Building resilience - the health footprint of a healthy doctor

European Association for Physician Health 2015

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Barcelona, 20 April 2015

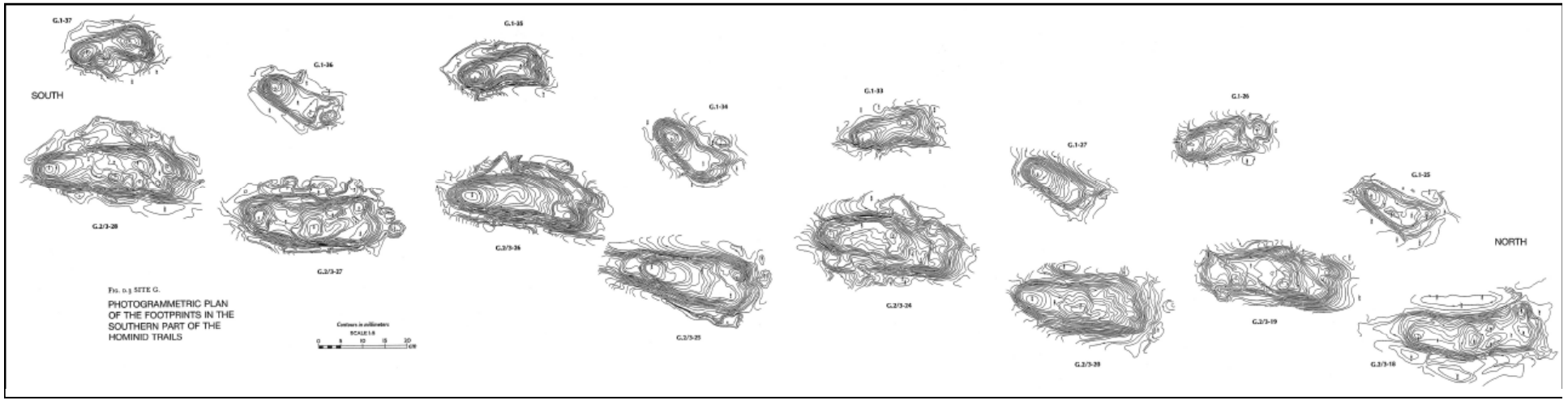
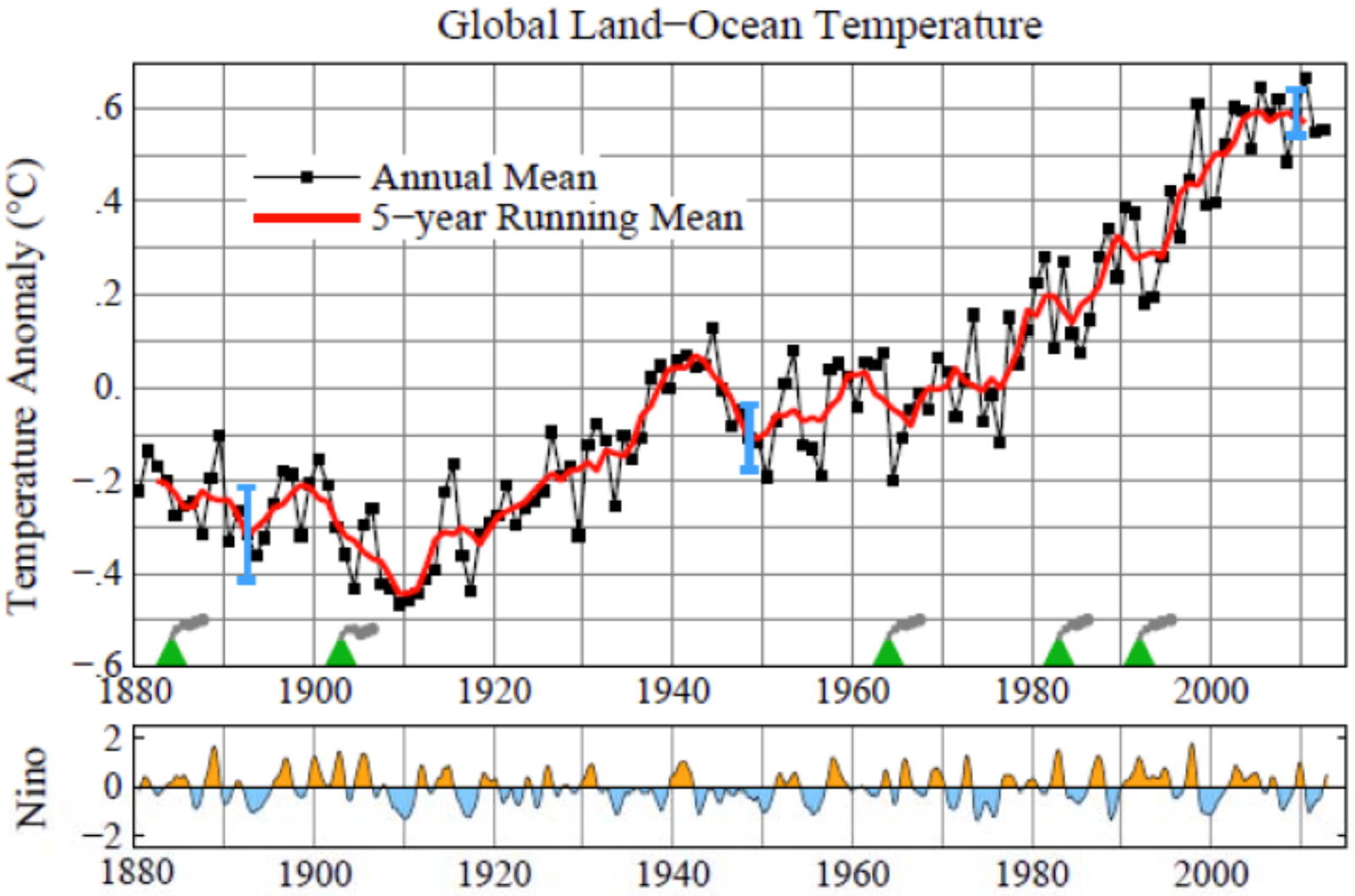
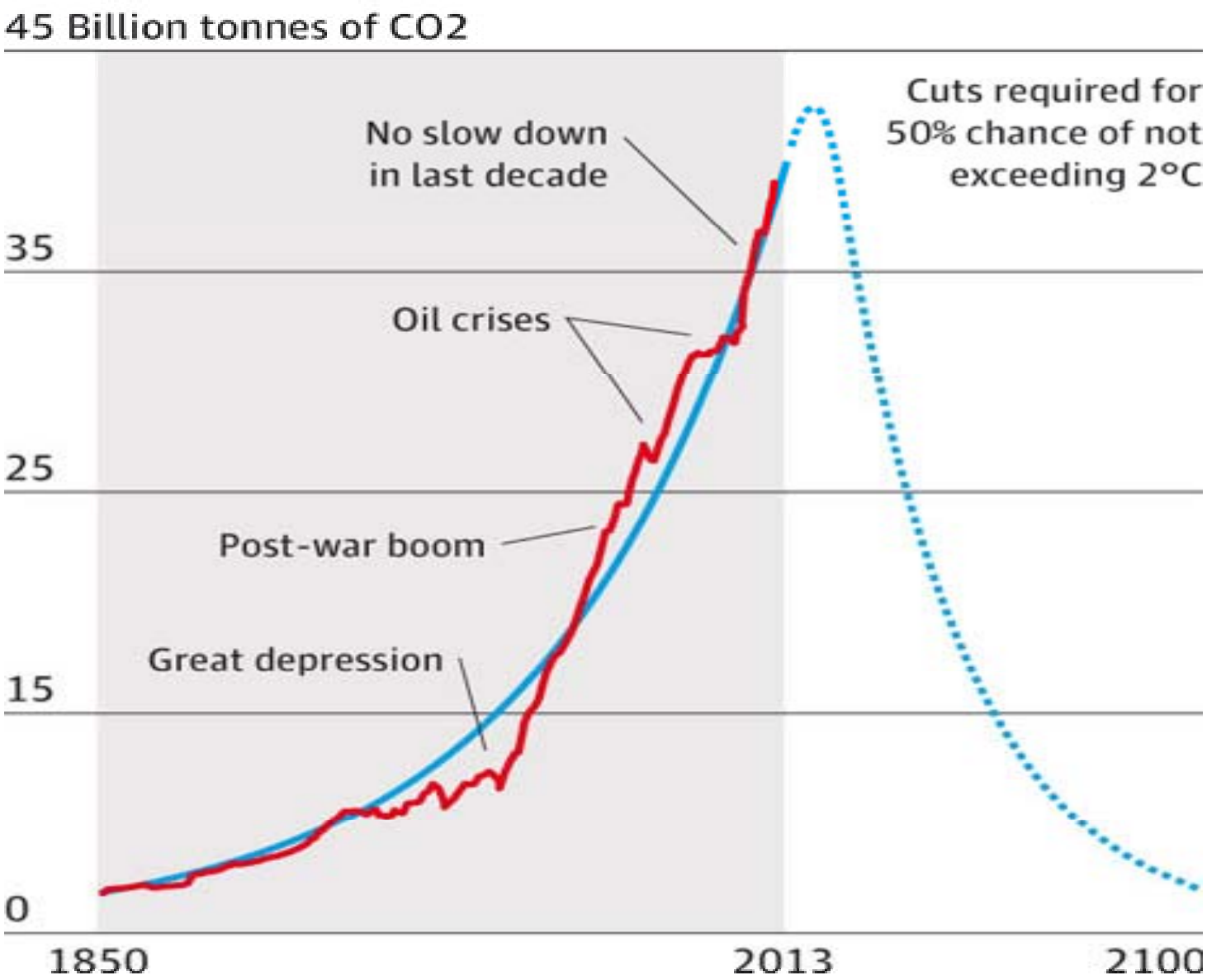


Fig. 0.3 SITE G.
PHOTOGRAMMETRIC PLAN OF THE FOOTPRINTS IN THE SOUTHERN PART OF THE HOMINID TRAILS


Global Land−Ocean Temperature
Temperature Anomaly (°C)
.6
.4
.2
0.
−.2
−.4
−.6
Annual Mean
5−year Running Mean
1880
1900
1920
1940
1960
1980
2000
Nino
2
0
−2
1880
1900
1920
1940
1960
1980
2000


45 Billion tonnes of CO2
No slow down
in last decade
Cuts required for
50% chance of not
exceeding 2°C
35
Oil crises
25
Post-war boom
Great depression
15
0
1850
2013
2100

A beginner's guide to carbon footprinting

Carbon Management (2012) 3(1), 55–67

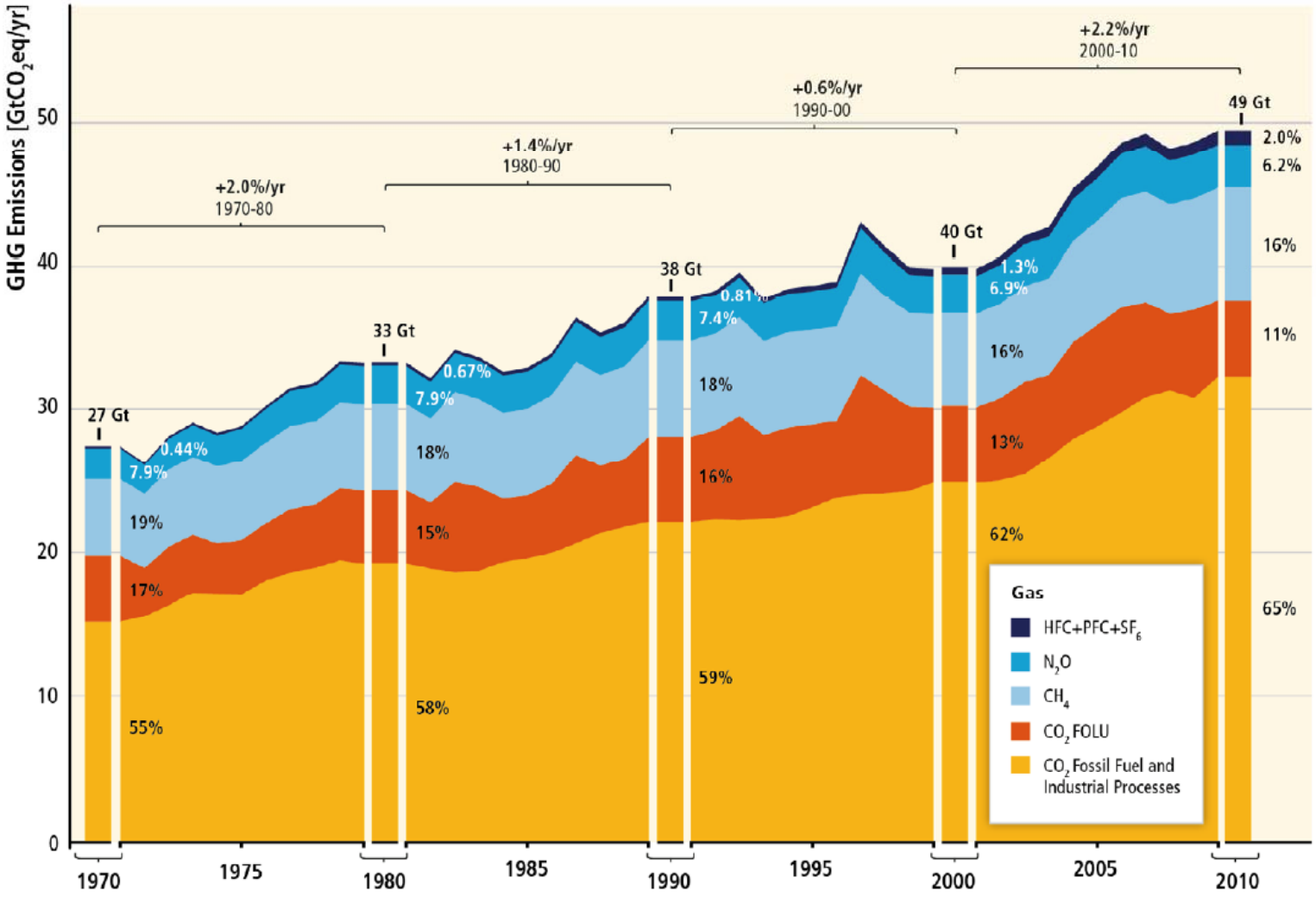
Ian Williams*, Simon Kemp, Jonathan Coello, David A Turner & Laurence A Wright

Carbon footprinting is one of the foremost methods available for quantifying anthropogenic environmental impacts and for helping tackle the threat of climate change. However, for any person undertaking a carbon footprinting analysis for the first time, they will almost certainly be struck by the broad array of definitions, approaches and terminology surrounding the field. This paper provides an introductory guide to some basic concepts in carbon footprinting for researchers and lay people interested in the area. Each stage of calculating a carbon footprint is considered and an introduction to the main methodologies is provided. The advantages and disadvantages of the various approaches are discussed and a rough framework of procedures is provided for the calculation of carbon footprints over a variety of subjects. Some general data sources are included and a glossary of key carbon footprinting terminology is available in supplementary data online.

A tool for climate change management

A carbon footprint is a measure of green house gas emissions, [specifically carbon dioxide and methane, calibrated for $C0_2$ equivalent], produced by actions of an entity.

The central reason for estimating a carbon footprint is to help reduce the risk of climate change through enabling targeted reductions of greenhouse gas emissions.



A tool for climate change management

A carbon footprint:

- Promotes accountability
- Is an advocacy tool
- Monitors change

A tool for climate change management

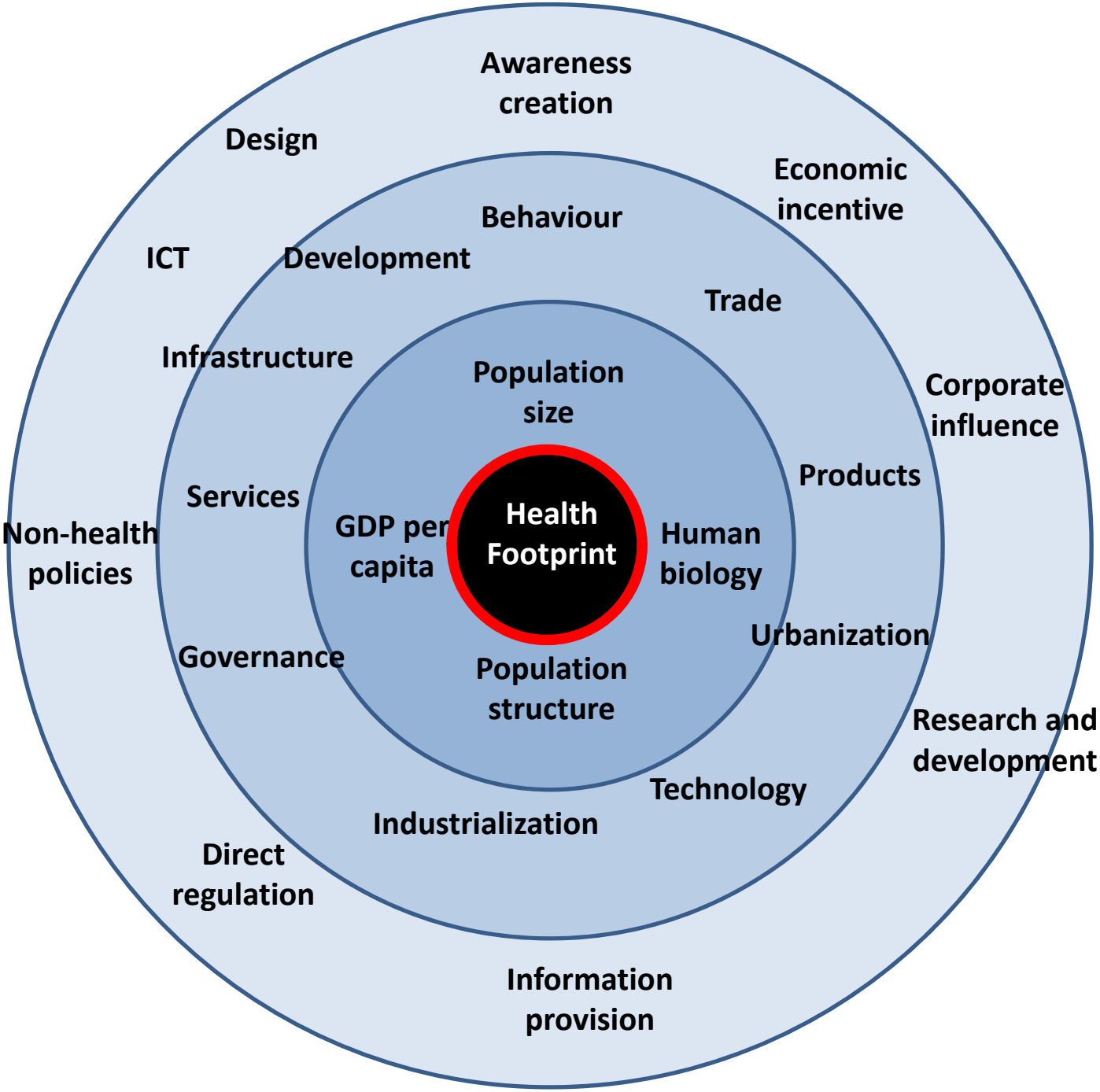
- Carbon footprints of nations, regions and cities
- Carbon footprints of sectors and organizations
- Carbon footprints of products and services
- Personal carbon footprints

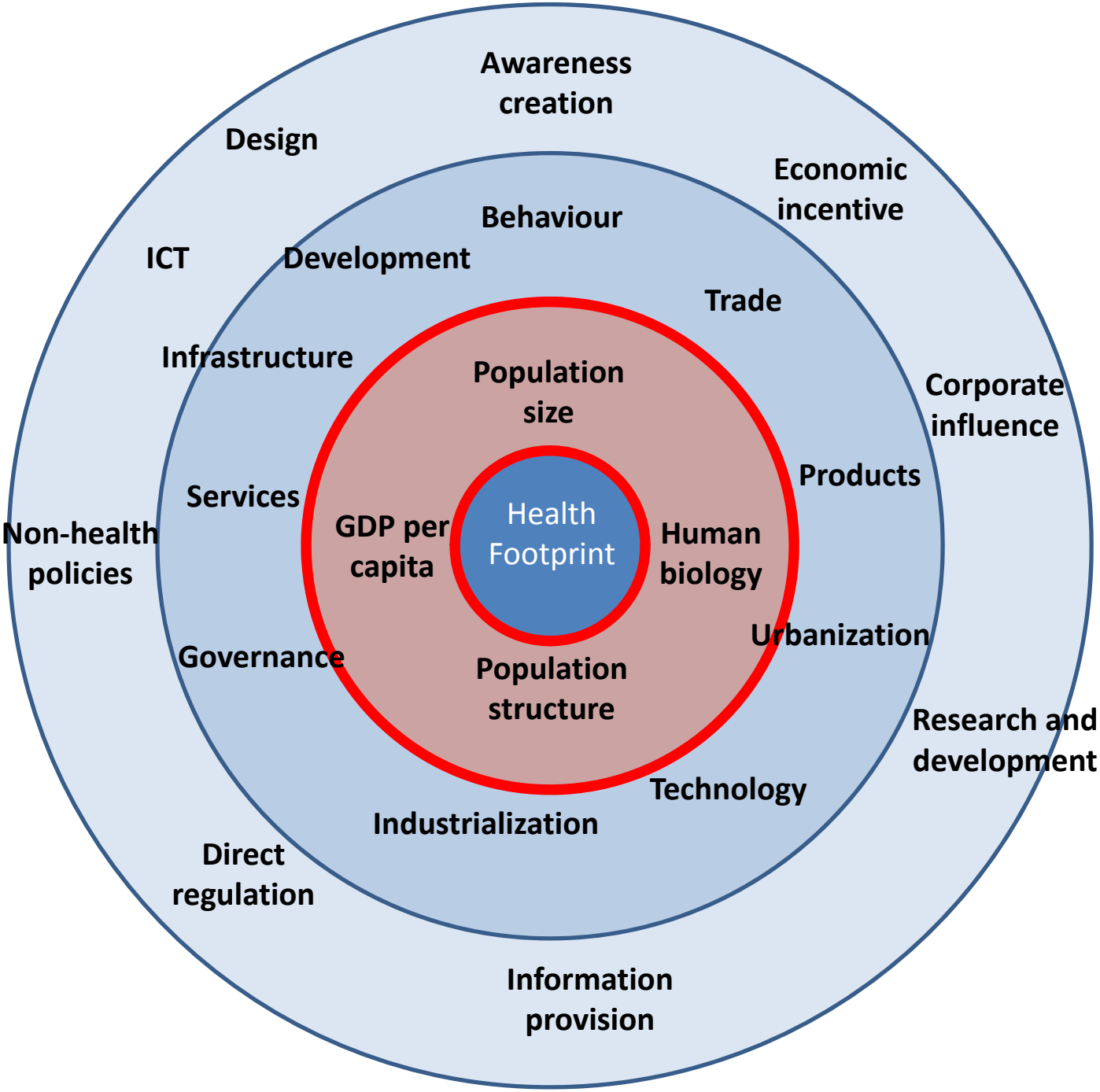
A tool for health governance

A health footprint is proposed as a measure of disability adjusted life years (DALYs) produced by actions of an entity.

A health footprint:

- Footprints of nations, regions and cities
- Footprints of sectors and organizations
- Footprints of products and services
- Personal footprints


Awareness creation
Design
Economic incentive
Behaviour
ICT
Development
Trade
Infrastructure
Population size
Corporate influence
Products
Services
Non-health policies
GDP per capita
Health Footprint
Human biology
Urbanization
Governance
Population structure
Research and development
Technology
Industrialization
Direct regulation
Information provision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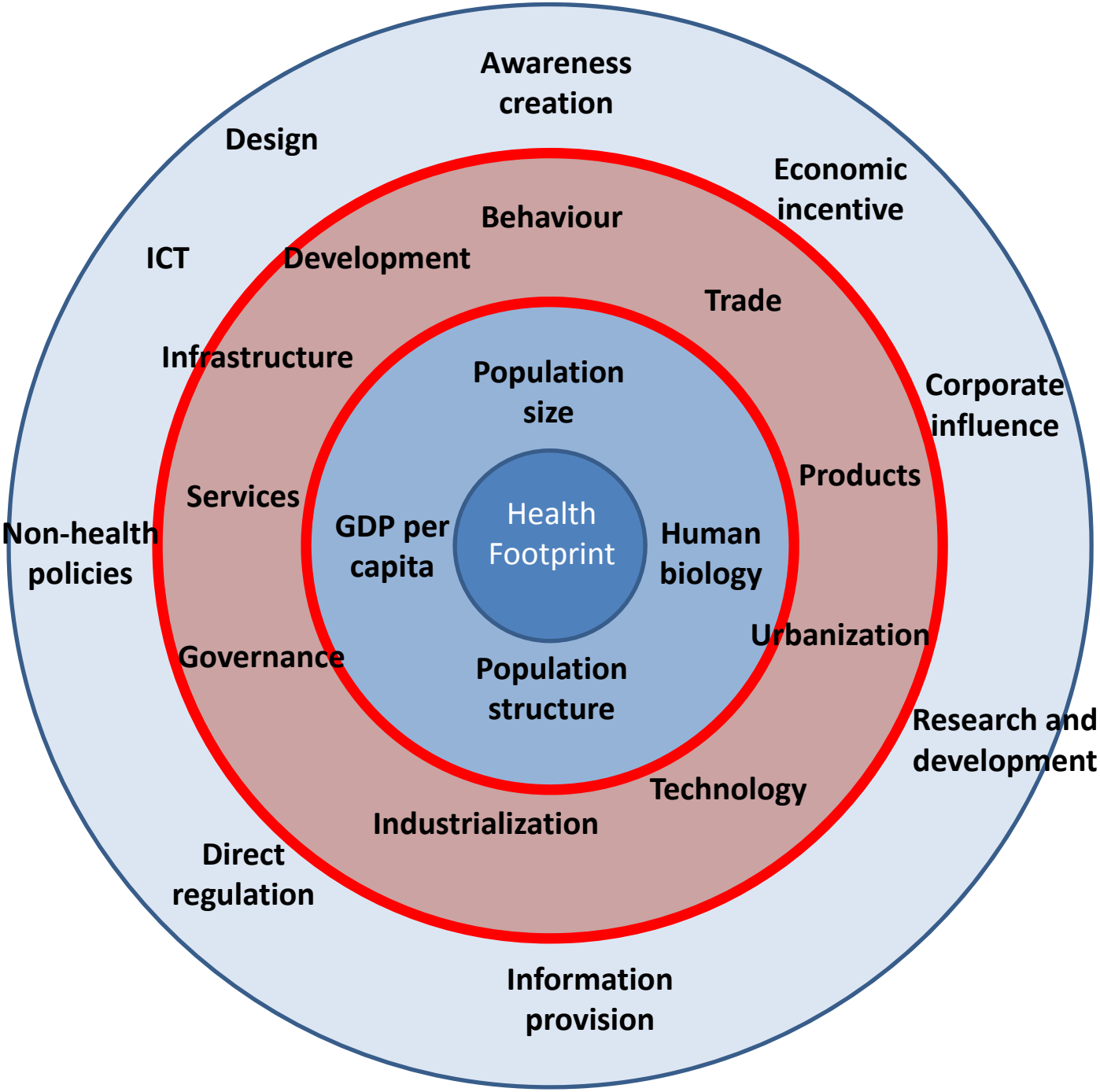
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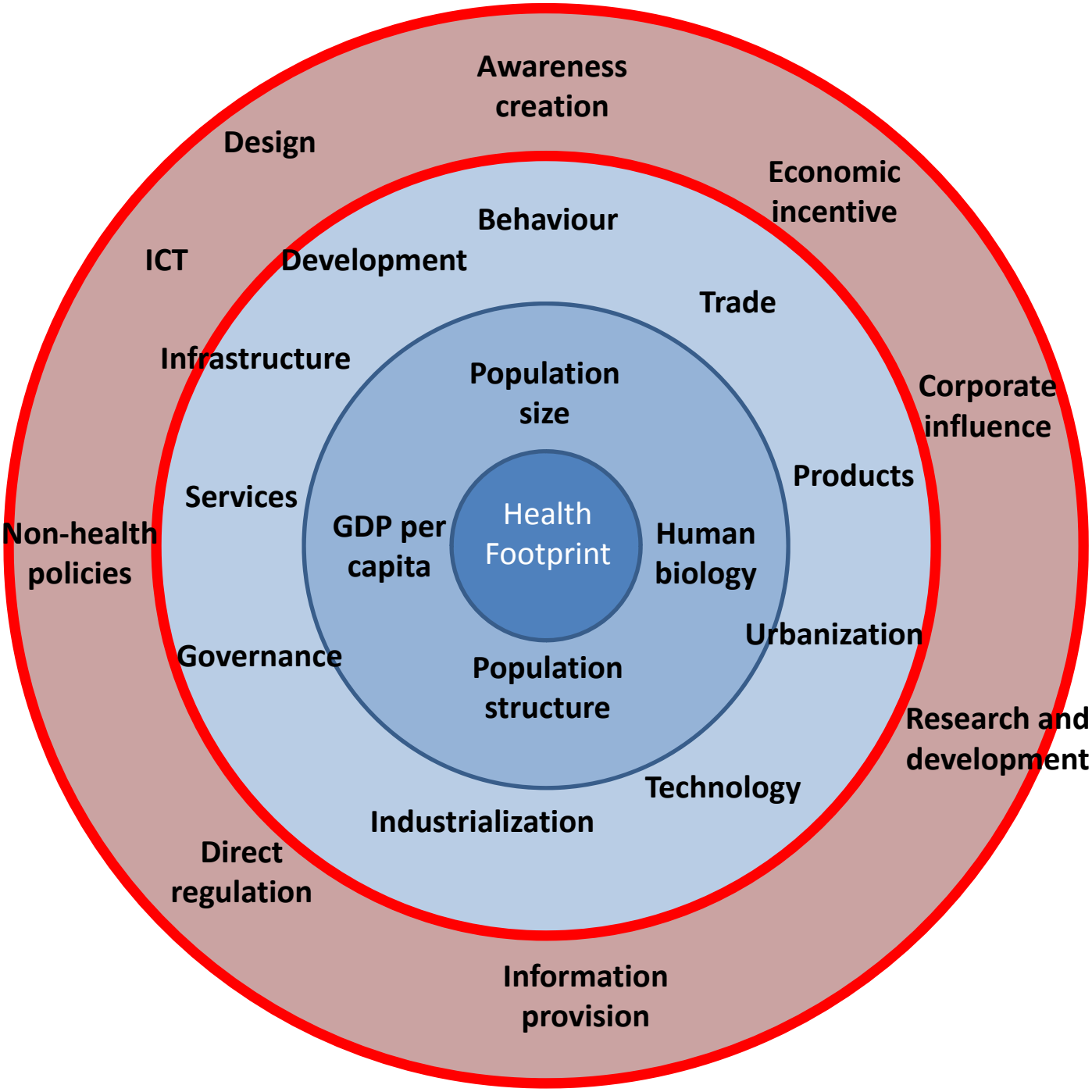
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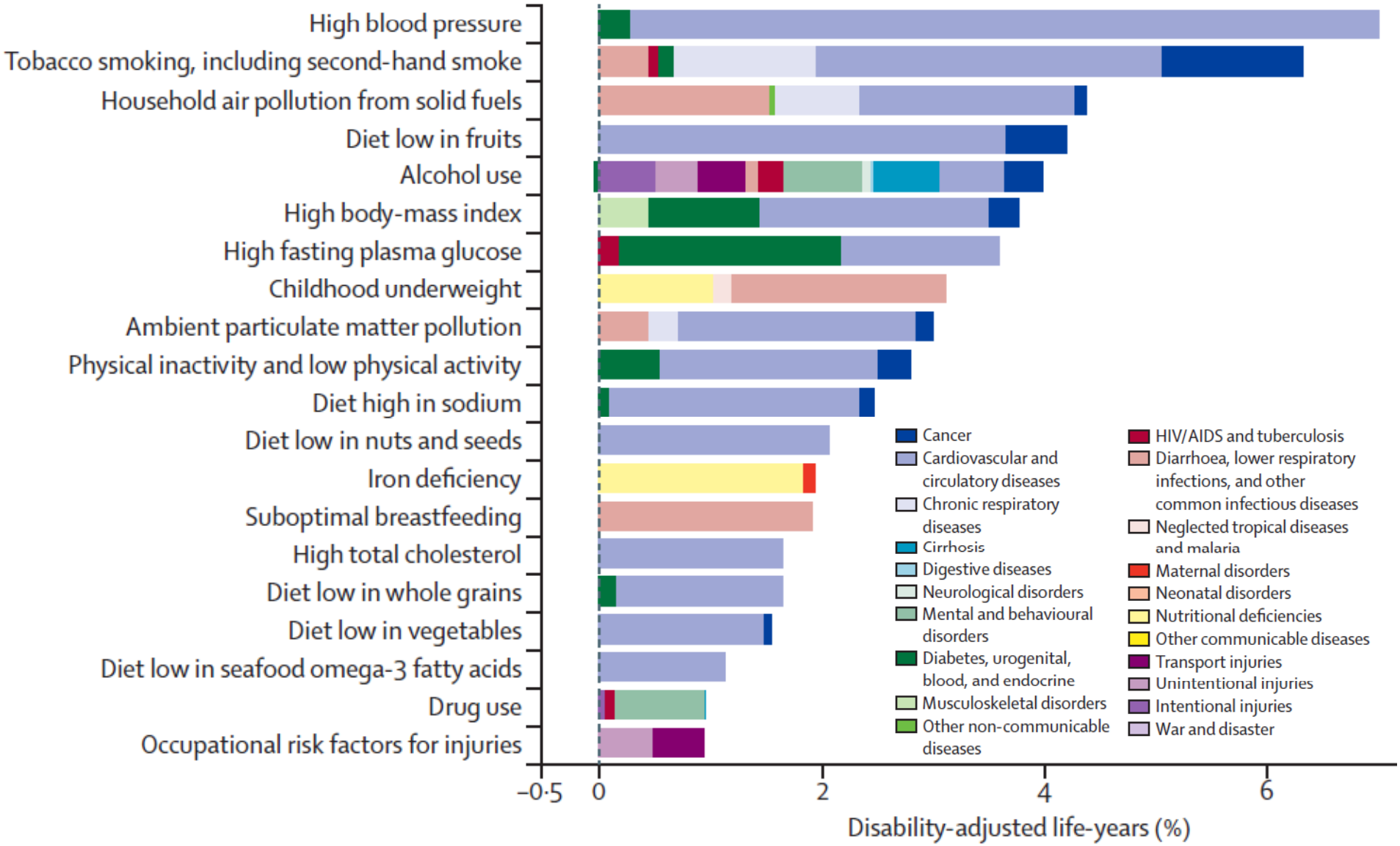
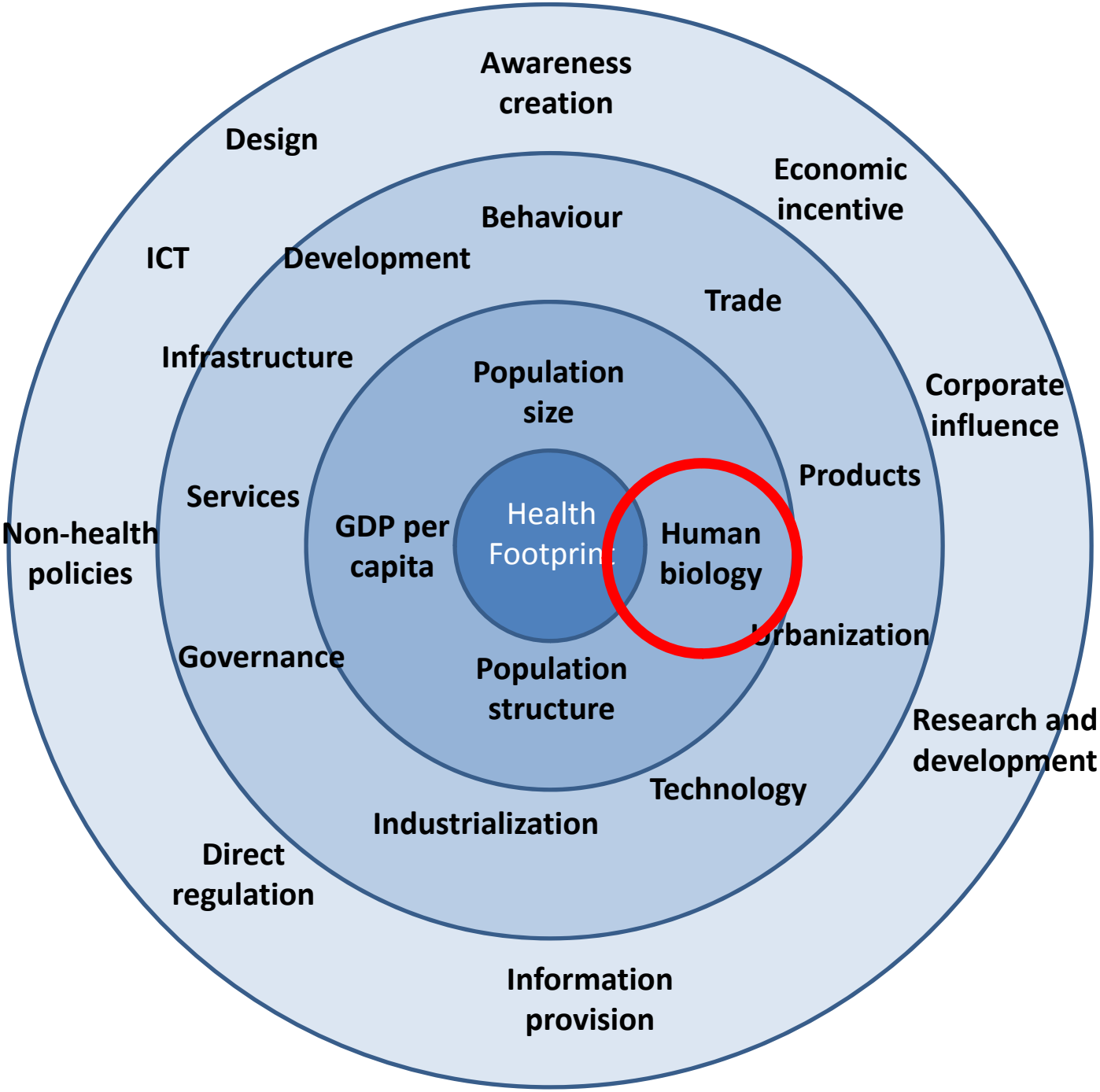
Risk factors for disability adjusted life years, world, 2010



Source: Lim et al 2012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Human evolution would suggest that we are

“active and functional”

in relation to the drugs that we take, including alcohol and nicotine, rather than being

“passive and vulnerable”

1. Co-evolution with nicotine, a plant toxin
2. Functional use of alcohol, as part of a fruit-eating diet

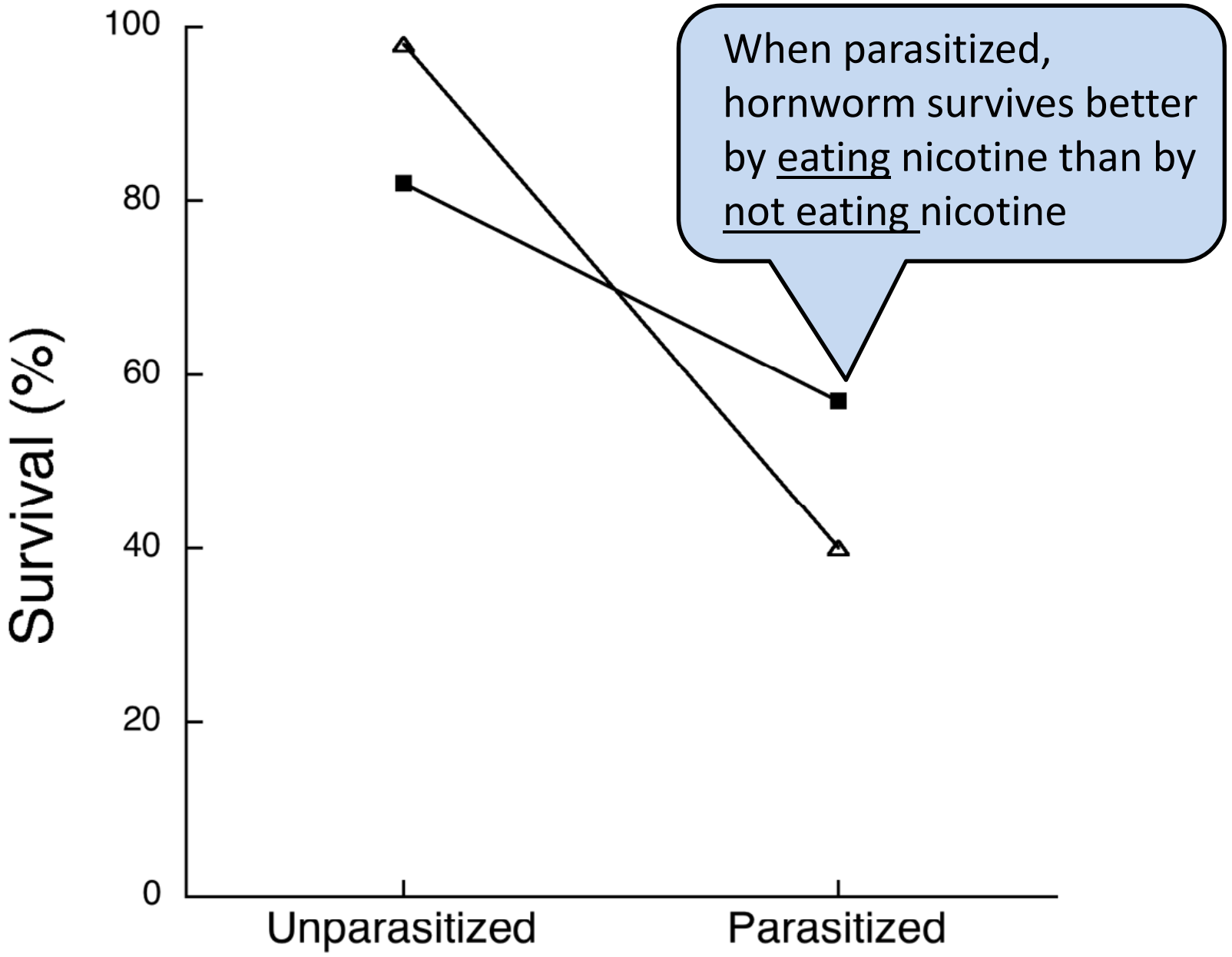
In the story of life over the last 400 million years, one of the main plot lines has been the battle between plants, and the animals that eat them.

Of many defense mechanisms, plants produce secondary metabolites, including nicotine, morphine, and cocaine, potent neurotoxins that evolved because they punished and deterred consumption by plant-eating animals

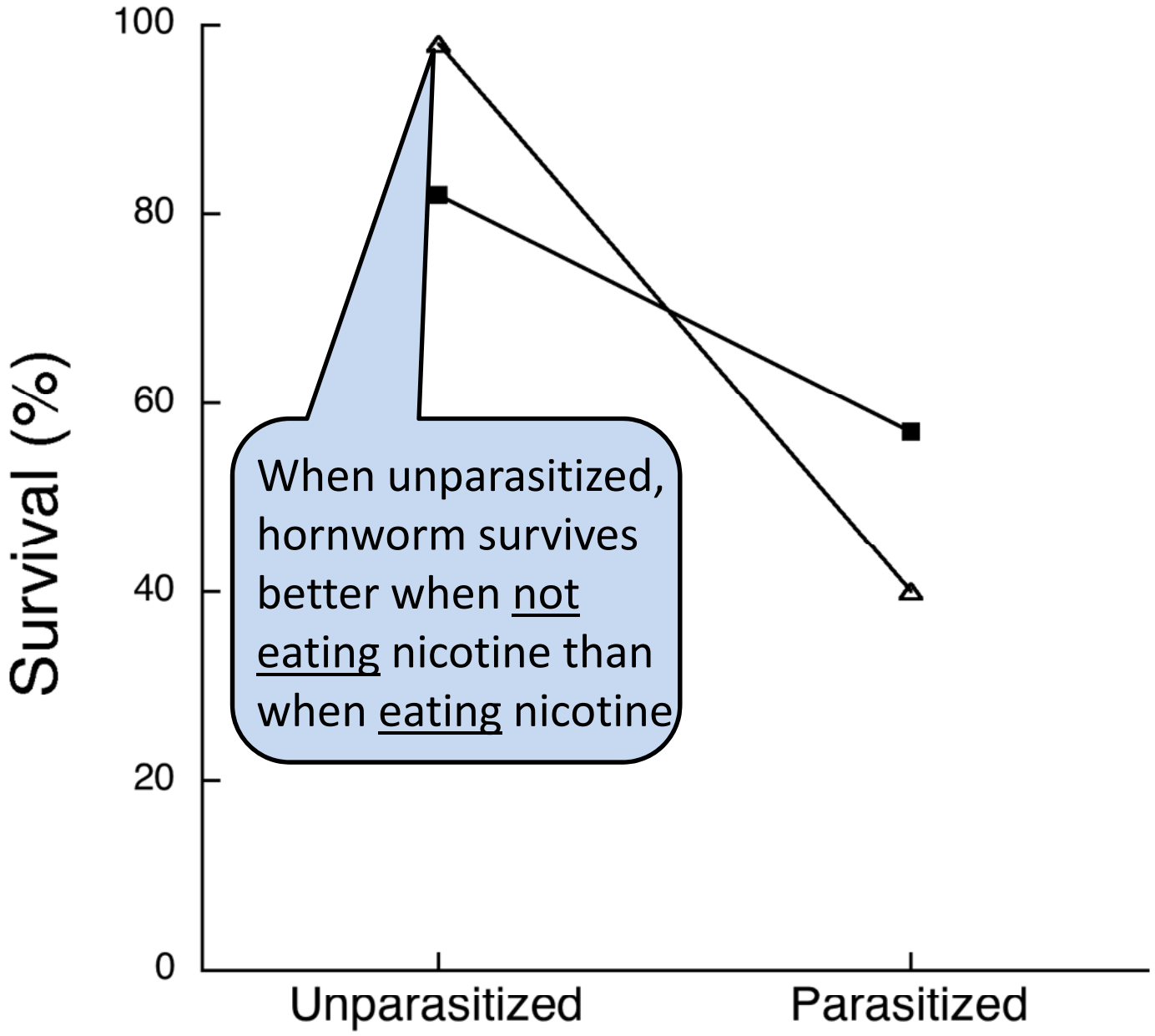
Source: Sullivan & Hagen 2014

To inhibit and kill their own parasites, animals have evolved to counter-exploit the products of hundreds of millions of years of "research' by plants by subsisting on a mixed diet of palatable and toxic plants, trading off diet quality (and thus growth) for what is termed *enemy-reduced* or *enemy-free* space.

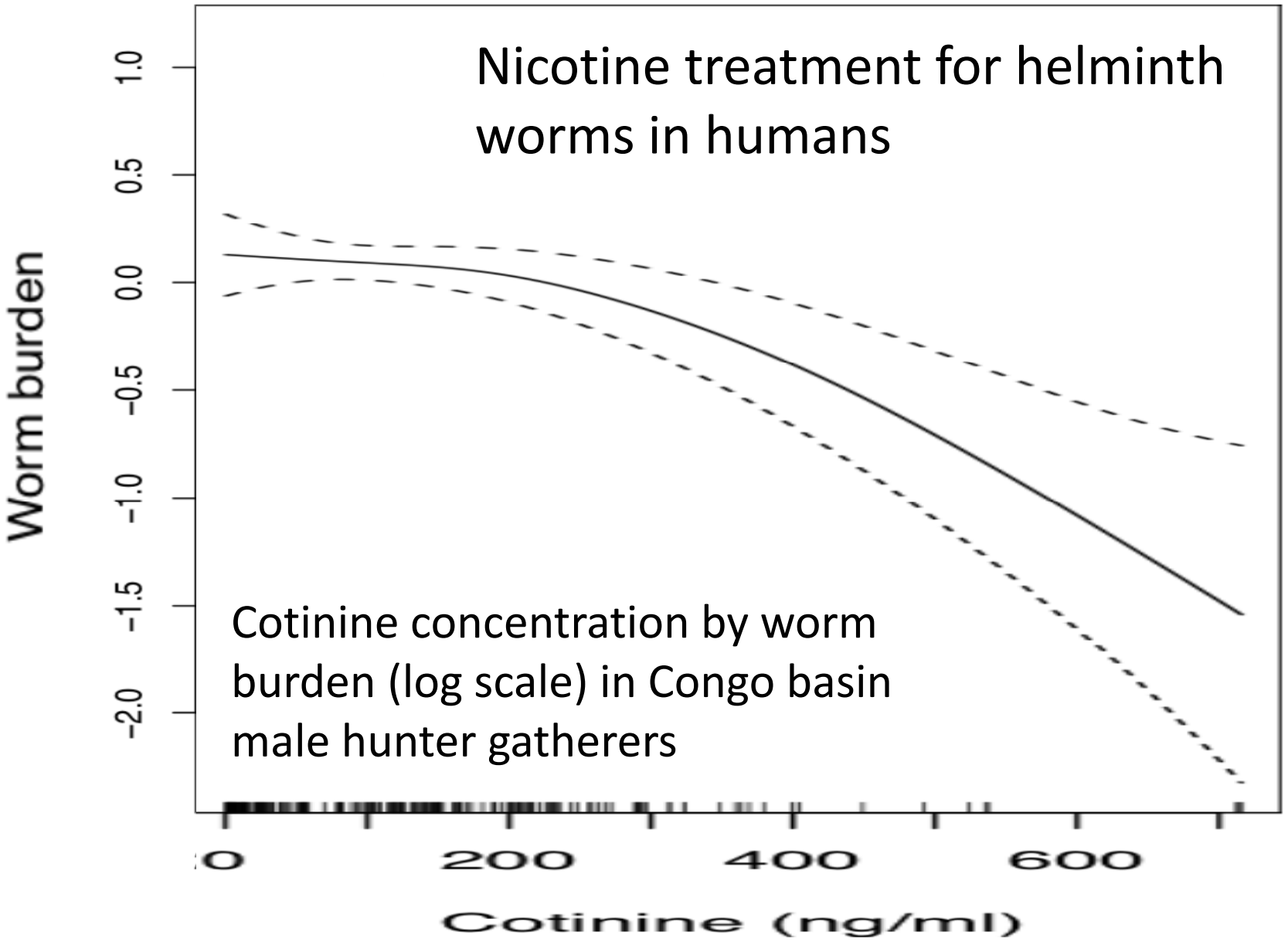
Source: Sullivan & Hagen 2014



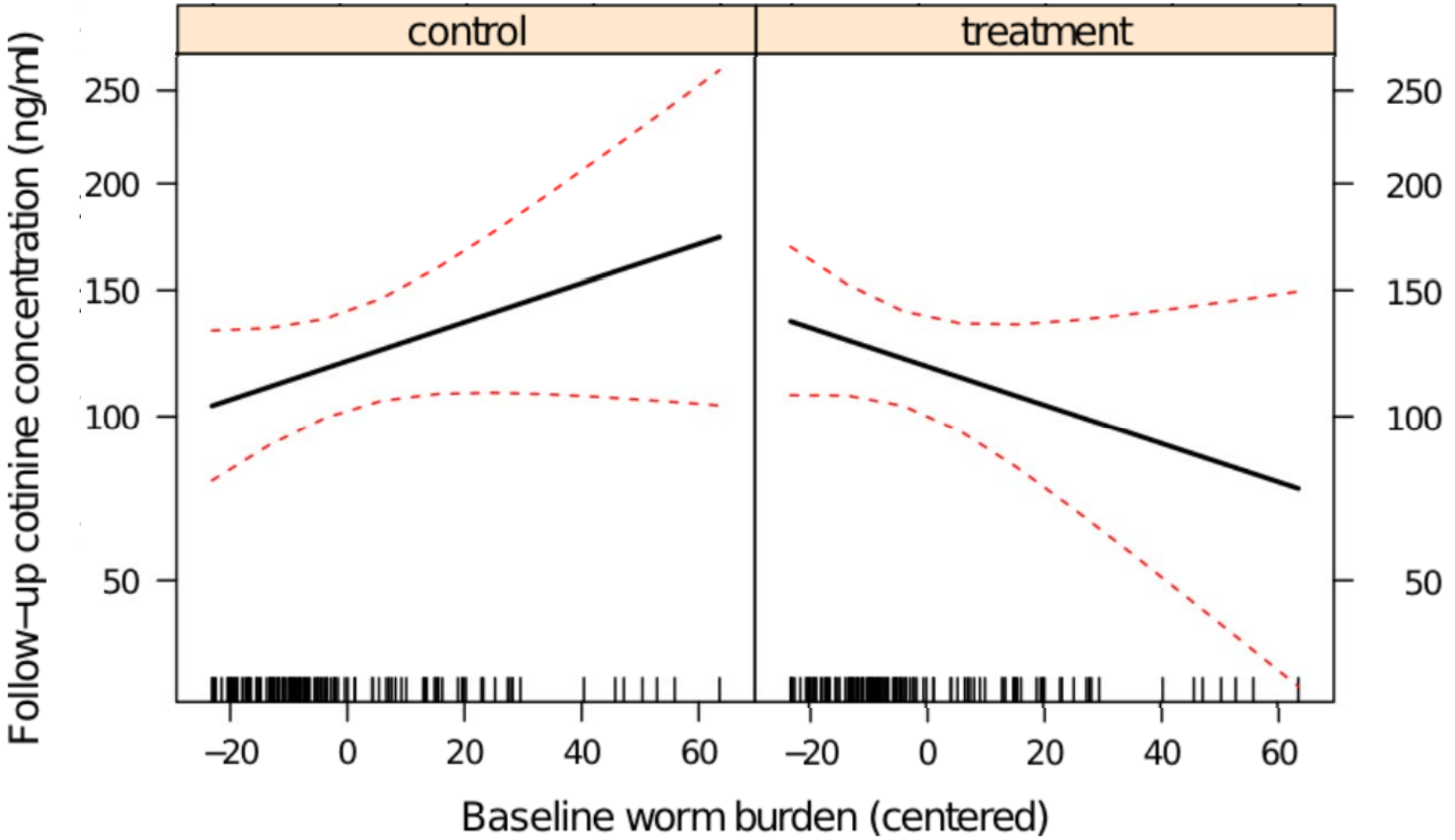
Source: Singer et al. 2009



Source: Singer et al. 2009

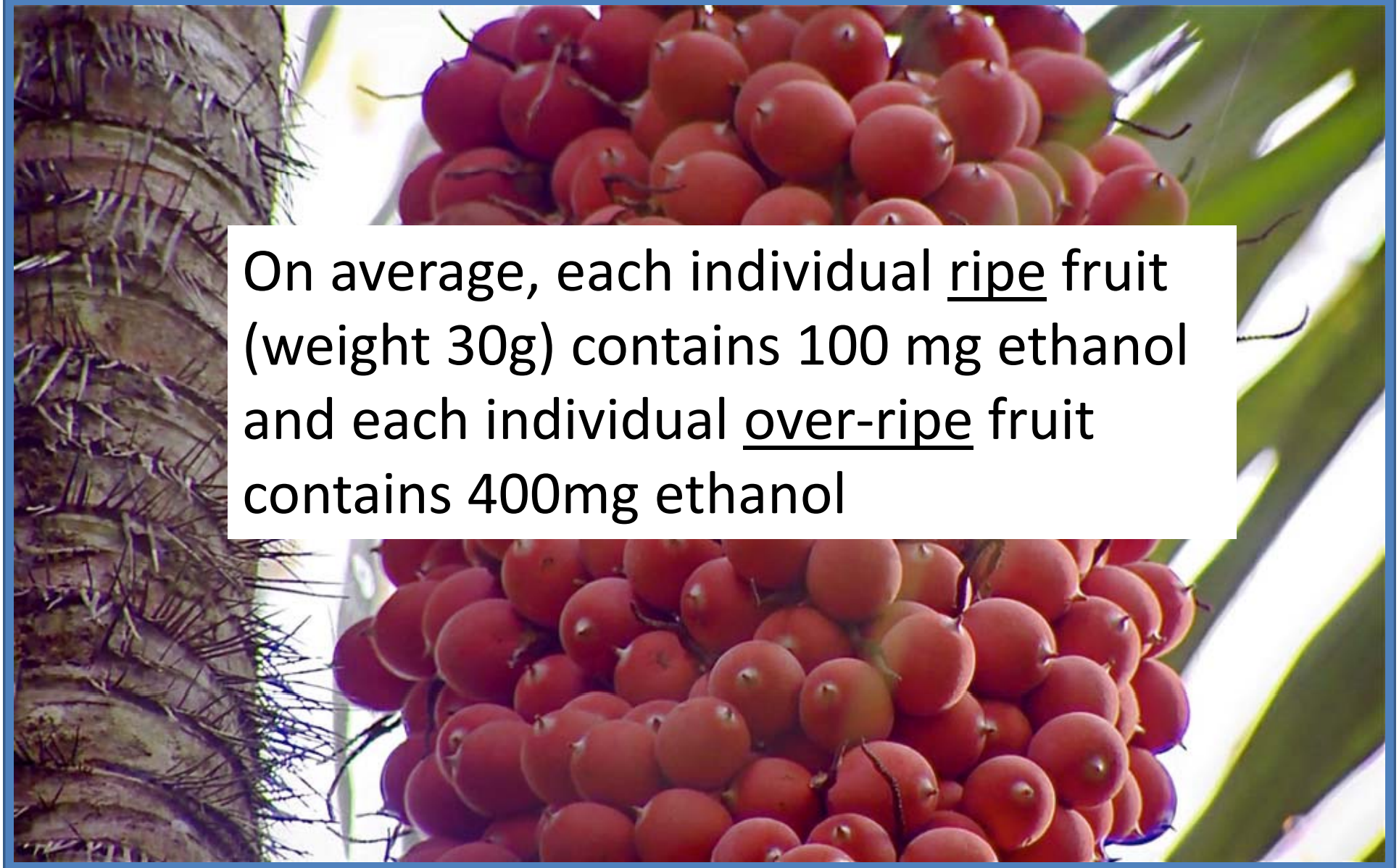


Source: Roulette et al. 2014



Impact of albendazole on cotinine concentration by baseline worm burden in Congo basin male hunter gatherers

Source: Roulette et al. 2014



On average, each individual ripe fruit (weight 30g) contains 100 mg ethanol and each individual over-ripe fruit contains 400mg ethanol

Source: Dudley 2004

- The presence of ethanol within ripe fruit suggests low-level but chronic dietary exposure for all fruit-eating animals.
- Volatilized alcohols from fruit could potentially serve in olfactory localization of nutritional resources

Source: Dudley 2014

- Primate ancestors living 16-21 million years ago could not effectively metabolize consumed ethanol.
- However, by 6-12 million years ago, human's last common ancestor with gorillas and chimpanzees had evolved a digestion fully capable of metabolizing consumed ethanol, at levels found in fermenting fruits.

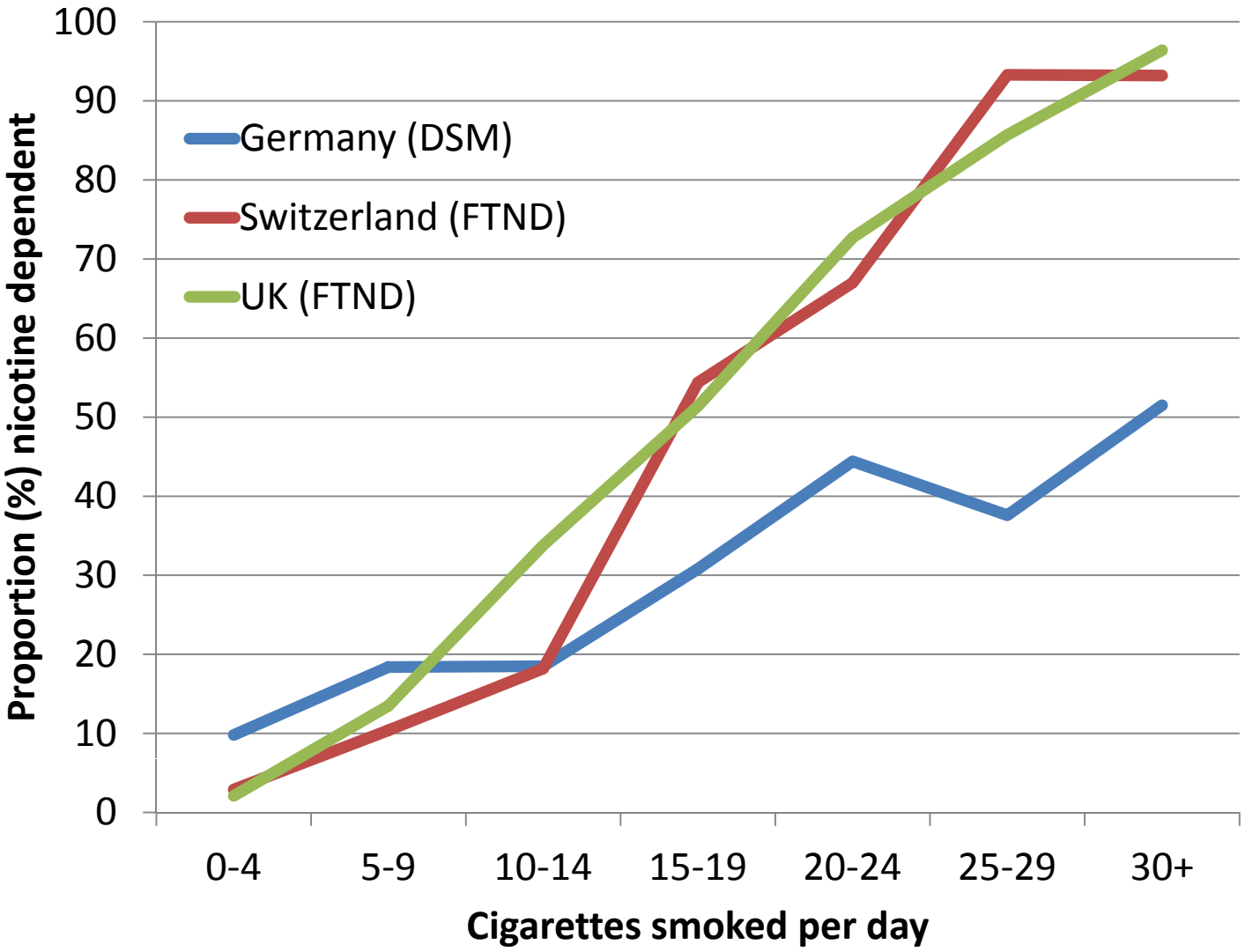
Source: Benner 2013

Thus, human evolution would suggest that we are

“active and functional”

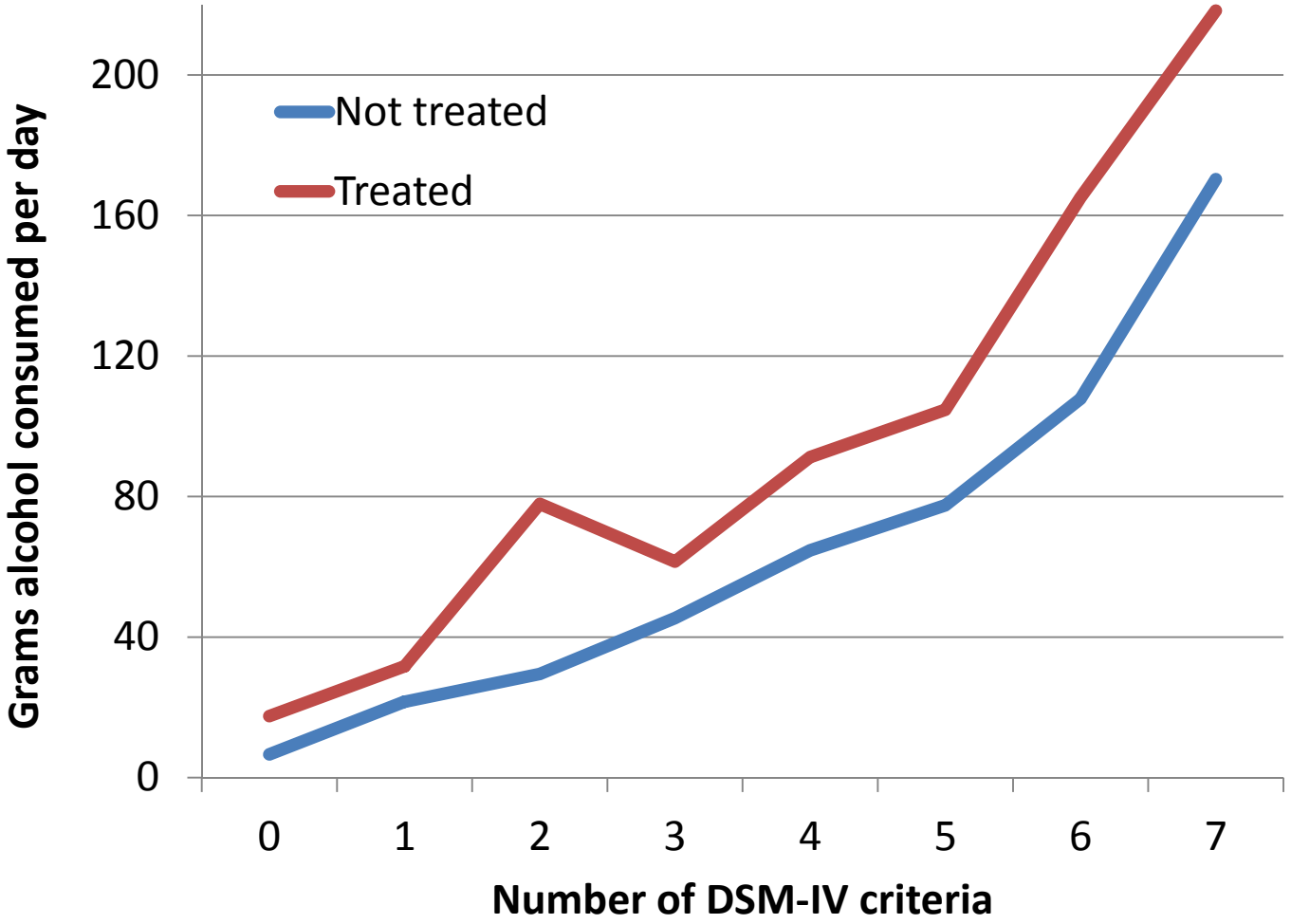
in relation to the drugs that we take, including alcohol and nicotine

“Active and Functional” speak to **potency**, **quantity** and **availability** (economic and physical) as being primary drivers of drug use and related harm.



Proportion (%) nicotine dependent persons by number of cigarettes smoked per day

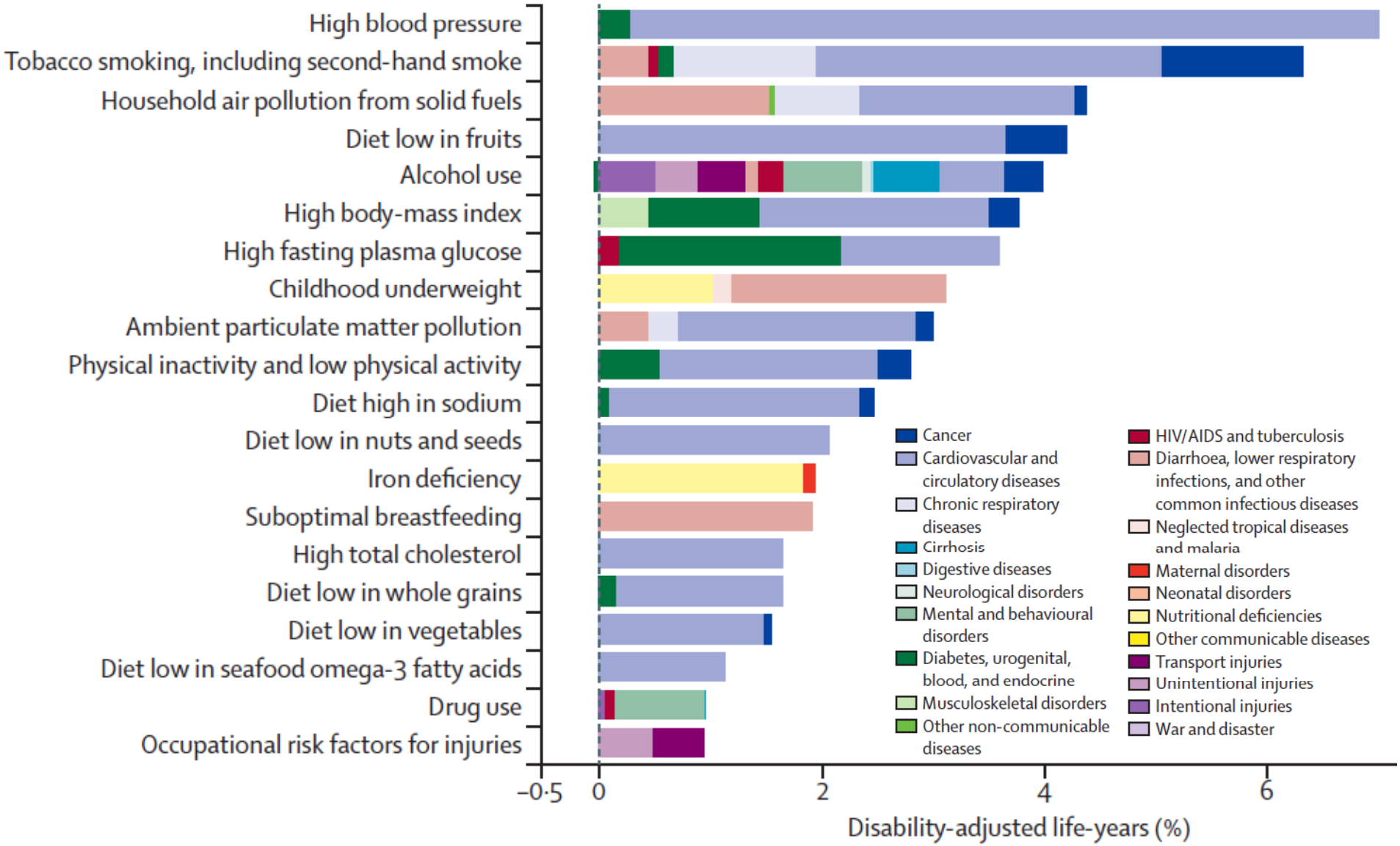
Source: Rehm et al 2013



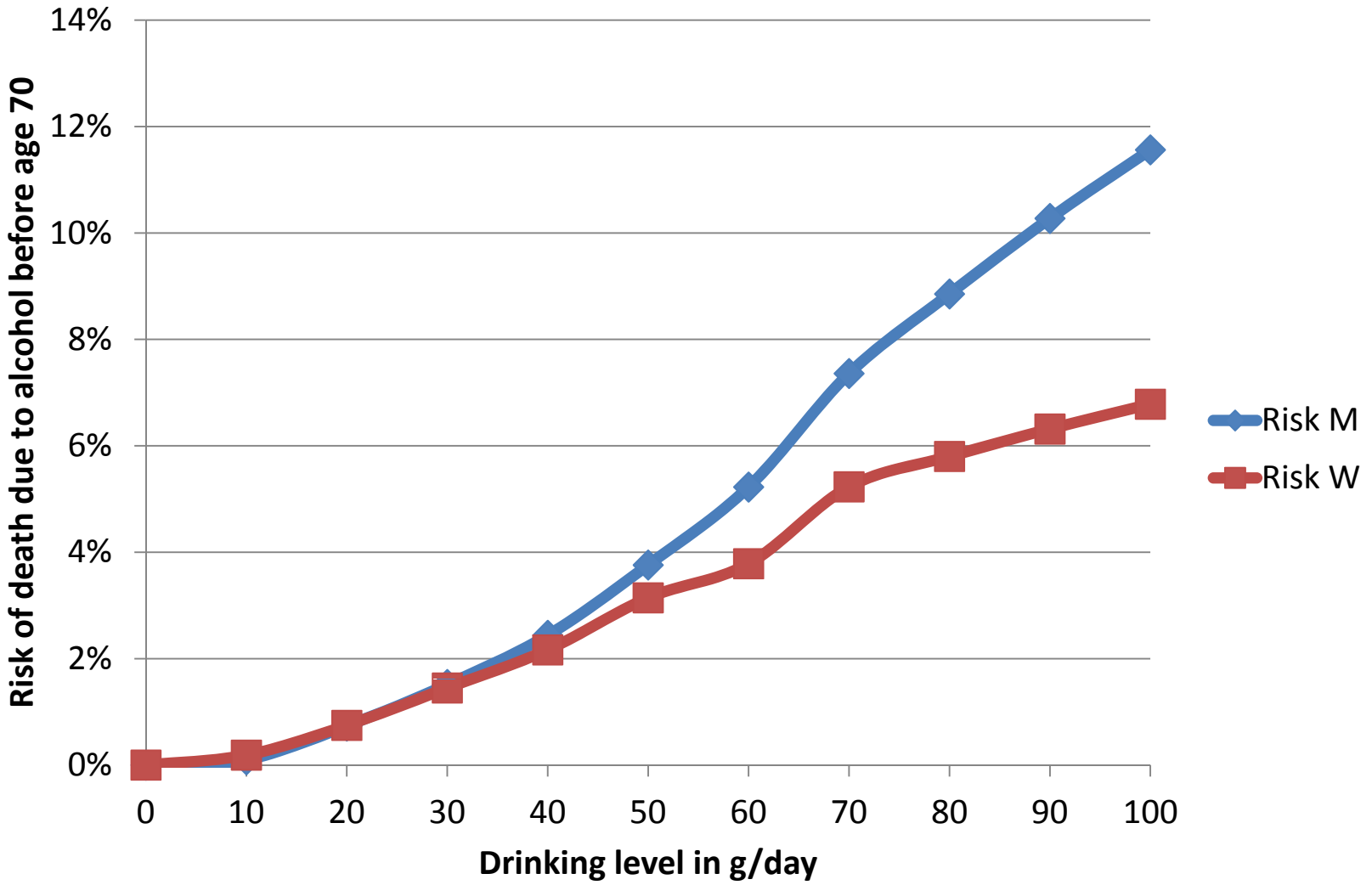
Number of DSM-IV criteria for alcohol dependence by grams alcohol per day (NESARC data)

Source: Rehm et al 2013

Risk factors for disability adjusted life years, world, 2010



Source: Lim et al 2012

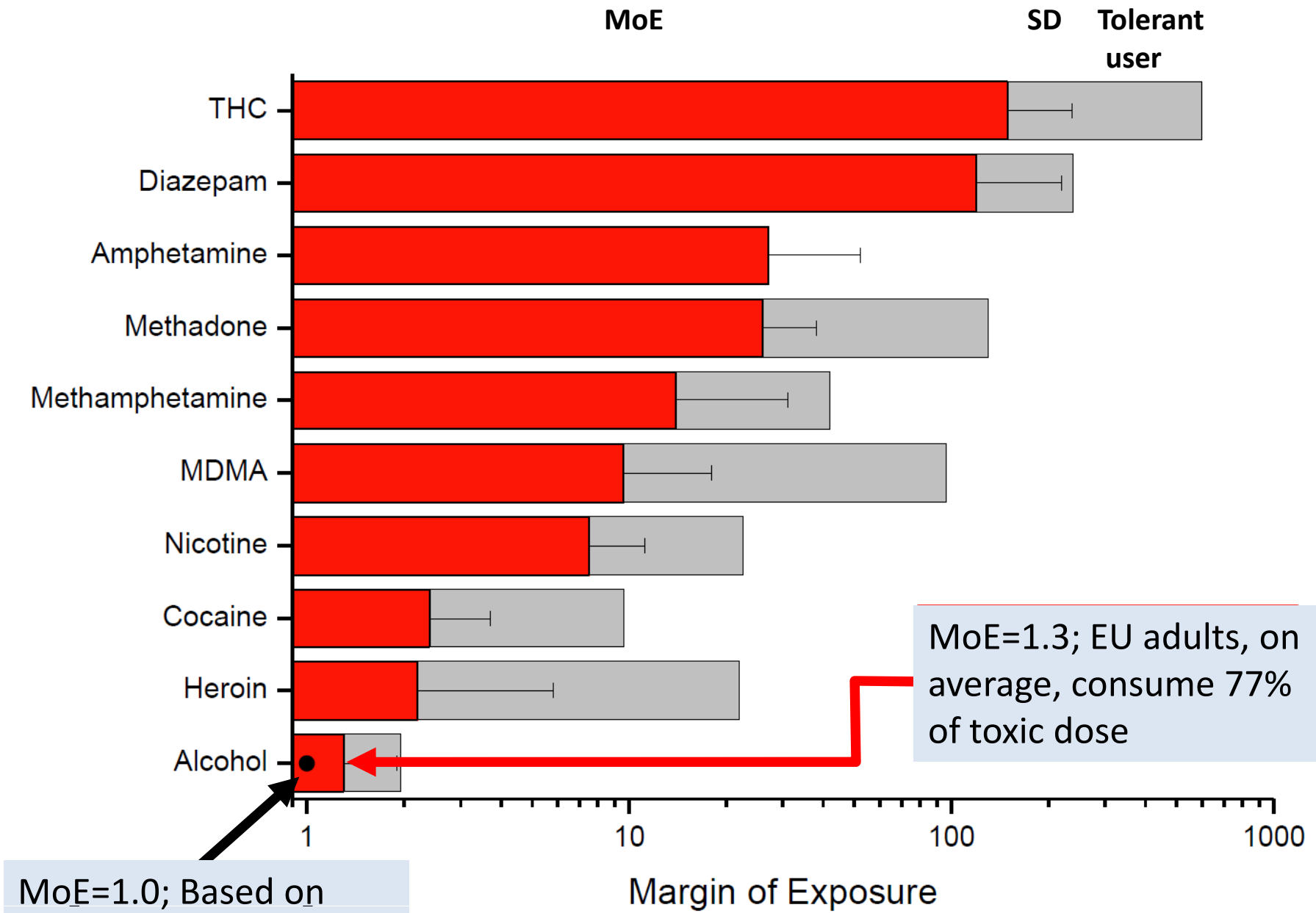


Risk of dying prematurely (up to age 70) due to alcohol consumption in European Union

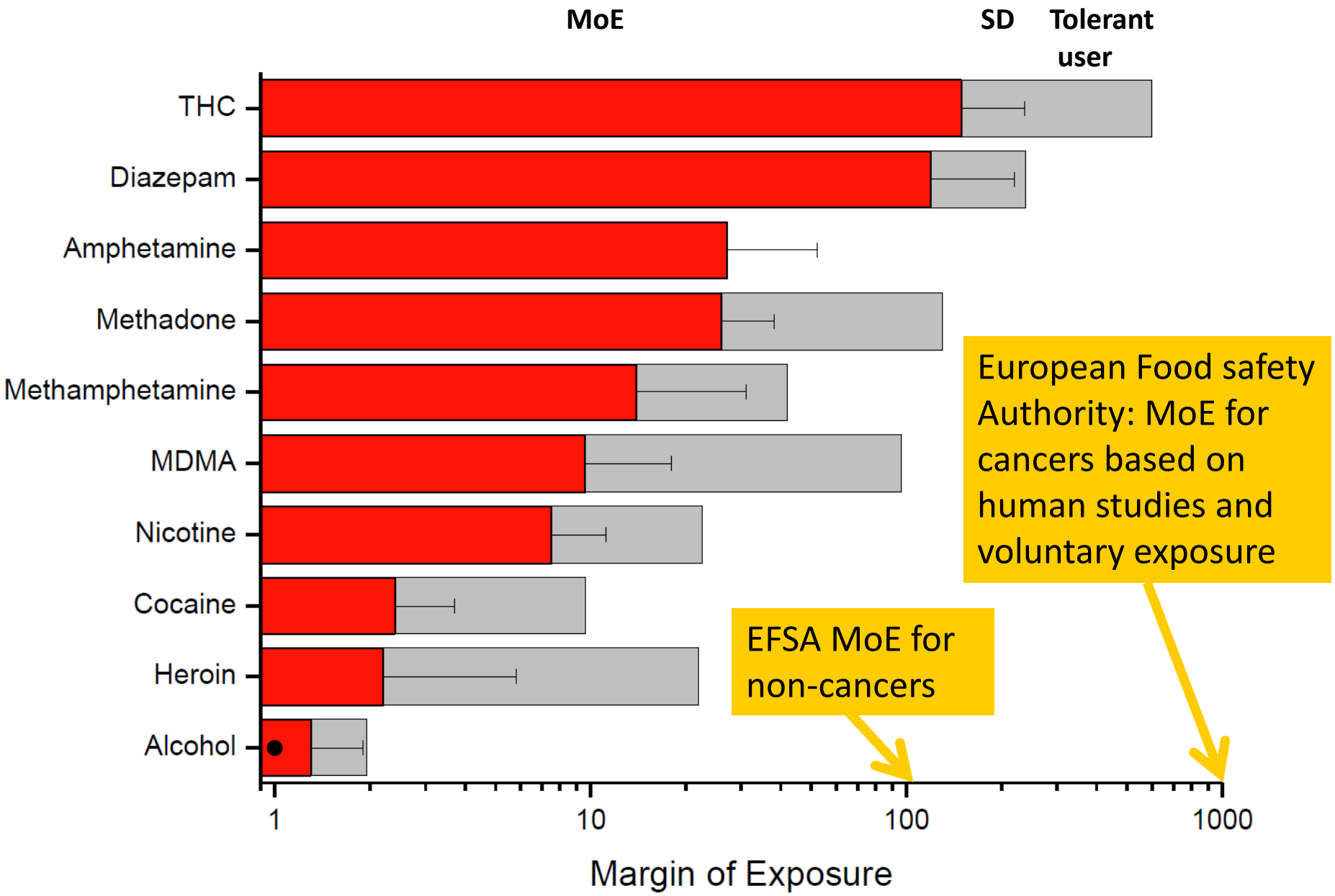
Source: Rehm et al. 2014

Margin of Exposure analysis compares the ratio of a toxic dose with the dose consumed. The toxic dose can be defined as the dose in animals that increases death rates by 10%.

MoE=1: consuming toxic dose
MoE=100: consuming $1/100^{th}$ toxic dose



Source: Lachenmeier & Rehm 2014



Source: Lachenmeier & Rehm 2014

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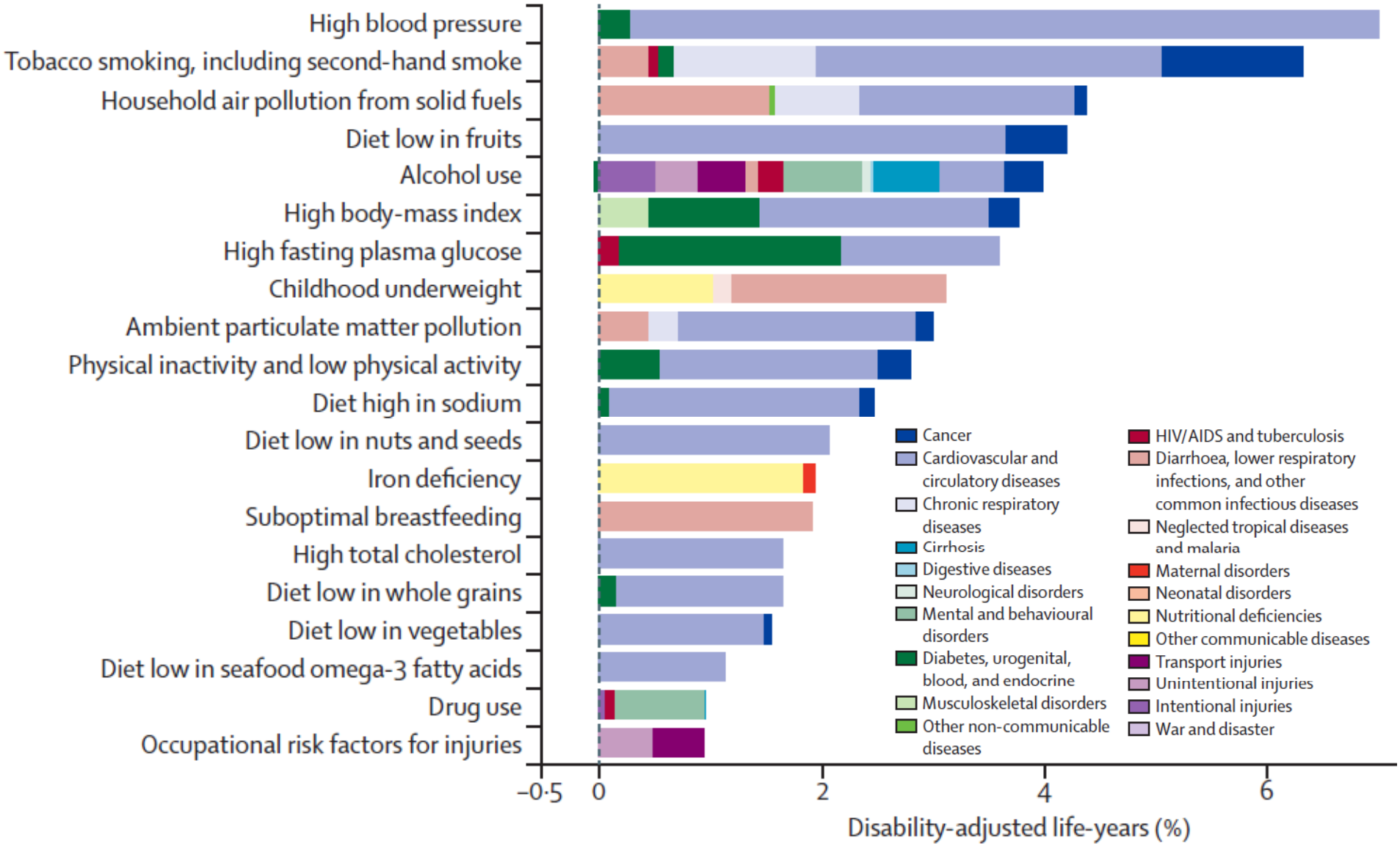
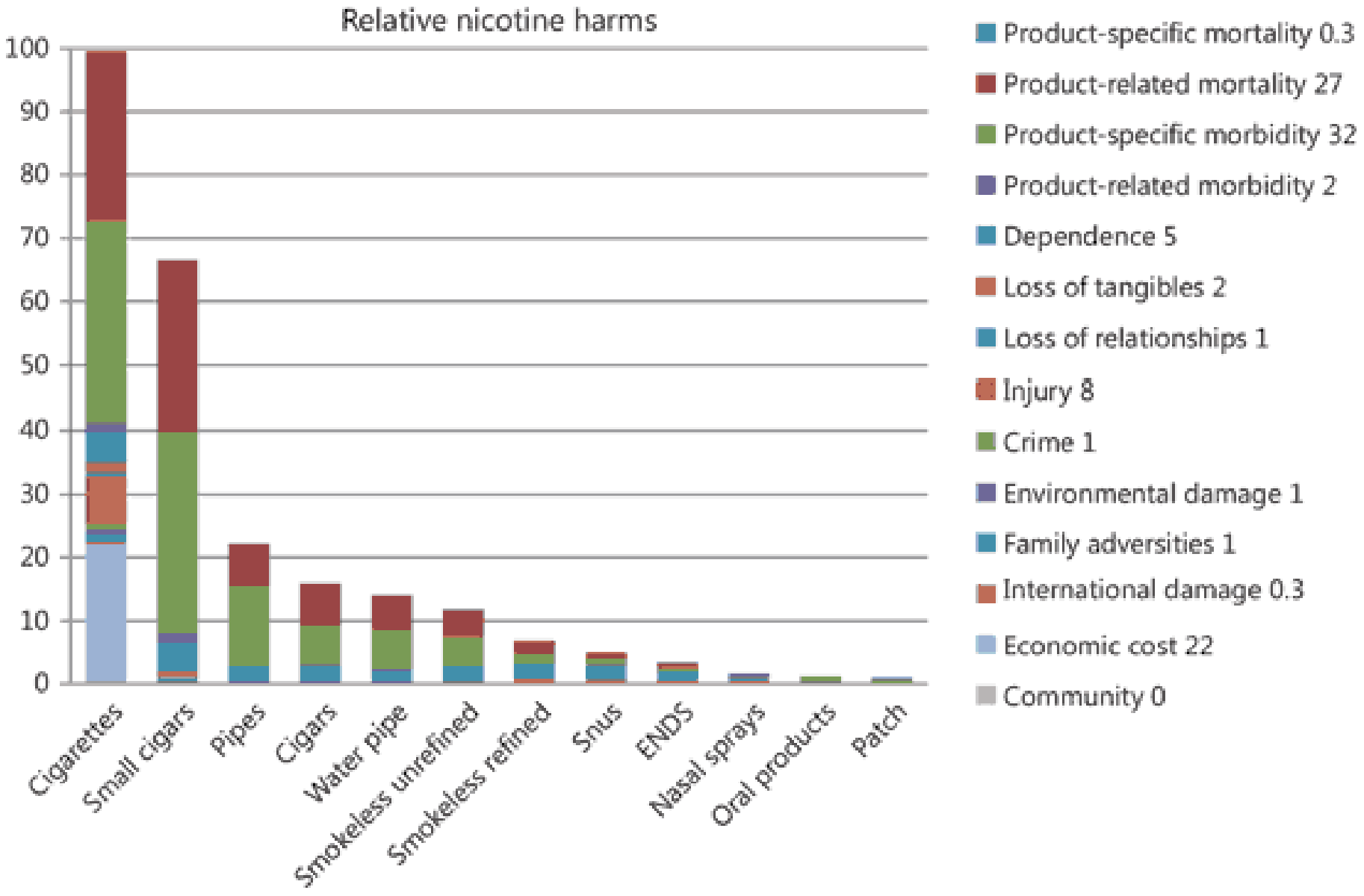
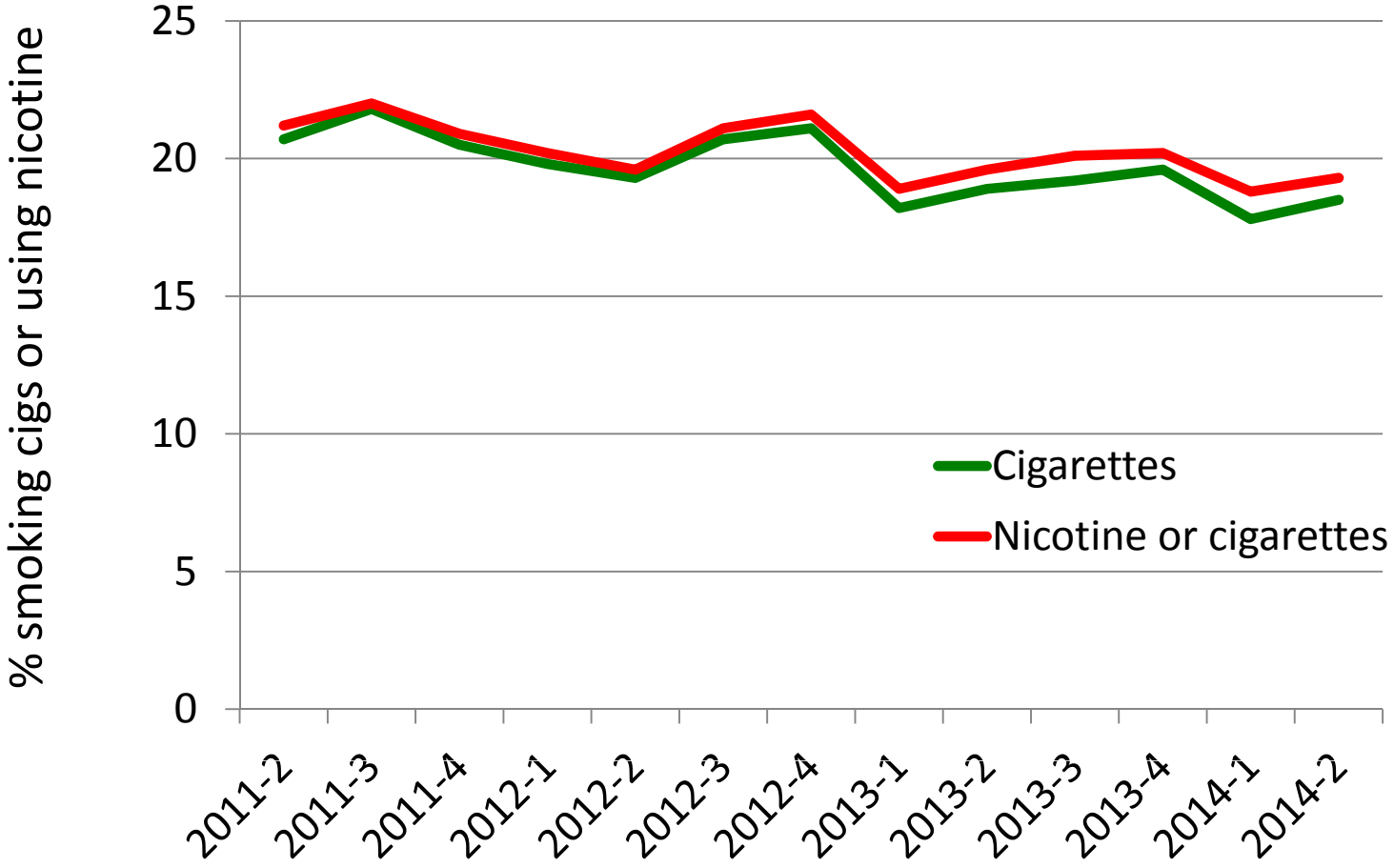


Source: Lim et al 2012



Source: Nutt et al 2014

Prevalence of nicotine/cigarette use in UK

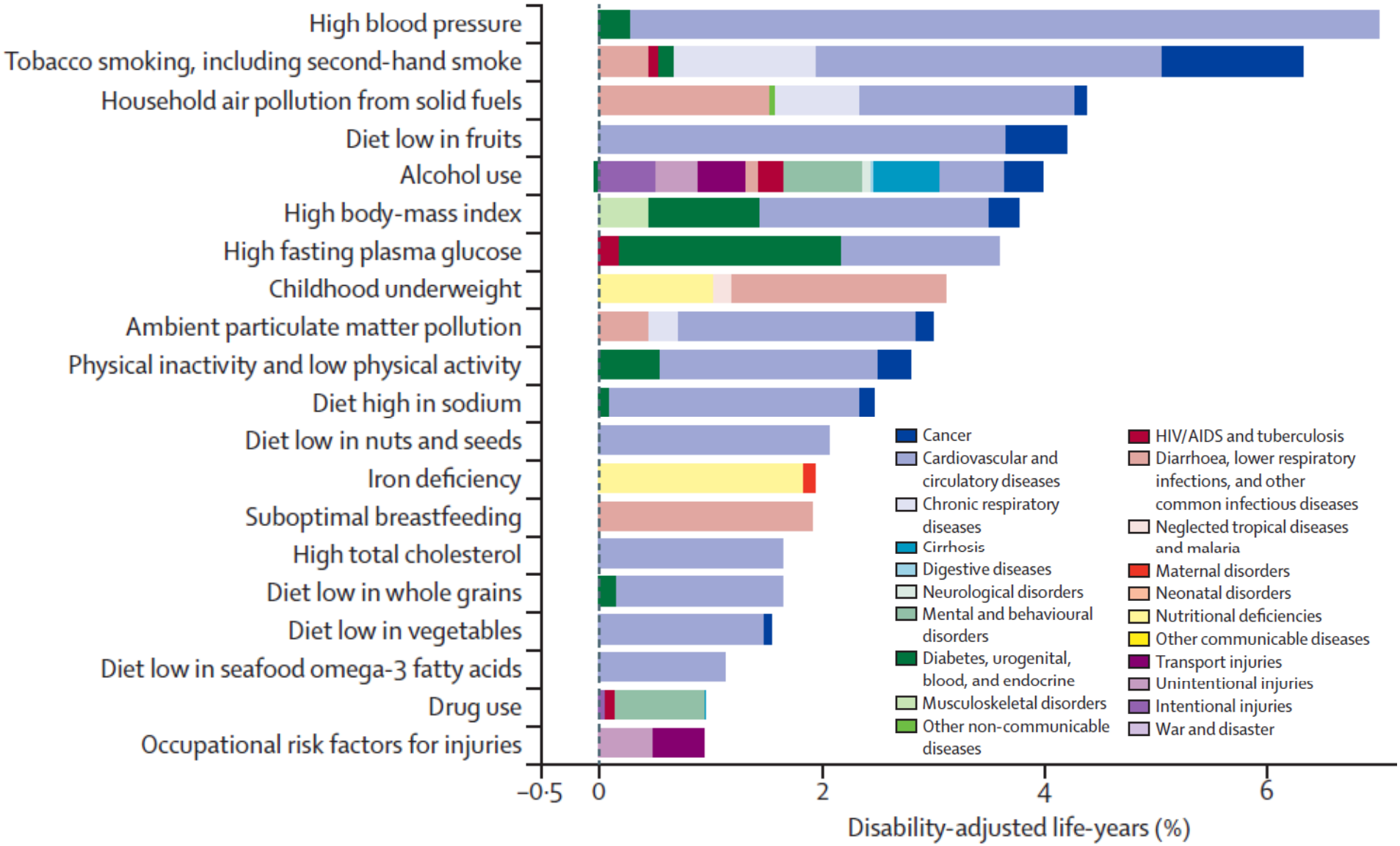


Source: West et al. 2014

“For every million smokers who switched to an e-cigarette we could expect a reduction of more than 6000 premature deaths in the UK each year”

Source: West & Browne 2014

Risk factors for disability adjusted life years, world, 2010



Source: Lim et al 2012

SALT

Recommended salt daily intake

Sodium intake RANGES from:

1500 mg sodium day (IOM)

2000 mg sodium day (WHO)

2300 mg sodium day (USA Government)

Salt intake:

2000 mg sodium = **5 gr salt** or **1 teaspoon**

http://www.who.int/mediacentre/news/notes/2013/salt_potassium_20130131/en/

Any one of these reach your daily limit

Arby's Mozarella Sticks:
3 sticks=1200mg sodium

Soy Sauce:
1 1/3 tbs=1200mg sodium

Chipotle Carnitas Burrito:
2/5 burrito=1200mg sodium

McDonald's Cheeseburger:
1 3/5 burger=1200mg sodium

Ramen Noodles:
3/4 package=1200mg sodium

Chicken Breast:
3 pieces=1200mg sodium

Cottage Cheese:
1 cup=1200mg sodium

Cereal:
5 1/5 cups=1200mg sodium

Ketchup:
7 4/5 tbs =1200mg sodium

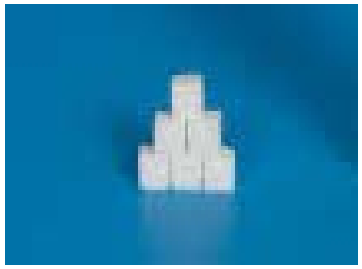
SUGAR

Recommended sugar daily intake: many disagreements

- At least 10% of daily calorie intake = 50 gr of sugar a day (for adult of normal weight)

- Better if 5% of daily calorie intake = 25 gr sugar a day (for adult of normal weight)

or

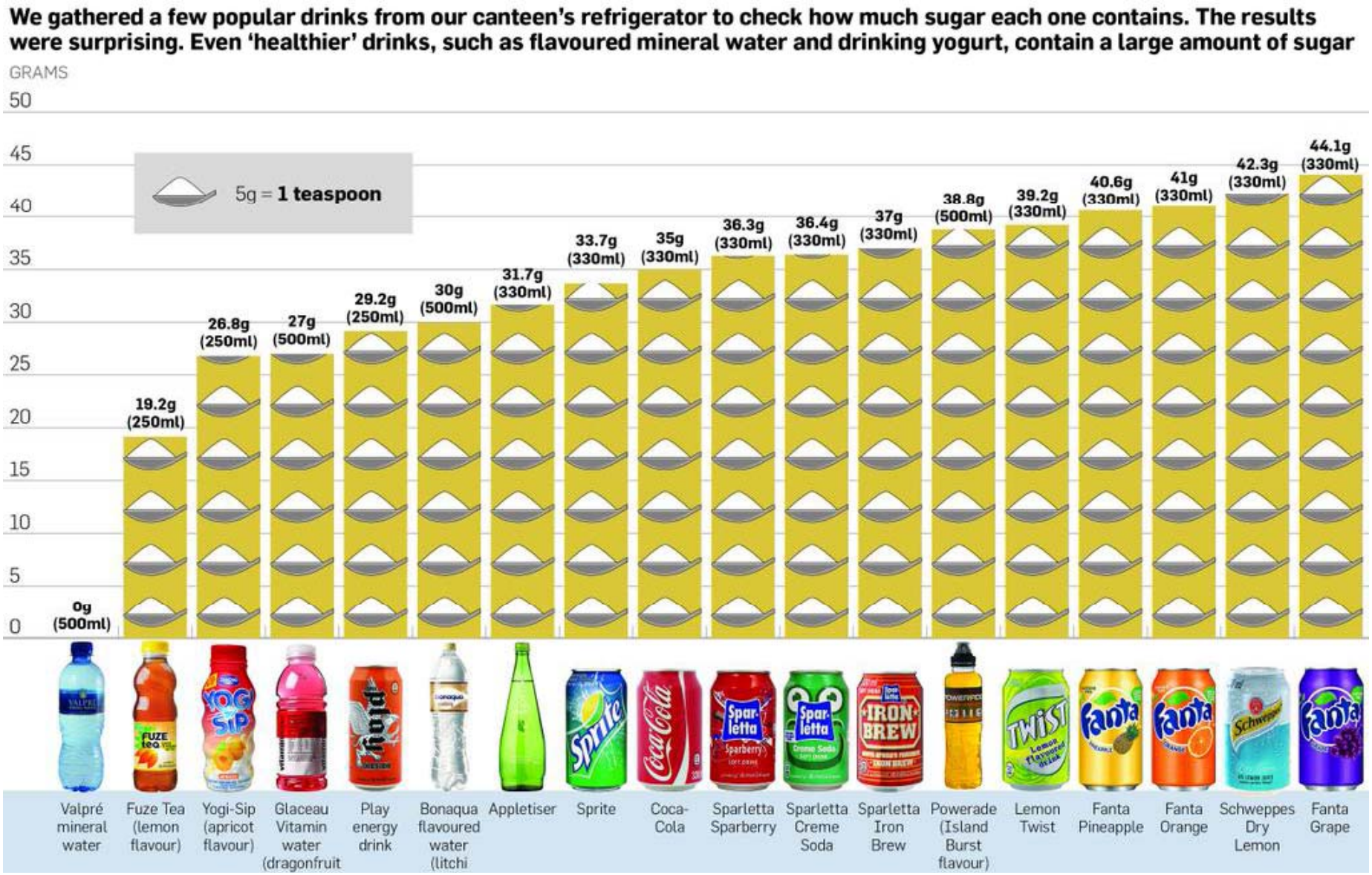


Upper limit:
= 12 sugar cubes
= 12 teaspoons

IDEAL RECOMMENDED limit:
= 6 sugar cubes
= 6 teaspoons sugar

Source: (WHO guidelines)

Most sugary drinks exceed daily recommendation



Other comparisons to the 6 cubes daily recommendation

Fruit and Vegetables:

5 a day

What is 5 a day?

Tomatoes

1 medium tomato

Oranges

1 orange

Bananas

1 medium banana

Strawberries

7 strawberries

Asparagus

5 spears

Avocado

Half an avocado

Peppers

Half a pepper

Kiwis

2 Kiwis

POTATOES

Though a vegetable and rich

SWEETCORN

Three heaped tbsp of kernels or 1 cob.

PEAS

Three heaped tablespoons. Frozen

ONION

One medium (or half a large) onion. It contains

LETTUCE

A cereal bowlful. Iceberg is least

CABBAGE

Four heaped (cooked) tablespoons. It

PEPPERS

Half a pepper. Green is lowest in calories (and

SPINACH

A bowl of fresh, or four discs of frozen. Forms

PARSNIP

One large parsnip. The vitamin C in them

KIDNEY BEANS

Three heaped tablespoons. No

OLIVES

Thirty olives. Although

LEEKS

One leek (white

CAULIFLOWER

Quarter of a cauliflower.

WATERCRESS

One x 75g pack.

GREEN BEANS

Four tablespoons. Frozen beans (27p per

TOMATO

One medium or seven cherry. Fresh tomatoes

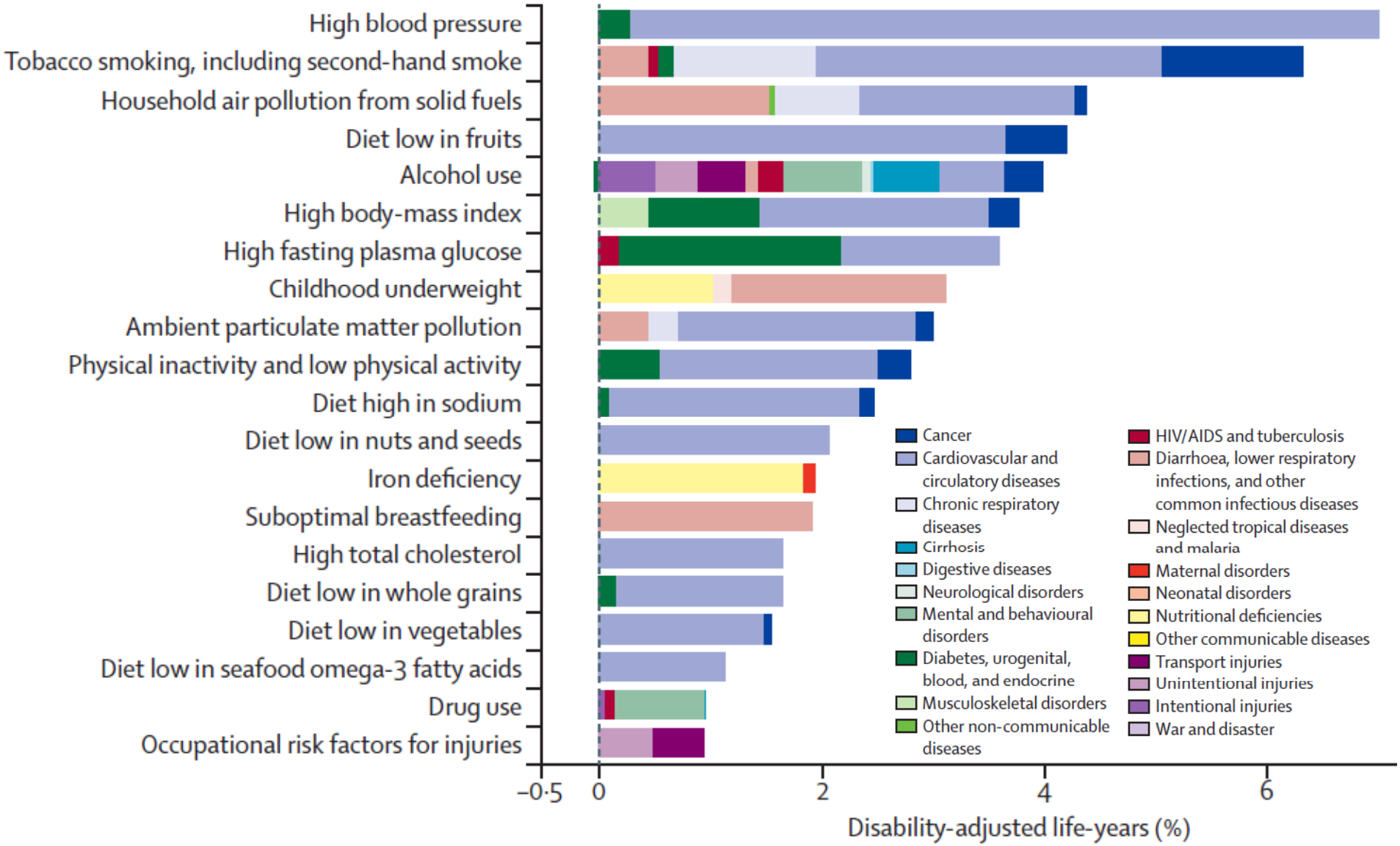
ASPARAGUS

Seven spears. A very good source of

SWEET POTATO

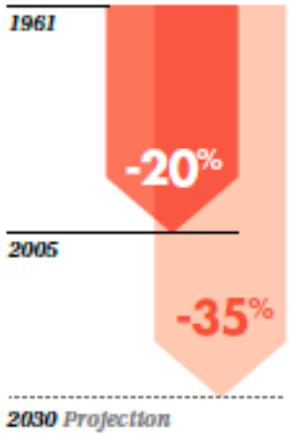
One large potato. Rich in antioxidants, so

Risk factors for disability adjusted life years, world, 2010

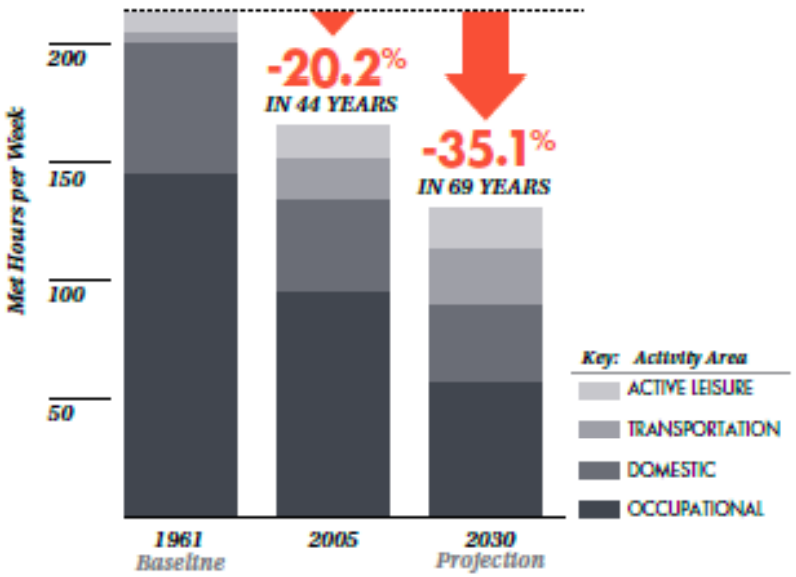


Source: Lim et al 2012

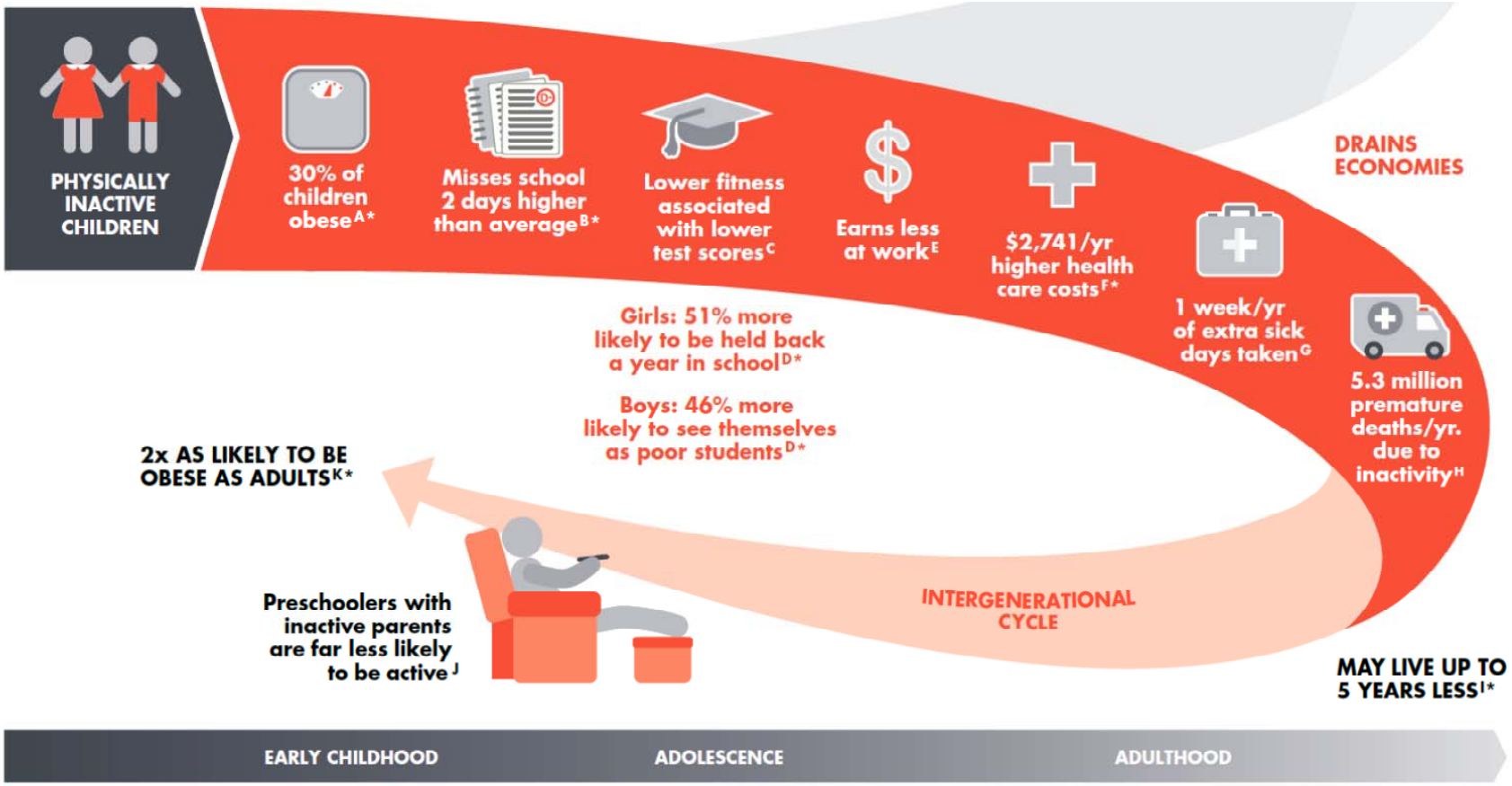
UK



Total Decline in Physical Activity



Decline in Physical Activity by Activity Area


PHYSICALLY INACTIVE CHILDREN
30% of children obese[A]*
Misses school 2 days higher than average[B]*
Lower fitness associated with lower test scores[C]
Earns less at work[E]
$2,741/yr higher health care costs[F]*
1 week/yr of extra sick days taken[G]
5.3 million premature deaths/yr. due to inactivity[H]
DRAINS ECONOMIES
Girls: 51% more likely to be held back a year in school[D]*
Boys: 46% more likely to see themselves as poor students[D]*
2x AS LIKELY TO BE OBESE AS ADULTS[K]*
Preschoolers with inactive parents are far less likely to be active[J]
INTERGENERATIONAL CYCLE
MAY LIVE UP TO 5 YEARS LESS[I]*
EARLY CHILDHOOD
ADOLESCENCE
ADULTHOOD

INTELLECTUAL CAPITAL

IMPROVEMENTS IN:

- Educational attainment
- School engagement
- Processing speed
- Executive function/Inhibition/ Mental flexibility
- Memory
- Academic performance
- Brain structure and function
- Concentration/Attention/Impulse control
- Learning
- ADHD management
- Age-related cognitive decline management

FINANCIAL CAPITAL

IMPROVEMENTS IN:

- Income
- Job success
- Productivity/Job performance
- Morale/Commitment/Turnover

REDUCTION IN:

- Health care costs
- Absenteeism
- Presenteeism

PHYSICAL CAPITAL

IMPROVEMENTS IN:

- General motor skills
- Functional fitness/ Physical appearance
- Cardio respiratory fitness
- Muscular strength
- Adiposity/Body composition
- Lipid profile
- Bone health/ Osteoporosis
- Joint health
- Maternal & infant health
- Rehabilitation & recovery
- Immune system function
- Sleep patterns
- Nutrition/Diet

PREVENTION/ TREATMENT OF:

- Metabolic syndrome/ Type 2 diabetes
- Overall mortality
- Cardiovascular disease
- Coronary heart disease
- Hypertension
- Stroke
- Colon & breast cancer
- Lung, endometrial, ovarian cancers
- Back pain

REDUCTION OF:

- Falls
- Smoking
- Teen pregnancy
- Risky sex
- Drug use
- Addiction
- Suicide

SOCIAL CAPITAL

IMPROVEMENTS IN:

- Social norms
- Social network/ Positive relationships
- Social status/Social commitment
- Social inclusion & acceptance
- Trust/Teamwork/Collaboration
- Civic participation
- Gender equality
- Equity for persons with disabilities
- Crime, juvenile delinquency & gang participation reduction
- Community cohesion
- Peace/Understanding/Recovery
- Bridging differences (socio economic status, racial, ethnic, disability, religious, sexual)
- Safety & support

INDIVIDUAL CAPITAL

IMPROVEMENTS IN:

- Activity knowledge and skills
- Social skills/Life skills/ Non-cognitive skills
- Sportsmanship
- Time management
- Goal setting
- Initiative/Leadership
- Honesty/Integrity/Respect/ Responsibility
- Enthusiasm/Intrinsic motivation
- Commitment/Self discipline/ Self control/Persistence
- Assertiveness & courage

EMOTIONAL CAPITAL

IMPROVEMENTS IN:

- Fun, enjoyment, satisfaction
- Feeling good
- Self esteem
- Self efficacy
- Body image
- Intrinsic motivation for physical activity
- Mood

PREVENTION/TREATMENT OF:

- Stress
- Depression
- Anxiety

Nike, Inc. initiated a multidisciplinary input and validation process with a pool of experts to develop this model, which is informed by more than 500 pieces of published research. The scholarly foundation for this work is further elucidated in Bailey, R., Hillman, C., Arent, S. & Petitpas, A. (2013). "Physical Activity: An Underestimated Investment in Human Capital?" Journal of Physical Activity and Health, 10, 289-308.

Guidelines for adults aged 19-64

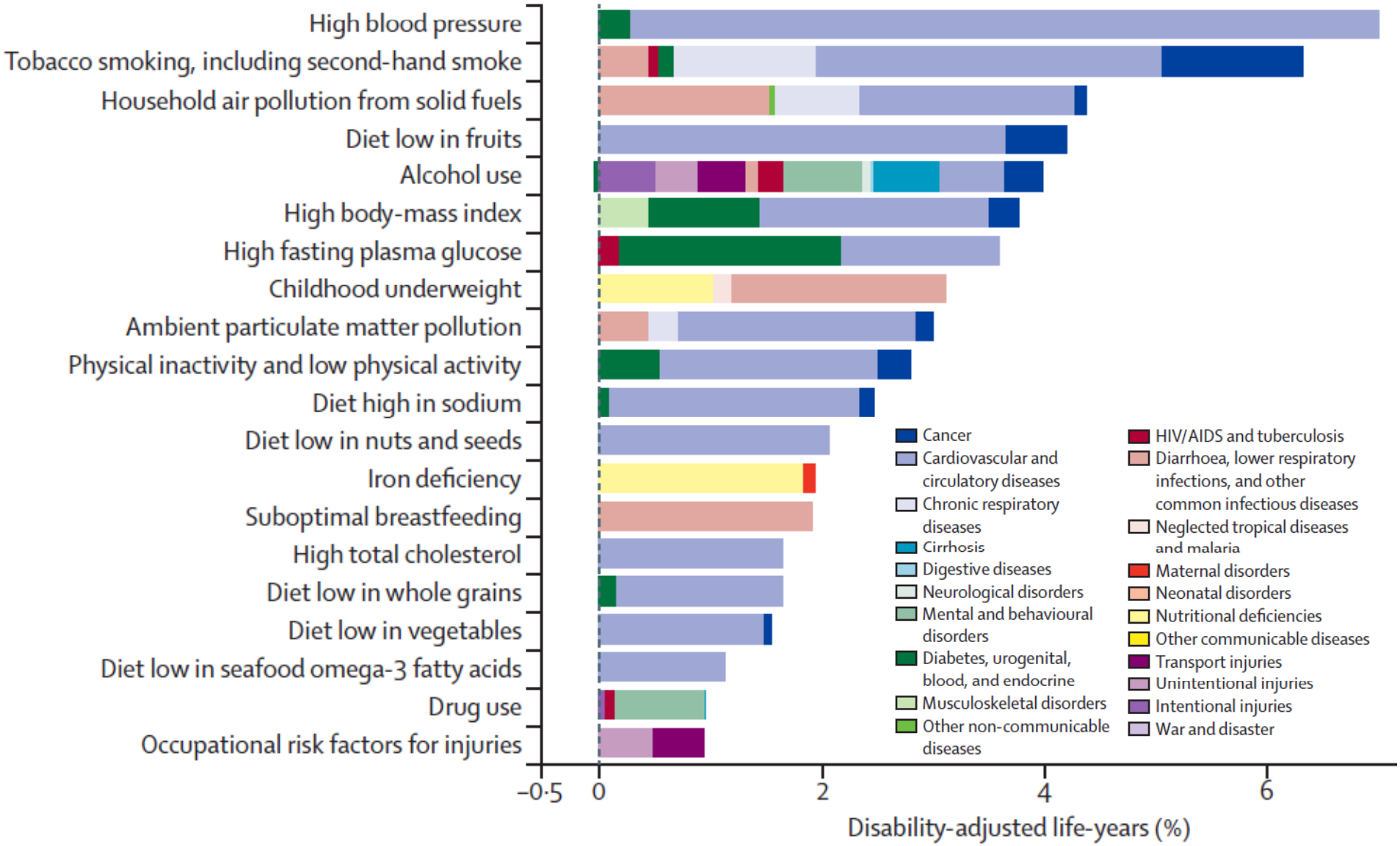
To stay healthy, adults aged 19-64 should try to be active daily and should do:

- At least 150 minutes (2 hours and 30 minutes) of moderate-intensity aerobic activity such as cycling or fast walking every week, **and**
- muscle-strengthening activities on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms).

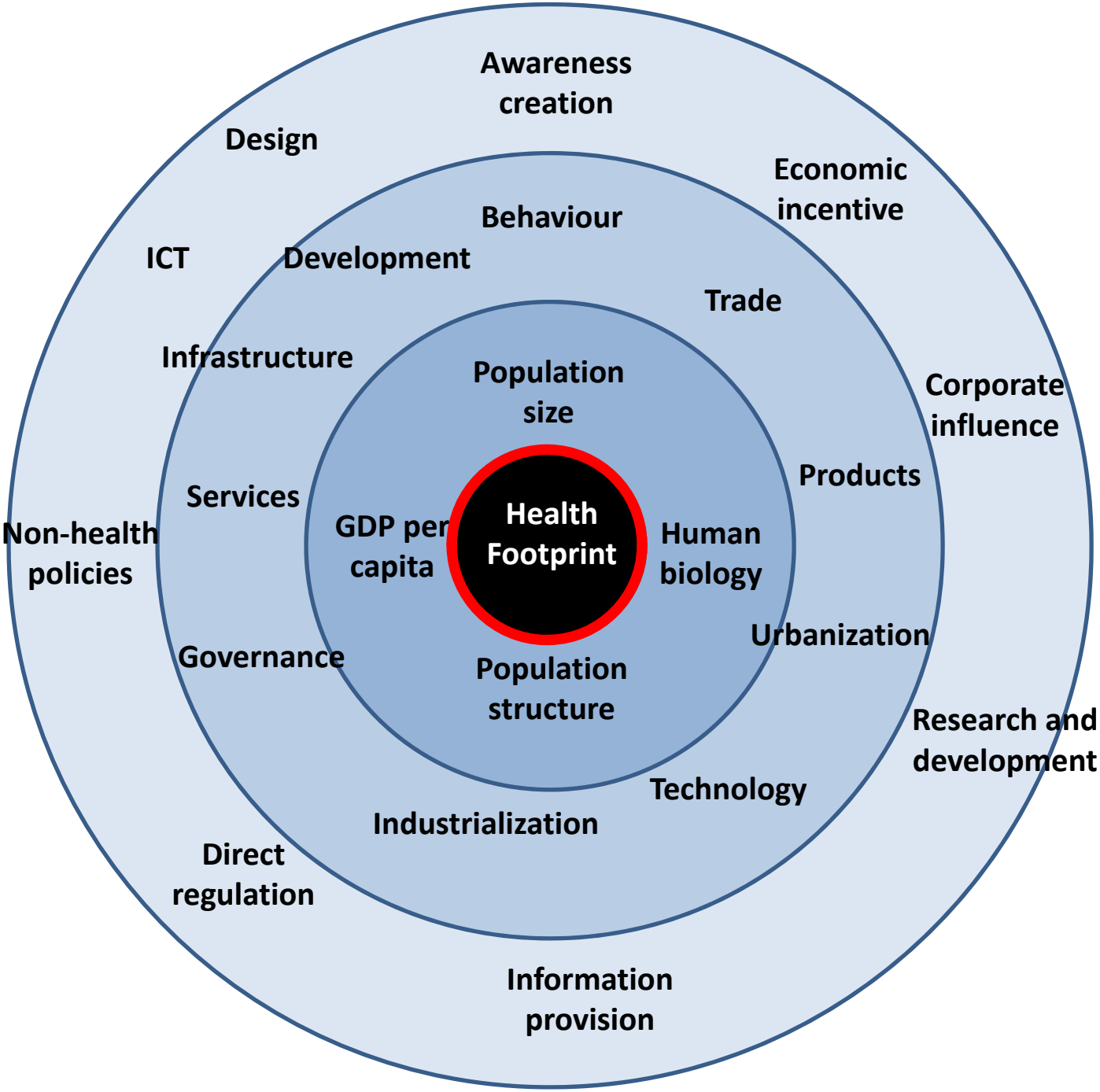
- 75 minutes (1 hour and 15 minutes) of vigorous-intensity aerobic activity such as running or a game of singles tennis every week, **and**
- muscle-strengthening activities on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms).

- An equivalent mix of moderate- and vigorous-intensity aerobic activity every week (for example 2 30-minute runs plus 30 minutes of fast walking), **and**
- muscle-strengthening activities on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms).

Risk factors for disability adjusted life years, world, 2010



Source: Lim et al 2012


Awareness creation
Design
Economic incentive
Behaviour
ICT
Development
Trade
Infrastructure
Population size
Corporate influence
Products
Services
Non-health policies
GDP per capita
Health Footprint
Human biology
Urbanization
Governance
Population structure
Research and development
Technology
Industrialization
Direct regulation
Information provision

Thank you for your attention

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