Sustainable well-being and health

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080912　In search of Sustainable Well-being

Sustainable well-being and health - my standpoint

Human ecology - understanding human populations in [respective] ecological context. Procurement of food, reproduction, and degradation (contamination) of environment, as well as resultant status including nutritional status, health, demographic structure have been our major topics.

Toxicology – my own background

Outline

- major changes in our life-style
- health as a goal
- what kind of health matters?
- sustainability in the context of environmental health
- adaptation to sustainable world

Two major changes in our life-style

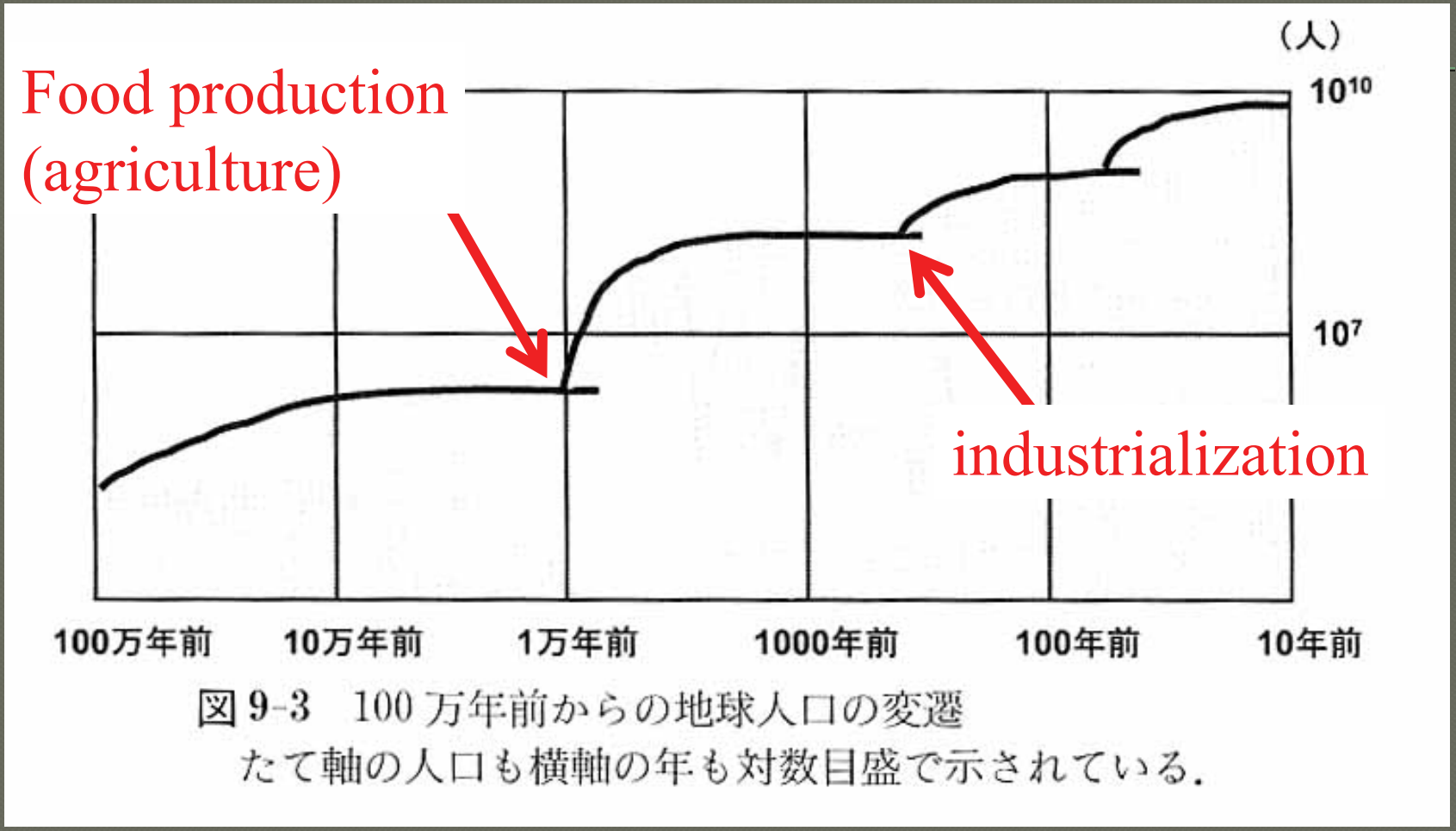


図 9-3　100 万年前からの地球人口の変遷
たて軸の人口も横軸の年も対数目盛で示されている.

Source: Ohtsuka et al. (2002)
"Jinrui-seitaigaku" [Human ecology]

Two major changes in our life-style (continued)

Hunter-gatherers

industrialized

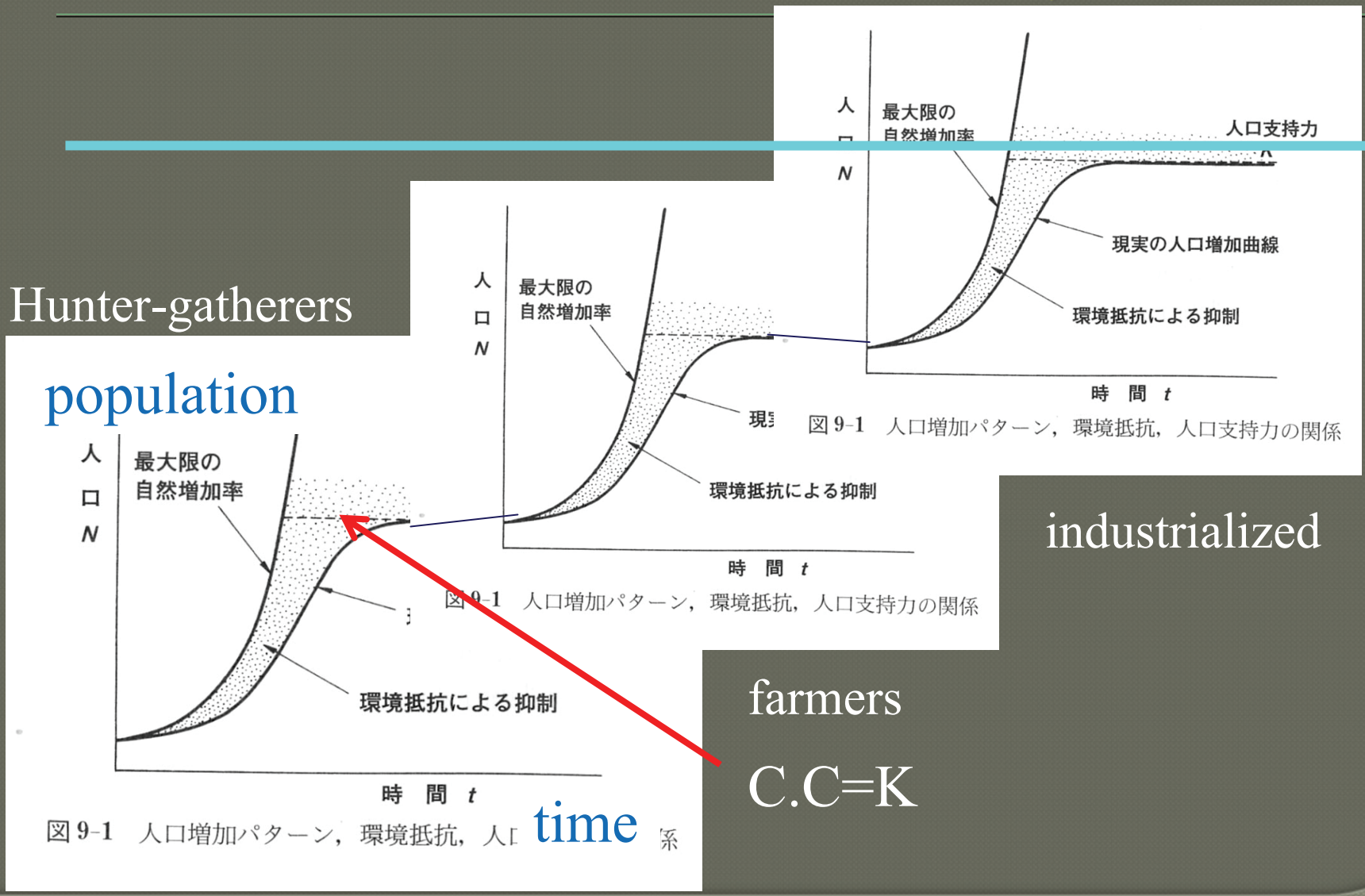
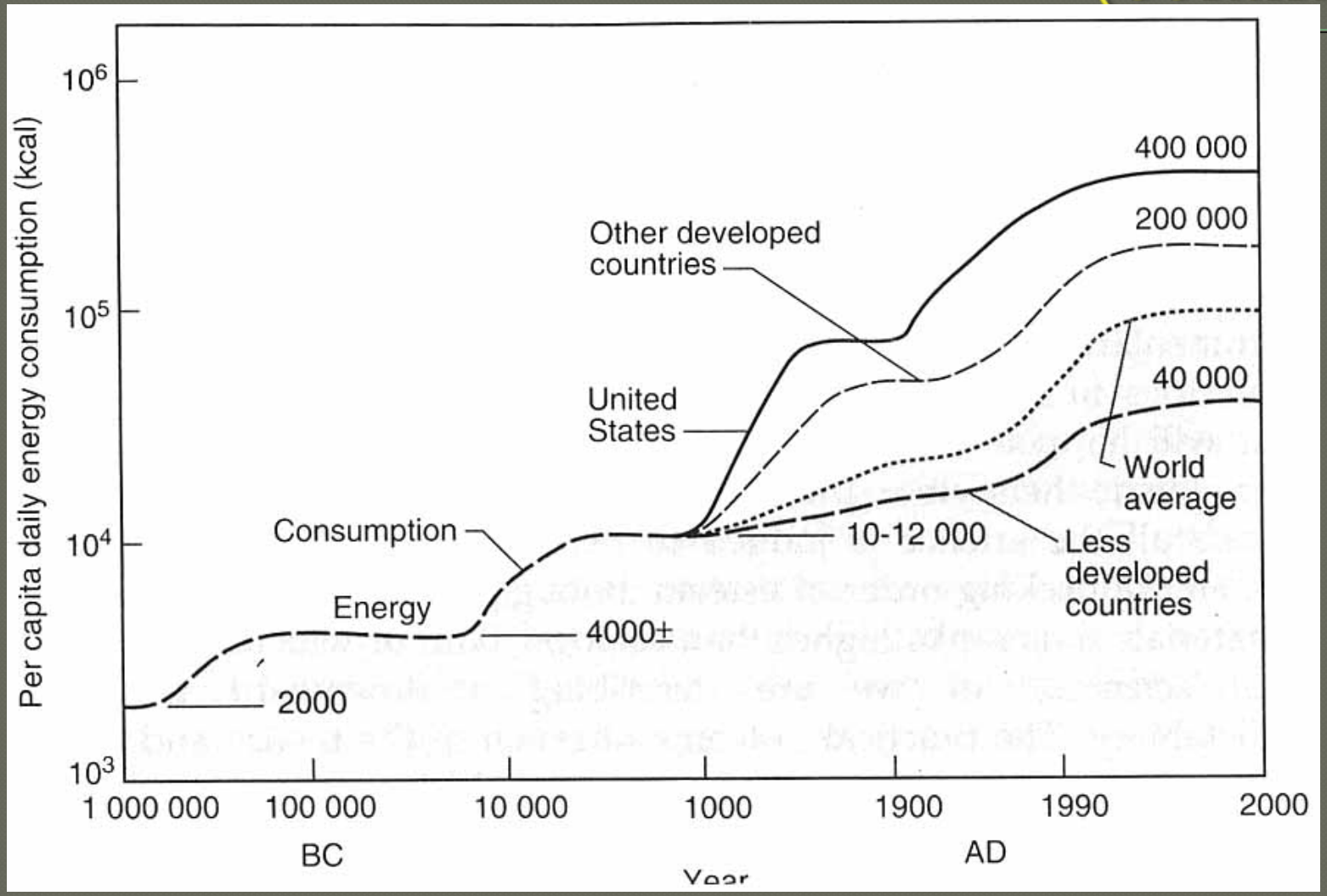


図 9-1 人口増加パターン，環境抵抗，人口支持力の関係

Two major changes in our life-style (continued)



Source: Simmons, 1989

reduction of CO_2 emission is *a method*

- Not the goal
- then, what is the goal?
  - to establish a sustainable society
    - then, what should be sustained?

Health as a goal

- What should be sustained – not so much discussed >> basis of mitigation planning
- Why Human health is important?
  - Resource for vital economy, basis for resilience of the society
  - a component of well-being
    positive and equitable human experience is the core of sustainability …. Health is one of its component (McMichael, 2006)
  - an integrated consequence of climate change; i.e., environment & ecosystem
  - Once lost, huge cost to restore

What IPCC report tells about it?

- AR4 WG2 Chap.8 "Human Health"
- current situation
  - Heat wave/cold wave; flood/wind/storm; drought/nutrition; water and diseases (diarrhea); air quality and diseases (ozone pollution); air-borne allergens (e.g., pollen)
- future trends
  - "the use of scenarios to explore future effects of climate change …. is at an early stage of development"
  - key factors that affect the future trend of health –
    * ageing of populations, urbanization in developing countries, economic growth (with negative effects - increased social stress and environmental degradation)
  - diarrhea in developing countries: 2-5% increase by 2020; malaria (region dependent); Dengue 5-6B at risk in 2080

Health as a goal
What MEA report tells about it?

"Millennium Ecosystem Assessment" (2005, UN)

- Health synthesis [summary]

- Ecosystem services: water, food, timber/fiber/fuel, biological products (e.g., medicine), nutrient and waste, infectious disease regulation, cultural/spiritual/recrea-tional services, climate regulation
- Risk of irreversible/non-linear change in ecosystem → catastrophic effect on health may occur
- future scenarios:
  global/regional * reactive/proactive to ecosystem change = 4 scenarios ….
  all scenarios → increasing consumption of ecosystem service, loss of diversity, degradation of ecosystem services

Health as a goal
A review of scenarios

- Reviewed – 8 studies with 31 scenarios

  Only 15% of scenario – touched health (Marten and Huyen, 2003)
- Why such small attention?
  - difficulty – uncertainty (Marten & Huyen, 2003; McMichael 2008) >> systematic inventory needed

- future health scenario [stage of health transition] major drivers for health – found in the scenarios
  - medical technology
  - emergent and re-emergent infectious diseases
  - sustainable health

What kind of health matters?

WHO (1948, update proposed 1999): Health is a dynamic state of complete physical, mental, spiritual and social well-being and not merely the absence of disease or infirmity

When "sustainability" is discussed, health should also refer to subsequent (future) generations as well as ecosystems.

Individual health

Population health

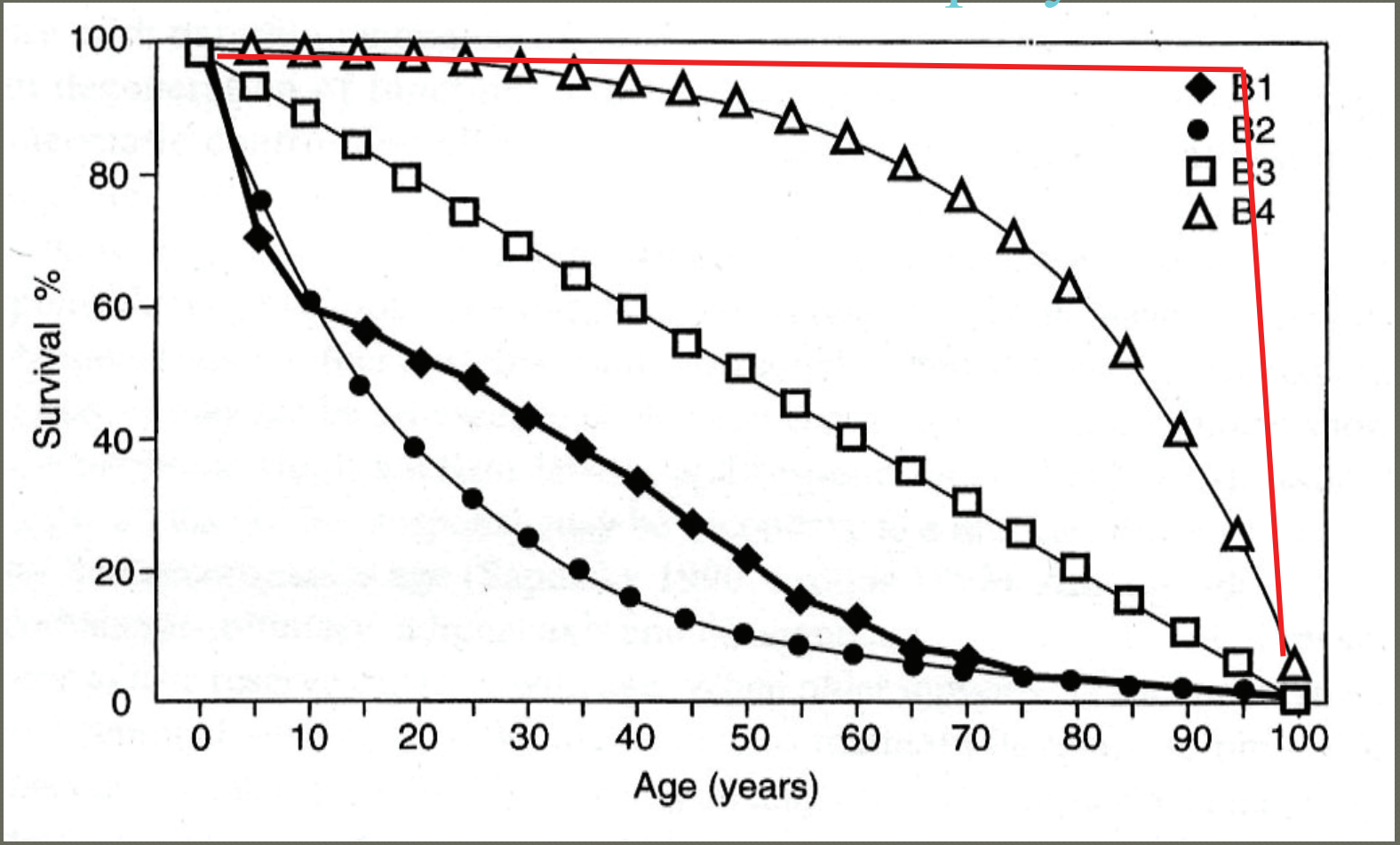
Ecological [view on] health

Pursuing health may result in conflict

- within individual or within a population
  - valuation by the individual or the population e.g., irrigation – infectious diseases (mosquito, snail)

- between populations
  - discussion among all the stakeholders (MEA)
  (if future generations- ??)
- with ecosystems
  DDT, biomass fuel - food, biomass fuel - respiratory disease (developing country)

What kind of health matters? Inequity in health



B1: Traditional populations (e.g.,Yanomami, !Kung, Turukana)
B4: Modern-day populations (e.g., Japan, USA, UK, Sweden)

(sources: Stinson et al. (2000) Human Biology: and Evolutionary and Biocultural Perspectives, Fig 13.1)

sustainability in the context of environmental health

- Environmental health
  - dealing with the effect of "environmental factors" on human health
  - env factors …. Biological, physical, chemical: purely social, psychological factors or purely genetic health conditions may not be covered
  - increasing impact of human activity on such environmental factors
- Similarity -
  human activity > environment > society/health

sustainability in the context of environ health

relevance of environment in health as a whole

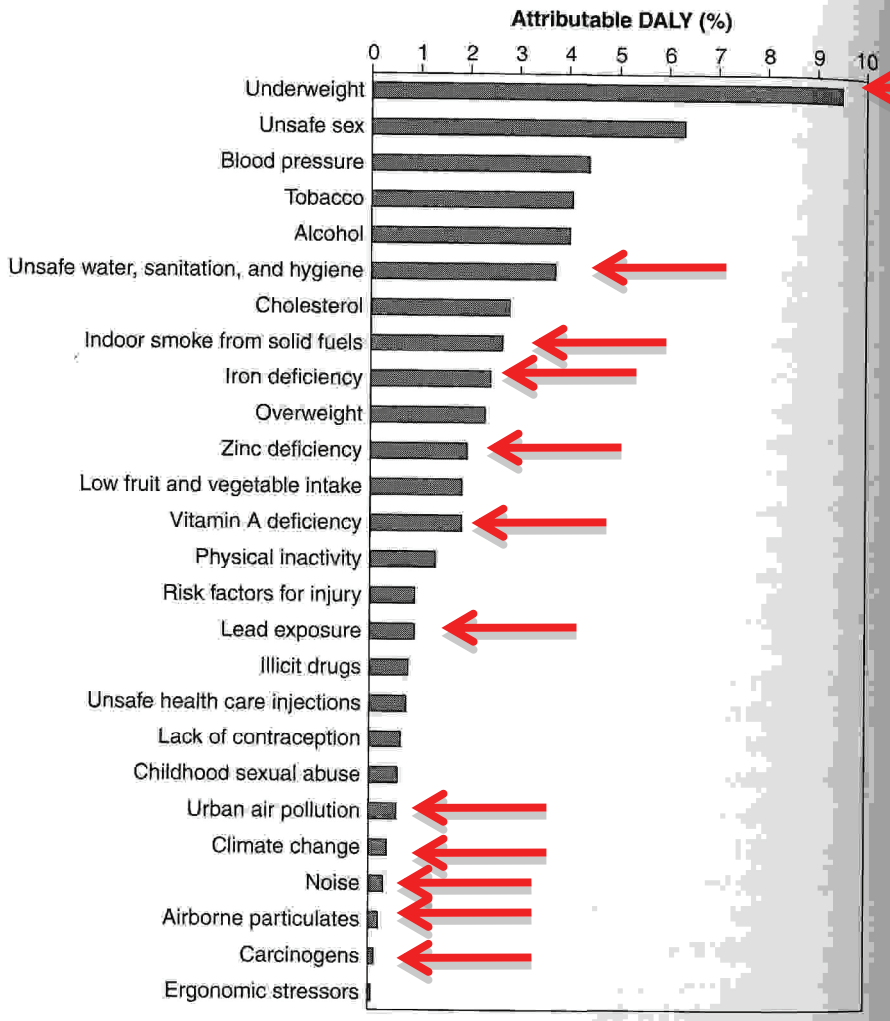


Figure 4.5. Contribution of selected health determinants to the global burden of disease.

- DALY = disability-adjusted life years
  (no disability=0
  Most severe = 1)
- Substantial contribution of environmental factors
- Quarter of deaths from environmental are avoidable (WHO, 2007)
- Disease burden of climate change 0.4%
  of total burden in yr of 2000 (WHO)

Source: Young (2005) "Population health"

Sustainability in the context of environ health Major life-style changes and biological factors

- Hunter-gatherers
- Agriculture
- Urban society (prior to industrialization)
- Industrialized society

- Data –
  observation of contemporary hunter-gatherer populations,
  "paleopathology" (bone, soft tissues, excreta)

Sources: based on Mascie-Taylor (1993), McEroy & Townsent (1996), Diesendorf & Hamilton (2000)

Sustainability in the context of environ health
Major life-style changes and biol. factors (1)

- **Hunter-gatherers**

  acute infectious diseases – rare;
  chronic infection – malaria, helminthiasis, accident/ trauma/infanticide

- **Farmers**

  * high population density; settlement providing place for mosquito, rats, snails; zoonosis → acute infectious diseases (mumps, *measles, rubella,* chicken pox, *small pox*);
  * dependence on small number of crops (rice, wheat, maize, etc.) → famine, malnutrition, nutritional deficiency

Sustainability in the context of environ health

Major life-style changes and diseases (2)

- Urban society (prior to industrialization)

  *city metabolism – provision of water, food; management of waste >> contamination leads to wide-spread infections (e.g., typhoid, cholera)

  * low hygiene – mortality higher than rural area

- Industrialized society

  * major causes of death - smallpox, pest, tuberculosis, typhoid

  * decreased mortality by infectious disease (even before era of drugs and health engineering)

  * increased degenerative diseases

  * decreased fertility ("demographic transition")

Sustainability in the context of environ health

Major life-style changes and diseases

- Hunter-gatherers
- Agriculture
- Urban society (prior to industrialization)
- Industrialized society

Impact of life-style changes on health

- not straightforward
- not only quantitative, but also qualitative changes observed
- fertility also affected

Sustainability in the context of environ health

chemicals - happenings

- Minamata disease
  thalidomide
  (optical isomer)

  No effects on directly exposed indivs

- CFC

  least toxic, stable

- "low-dose" effect

  Unusual D-R function; conventional toxicological tests may fail to detect toxicity

- CO_2 !

Sustainability in the context of environ health

Are we good foreseers ?

Adaptation to sustainable world

- we, our social systems, and our way of thinking … "shaped" by the current "unsustainable" world

- Impact of sustainable world on human – largely unknown
  - high energy >> low energy
  - high consumption/high disposal >> circulating
  - exploit ecosystem >> conserve ecosystem

Two types of human adaptations

- biological:
  - genetic, ontogenetic (physiological/biochemical)
  - change – occurs in organism in response to environmental change/pressure
  - genetic adaptation – after many failures (death of non-adapted indivs); needs considerable time (compared to usual life span)
- cultural:
  - change - organism changes the environment to make it more easy for its survival
  - flexible, short-term - upon failure, another set of "cultural" adaptation might take place.

Two types of human adaptations

- cultural:

Even no failure, new environment emerges, which may require another set of cultural adaptation (cf. food production, industrialization & diseases)

→ chain of adaptations

→ "self-domestication" may occur

Tentative conclusions

- question is *not* only "how to reduce GHG".
- human health should be one of the key components in designing sustainable society.
- future health trend appears not easy to predict; clearly, more information needed, but it should be noted that change in lifestyle may induce variety of [unexpected] changes in health-associated events
- cultural adaptation is a powerful mode of adaptation, but it may fail or may trigger a chain of adaptations.
- we need to devise a system, which allows and accommodates such unexpectedness or failures

Thanks a lot !