



Epi.NCDs

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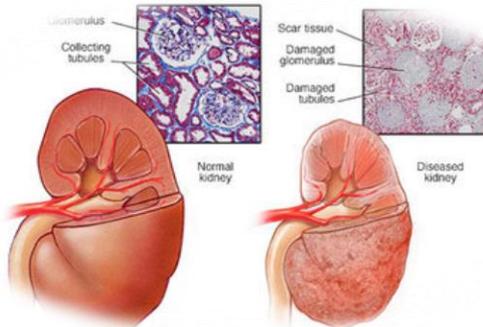
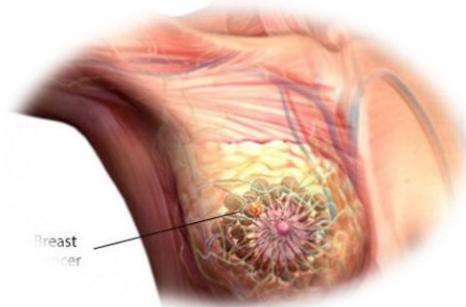
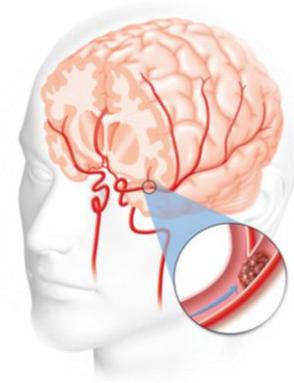
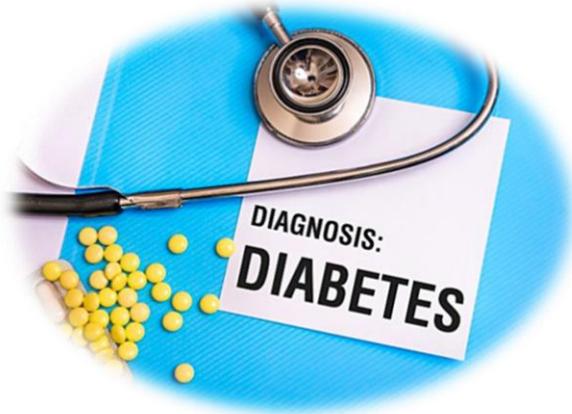
Non-communicable diseases definitions (1)

- *“A non-communicable disease(NCD) is a disease that is not transmissible directly from one person to another”*
https://en.wikipedia.org/wiki/Non-communicable_disease
- *“Non-communicable diseases (NCDs), also known as chronic diseases, tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behaviors factors.”* <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>

Non-communicable diseases definitions (2)

- *“Non-communicable diseases are a diverse group of chronic diseases that are not communicable, meaning you can't catch them from another person. They are defined as diseases of long duration, generally slow progression and they are the major cause of adult mortality and morbidity worldwide”.* World Health Organization. (WHO 2005a). Preventing chronic diseases: a vital investment. WHO global report. Geneva: World Health Organization.

What are NCDs you have known?

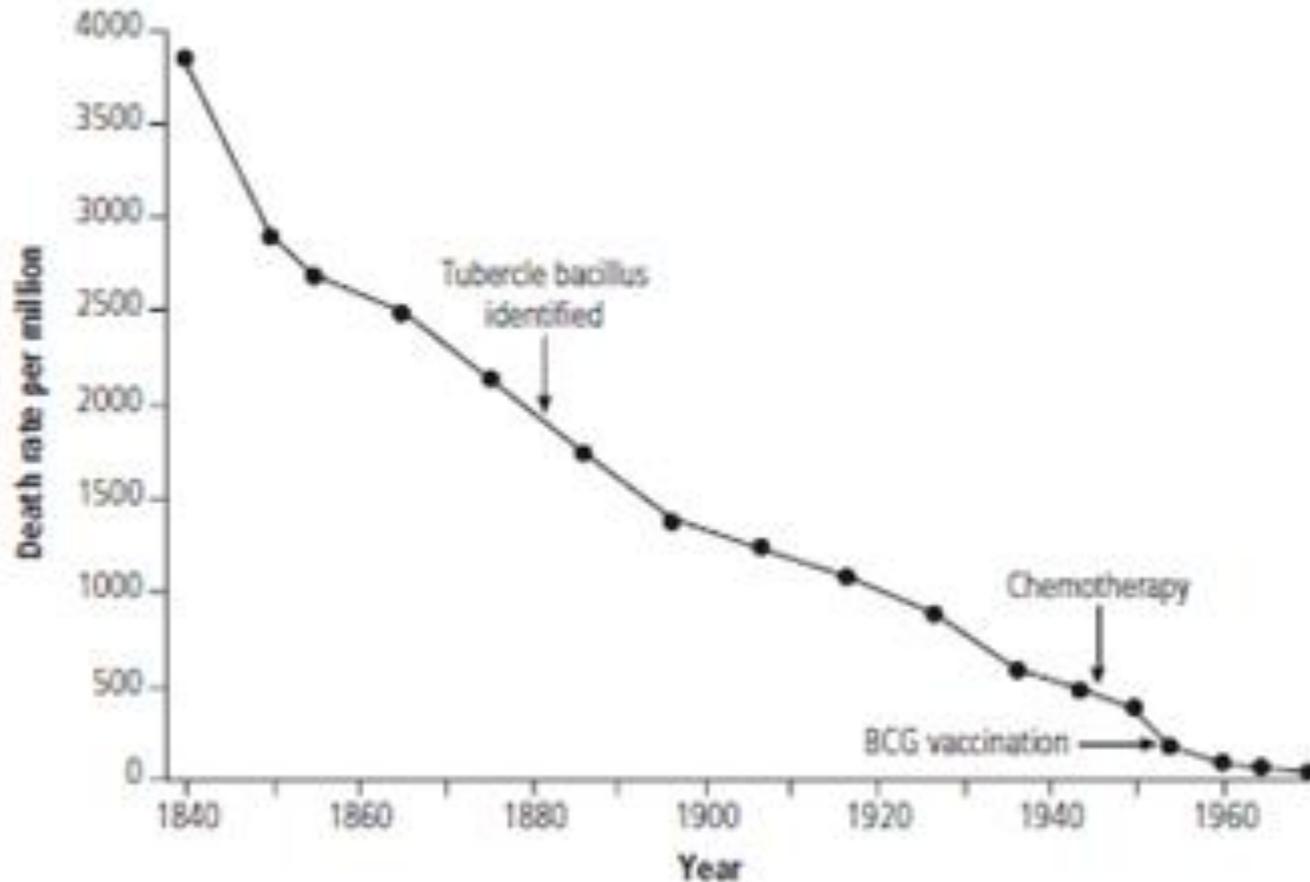


The importance of NCDs

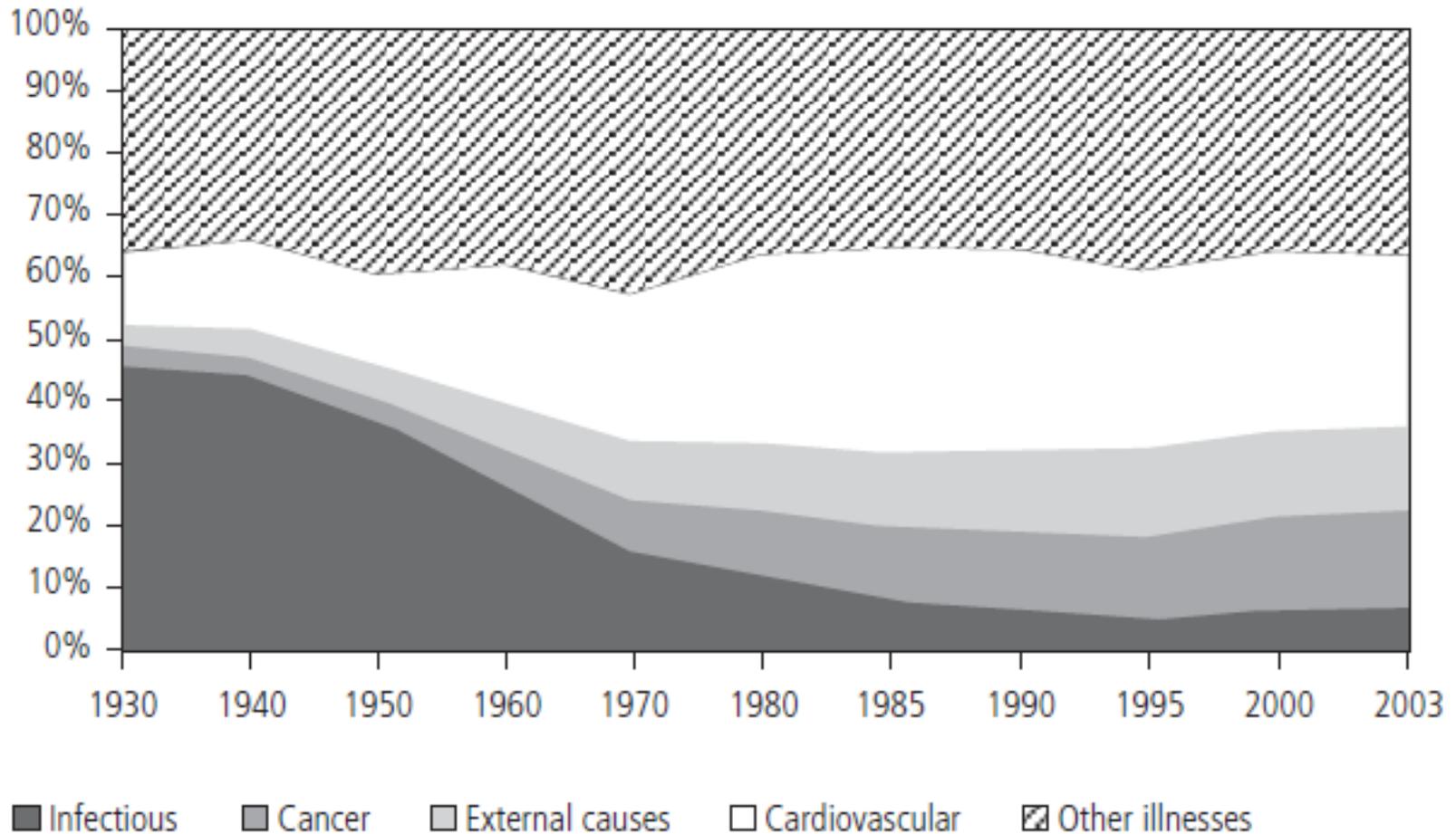
- Noncommunicable diseases (NCDs) kill more than 36 million people each year.
- Nearly 80% of NCD deaths - 29 million - occur in low- and middle-income countries.
- > 9 million of all deaths attributed to NCDs occur before the age of 60; 90% of these "*premature*" deaths occurred in low- and middle-income countries.
- Cardiovascular diseases account for most NCD deaths, or 17.3 million people annually, followed by cancers (7.6 million), respiratory diseases (4.2 million), and diabetes (1.3 million¹).
- These four groups of diseases account for around 80% of all NCD deaths.
- They share four risk factors: tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets.

Age-standardized death rates from TB in England and Wales, 1840 – 1960

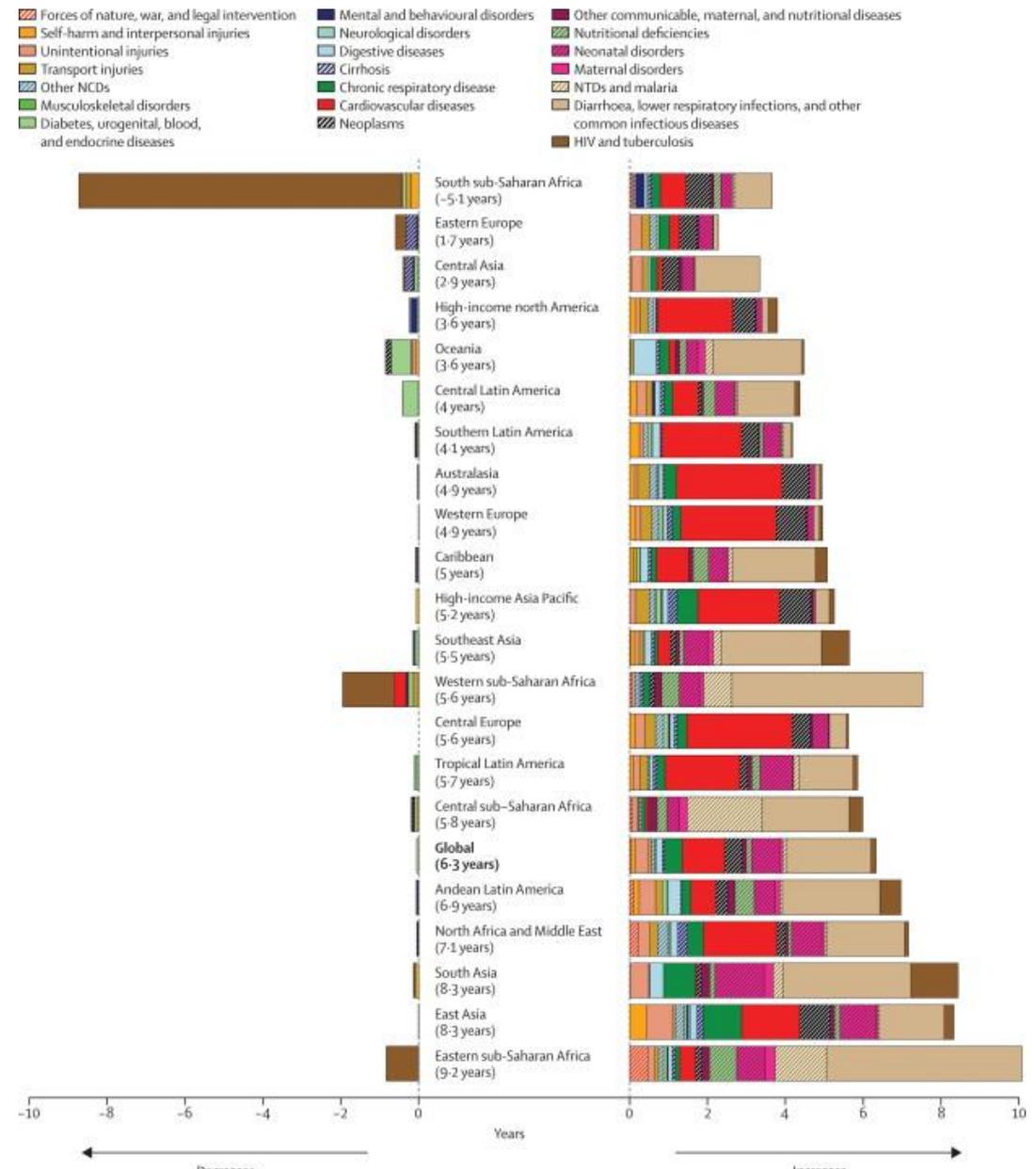
Figure 6.1. Age-standardized death rates from tuberculosis in England and Wales, 1840–1968*



Changes in contribution of chronic and infectious conditions to total mortality in Brazilian state capitals, 1930–2003

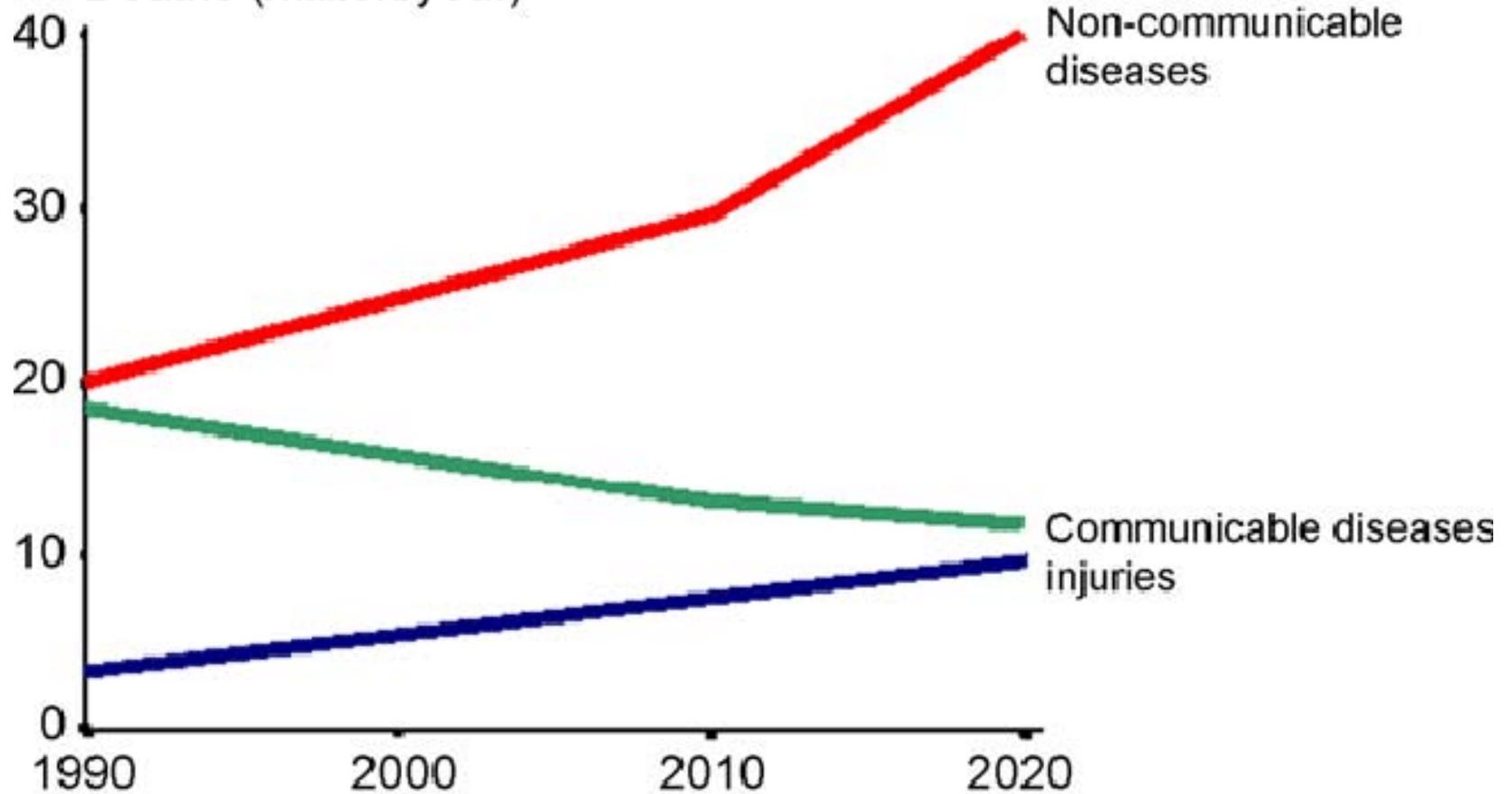


GDB2013: Changes in life expectancy by region and cause, 1990-2013. (The Lancet)



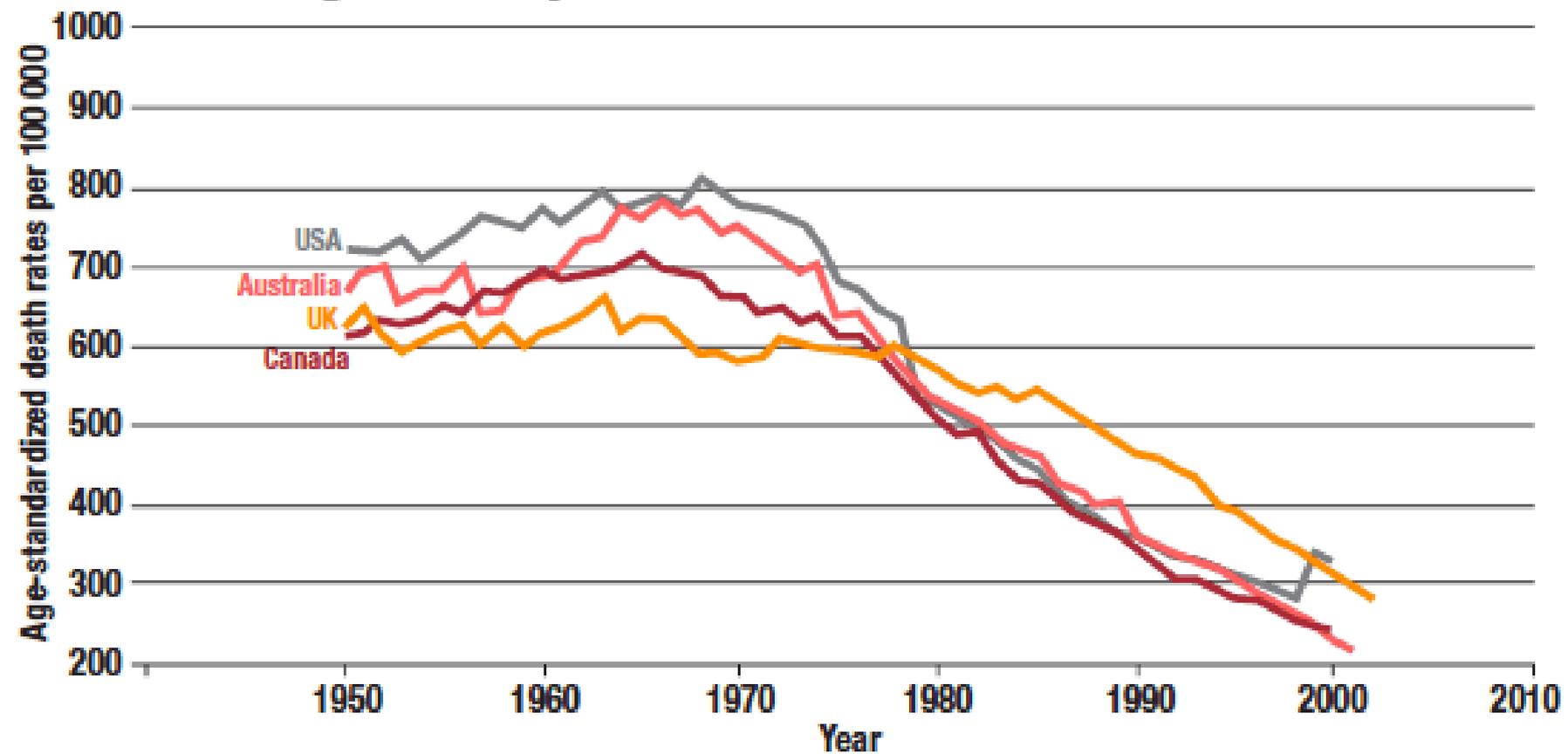
Projected trends in cause of deaths in developing regions

Deaths (million/year)



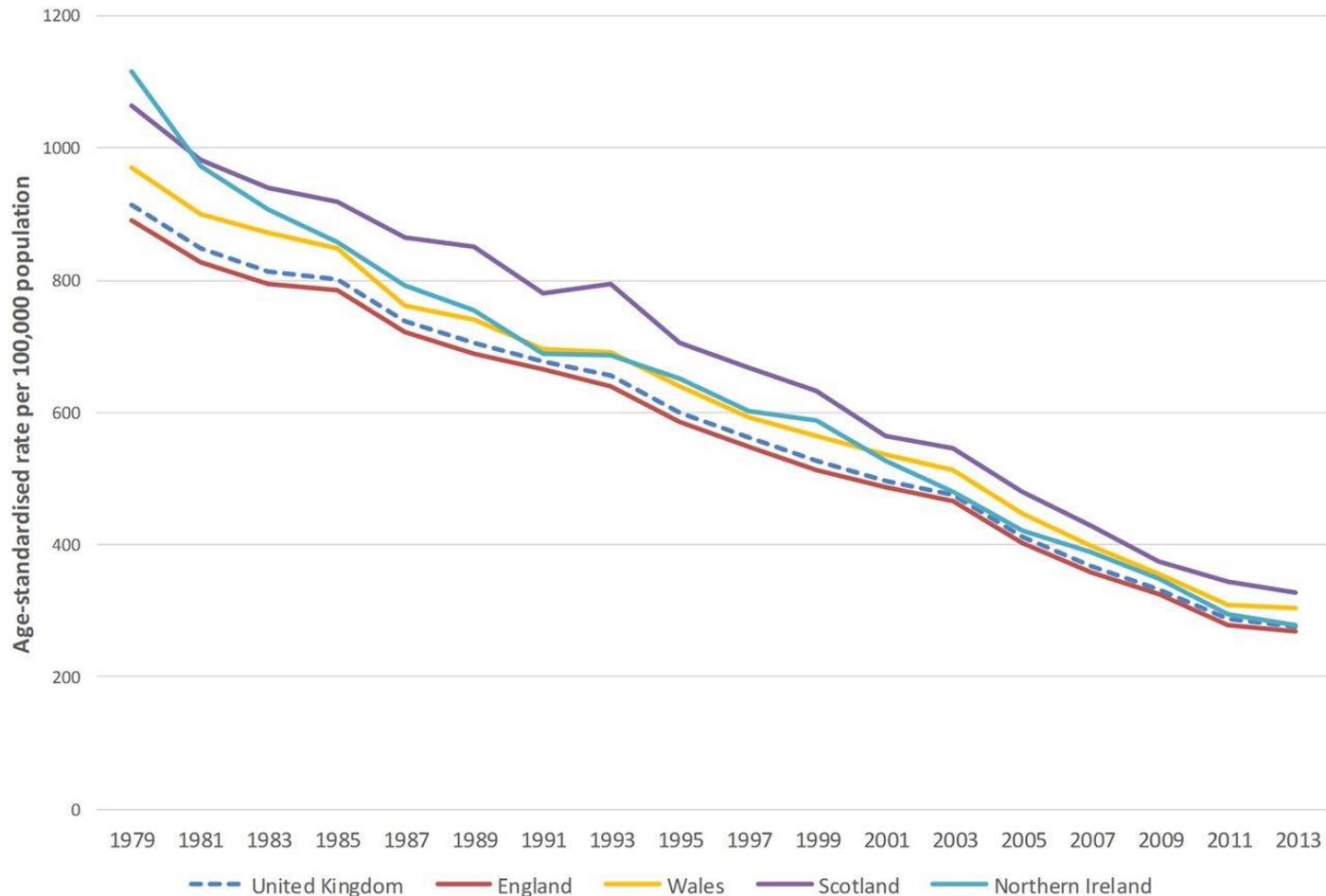
Source: Global Burden of Disease study (Murray & Lopez 1996)

Heart disease death rates among men aged 30 years or more, 1950–2002



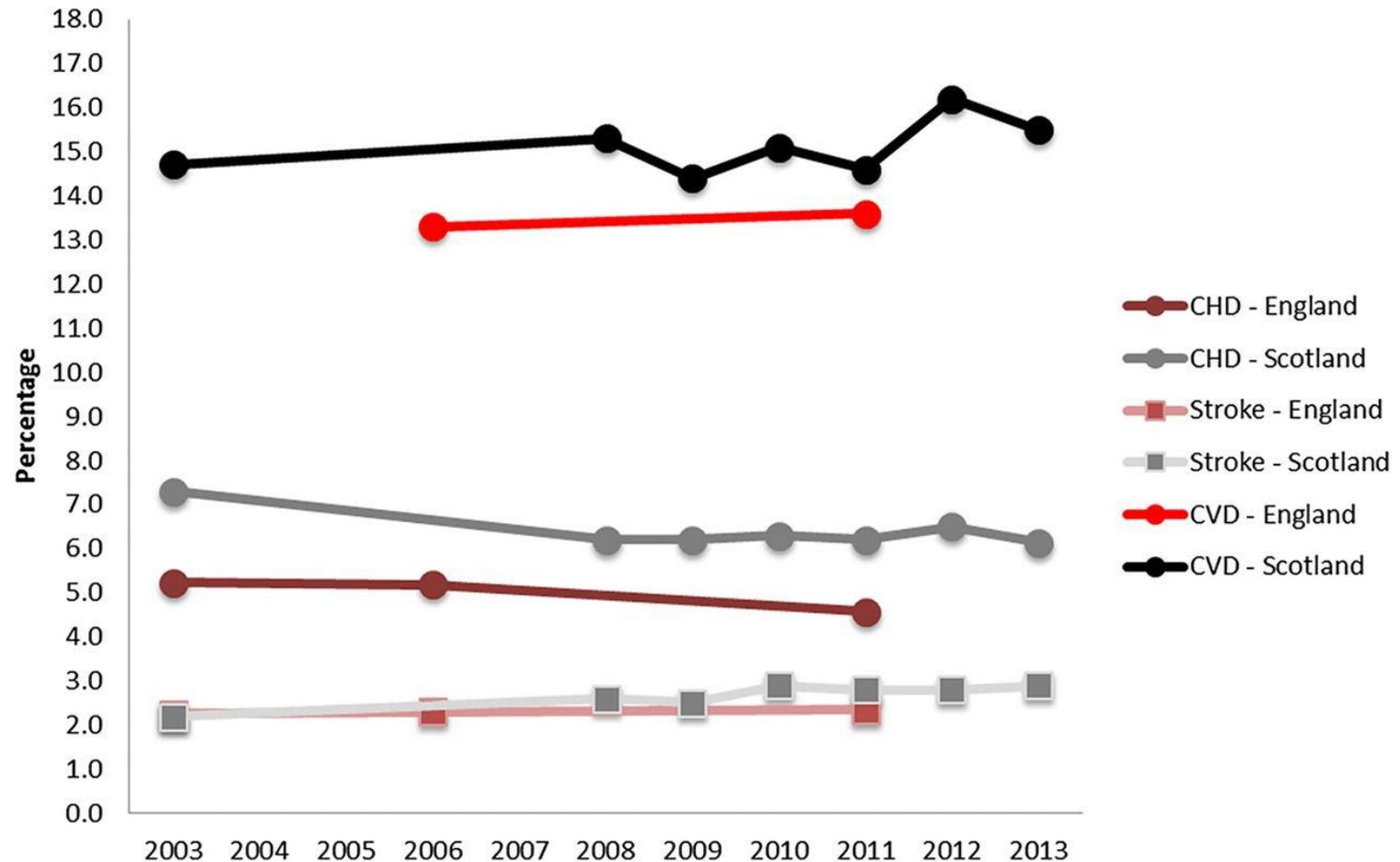
Source: World Health Organization. *Preventing Chronic Diseases: A Vital Investment*. WHO Global Report. 2005

Age-standardized mortality caused by CVD, UK 1980 – 2013

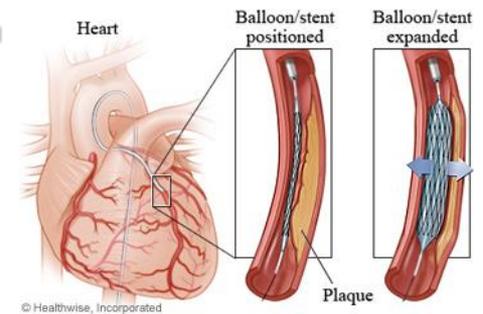
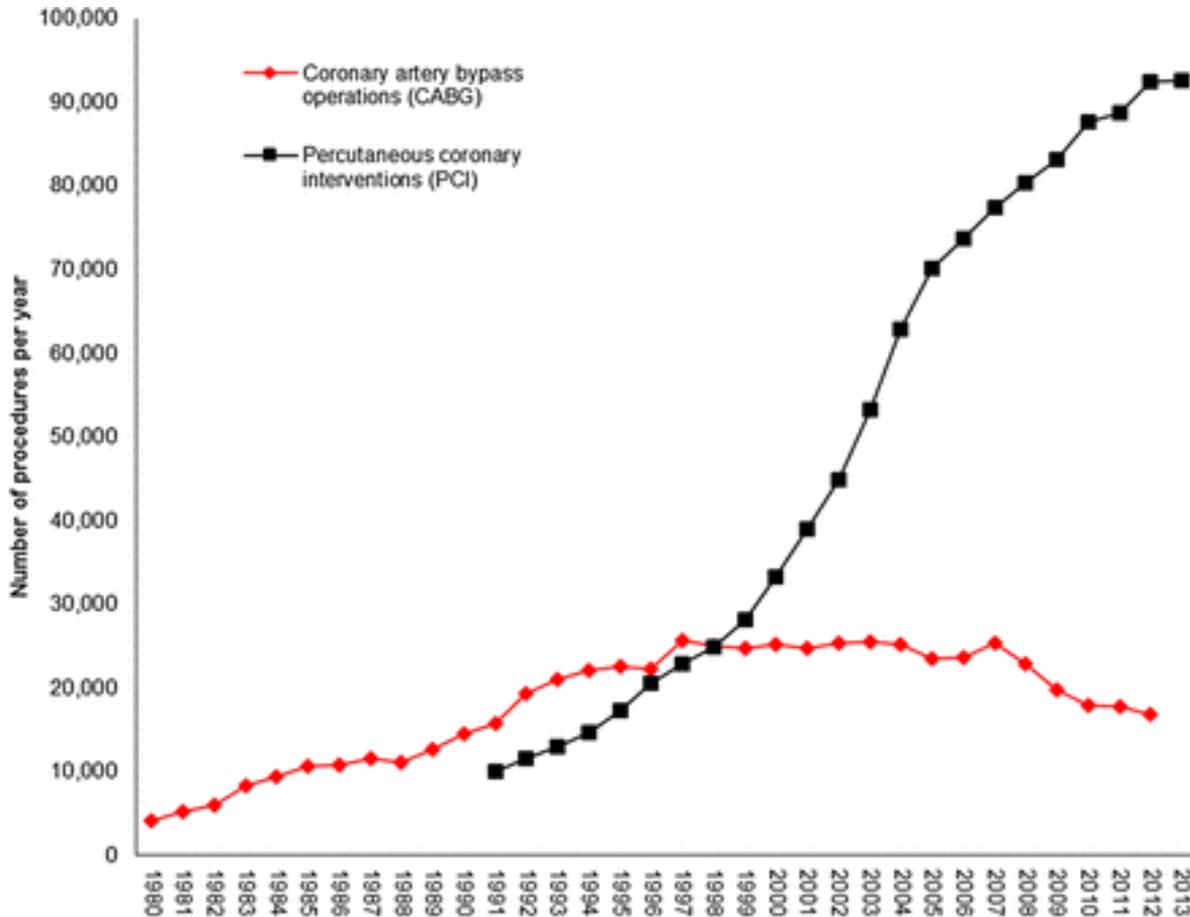


Bhatnagar P, Wickramasinghe K, Wilkins E, Townsend N. Trends in the epidemiology of cardiovascular disease in the UK. *Heart*. 2016;102(24):1945-1952.

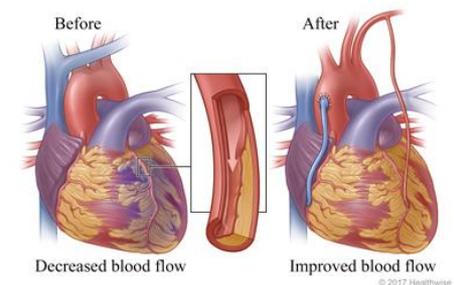
The prevalence of CVD, CHD, and stroke, from the health surveys of England and Scotland 2003–2013.



Number of coronary artery bypass operations and percutaneous coronary interventions per year, UK 1980–2013.



PCI



CABG

Bhatnagar P, Wickramasinghe K, Wilkins E, Townsend N. Trends in the epidemiology of cardiovascular disease in the UK. *Heart*. 2016;102(24):1945-1952.

Which diseases had more burden?

- DALYs = Disability Adjusted Life Years
 - The sum of years of potential life lost due to premature mortality and the years of productive life lost due to disability.
- DALYs = YLL + YLD
 - YLD = Years Lived with Disability
 - YLL = Years of life lost



Originally developed by [Harvard University](#) for the [World Bank](#) in 1990

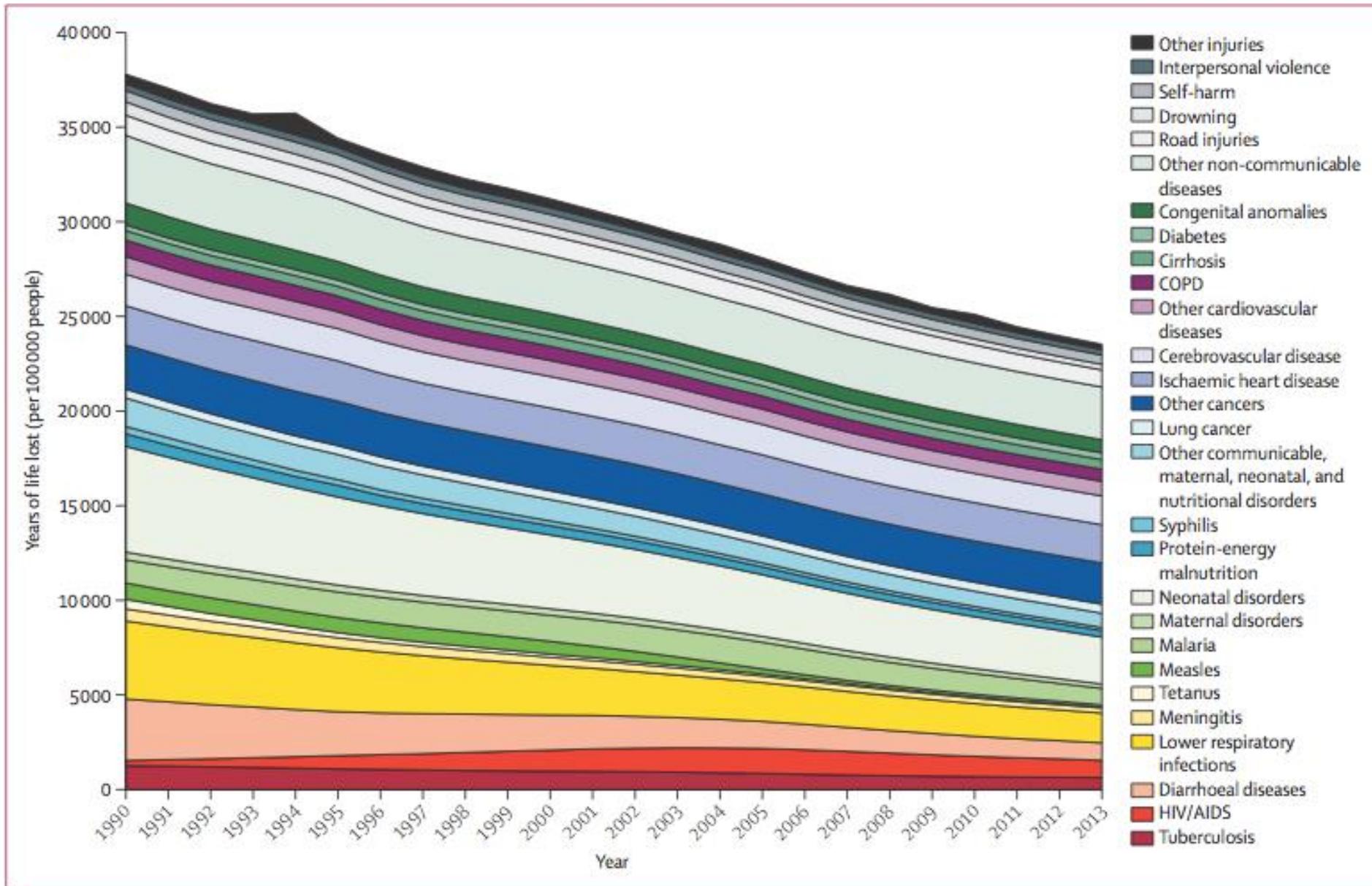
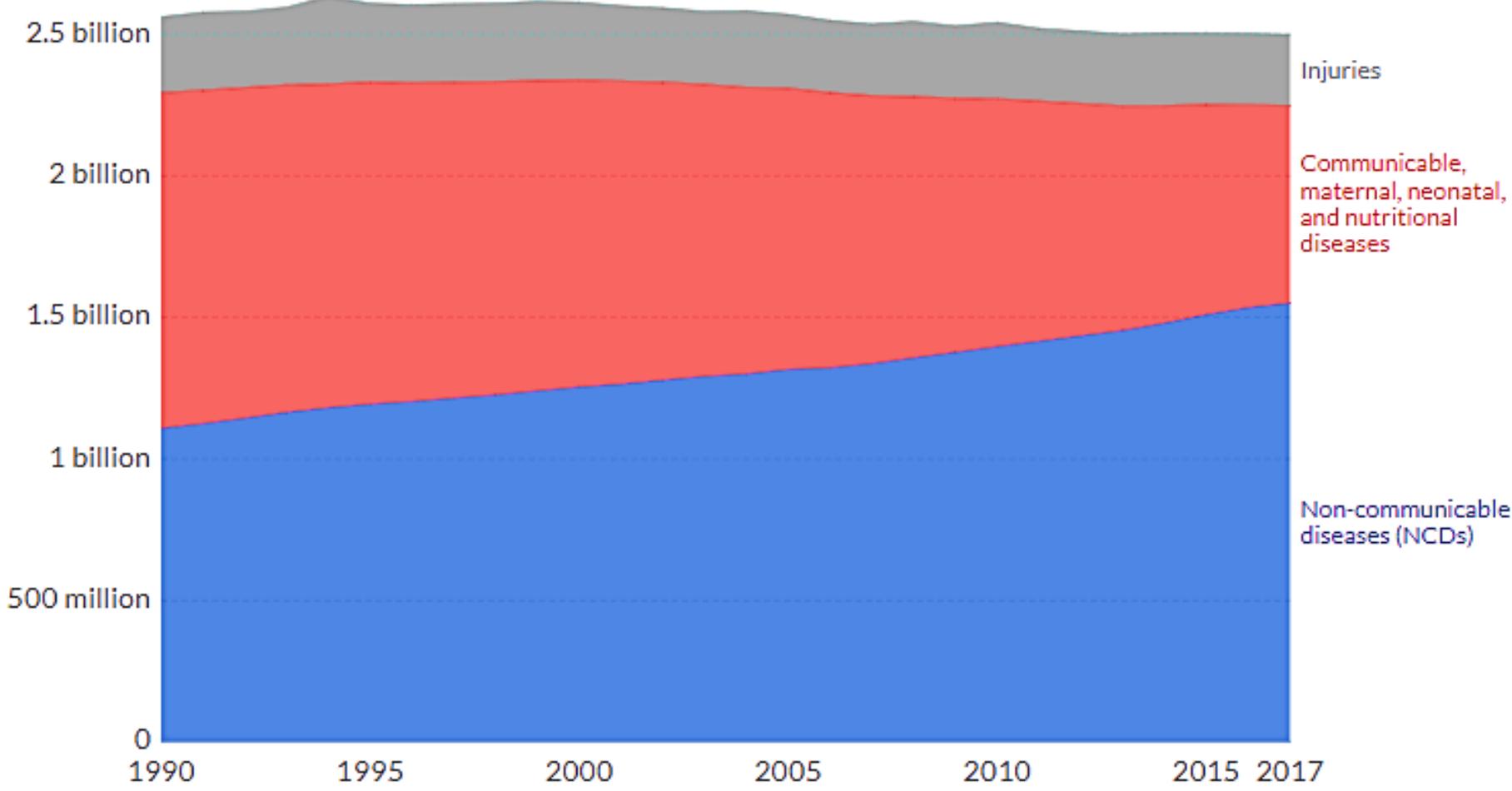


Figure 11: Global years of life lost by large cause groupings for 1990 to 2013
 COPD=chronic obstructive pulmonary disease.

Total disease burden by cause, World

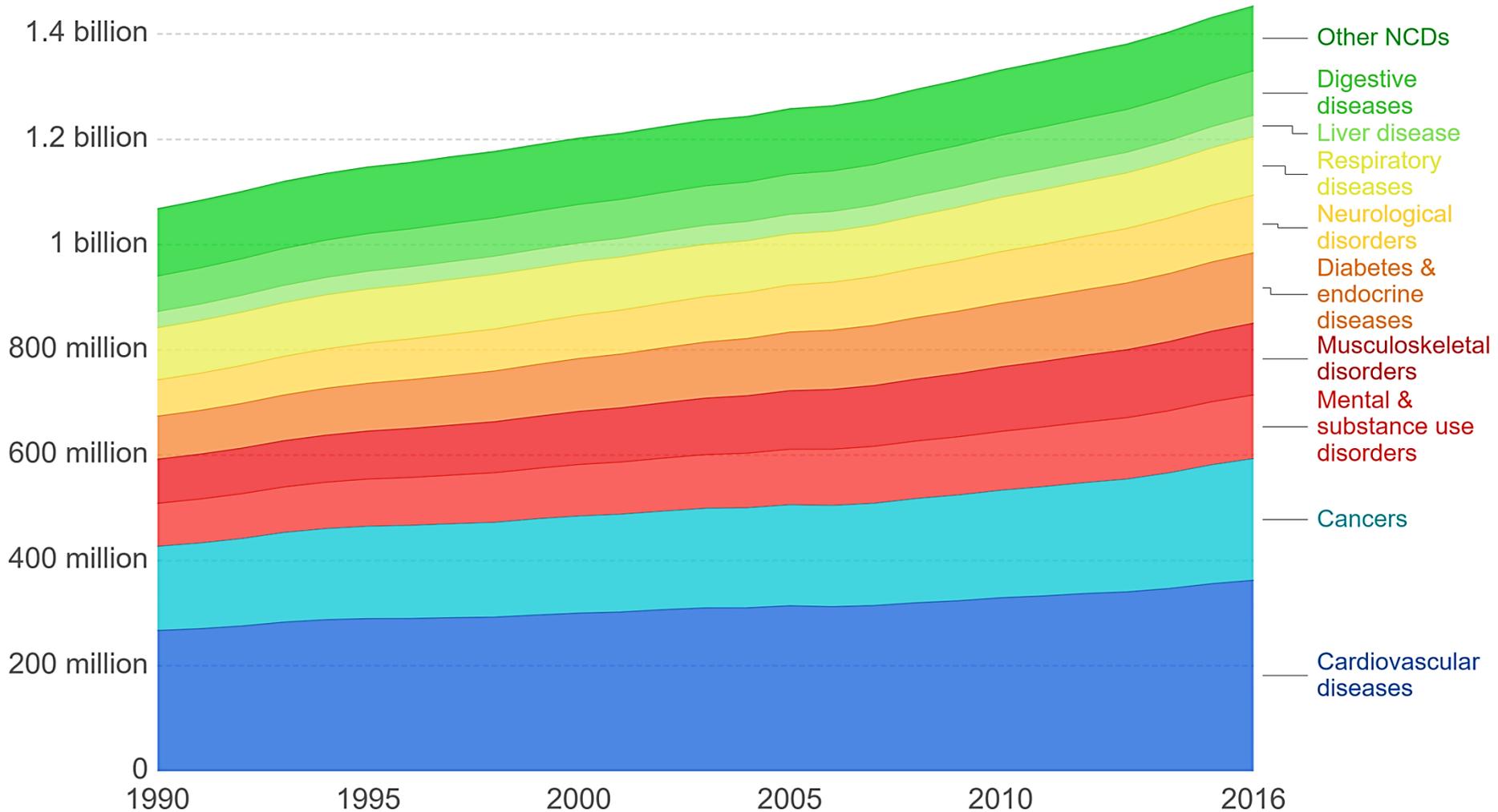
Total disease burden measured as the number of DALYs (Disability-Adjusted Life Years) per year. DALYs are used to measure total burden of disease - both from years of life lost and years lived with a disability. One DALY equals one lost year of healthy life.



Source: IHME, Global Burden of Disease

Disease burden from non-communicable diseases, World

Total disease burden from non-communicable diseases (NCDs), measured in DALYs (Disability-Adjusted Life Years) per year. DALYs are used to measure total burden of disease - both from years of life lost and years lived with a disability. One DALY equals one lost year of healthy life.



DALYs of diseases in Thailand, 2009

Male (Year(B.E.) 2552)			Female (Year(B.E.) 2552)		
Rank	Diseases	DALYs (x100,000)	Rank	Diseases	DALYs (x100,000)
1	Alcohol related disease	5.1	1	Diabetes	3.8
2	Traffic accident	5.0	2	Stroke	3.5
3	Stroke	3.7	3	Depression	2.4
4	HIV	2.6	4	Ischemic heart disease	1.8
5	Liver cancer	2.6	5	HIV/AIDs	1.6
6	Ischemic heart diseases	2.5	6	Cataract Osteoarthritis	1.5
7	Diabetes	2.2	7	Osteoarthritis	1.4
8	COPD	2.1	8	Traffic accident	1.3
9	Cirrhosis	1.8	9	Anemia	1.2
10	CA lung	1.3	10	Liver cancer	1.1

Aims of today

- Epidemiology of NCDs comparing with CDs



NCDs

- Epidemiological triad
 - Host
 - Agent
 - Environment
- Mode of transmission
- Onset
- Incubation period

Epidemiological Triad



- External **agent**
- Susceptible **host**
- **Environment** that brings the host and agent together



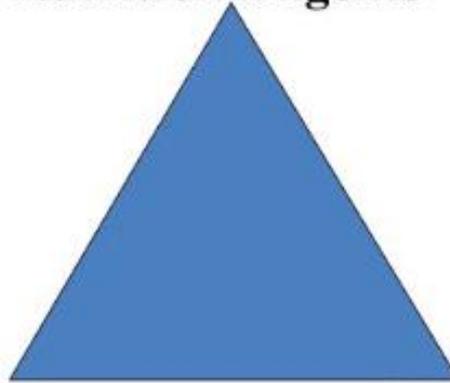
Agent Factors

Physical Agents

Chemical Agents

Biological Agents

Nutritional agents



Environmental Factors

Physical Environment

Biological Environment

Social Environment

Host Factors

Socio-demographic Factors

Psycho-social Factors

Intrinsic Characteristics

Agent TB organism

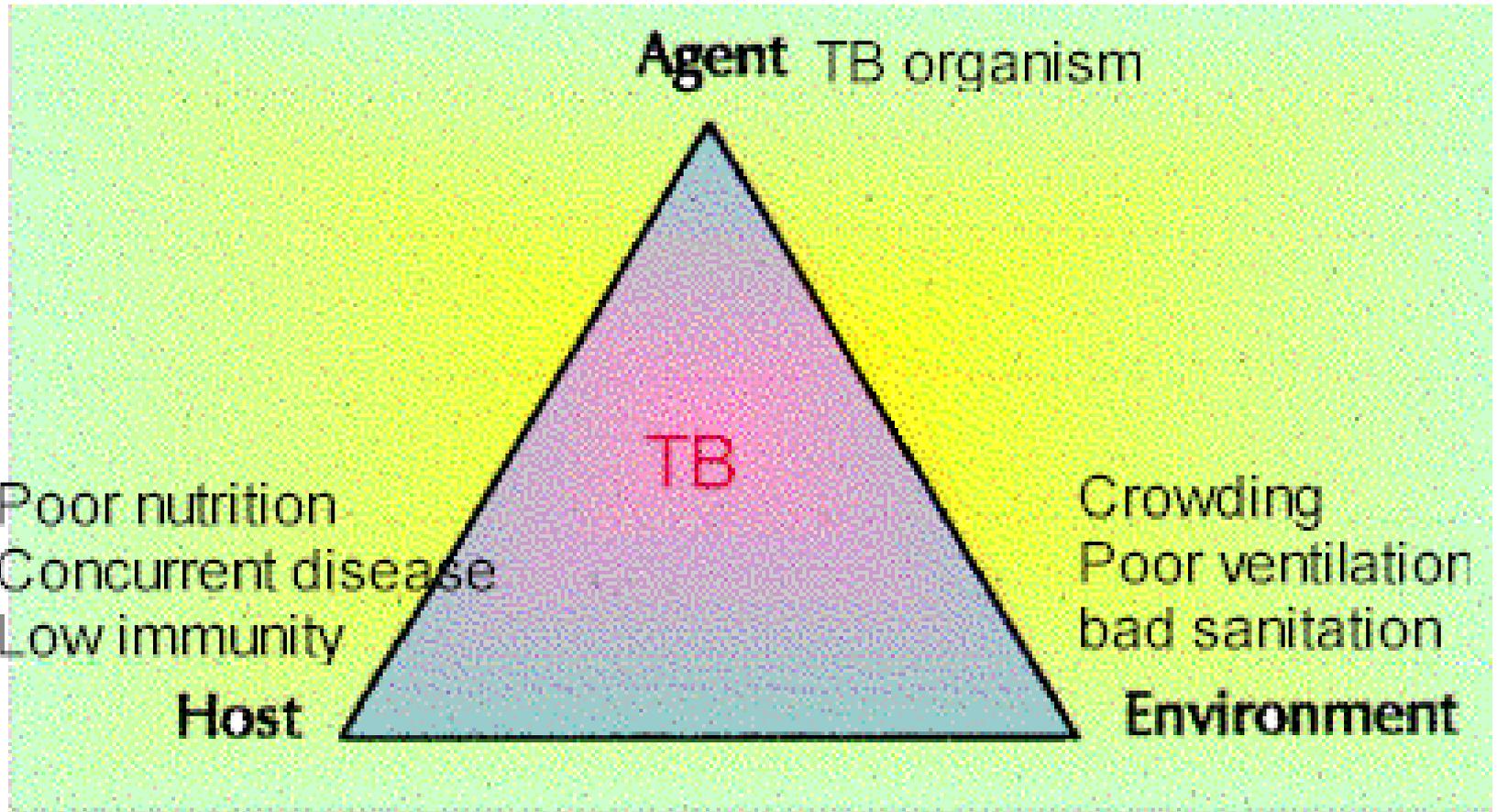
TB

Poor nutrition
Concurrent disease
Low immunity

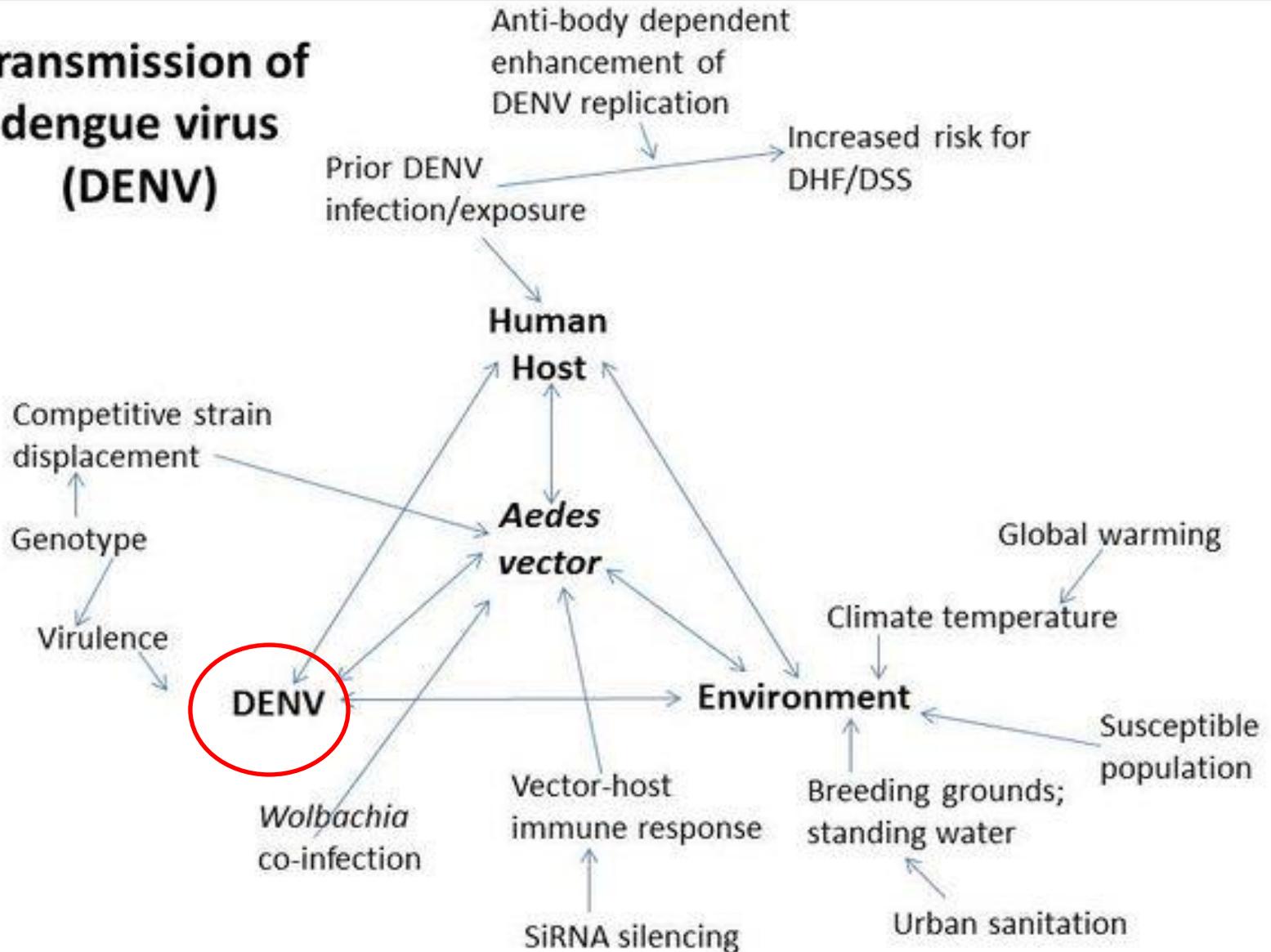
Host

Crowding
Poor ventilation
bad sanitation

Environment



Transmission of dengue virus (DENV)

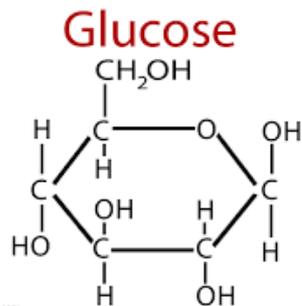


What is “Host”, “Agent”, “Environment” of NCDs??

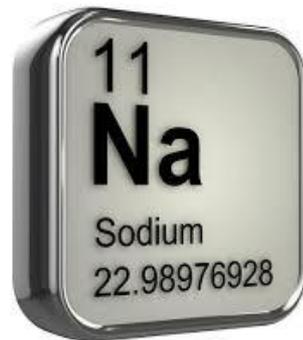
What is “Agent” for Stroke??

What is “Agent” for DM??

What is “Agent” for HT??



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Limitation of epidemiological triad

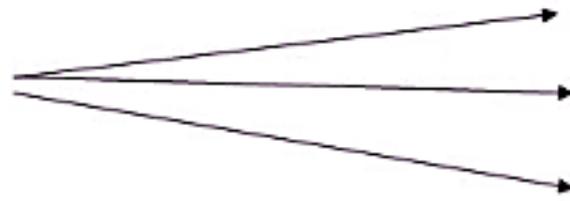
- Epidemiologic triad serves as a useful model for many diseases,
- It has proven inadequate for cardiovascular disease, cancer, and other diseases that appear to have multiple contributing causes without a single necessary one.

Association

- Direct (causal) association
 - One-to-one causal association: Whenever disease occurs, the factor or cause must be present.
 - Multifactorial causation: multiple factors lead to the diseases
 - Sufficient and necessary causes
 - Web of causation (interaction)
- Indirect association (confounder)

One to one causal association

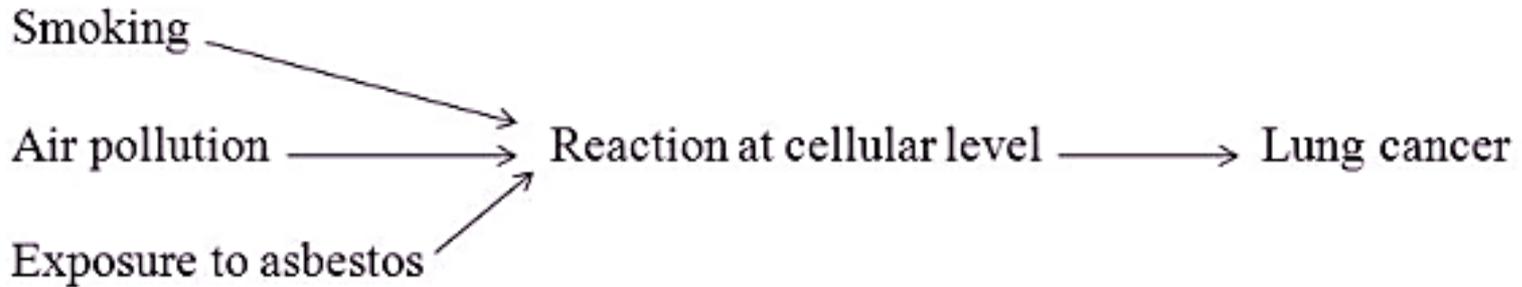
Haemolytic
Streptococci



Streptococcal tonsillitis
Scarlet fever
Erysipelas



Multifactorial causation



Interaction of multiple individual causes

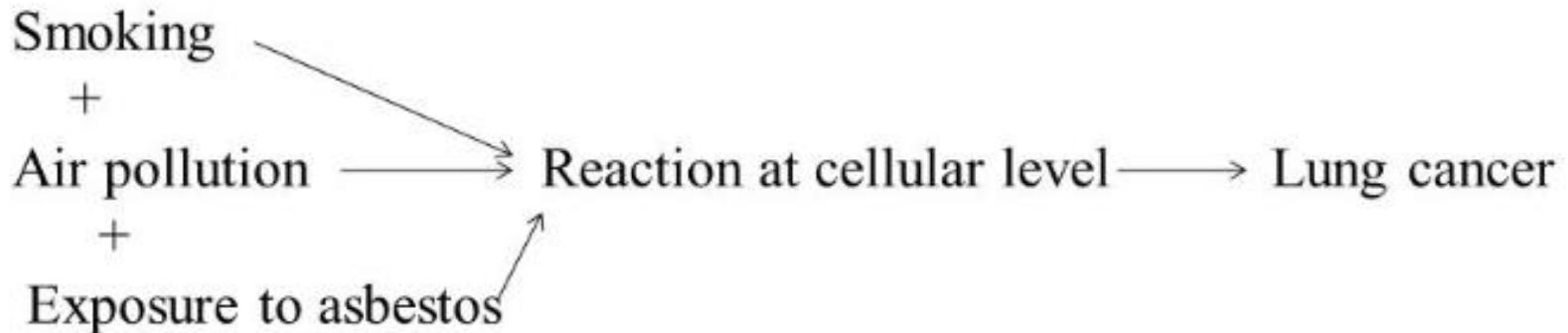
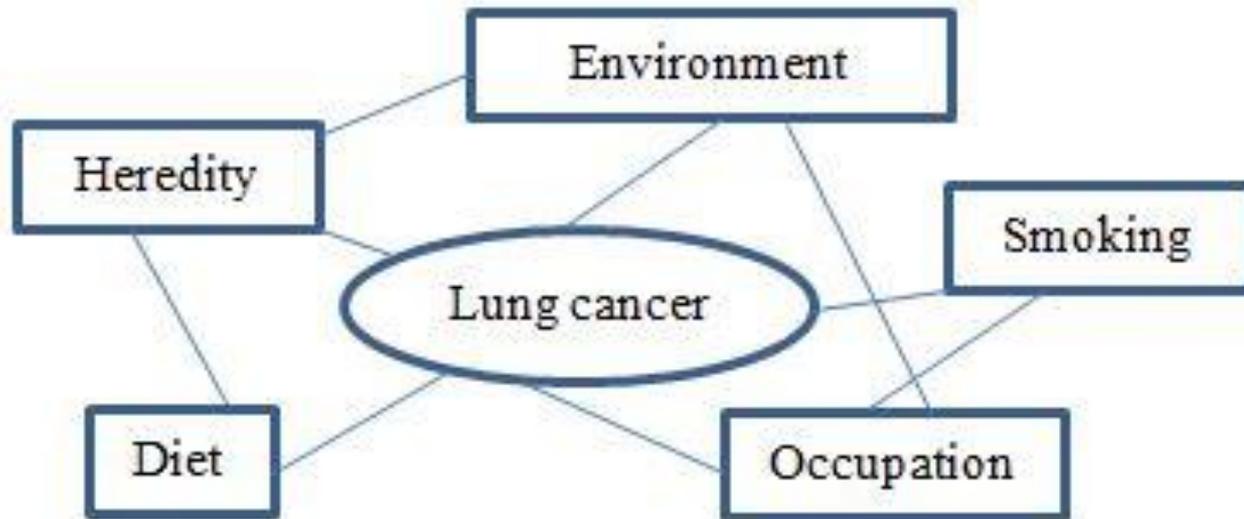


Table 1: Age-standardized lung cancer death rates (per 100 000 population) in relation to tobacco use and occupational exposure to asbestos dust

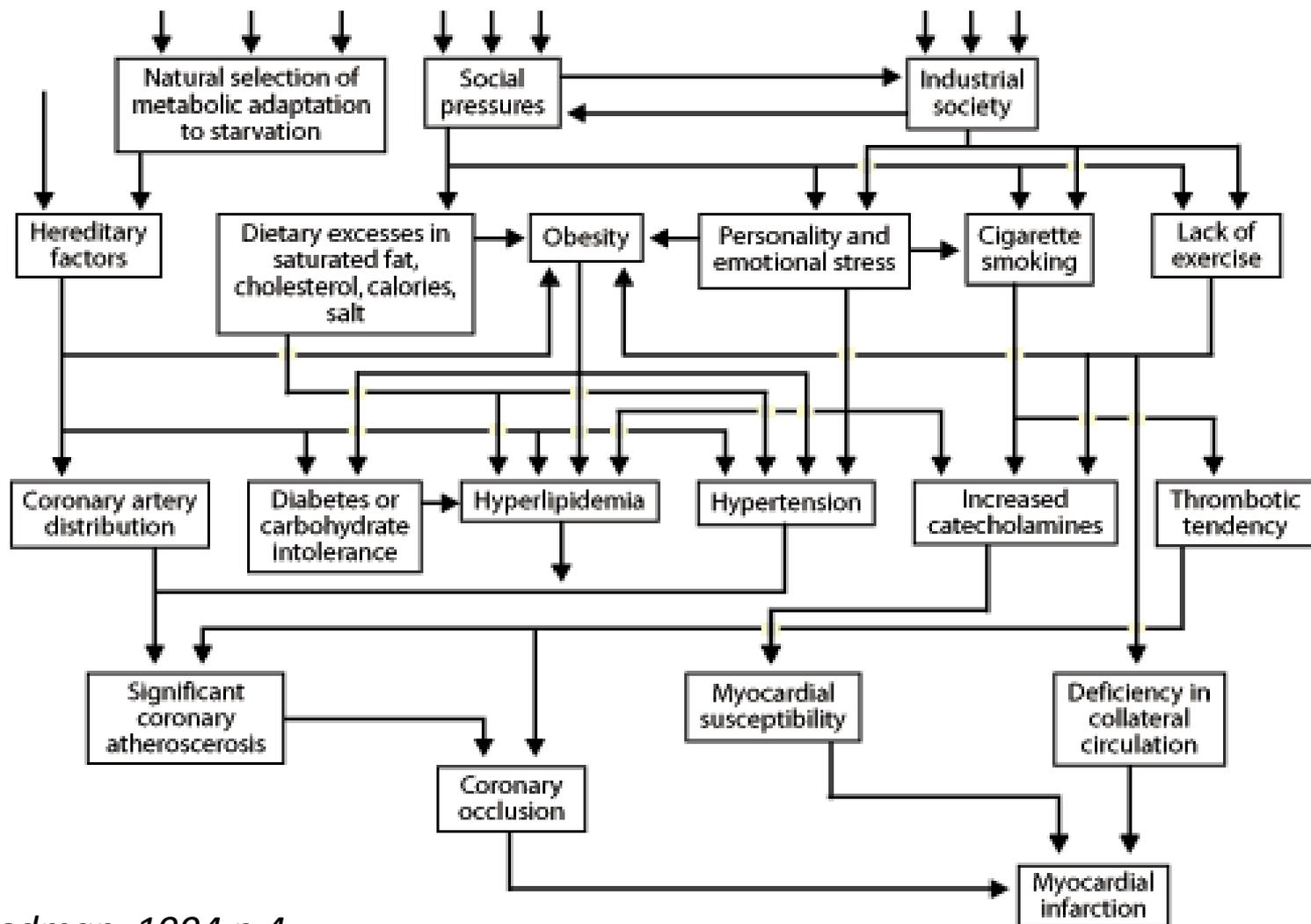
Exposure to asbestos	History of tobacco use	Lung cancer death rate per 100 000
No	No	11
Yes	No	58
No	Yes	123
Yes	Yes	602

Simple web of causation for Lung cancer



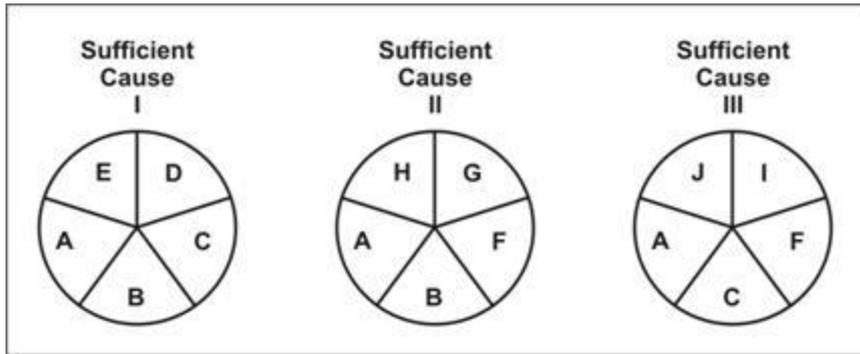
Disease in general is viewed in terms of more complex, multi-factorial relationships. Health is now viewed as a complex interaction of agent, host and environmental factors - in other words, a "web" of interconnected factors leading to disease.

Web of causation model for Myocardial infarction



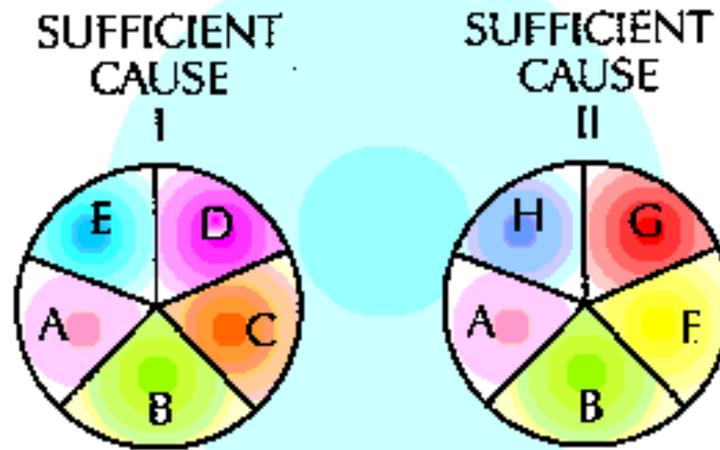
Rothman's Causal Pies

Because the agent-host-environment model did not work well for many non-infectious diseases, several other models that attempt to account for the multifactorial nature of causation have been proposed.



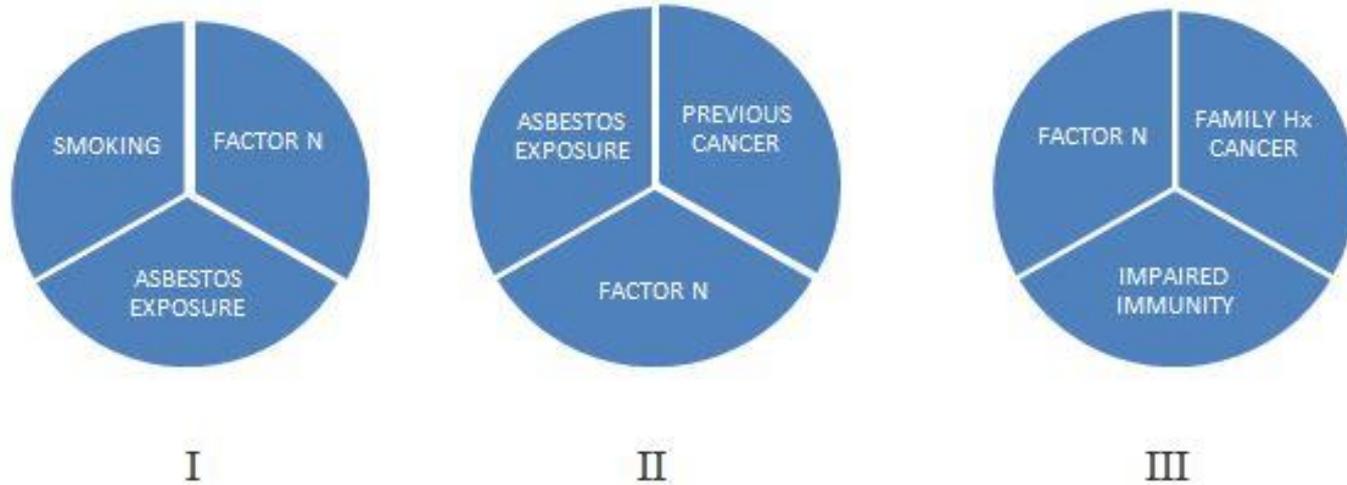
Source: Rothman KJ. Causes. Am J Epidemiol 1976;104:587–592.

- The individual factors are called **component causes**.
- The complete pie, which might be considered a causal pathway, is called a **sufficient cause**.
- A component that appears in every pie or pathway is called a **necessary cause**.



- If "A" is "necessary", then disease will not occur without it, but "A" may require other factors to be sufficient (example: TB). (both pies must have the TB organism, is a necessary factor for TB to occur.)
- Several factors together may be sufficient for disease but no one factor may be necessary in itself (example: CHD); several sufficient pies may exist for a disease.

3 scenarios on Lung cancer causes



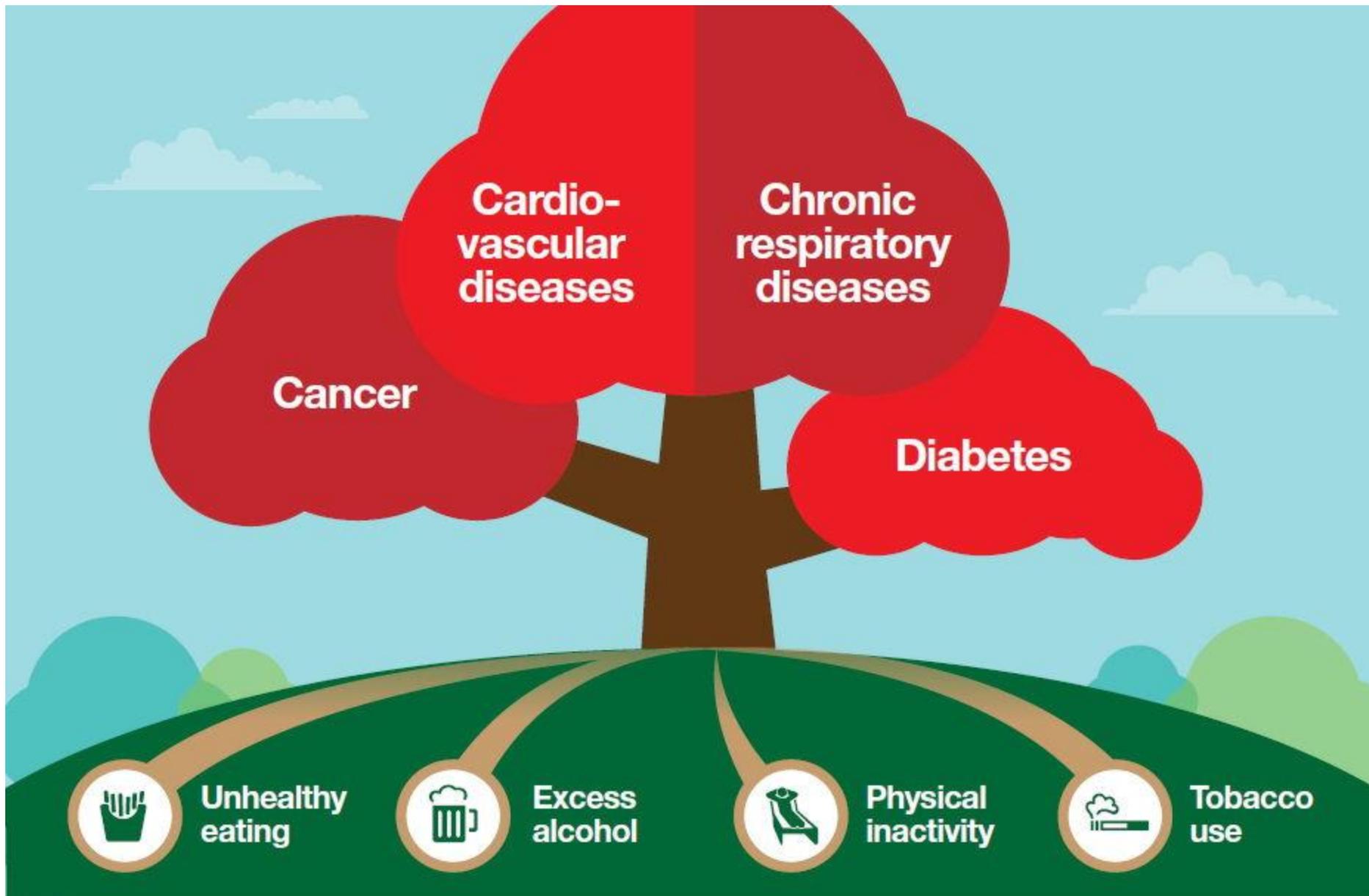
Smoking: component causes
Asbestos exposure: sufficient causes
Factor N: necessary causes

10 facts on non-communicable diseases

1. NCDs, primarily cardiovascular diseases, cancers, chronic respiratory diseases and diabetes, are responsible for 63% of all deaths worldwide (36 million out of 57 million global deaths).
2. 80% of NCDs deaths occur in low- and middle-income countries.
3. More than 9 million of all deaths attributed to NCDs occur before the age of 60.
4. Around the world, NCDs affect women and men almost equally.
5. NCDs are preventable through effective interventions that tackle shared risk factors, namely: tobacco use, unhealthy diet, physical inactivity and harmful use of alcohol.

10 facts on non-communicable diseases

6. NCDs force many people into, or entrench them in poverty due to catastrophic expenditures for treatment. They also have a large impact on undercutting productivity.
7. 1.5 billion adults, 20 and older, were overweight in 2008.
8. Nearly 43 million children under 5 years old were overweight in 2010.
9. Tobacco use kills nearly 6 million people a year. By 2020, this number will increase to 7.5 million, accounting for 10% of all deaths.
10. If the major risk factors for NCDs were eliminated, at around three-quarters of heart disease, stroke and type 2 diabetes would be prevented; and 40% of cancer would be prevented.



Cancer

Cardio-vascular diseases

Chronic respiratory diseases

Diabetes



Unhealthy eating



Excess alcohol



Physical inactivity



Tobacco use

NCD

4X4

Modifiable causative risk factors for NCDs

Tobacco
use

Unhealthy
diets

Physical
inactivity

Harmful
use of
alcohol

Noncommunicable diseases

Heart disease
and stroke



Diabetes



Cancer



Chronic lung
disease



5X5

DISEASES



Cardiovascular Disease



Chronic Respiratory Diseases



Cancer



Diabetes



Mental and Neurological Conditions

RISK FACTORS



Unhealthy Diet



Tobacco Use



Harmful Use of Alcohol

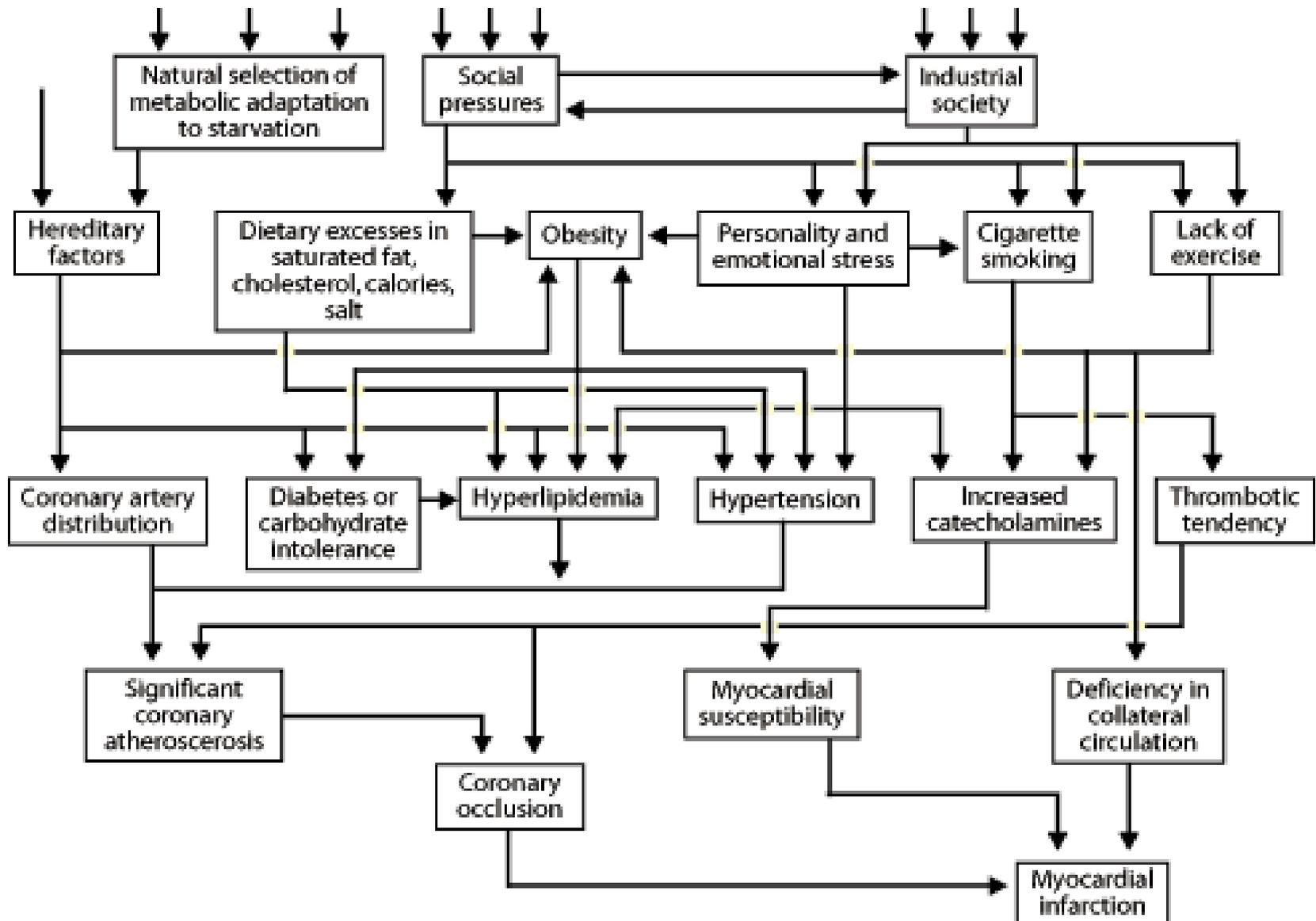


Physical Inactivity

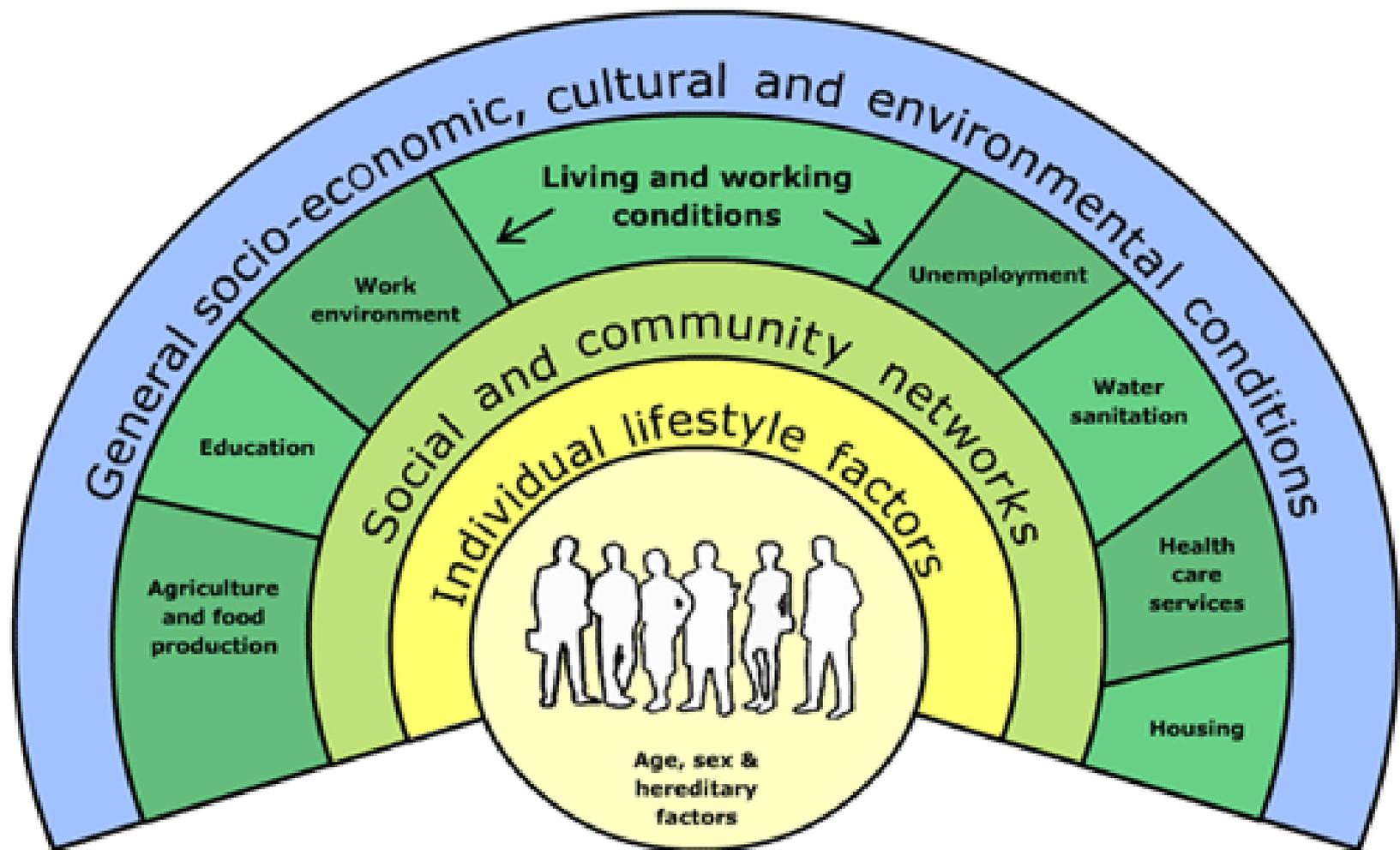


Air Pollution

Surveillance and intervention design

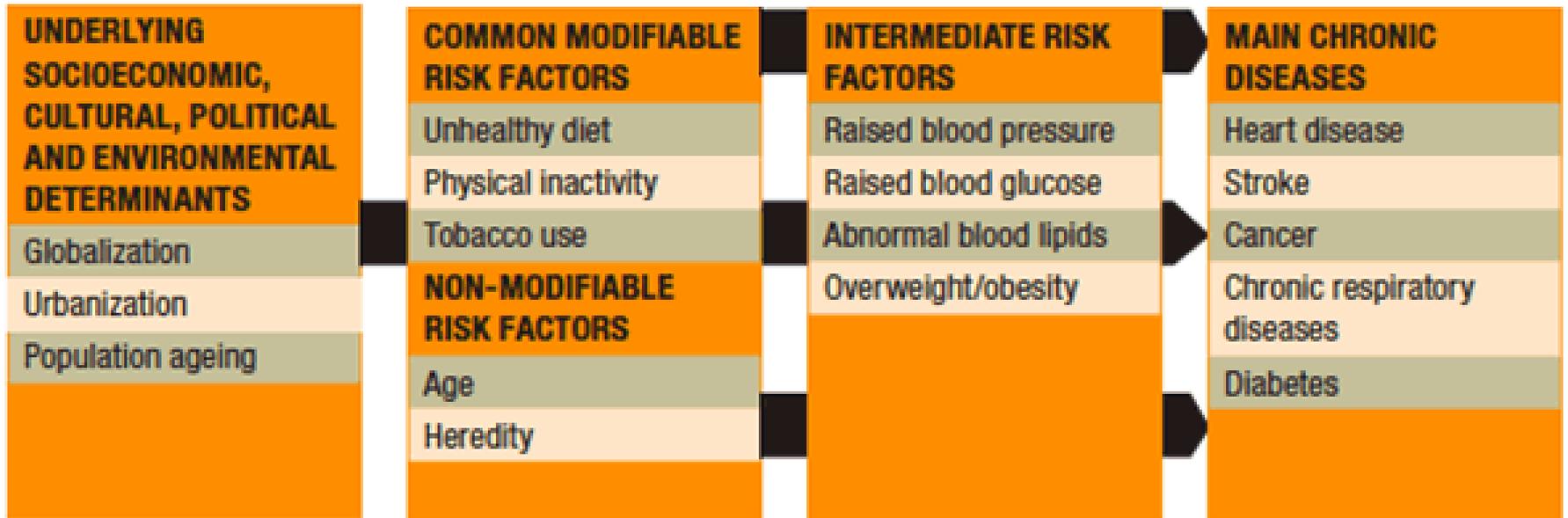


The Main Determinants of Health



Surveillance and intervention design

Causes of chronic diseases



Level of prevention

- Primordial prevention:
- Primary prevention:
- Secondary prevention:
- Tertiary prevention:

Primordial prevention

- Primordial prevention consists of actions and measures that inhibit the emergence of risk factors in the form of environmental, economic, social, and behavioral conditions and cultural patterns of living etc.

Primordial prevention (cont.)

- It is the prevention of the emergence or development of risk factors in countries or population groups in which they have not yet appeared
- For example, many adult health problems (e.g., obesity, hypertension) have their early origins in childhood, because this is the time when lifestyles are formed (for example, smoking, eating patterns, physical exercise).

Primary prevention

- Primary prevention can be defined as the action taken prior to the onset of disease, which removes the possibility that the disease will ever occur.
- It signifies intervention in the prepathogenesis phase of a disease or health problem.
- Primary prevention may be accomplished by measures of “Health promotion” and “specific protection”

Primary prevention

Achieved by

Health promotion

- Health education
- Environmental modifications
- Nutritional interventions
- Life style and behavioral changes

Specific protection

- Immunization and seroprophylaxis
- chemoprophylaxis
- Use of specific nutrients or supplementations
- Protection against occupational hazards
- Safety of drugs and foods
- Control of environmental hazards, e.g. air pollution

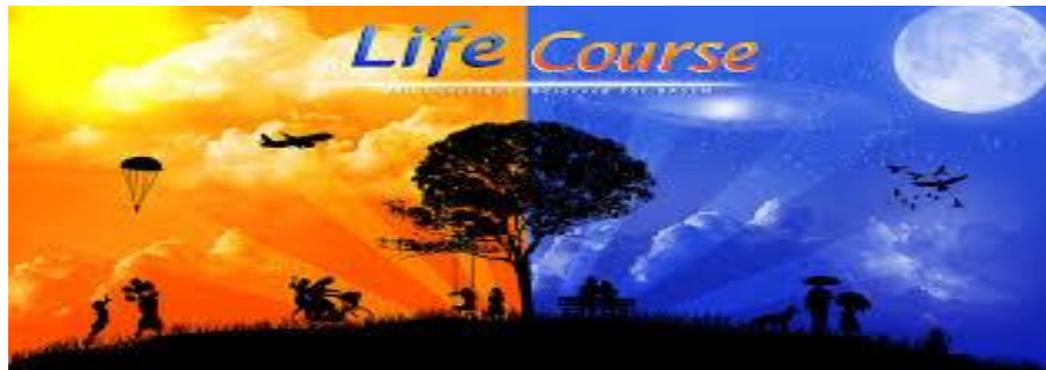
Secondary prevention

- It is defined as “ action which halts the progress of a disease at its incipient stage and prevents complications.”
- The specific interventions are: early diagnosis (e.g. screening tests, and case finding programs) and adequate treatment.

Tertiary prevention

- It is used when the disease process has advanced beyond its early stages.
- It is defined as “all the measures available to reduce or limit impairments and disabilities, and to promote the patients’ adjustment to irremediable conditions.”
- Intervention that should be accomplished in the stage of tertiary prevention are disability limitation, and rehabilitation.

Different risk factors in different age



Event-based surveillance

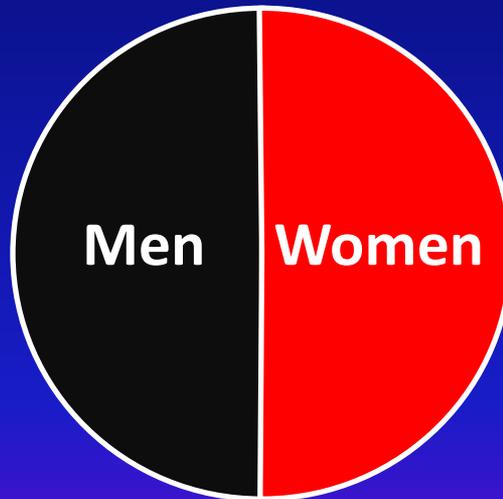


Population at risk

Proper denominator for CA cervix?

Total population

Population at risk



All of them still have cervix?

District A, population 100

Women age 1 – 25 years	20
Women age 25 – 69 years	50
Women age >69 years	30
new case of CA cervix	15

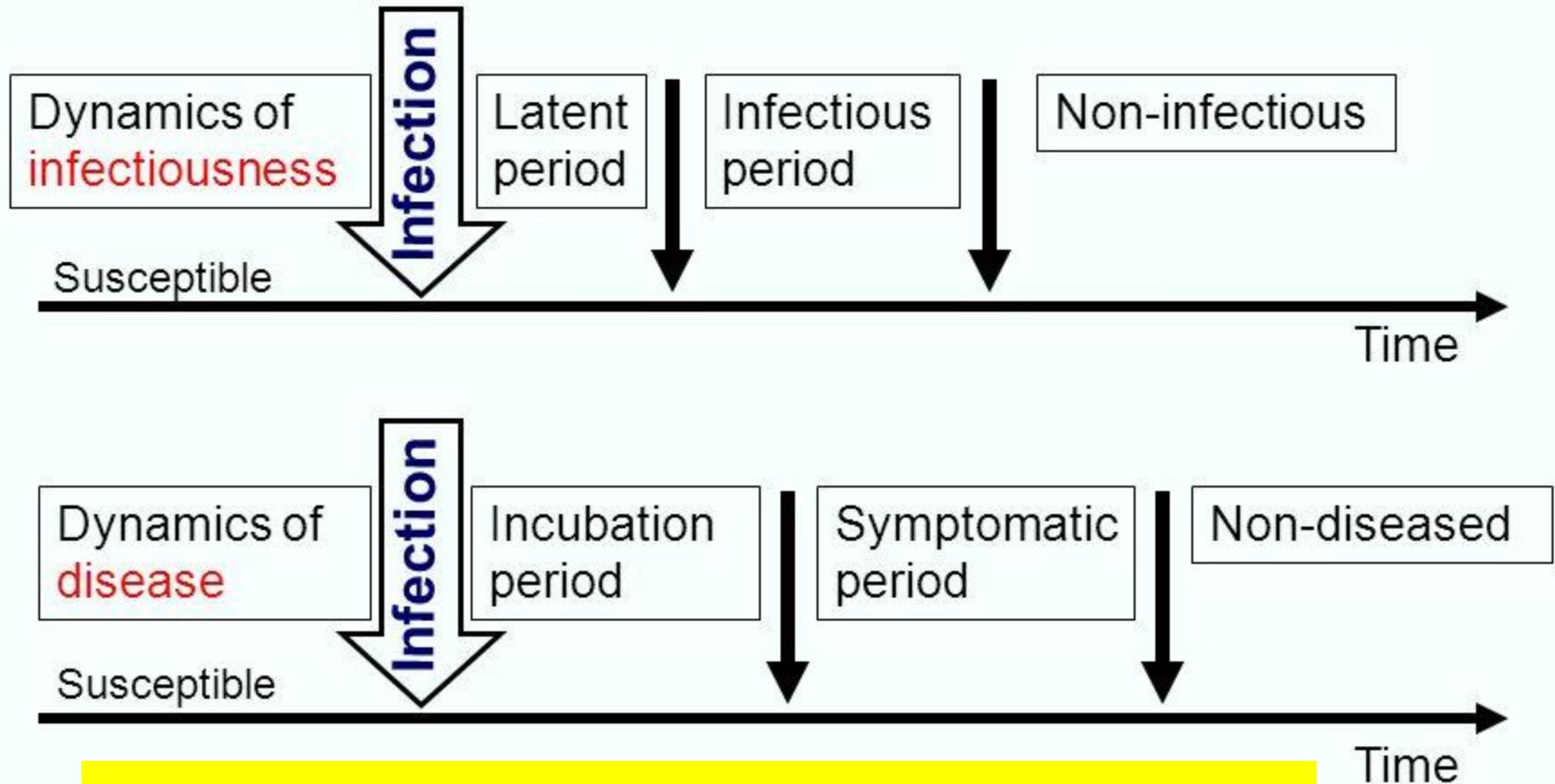
District B, population 100

Women age 1 – 25 years	50
Women age 25 – 69 years	20
Women age >69 years	30
new case of CA cervix	10

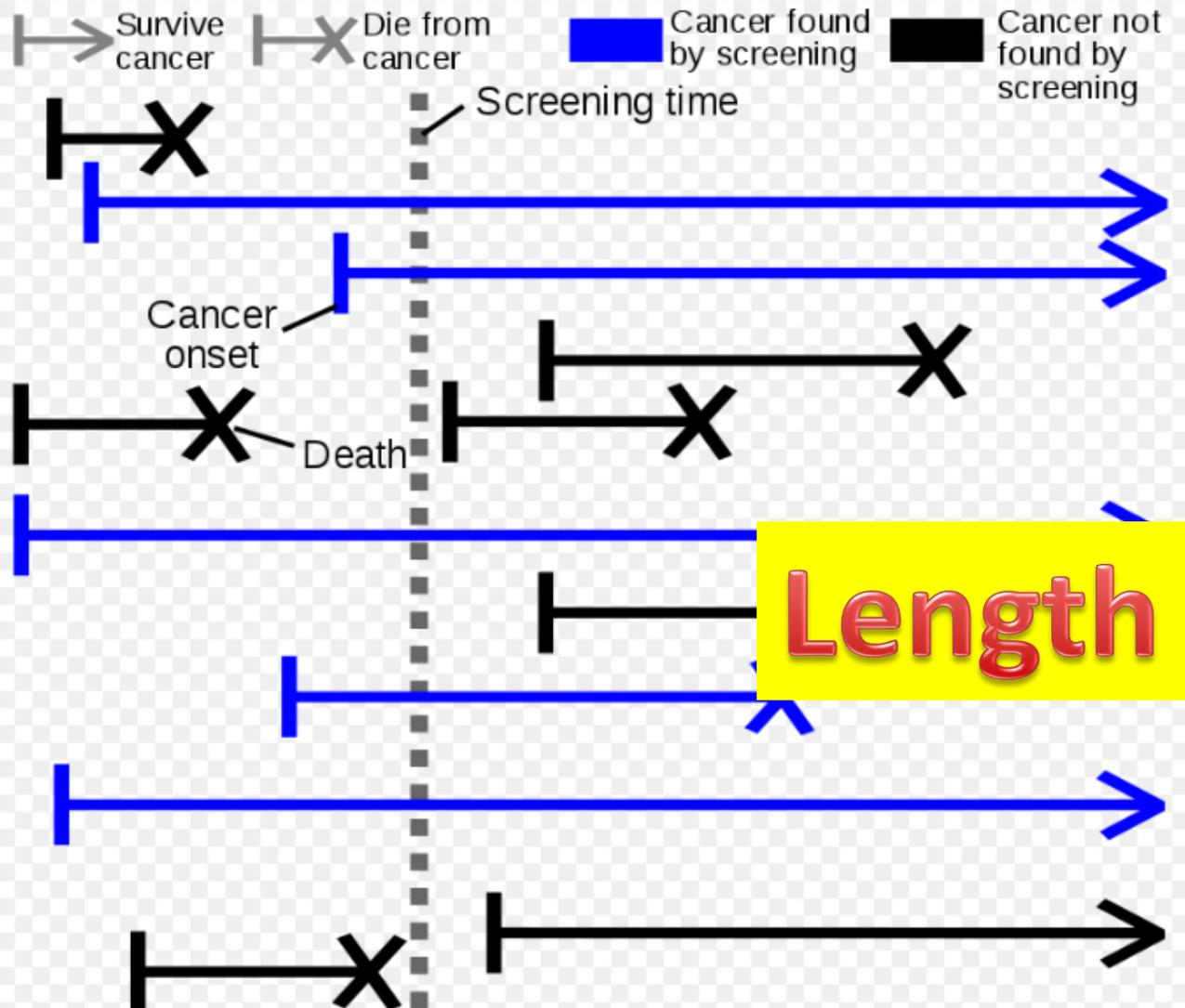
Which district is facing more problem?

Disease screening

Timeline for Infection



What if they are NCDs

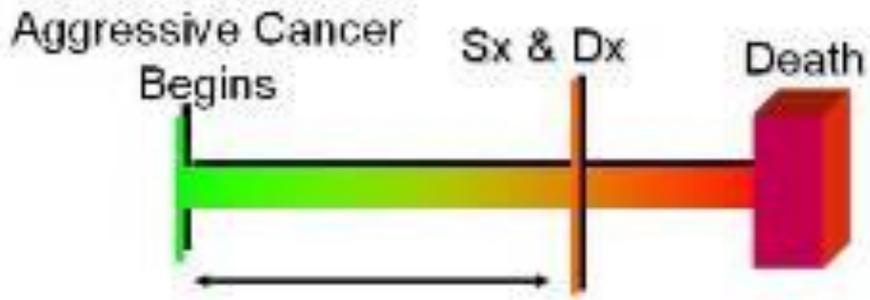
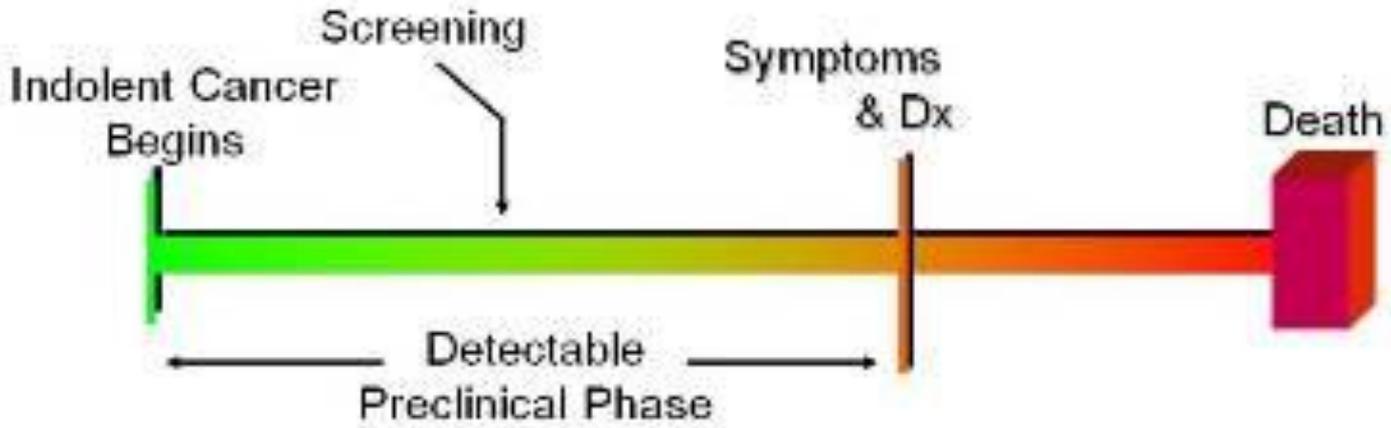


Length time bias

Length time bias in cancer screening. Screening appears to lead to better survival even if no effective treatment is given.

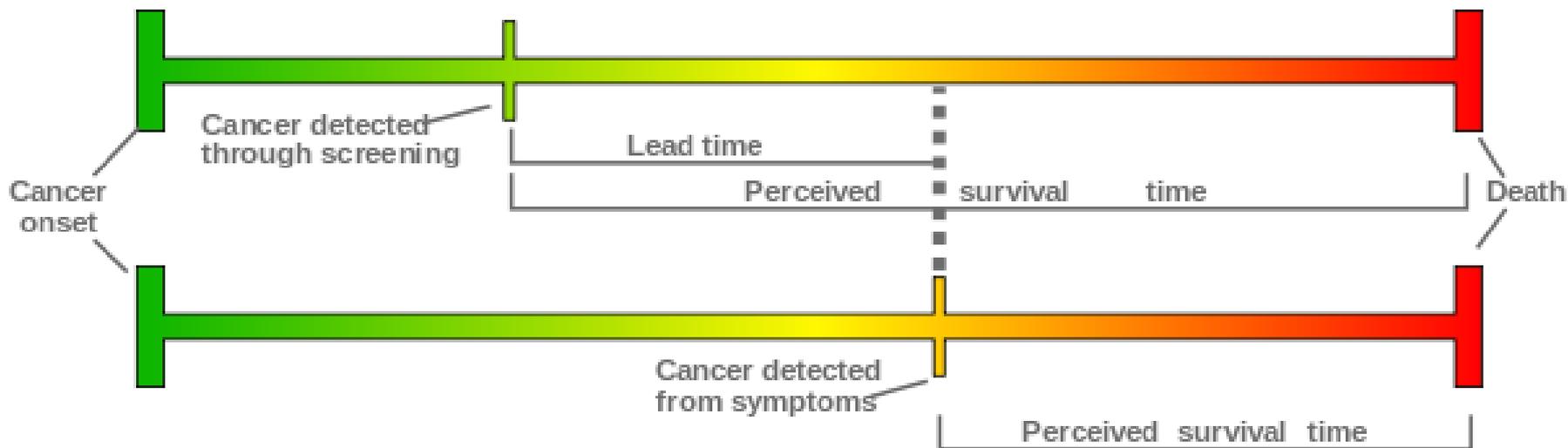
	Death from cancer	Survive cancer	% surviving cancer
Cancer discovered through screening	1	4	80%
Truly had cancer	7	5	41.7%

Length Bias



Screening tends to detect more indolent cancers.

Lead time bias



Lead time bias occurs if testing increases the perceived survival time without affecting the course of the disease.

Epidemiological measurement

Measure of frequency

- Prevalence
- Incidence

EX1: Diabetes in District A and B

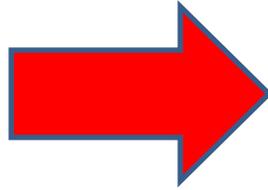
Which district is facing more problem?

Prevalence

	2013	2014	2015	2016
A	20%	22%	23%	24%
B	20%	20%	19%	19%

Case fatality

	2013	2014	2015	2016
A	1%	0%	1%	1%
B	6%	5%	9%	10%



Who is smoker?

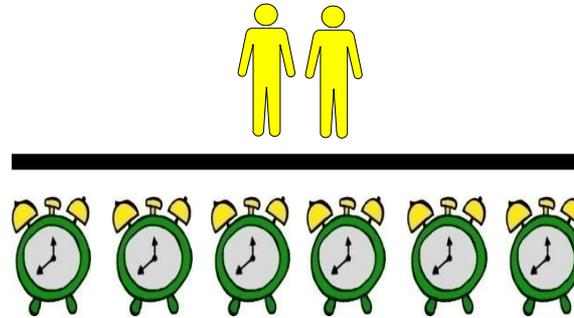
- A. Mr. John smoke once in his life time
- B. Mrs. Anne has quitted smoking for 5 years
- C. Mr. Smith has quitted smoking for 6 month
- D. Miss. Nan regularly smoke about 3 cigarettes per week

The risk increase by quantity and period of time of smoking

Incidence rate

Incidence Rate

=



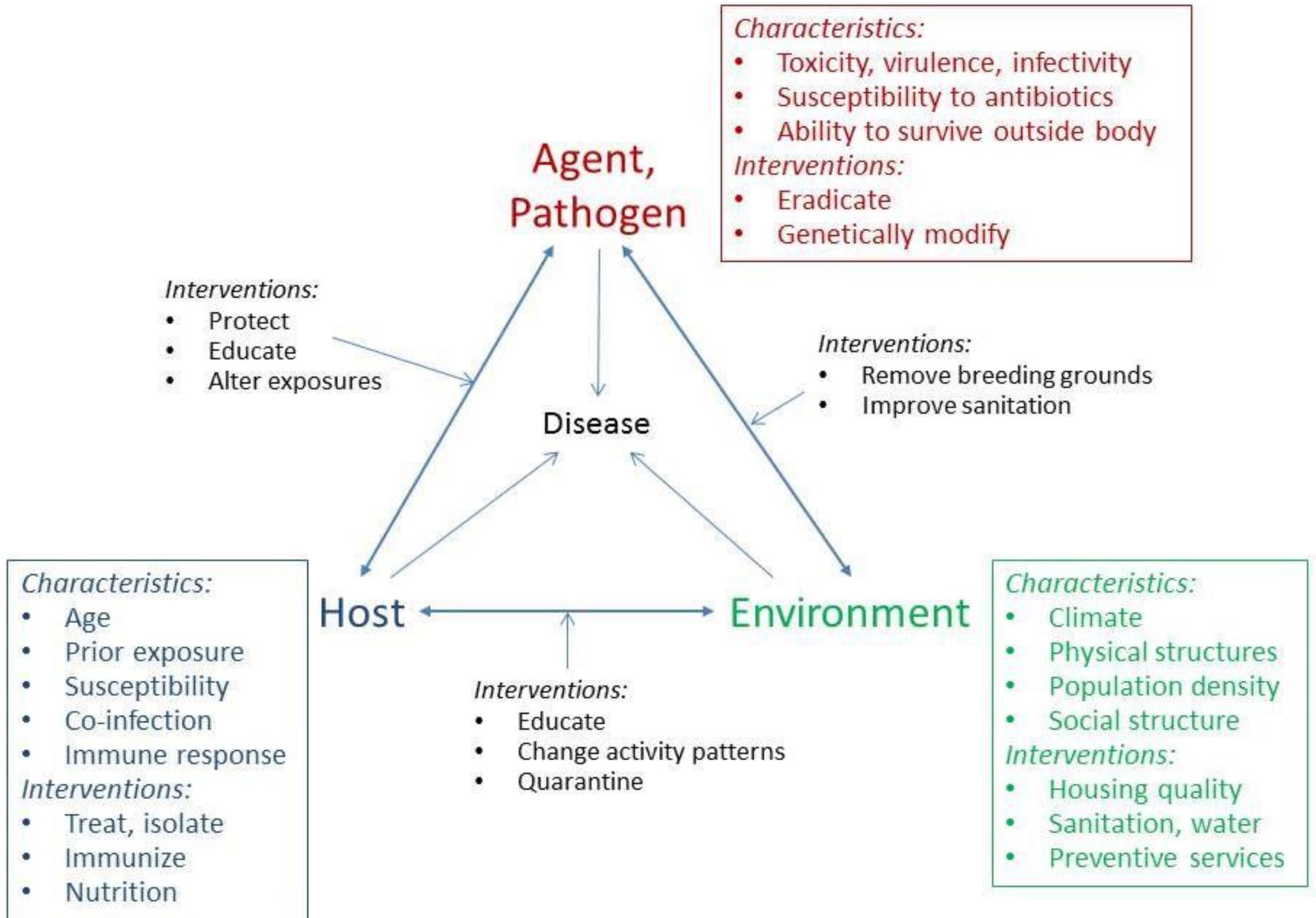
During
time t_1-t_2

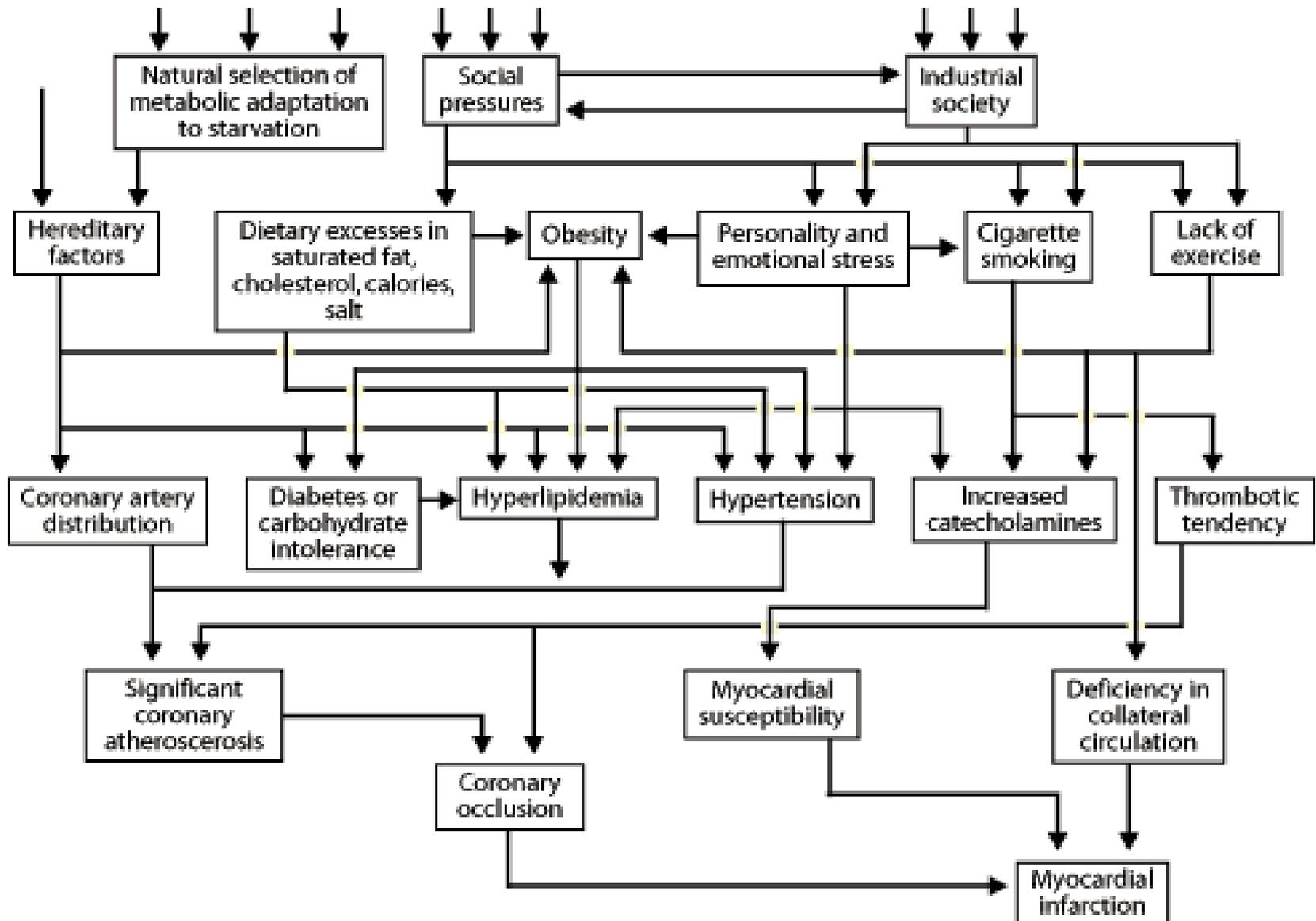
= person-time

Continuous Smoke 4 years and stop for 2 years, then smoke again for 3 years before becoming HT :

- person-time during 9 years = 4 + 3 = 7

Control and Prevention Measures





Tackling NCDs

- It is not always necessary to identify all of the components of a sufficient cause to reduce the occurrence of disease in a population. In fact, removal of one component cause (i.e. agent, host or environmental factor) can disrupt the dynamic to such an extent that the disease cannot occur.
- For example, although smoking is not sufficient to produce lung cancer, decreasing the smoking level in the population can lead to fewer cases of lung cancer, even if other component causes remain the same

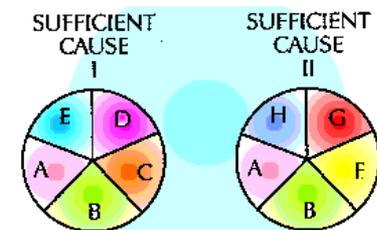


Table 2: “Best Buy” Interventions

Risk factor / disease	Interventions
Tobacco use	<ul style="list-style-type: none">• Tax increases• Smoke-free indoor workplaces and public places• Health information and warnings• Bans on tobacco advertising, promotion and sponsorship
Harmful alcohol use	<ul style="list-style-type: none">• Tax increases• Restricted access to retailed alcohol• Bans on alcohol advertising
Unhealthy diet and physical inactivity	<ul style="list-style-type: none">• Reduced salt intake in food• Replacement of trans fat with polyunsaturated fat• Public awareness through mass media on diet and physical activity
Cardiovascular disease (CVD) and diabetes	<ul style="list-style-type: none">• Counselling and multi-drug therapy for people with a high risk of developing heart attacks and strokes (including those with established CVD)• Treatment of heart attacks with aspirin
Cancer	<ul style="list-style-type: none">• Hepatitis B immunization to prevent liver cancer (already scaled up)• Screening and treatment of pre-cancerous lesions to prevent cervical cancer

Criteria of “Best buy”

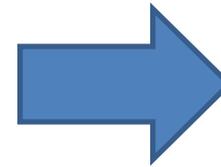
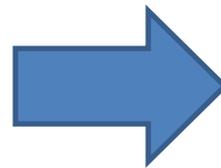
- i) health impact;
- ii) cost-effectiveness;
- iii) cost of implementation; and
- iv) feasibility of scale-up, particularly in resource constrained settings

*Interventions that do not meet all of these criteria - but which still offer good value for money and have other attributes that recommend their use - can be characterized as **"good buys"**

9 global NCD targets, 2010 - 2025

Target	Data sources
A 25% relative reduction in the overall mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases	BOD (Burden of disease Thailand)
At least 10% relative reduction in the harmful use of alcohol, as appropriate, within the national context	Excise department
A 10% relative reduction in prevalence of insufficient physical activity	NHES
A 30% relative reduction in mean population intake of salt/sodium	NHES
A 30% relative reduction in prevalence of current tobacco use in persons aged 15+ years	National Security Office
A 25% relative reduction in the prevalence of raised blood pressure or contain the prevalence of raised blood pressure, according to national circumstances	NHES
Halt the rise in diabetes and obesity	NHES
At least 50% of eligible people receive drug therapy and counselling (including glycaemic control) to prevent heart attacks and strokes	NHES
An 80% availability of the affordable basic technologies and essential medicines, including generics, required to treat major NCDs in both public and private facilities	SARA

Mutation



กินน้ำตาลเกิน 6 ช้อน/วัน

เสี่ยงต่อโรคมามากมาย



ปริมาณน้ำตาลในเครื่องดื่มยอดฮิต

- * โรคเบาหวาน
- * โรคหัวใจ
- * ภาวะจอประสาทตาเสื่อม
- * ไตเสื่อม
- * หลอดเลือดหัวใจตีบ

Sodium < 2000 mg/day

Higher Sodium Choices

Lower Sodium Choices

- Top slice of bread **200 mg**
- 1 teaspoon mustard **120 mg**
- 1 leaf of lettuce **2 mg**
- 1 slice of cheese **310 mg**
- 6 thin slices of turkey **690 mg**
- Bottom slice of bread **200 mg**



- Top slice of bread **110 mg**
- 1 teaspoon mustard **120 mg**
- 1 leaf of lettuce **2 mg**
- 1 slice of cheese **135 mg**
- 6 thin slices of turkey **440 mg**
- Bottom slice of bread **110 mg**

Total = 1,522 mg
per whole sandwich

Total = 917 mg
per whole sandwich



10 อันดับ สุดยอดอาหาร โซเดียมสูงปรี๊ด

1 สุกีน้า 1 ชาม ปริมาณโซเดียม 1,560 มิลลิกรัม	3 เส้นใหญ่ เย็นตาโฟ 1 ชาม ปริมาณโซเดียม 1,417 มิลลิกรัม
2 บะหมี่น้ำ หมูแดง 1 ชาม ปริมาณโซเดียม 1,480 มิลลิกรัม	4 ผัดซีอิ้ว 1 จาน ปริมาณโซเดียม 1,352 มิลลิกรัม
5 แกงส้ม ผักรวม 1 ชาม ปริมาณโซเดียม 1,130 มิลลิกรัม	7 บะหมี่กึ่ง สำเร็จรูป 1 ห่อ ปริมาณโซเดียม 977 มิลลิกรัม
6 ส้มตำ อีสาน 1 จาน ปริมาณโซเดียม 1,006 มิลลิกรัม	8 ผัดผักนึ่ง ไฟแดง 1 จาน ปริมาณโซเดียม 894 มิลลิกรัม
9 ข้าวหมู กรอบ 1 จาน ปริมาณโซเดียม 700 มิลลิกรัม	10 ปอเปี๊ยะสด 1 จาน ปริมาณโซเดียม 562 มิลลิกรัม

ที่มา: สถาบันโภชนาการ มหาวิทยาลัยมหิดล

rabbit today

