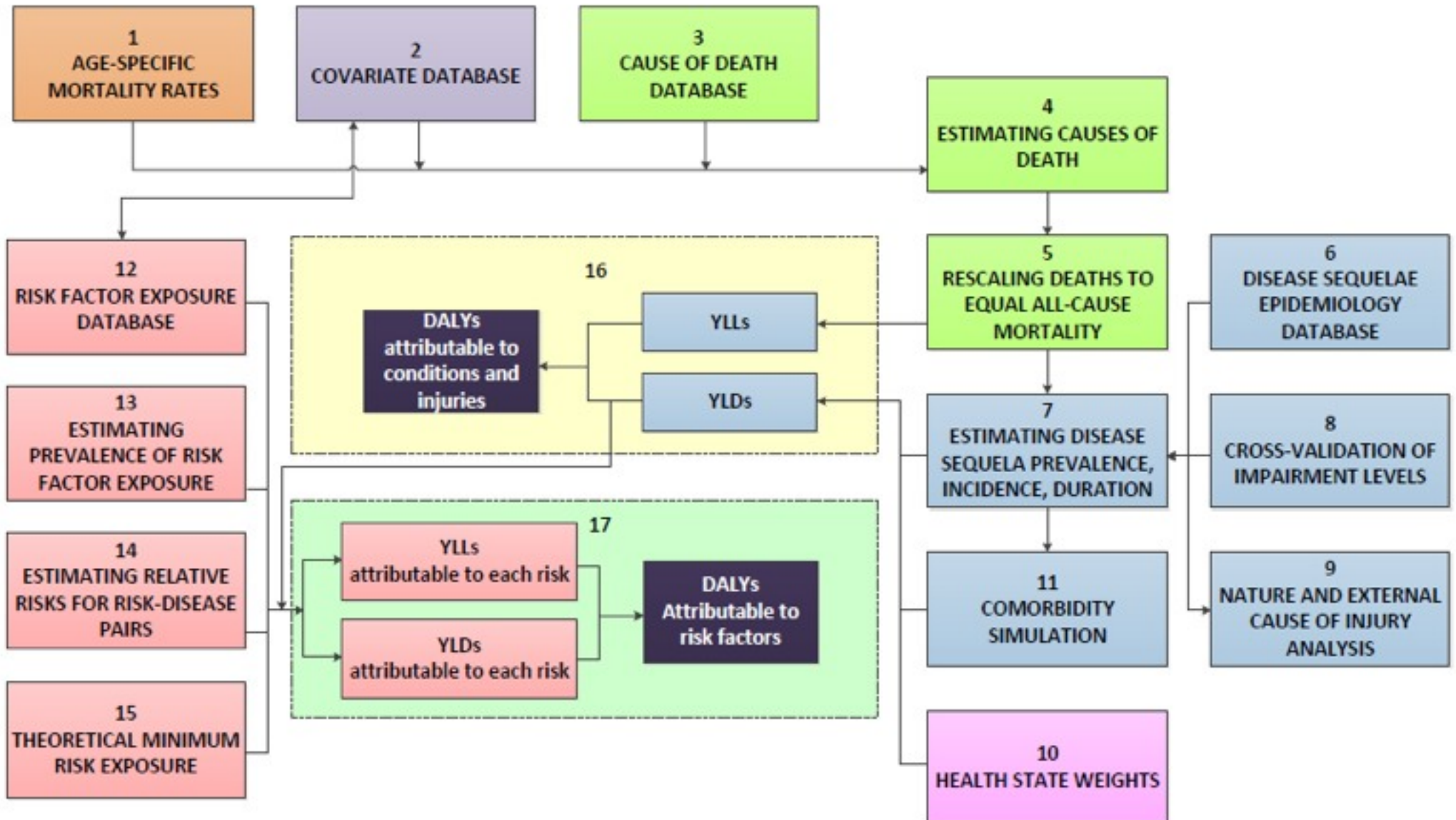
Global Burden of Disease, 1990

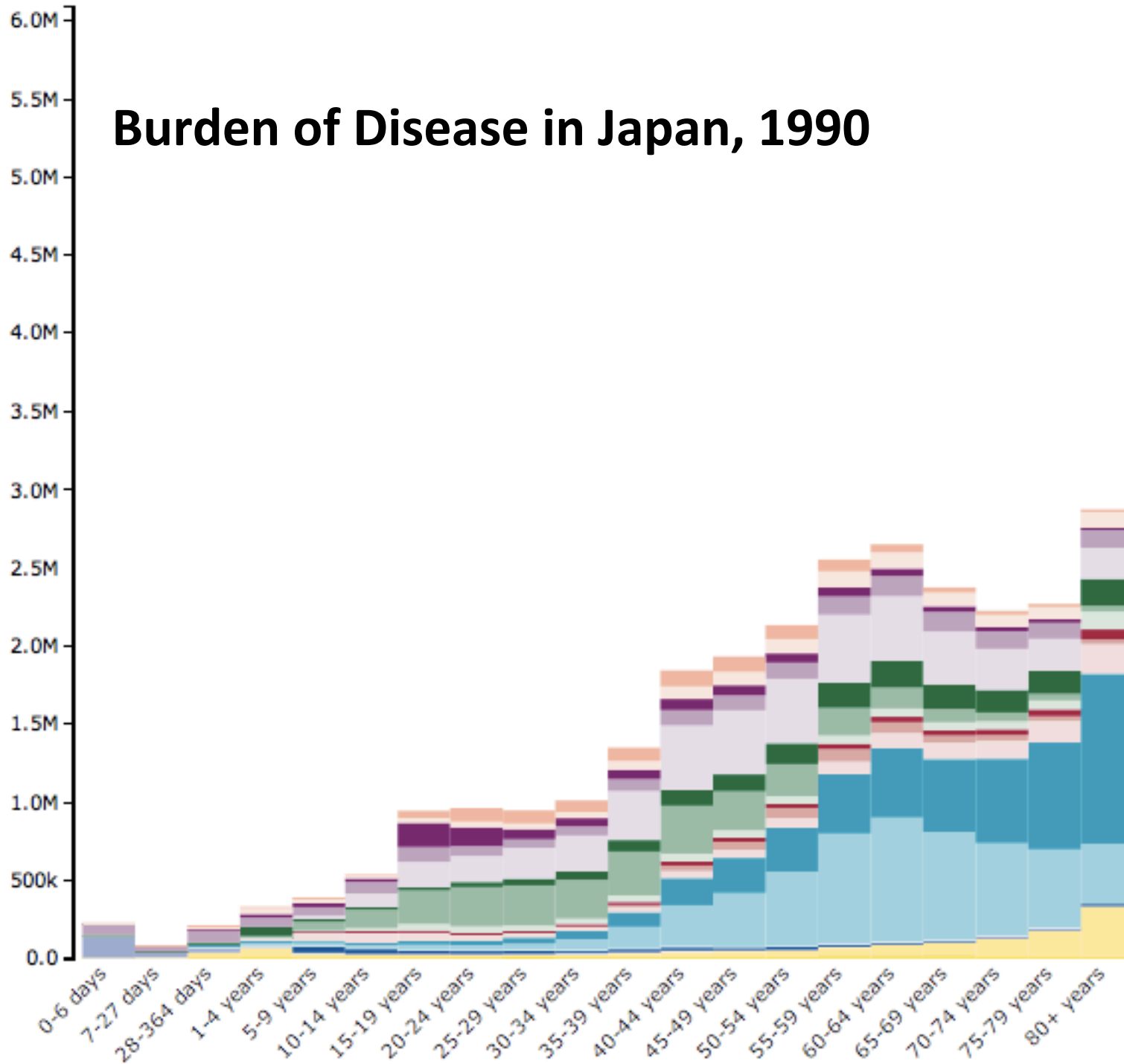Global Burden of Disease, 2010

21
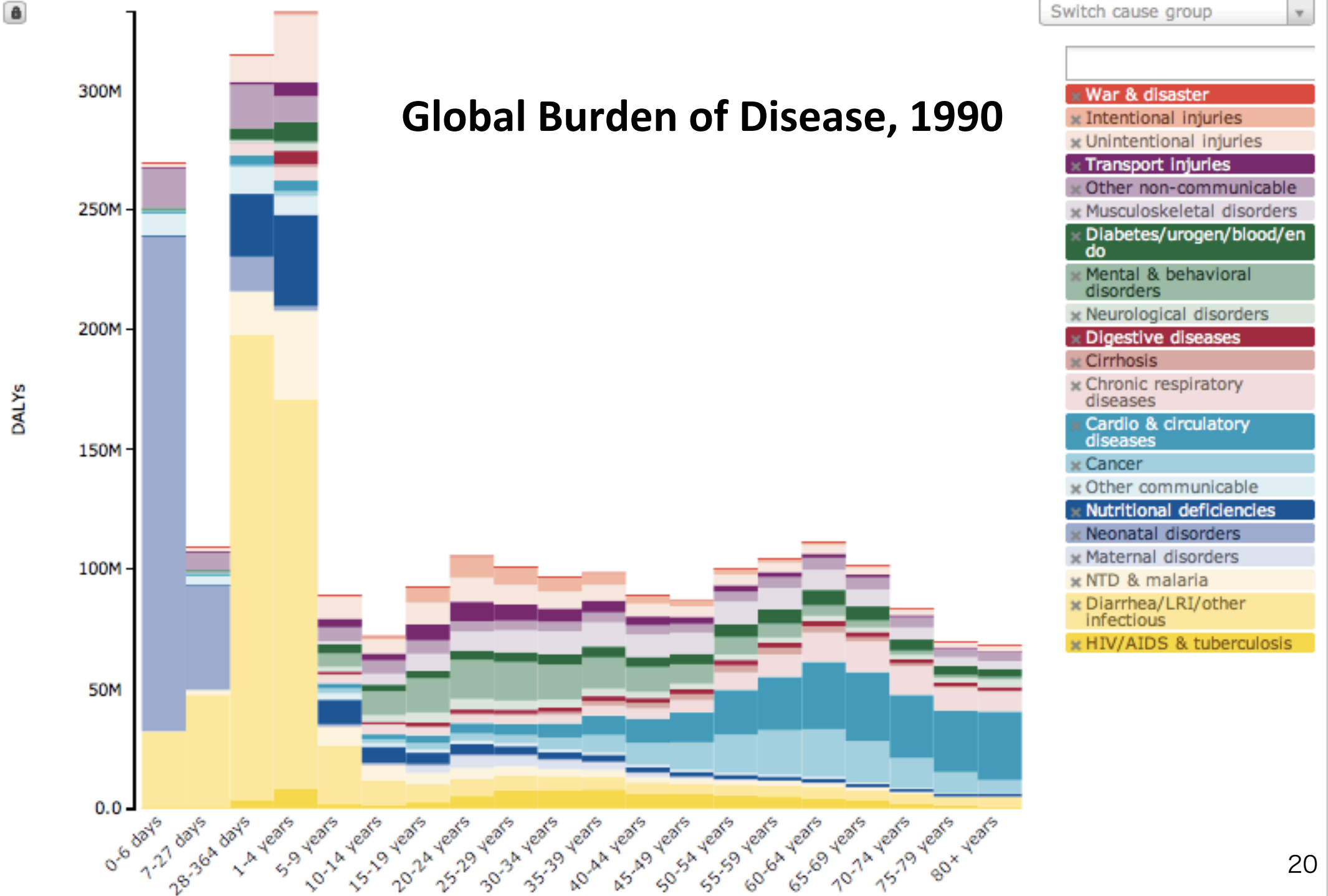
Burden of Disease in China, 1990

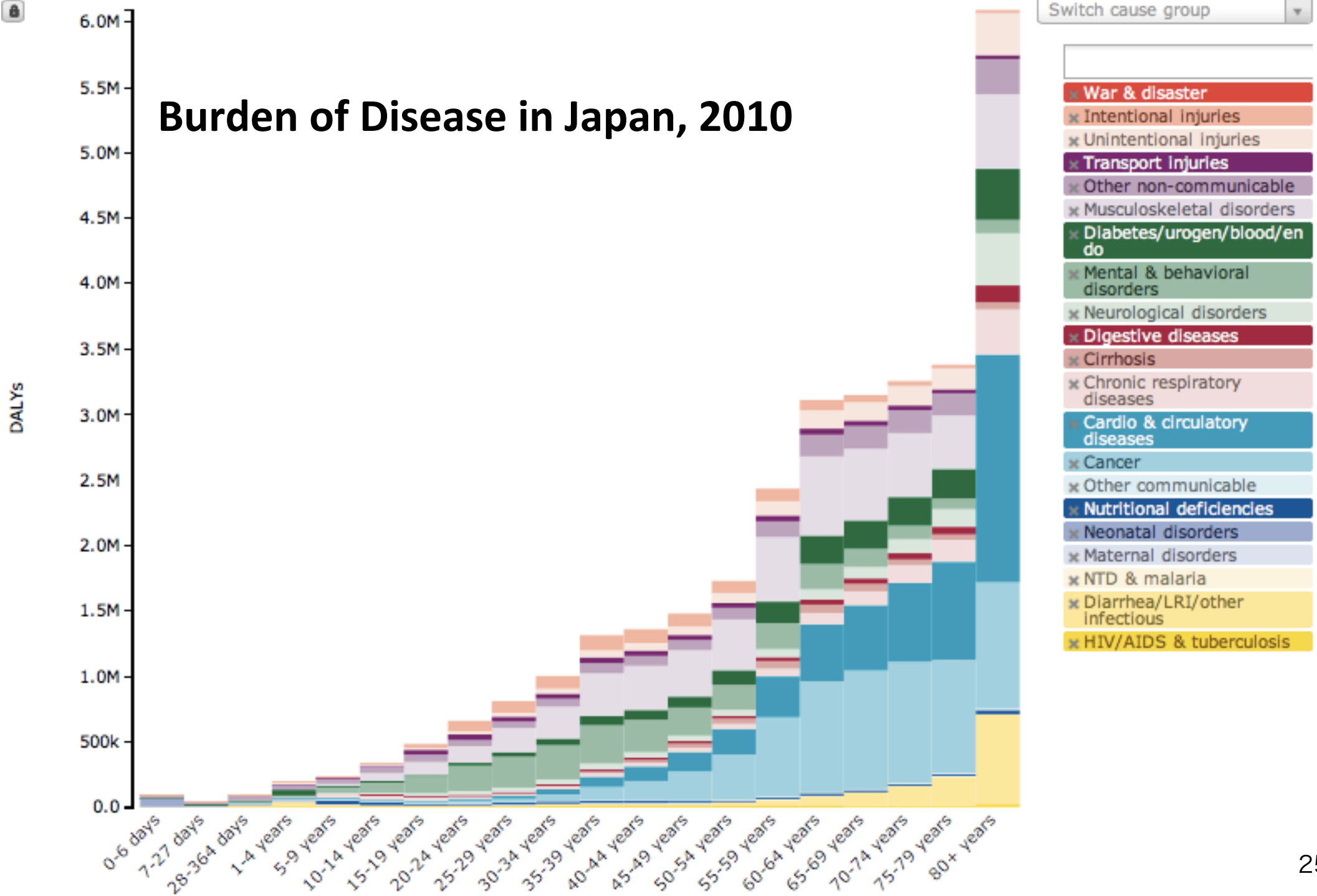**Burden of Disease in China, 2010**

23

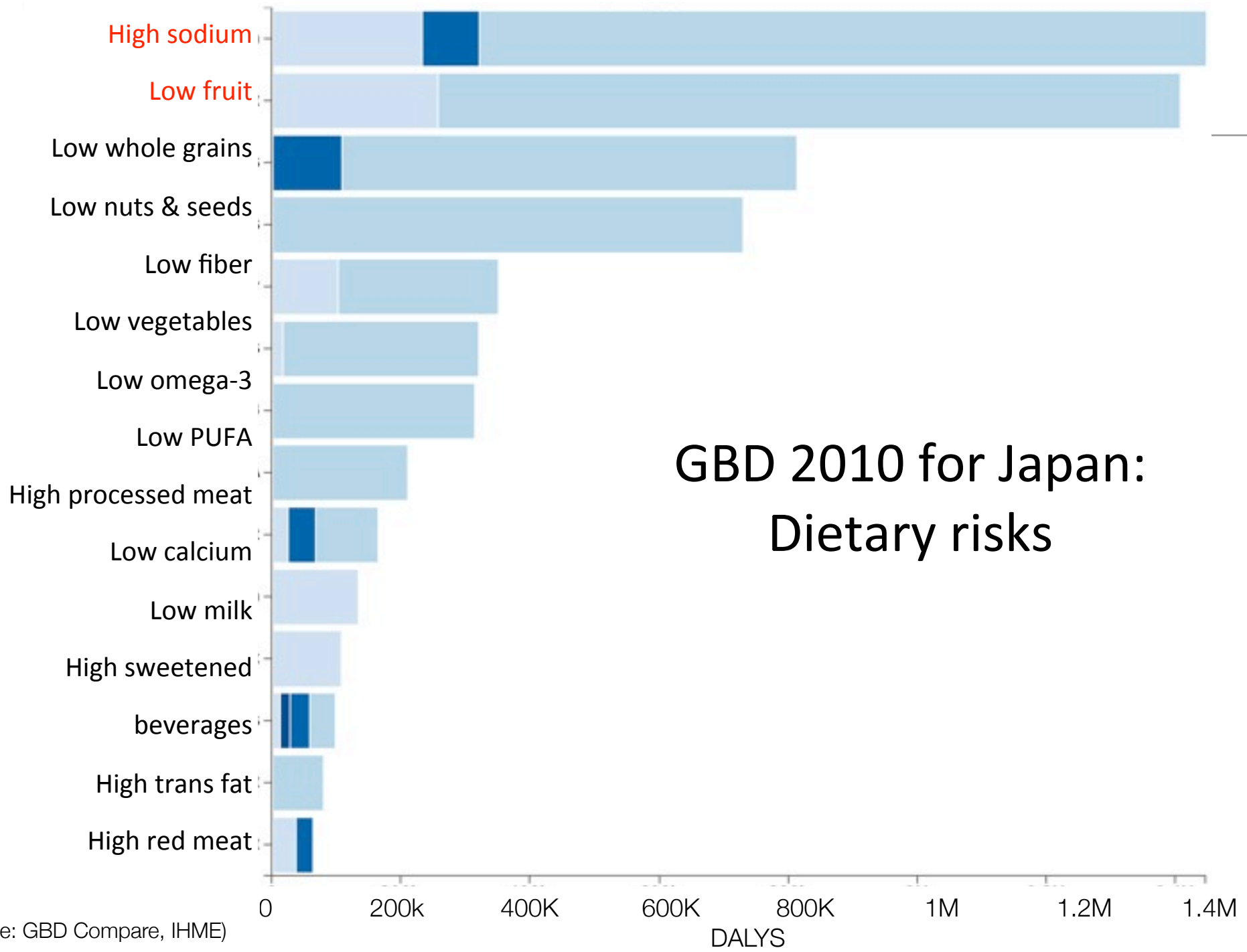Burden of Disease in Japan, 1990

Burden of Disease in Japan, 2010

25

Leading causes of death and disease burden, World, 2010

	Deaths	1990 rank	Disease burden（DALYs）	1990 rank
1	Ischaemic heart disease	1	Ischaemic heart disease	4
2	Cerebrovascular disease	2	Lower respiratory infections	1
3	COPD	4	Cerebrovascular disease	5
4	Lower respiratory infections	3	Diarrhoeal diseases	2
5	Lung cancer	8	HIV/AIDS	33
6	HIV/AIDS	35	Low back pain	11
7	Diarrhoeal diseases	5	Malaria	7
8	Road traffic accidents	10	Neonatal complications	3
9	Diabetes	15	COPD	6
10	Tuberculosis	6	Road traffic accidents	12

Burden of disease and risk factors in Japan (2010)

Rank	Deaths	Burden of disease	
		DALYs	Risk factors
1	Stroke	Low back pain	Dietary risks
2	Lower respiratory infections	Stroke	High blood pressure
3	Ischemic heart disease	Ischemic heart disease	Smoking
4	Lung cancer	Lower respiratory infections	Physical inactivity
5	Stomach cancer	Other musculoskeletal	High BMI
6	Colorectal cancer	Lung cancer	High fasting glucose
7	Liver cancer	Self-harm	Alcohol use
8	COPD	Stomach cancer	Ambient PM pollution
9	Chronic kidney disease	Neck pain	High total cholesterol
10	Self-harm	Falls	Occupational risks

(Source: GBD 2010)

GBD 2010 for Japan:
Dietary risks

Chart categories (top to bottom): High sodium, Low fruit, Low whole grains, Low nuts & seeds, Low fiber, Low vegetables, Low omega-3, Low PUFA, High processed meat, Low calcium, Low milk, High sweetened beverages, High trans fat, High red meat

X-axis: DALYS — 0, 200k, 400K, 600K, 800K, 1M, 1.2M, 1.4M

(Source: GBD Compare, IHME)

28

GBD2010

http://www.healthmetricsandevaluation.org/gbd/visualizations/country