Changing Environment – Changing Health

Advocacy and Capacity Building Training Programme

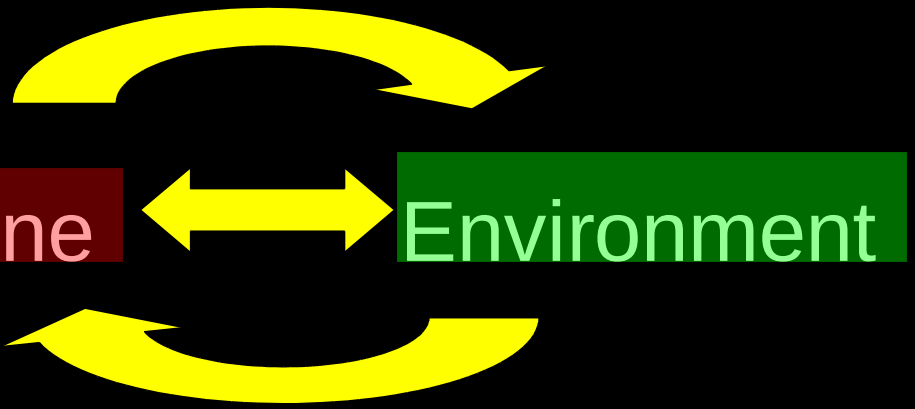
EEN and PSR

31 January 2005, Brussels, Belgium

Katherine M. Shea MD, MPH

Health is

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

- produced by Gene  Environment

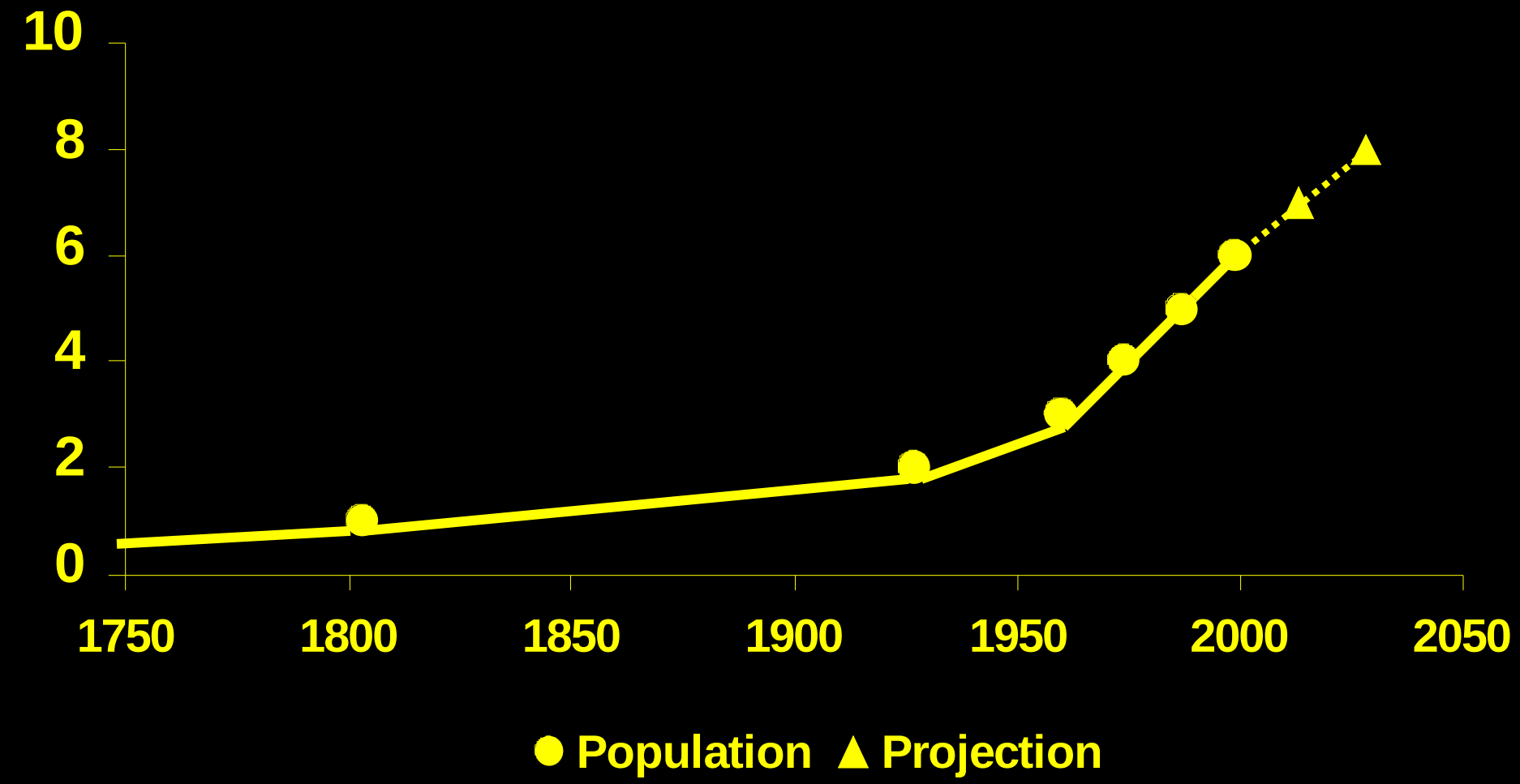
Unique Times

Blue Moon NASA

Unique Times

Earth Rise, Apollo 16

Population


10
8
6
4
2
0
1750
1800
1850
1900
1950
2000
2050
Population
Projection

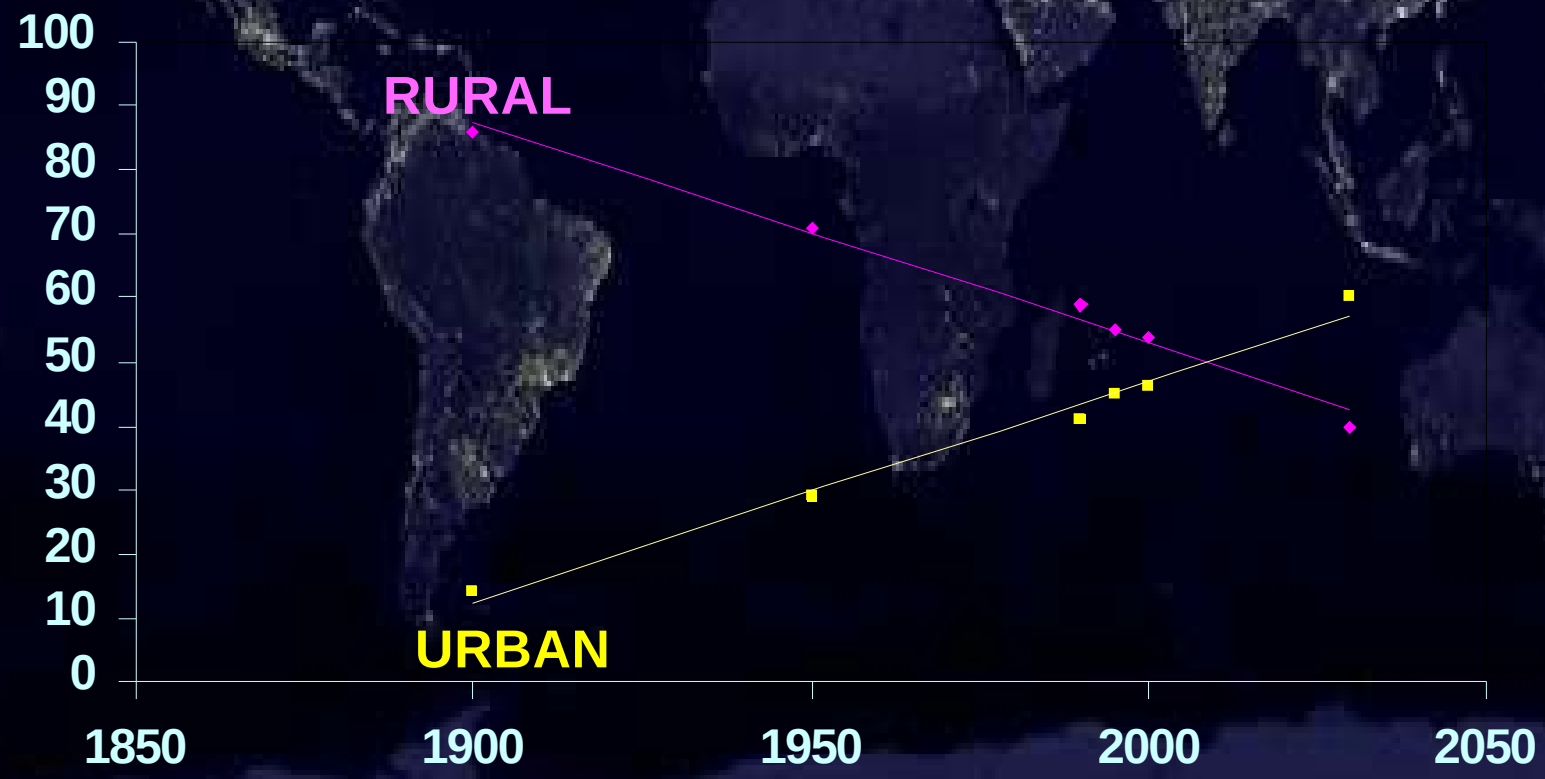
Not just how many, but

HOW

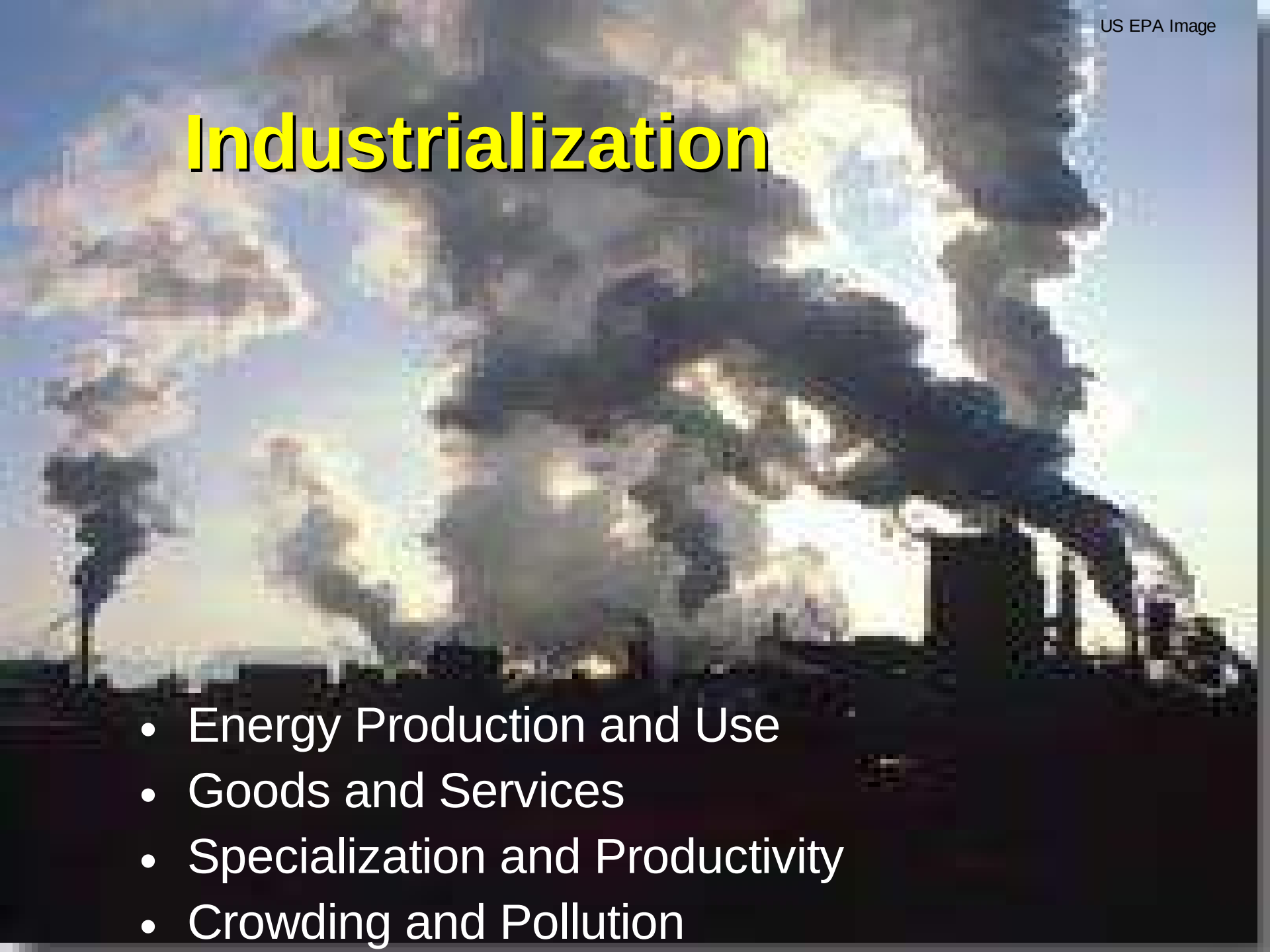
are humans living on earth….

“Overpopulation” from the Millennium Series
by Victor Cauduro Rojas *With permission from the artist*

Urbanization



City Lights, NASA



Industrialization

- Energy Production and Use
- Goods and Services
- Specialization and Productivity
- Crowding and Pollution

Globalization

- Transportation
- Trade
- Technology
  - Information
  - Communication
- Transformation
  - Physical
  - Cultural

Earth is a Closed System

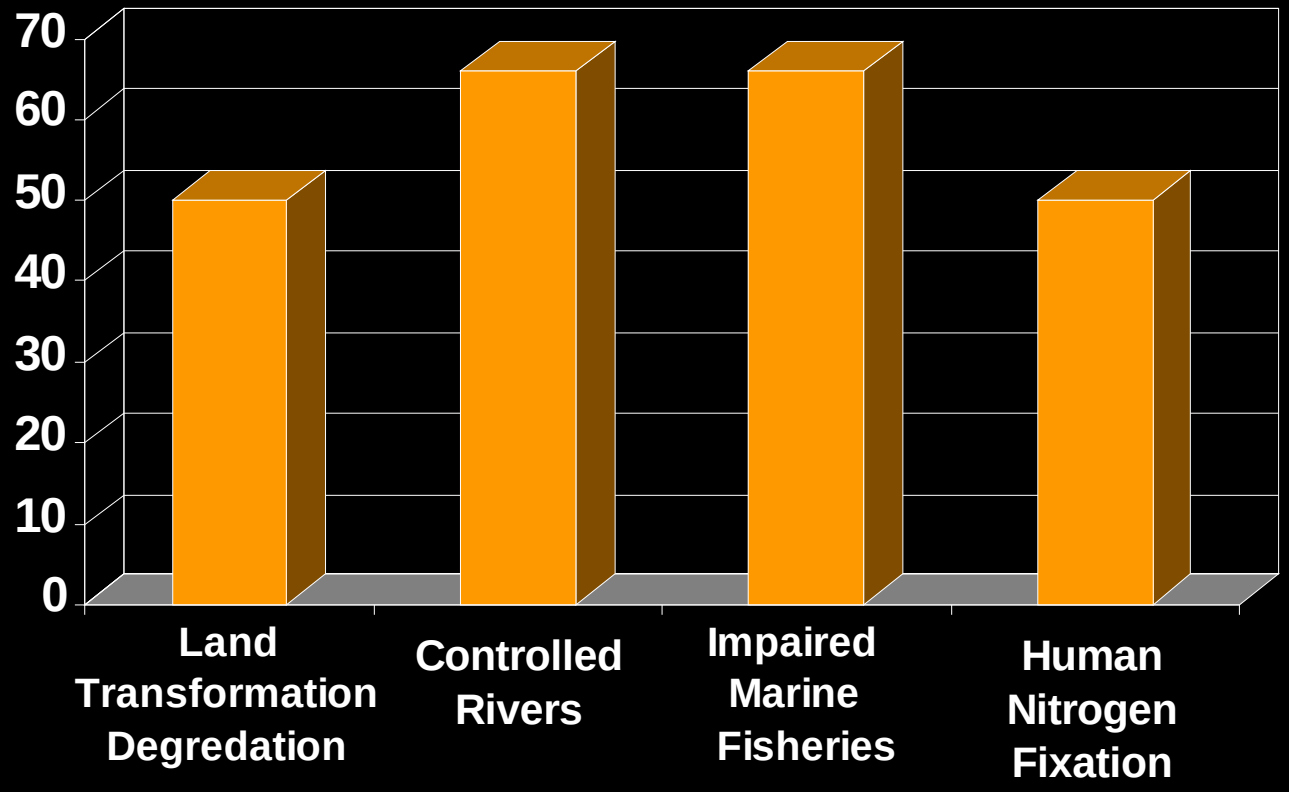
Earth Observatory, NASA

Unprecedented Changes

Melting Arctic Ice
Earth Observatory, NASA

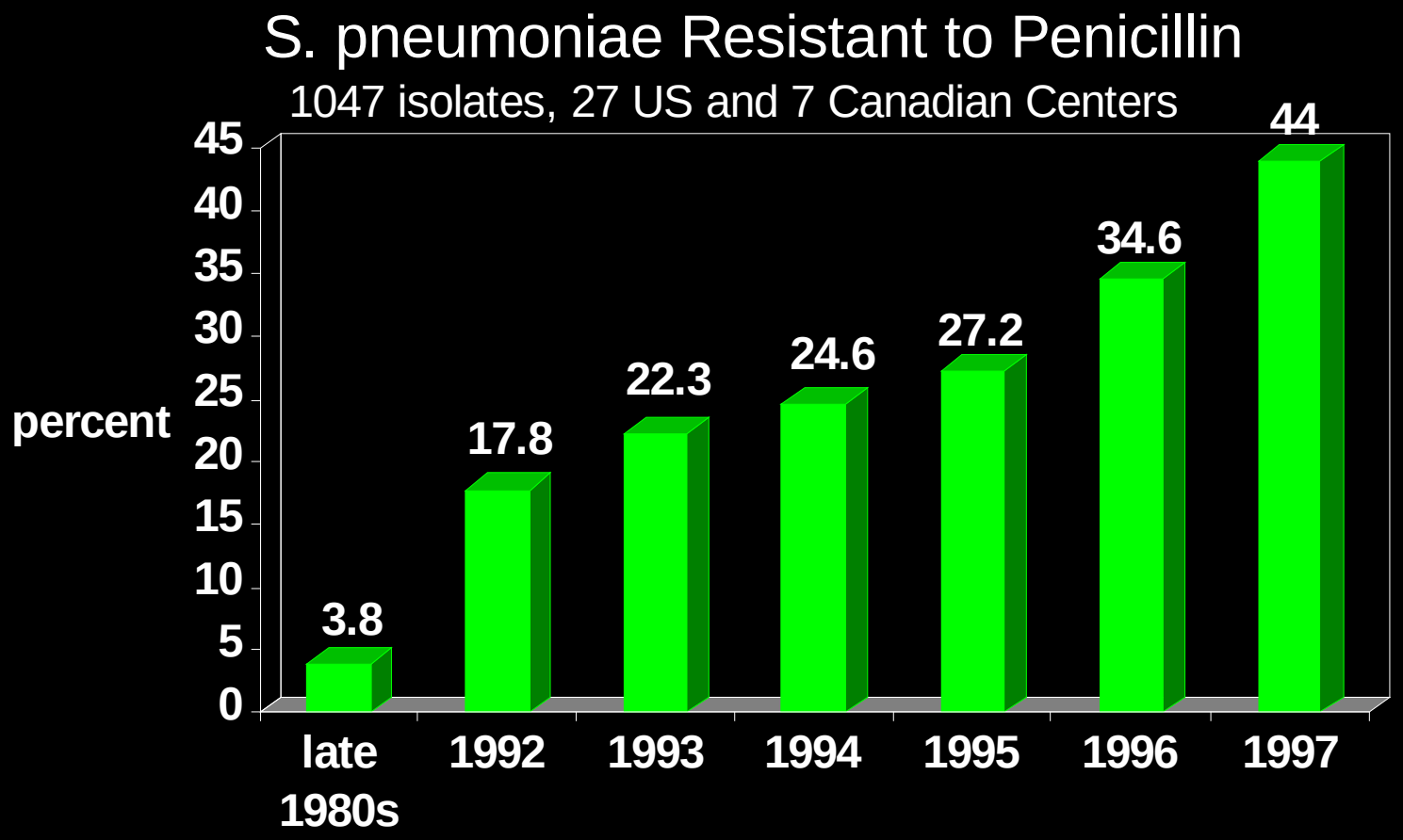
- Planetary Life Support Systems
  - Climate Change
  - Stratospheric Ozone
- Distribution & Abundance of Life
  - Land Transformation
  - Over Hunting/Fishing
  - Invasive/Exotics
  - Extinction
- Acceleration of Genetic Change
  - Creation/Use of Chemicals
  - Bioengineering

Magnitude of Human Impact
GLOBAL SCALE



Vitousek, 1997 Science 277:494

Magnitude of Human Impacts Molecular Level



Doern, et. al. Clin Inf Dis (1998) 27:764

Effect of Human Impact
IRREVERSIBLE

Species Extinction Rate:

Previous 65 Million years

1 species / million / year

Now

1000 species / million / year

(22-47% plants endangered)

Raven, Science (2002) 297: 954

Pitman, Science (2002) 298: 989

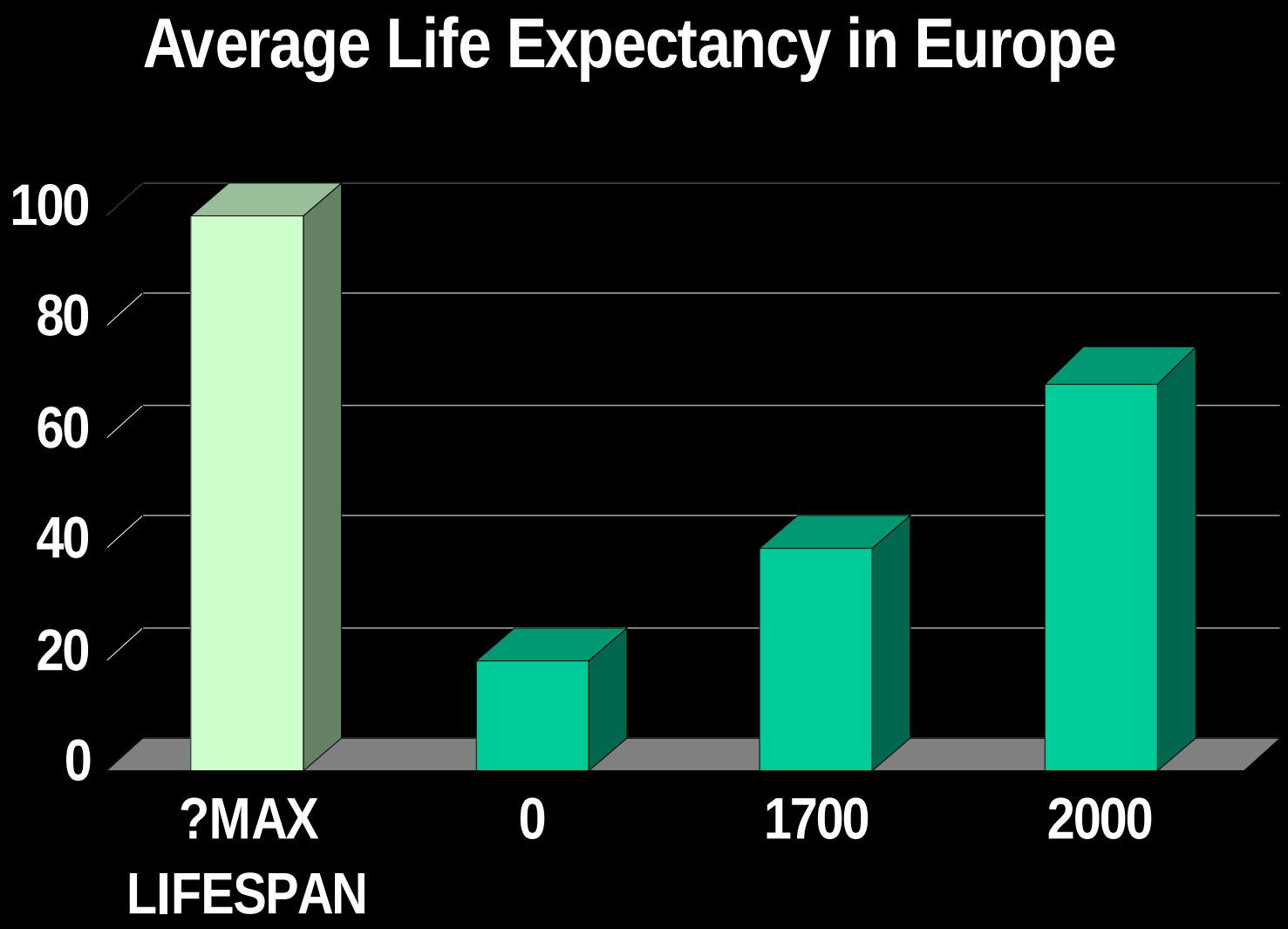
Florida Keys National Marine Sanctuary, NOAA

Changing Environment:
Anthropocene Epoch

Hudson River, New York City, 1996, NASA

- Scale of Change
  - Microscopic Planetary
    - Air
    - Water
    - Food
    - Fiber
- Rate of Change
  - Decades not Millennia
- Distributional Inequity
  - Within & Among Nations/Regions

Changing Health – Good News



Changing Health

Epidemiologic Transition

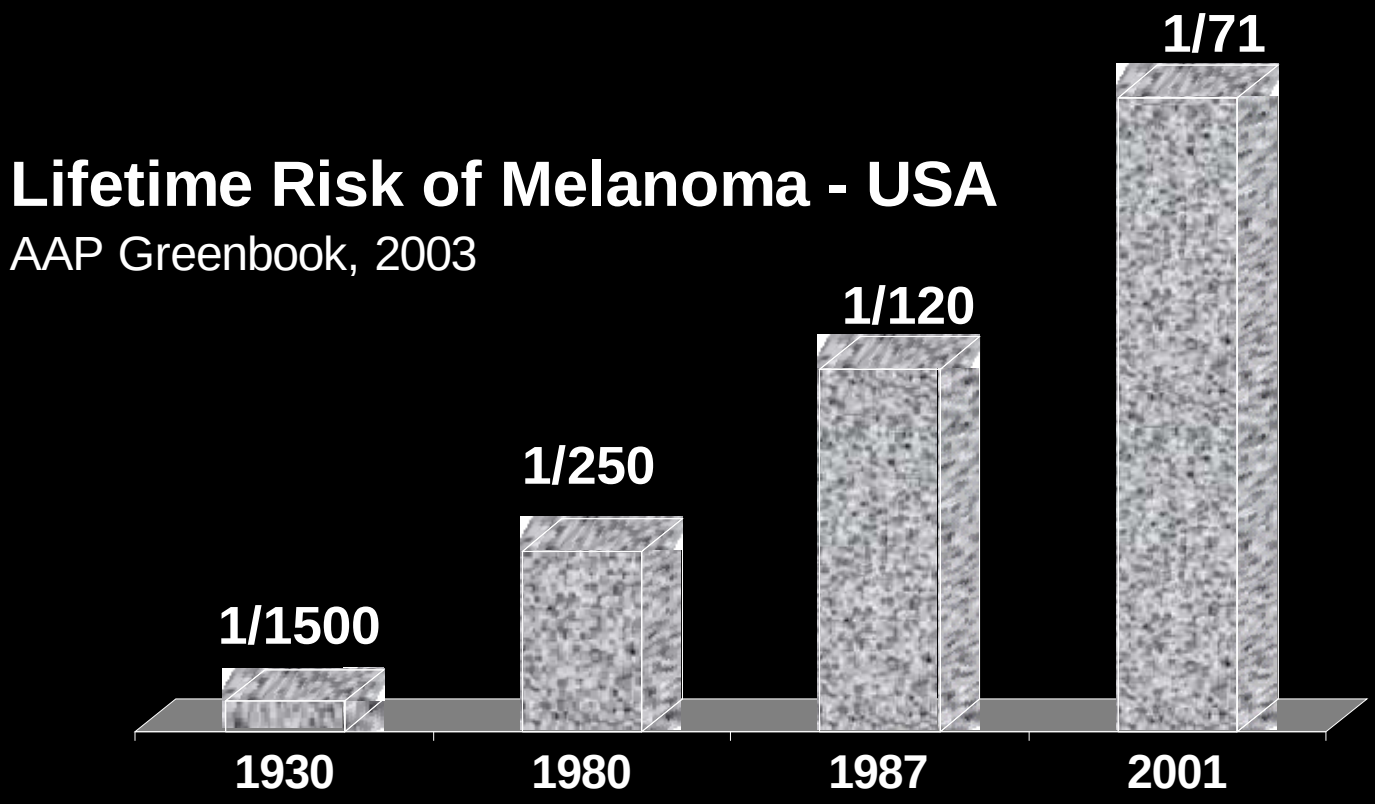
- Decreasing
  - Infant mortality
  - Infectious disease
- Increasing Lifetimes
  - Chronic Diseases
  - CVD, Cancer

Changing Health

EHP Image

- Are we measuring direct adverse health effects linked to our changing physical environmental?
  - Stratospheric Ozone Depletion
  - Global Warming
  - Globalization
  - Chemical Toxicities

Stratospheric Ozone Depletion

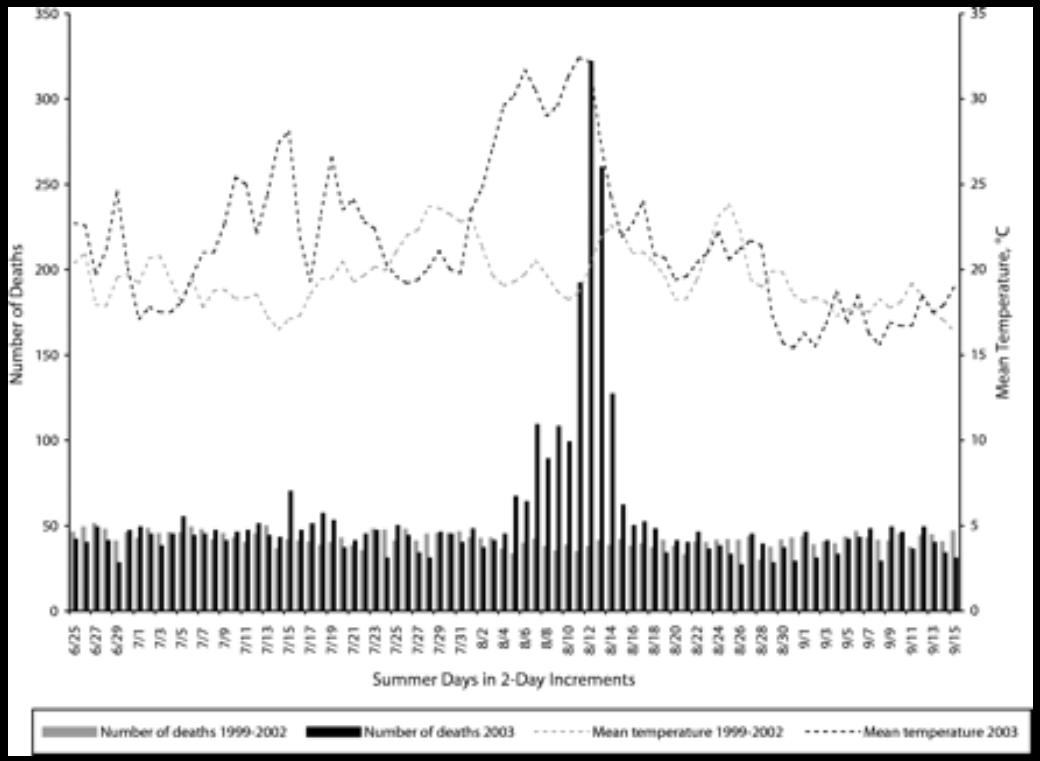


- CMM in 15-19 yo increased 2.6%/yr from 1973-95
- 1 in 5 Americans gets Non-Melanoma Skin Cancer
- More cataracts, immune deficiencies?

Global Warming:

- Increased Heat Related Deaths
- Increased Air Pollution Related Illness and Death
- Injury, Death and PTSD from Extreme Weather Events
- Increased Waterborne Diseases
- Increases in Vector-borne Illness

Global Warming:
Heat Related Death and Illness



Paris, August 2003, 475 excess deaths
(14,800 excess deaths in France)

- Decline in Winter Deaths
  - Will NOT Offset
- Increase in Heat Related Death/Illness
- Vulnerable Populations
  - **Elderly**
  - Debilitated, Immobile
  - Very Young
  - Urban Dwellers
  - Poor
- Adaptive Behaviors
  - Available but at a cost

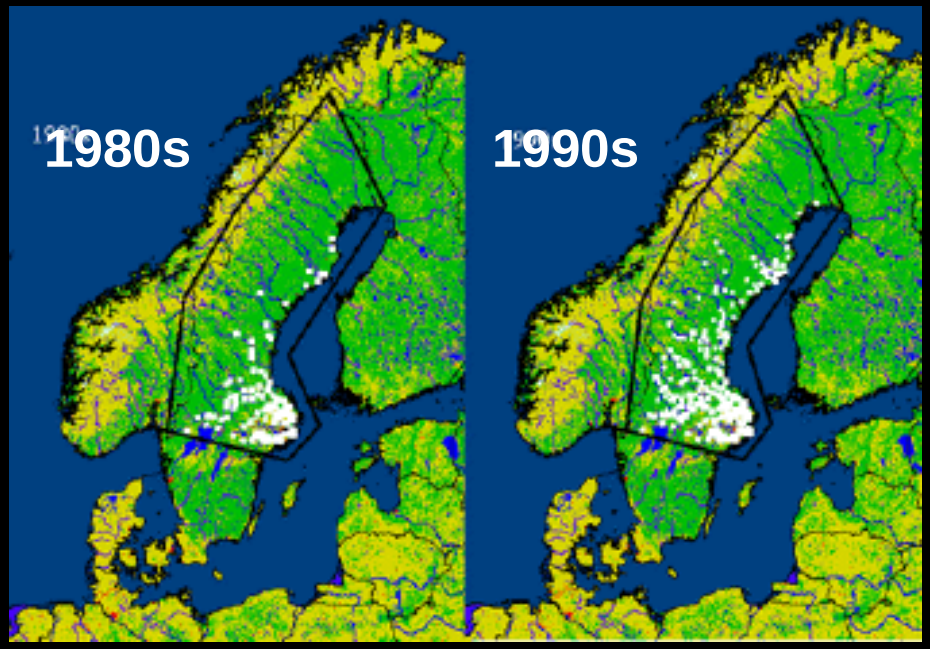
Am J Public Health (2004) 94: 1518-1520

Global Warming:
Air Pollution Related Illness/Death

- Hot Weather Outdoor Pollution
  - Ground-level Ozone: +4^{o}F +5% [O_3]
  - Change in bio-allergens (in urban areas)
- Increased Energy Use
  - Increased Ambient Air Pollution
  - Increased Greenhouse Gases
- Increased Time Inside indoor pollution
- Vulnerable Populations
  - Children, Elderly
  - Medically Debilitated
  - The Poor

Global Warming:
Vector-borne Illness

- Enhanced Infection Prevalence
- Prolonged Transmission Season
- Extended Range – latitude and altitude



Lyme Disease vector, *Ixodes ricinus,* moving north as winters warm

Lindgren, EHP (2000) 108:119

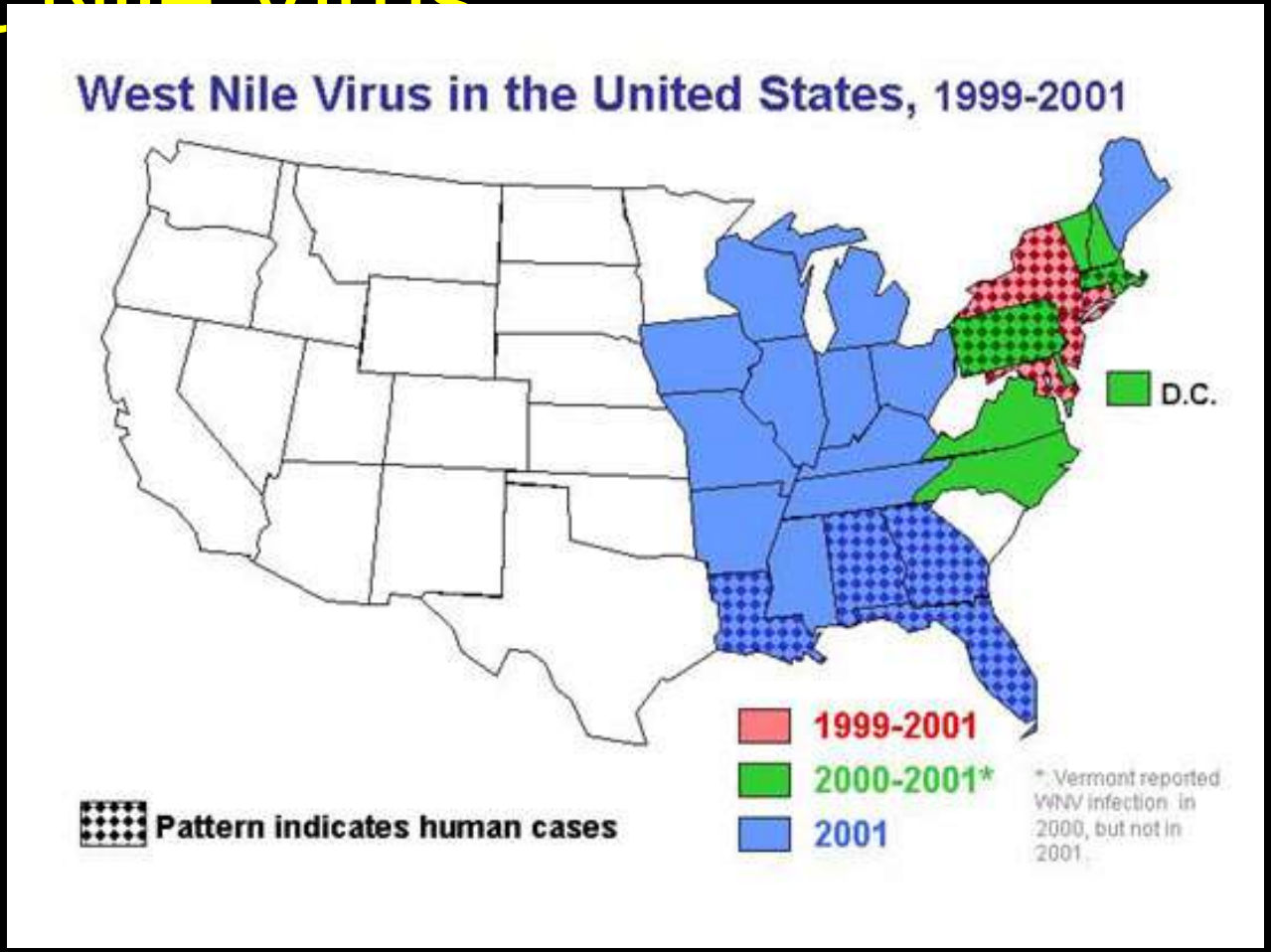
Globalization

Emerging, Re-Emerging Infections

- Emerging Infections
  - HIV, SARS,
  - Prions (MCD)
- Re-Emerging Infections
  - TB
    - Multidrug Resistant
  - Malaria
    - Multidrug Resistant
    - Insecticide Resistant
  - MDR Pathogens

Globalization + Global Warming:

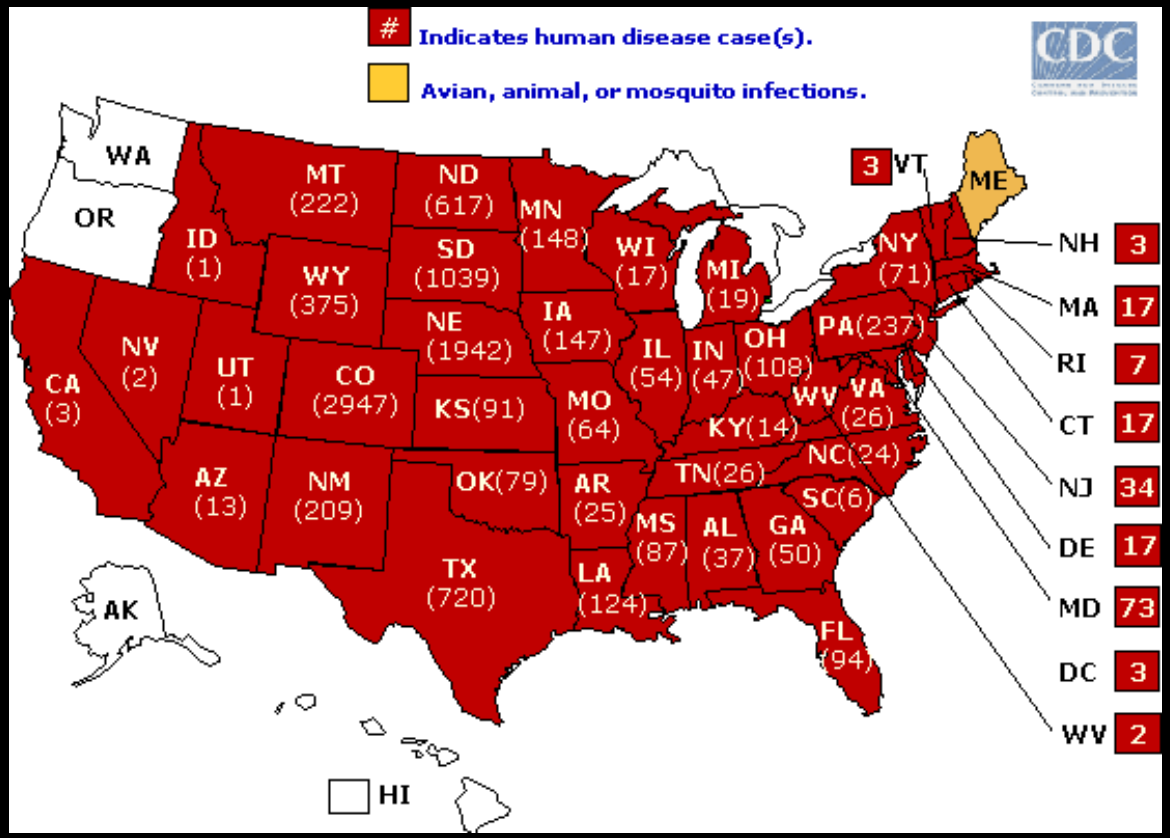
West Nile Virus



CDC

- 63 cases / 1999 (7 deaths)

West Nile 2003 – four years later!



(2004, 2470 human cases, 88 deaths)

- 9862 cases
  - 264 deaths
- 45/48 States
- > 130 bird spp
- 40 mosquito spp
  - Over-wintering
- Cost in Louisiana State in 2002
  - $20.1 Million

Manmade Chemical *"wildcards"*

80,000 synthetic chemicals developed since 1950

2,800 chemicals: 1 million pounds/year

< 45% basic human toxicity tests available

< 25% tested for developmental toxicity

< 1% tested for neuro-developmental toxicity

Slide adapted from J Pronczuk, WHO

US EPA, 1998

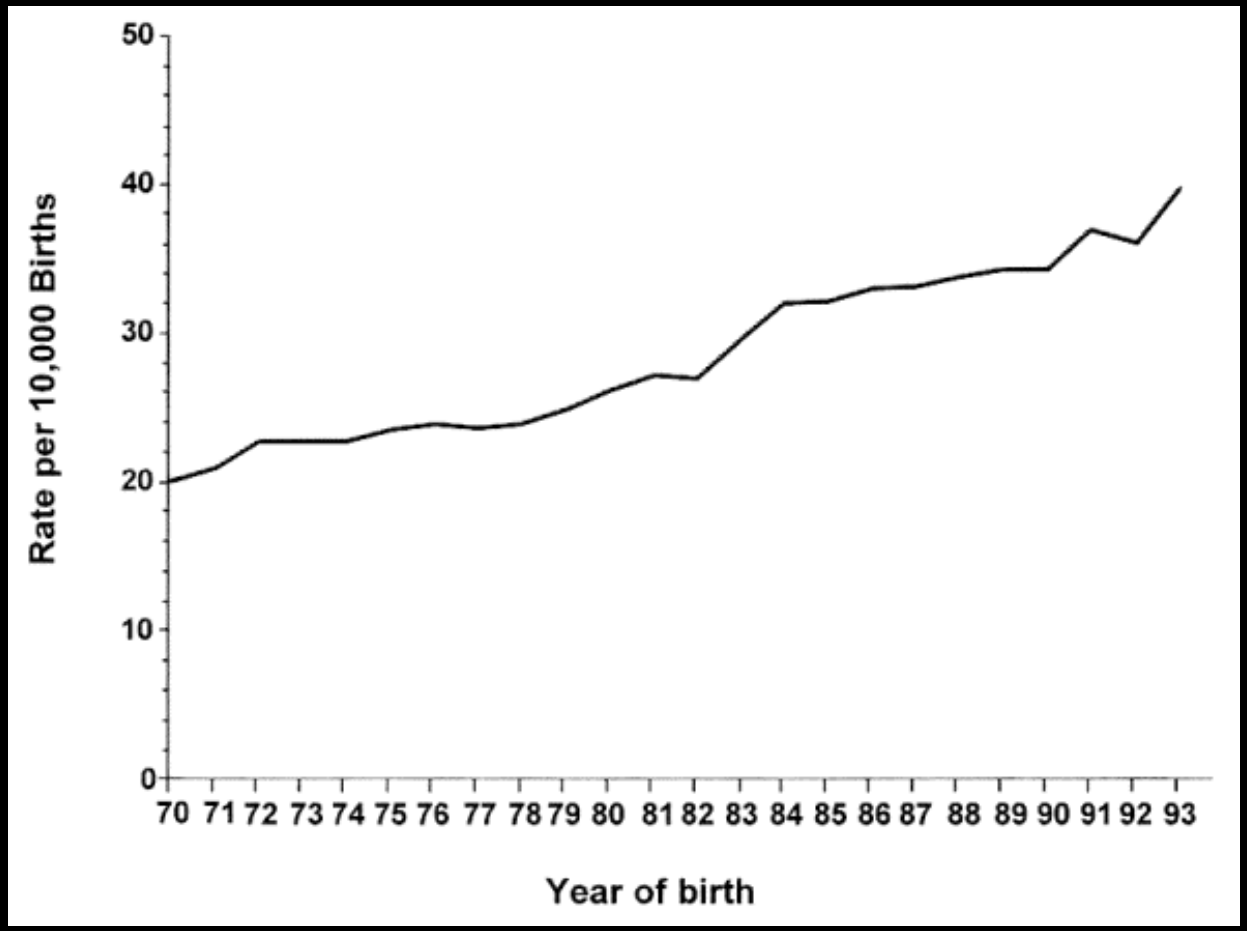
Chemical Toxicities

"…vast uncontrolled experiment with our children as the subjects?" *Herb Needleman*

- **1940-1960 F_o**
  - First Generation Exposed Postnatally
- **1960-1980 F_1**
  - First Generation Exposed Prenatally
- **1980-2000 F_2**
  - Second Generation Exposed Prenatally

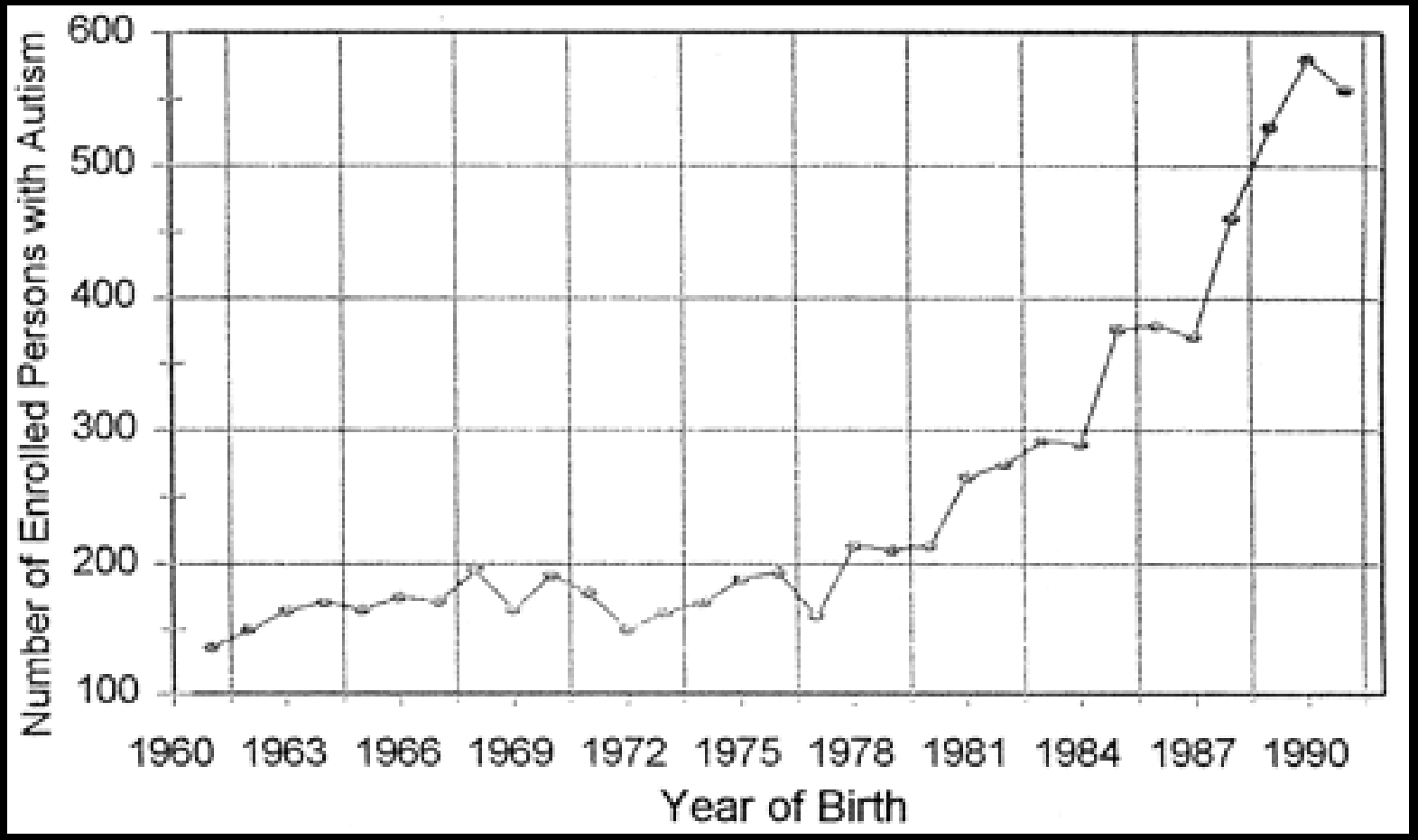
Adapted from Theo Colburn, WWF

Toxic Chemicals:
? Hypospadius ?



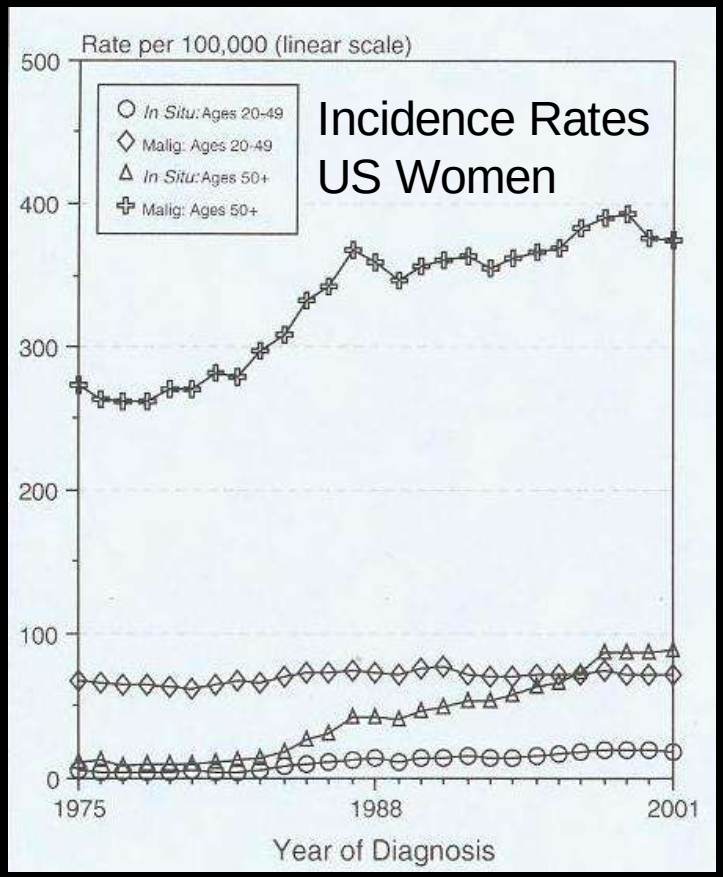
Poulozzi, Pediatrics (1997) 100:831

Toxic Chemicals:
?? Autism ??



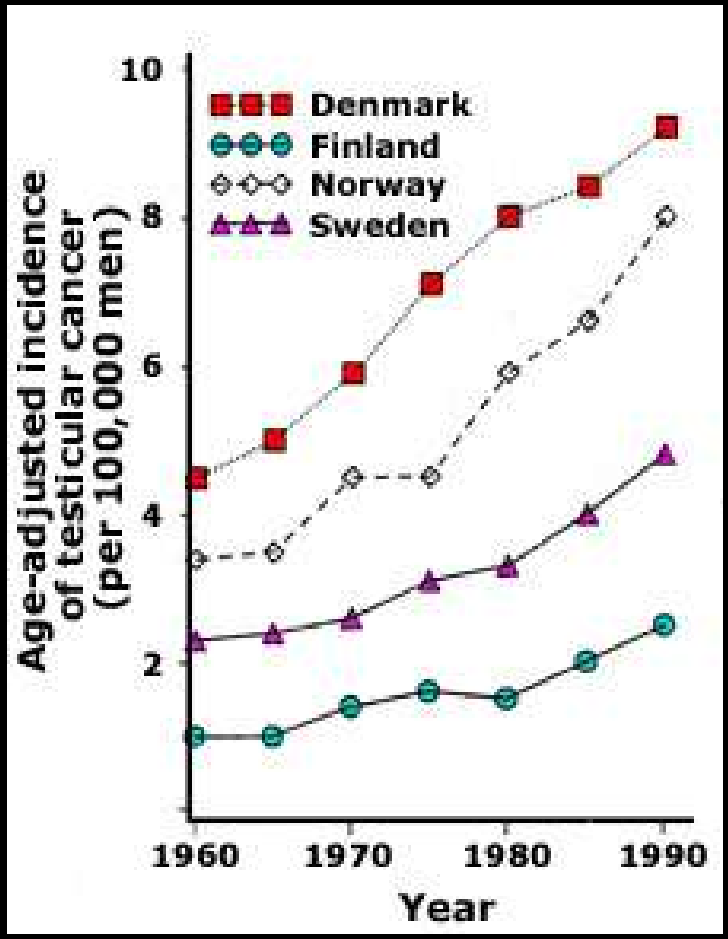
Pediatrics 2001 107: 411-412

Toxic Chemicals:
? Breast Cancer ?



SEER, Cancer Statistics and Review, 1975-2001

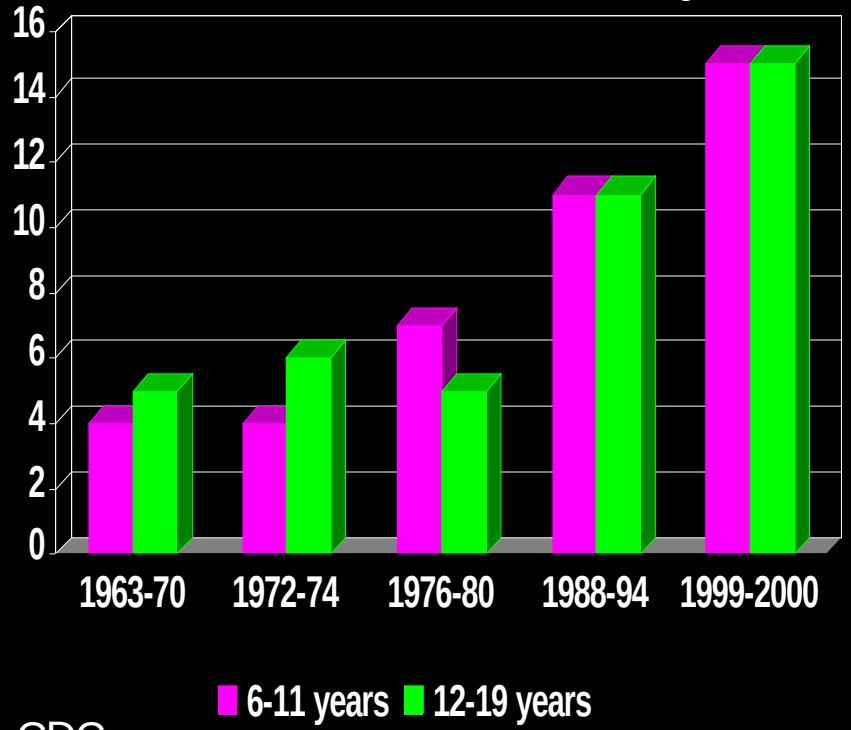
Toxic Chemicals:
? Testicular Cancer ?



Our Stolen Future - adapted from Møller 1998

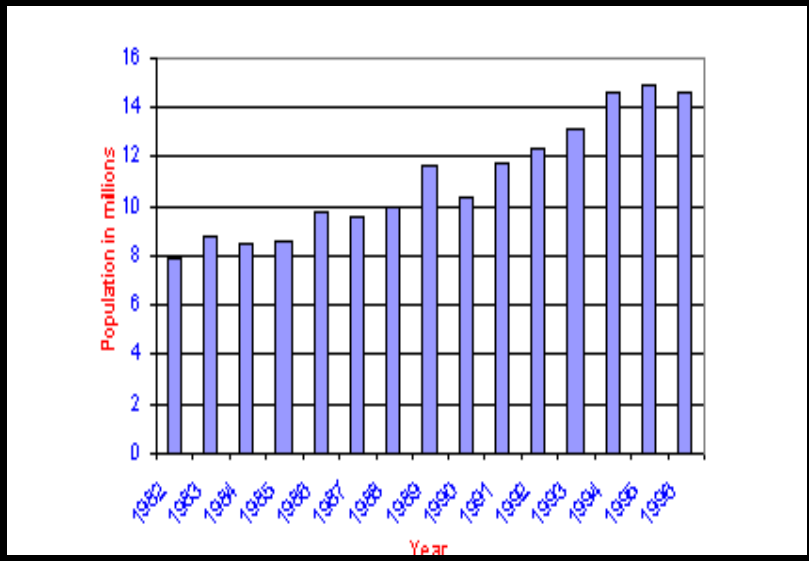
Big Heath Trends in Children

Childhood Obesity



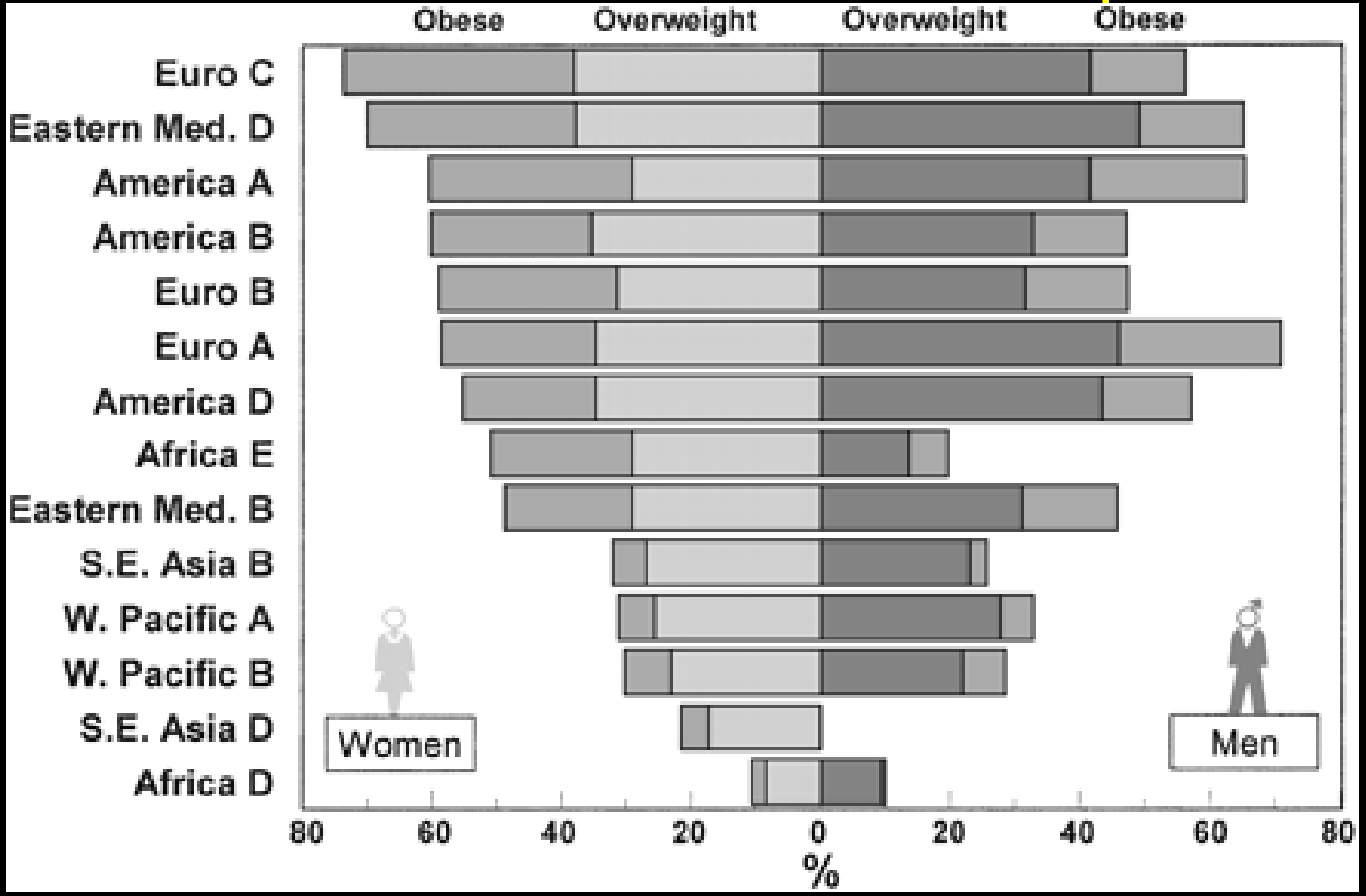
CDC

Increasing Asthma



Rapid Changes Environment

Globesity!
What is the Environmental Component?



Obesity Research 9:S228-S233 (2001)

Mental/Neurologic Disorders

- Depression
  - 5.8% men, 9.5% women in any year
- Alzheimer's
  - 5% men, 6% women over 60 y
- Childhood developmental or behavioral problems
  - 10-20% all children

Munch, The Cry
Nasjonalgalleriet , Oslo

WHO World Health Report 2001

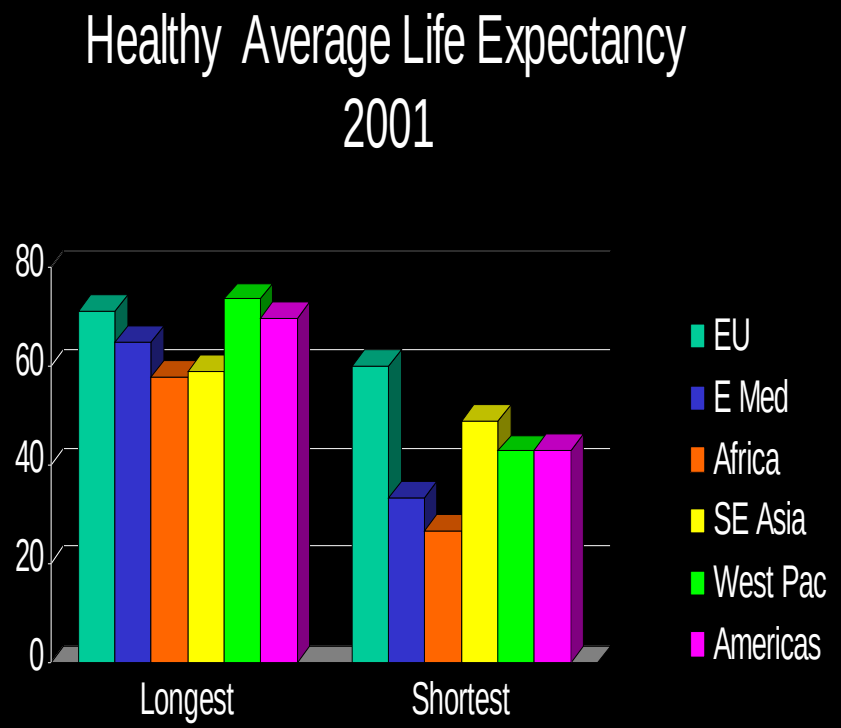
Indirect Human Health Effects of Changing Environment

- Food and Water Security
- Loss of Biological Capital
- Forced Migration
- Reduced Economic Capacity
- Depression
- Violence and Terrorism

"Hatred" from Millennium Series
By Victor Cauduro Rojas

Uneven Burden

- Longevity is Geographic
- Vulnerable Groups
  - Extremes of Age
  - People in Poverty
  - Malnourished/Medically Ill
- Developing Countries
  - Double Burden of Disease
  - 90% of disaster victims



World Health Report 2001

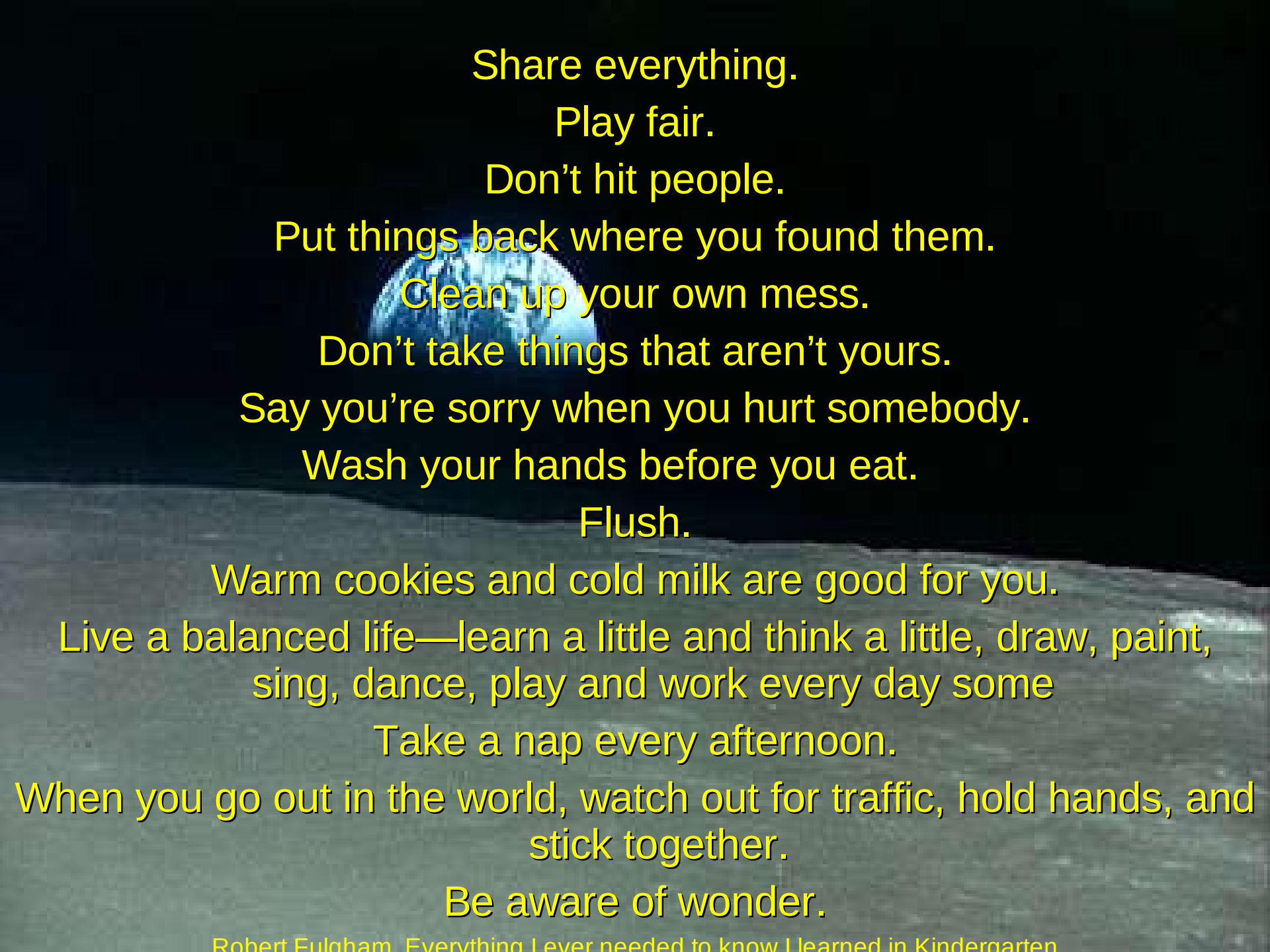
Finding Solutions

- **International**
  - Montreal Protocol, Kyoto
  - Millennium Development Goals
  - IFCS
- **Regional/ National**
  - REACH in EU
  - FQPA in US
- **Industry**
  - Green Chemistry
  - Clean and Hybrid Cars
- **Community**
  - Integrated Pest Management
  - Public Transport
- **Individual**
  - Consumer Choices
  - Advocacy

Making Changes

- Manmade problems have manmade solutions
- More tools than ever before
- Models of Success
- There’s still time…only just?
- We are all here!

“Legacy” Victor Cauduro Rojas


Share everything.
Play fair.
Don’t hit people.
Put things back where you found them.
Clean up your own mess.
Don’t take things that aren’t yours.
Say you’re sorry when you hurt somebody.
Wash your hands before you eat.
Flush.
Warm cookies and cold milk are good for you.
Live a balanced life—learn a little and think a little, draw, paint, sing, dance, play and work every day some
Take a nap every afternoon.
When you go out in the world, watch out for traffic, hold hands, and stick together.
Be aware of wonder.
Robert Fulghum, Everything I ever needed to know I learned in Kindergarten