

A systems approach to health and wellbeing in the urban environment

An ICSU Workshop in collaboration with the IIASA

NATURAL AND HUMAN-INDUCED HAZARDS RELATED TO URBAN HEALTH

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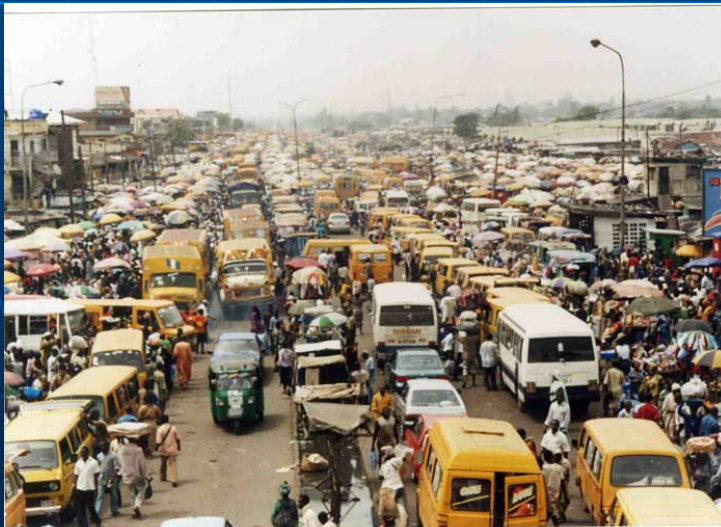
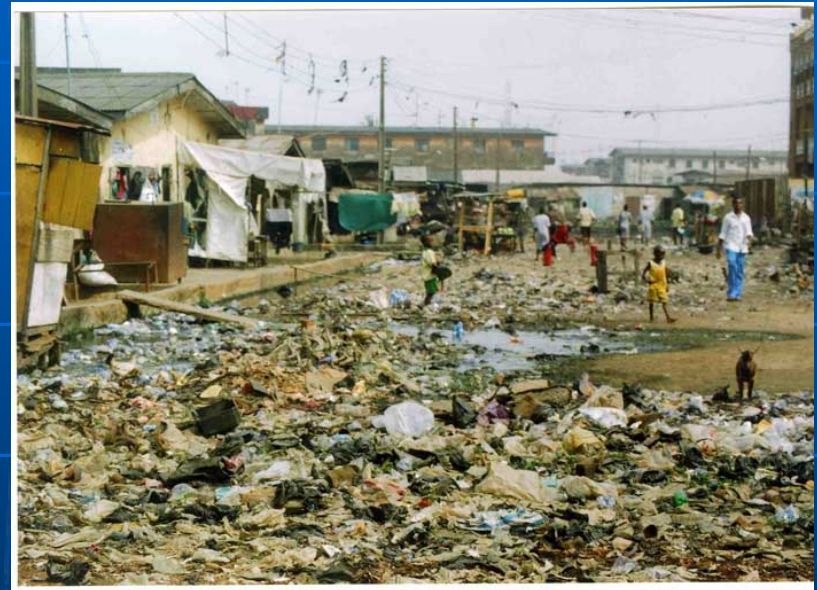
Vienna, Austria
24-25 January 2008

OUR URBANISING PLANET

- The world's population is growing
 - from 6 billion in 2005 to a projected 9 billion in 2050
- . . . and urbanising
 - May 23, 2007 : transition day !
 - ❖ global **urban** population : 3,303,992,253 people (approx)
 - exceeded **rural** population : 3,303,866,404 people

An increased probability of natural disasters affecting large numbers of people living in urban areas . . .

... while at the same time there is an increase in risks related to human-induced hazards



2008 is **both**

- the International Year of Planet Earth
(Earth Sciences for Society)

and

- the International Year of Sanitation

OVERVIEW

- Part I : Natural hazards
- Hazards and disasters
- The impact of climate change
- Part II : Human-induced hazards
- Natural-technological disasters
- Risk reduction, disaster management, urban catchment management and the systems approach

Part I :

Natural hazards and their impact on urban health

- Astrophysical hazards
- Biological hazards
- Geological hazards
- Hydro-meteorological hazards

Hazards and Disasters

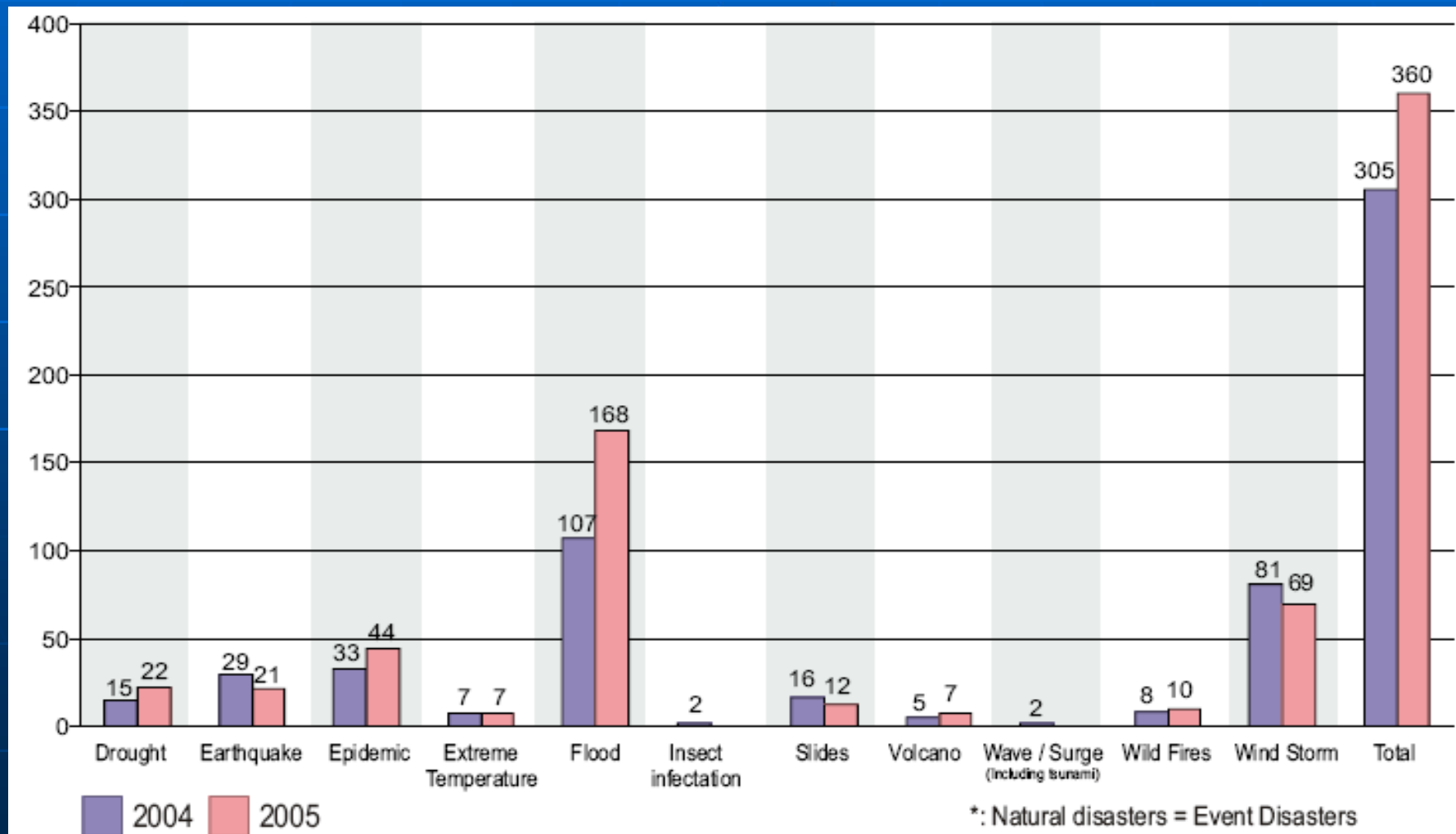
- **Hazard** : Any event, phenomenon or human activity that may cause loss or impact on human health.
- **Natural factors** and **human-induced factors** may act together to create a hazard
- **Disaster** : An event that causes serious disruption (widespread human, material and/or economic losses) beyond the coping capacity of a given society

Concepts of Risk, Vulnerability and Resilience

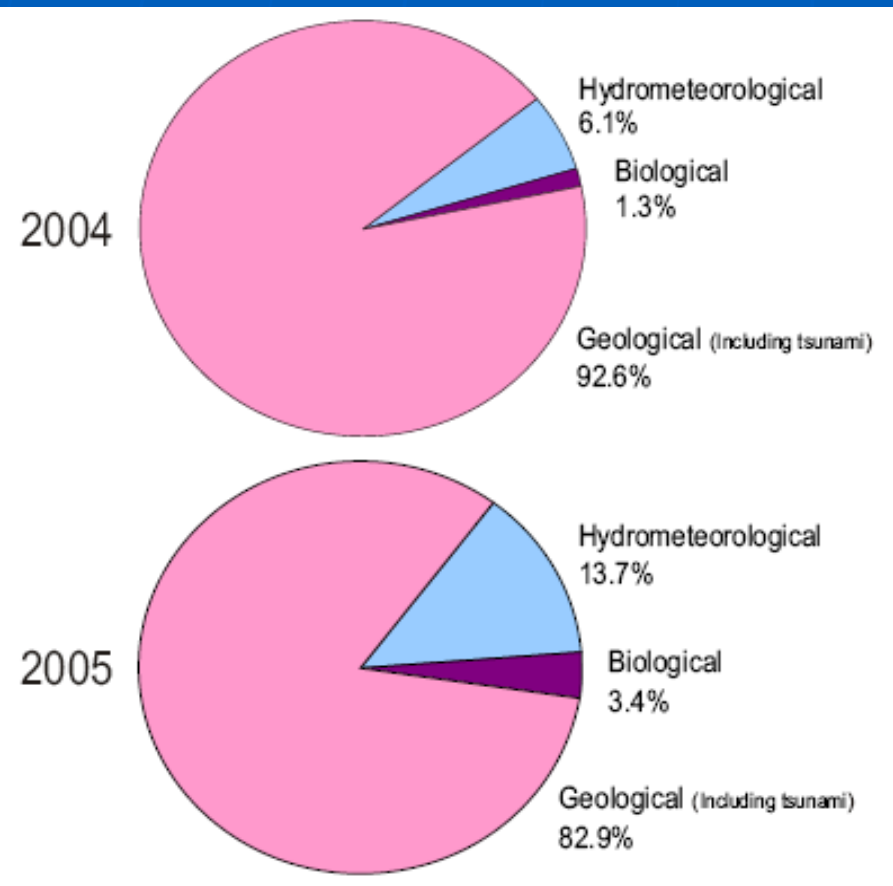
$$\text{Risk} = \text{Hazard} \times \text{Vulnerability}$$

- **Risk** : the probability of harmful consequences or expected losses - deaths, injuries, property, livelihoods, economic activities - resulting from interaction between natural or human-induced hazards and vulnerable conditions (ISDR, 2004)
- **Vulnerability**: the degree of loss to a given element at risk or set of such elements resulting from the occurrence of a hazard event and expressed on a scale from 0 (no damage) to 1 (total loss) (Cardona, 2003)
- **Resilience** : the capacity to prevent or mitigate losses; and then, if damage occurs, to maintain normal living conditions and to manage recovery from the impact

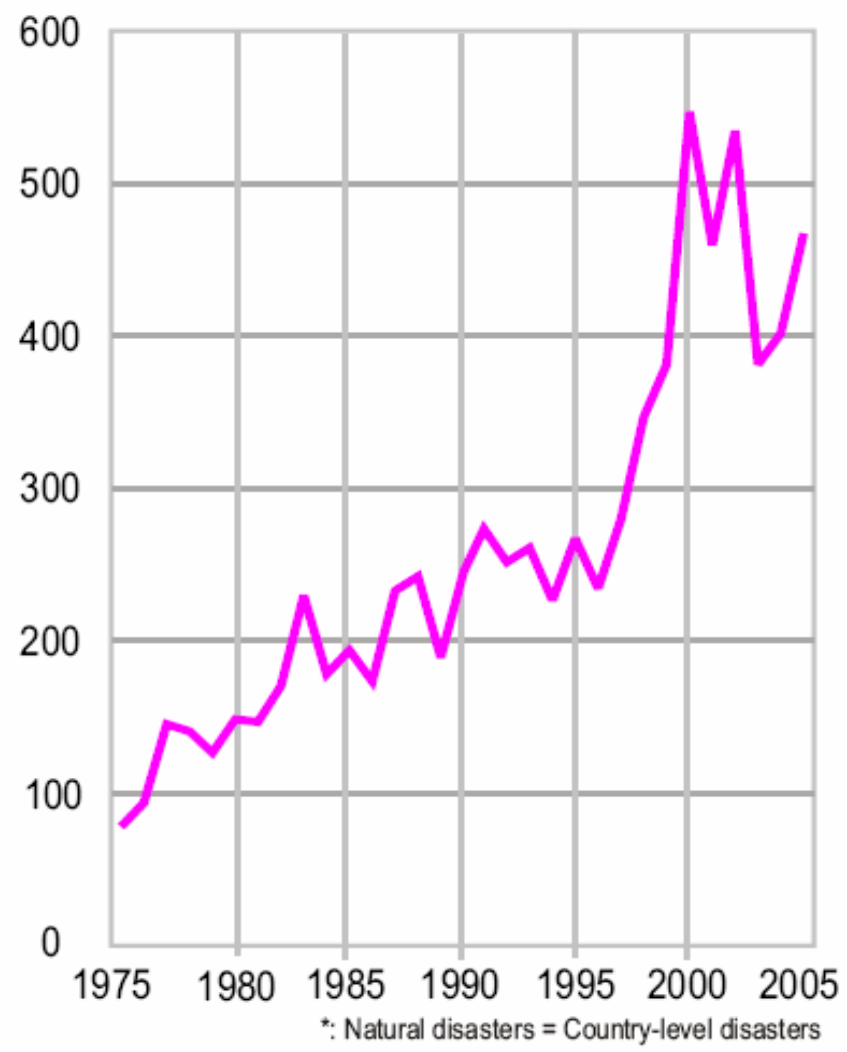
Natural disaster occurrence by disaster type 2004-2005 : number of events (ISDR, 2006)



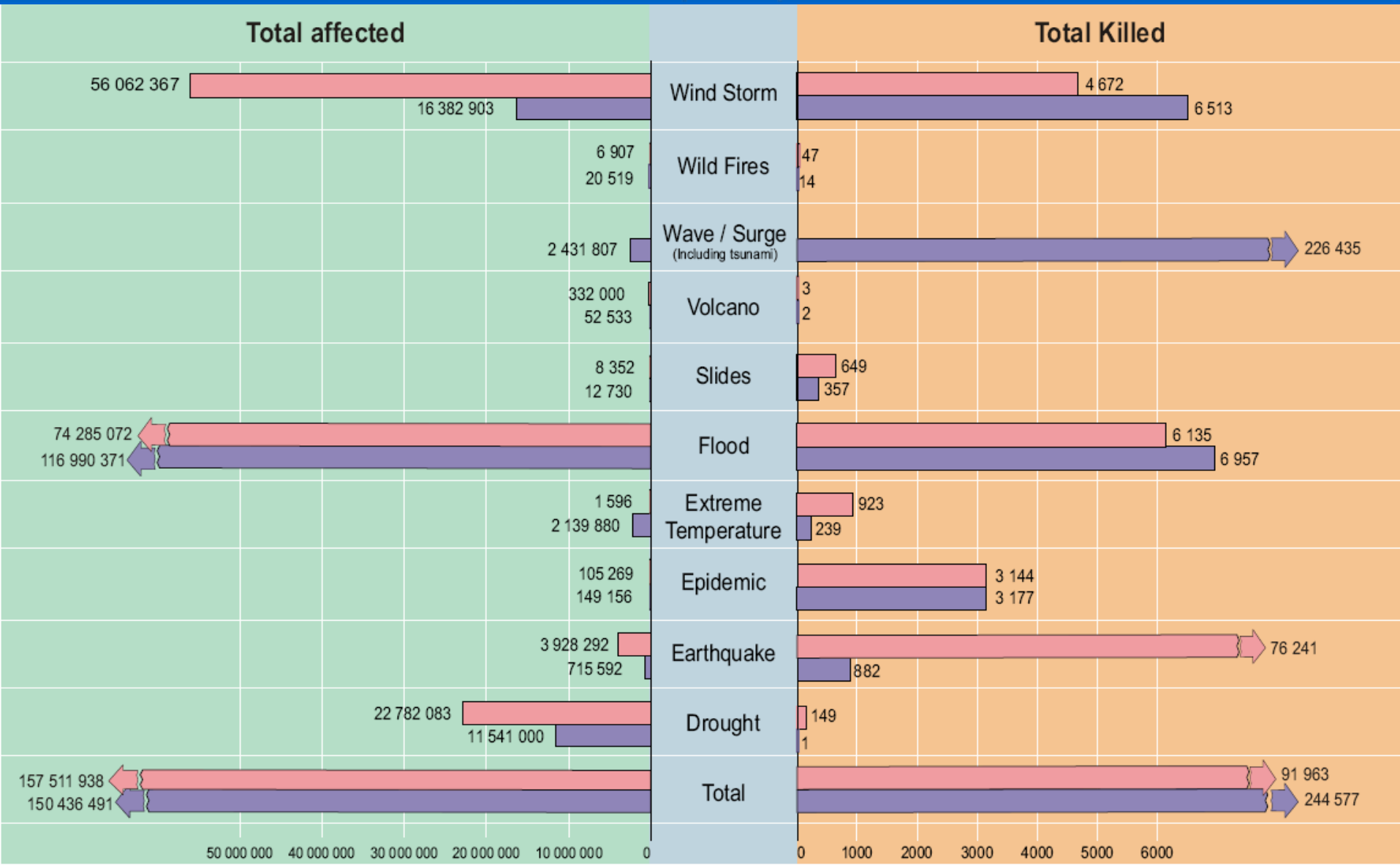
% of people killed (by natural disaster category)



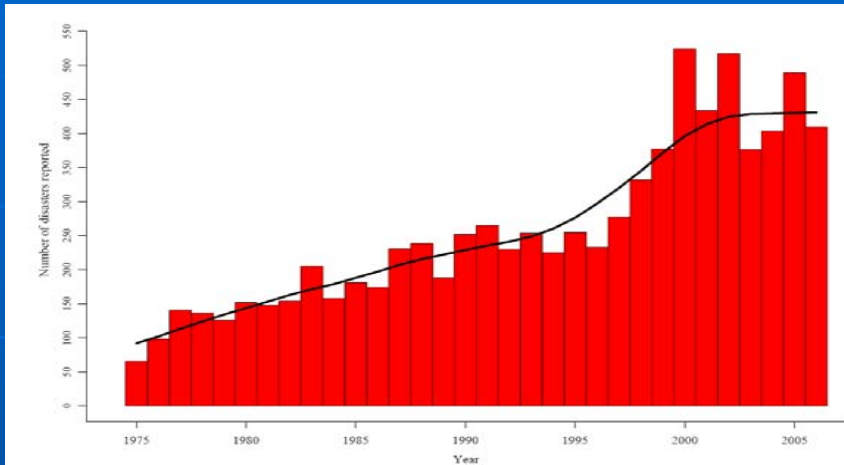
Time trend of natural disasters, 1975-2005*



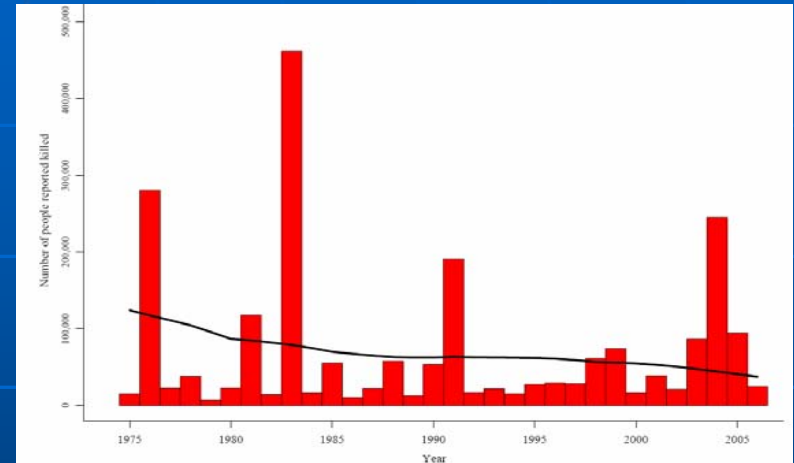
Human impact by disaster type 2004-2005



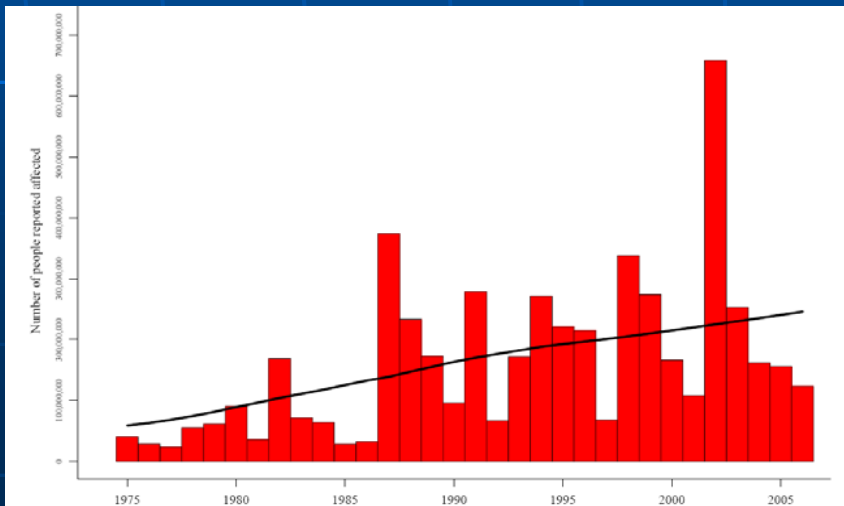
Over the past 30 years :



The number of national disasters has increased



Through improved disaster management, the number of fatalities is on a downward trend



The time trend shows that the number of affected people has grown

Astrophysical hazards

- Highly variable
- Space weather eg. solar flares
- Meteorite impact
- No human deaths definitively confirmed during recorded history
- **Tunguska** event in Siberia in 1908 :
 - felled around 80 million trees in an uninhabited area
 - Estimated force 1000 x Hiroshima atomic bomb



Naturally-induced biological hazards

- malaria, dengue fever, *Chikungunya* – linked to flooding and other environmental factors
- meningitis, influenza – seasonal
- Rift Valley fever – landslides
- pest infestations
- zoonoses – HIV, H5N1 virus, the plague

Geological hazards

- Earthquakes
- Tsunamis
- Volcanoes
- Landslides



The Lisbon earthquake occurred on November 1st, 1755 at 9:40 local time ...



30 minutes later the tsunami arrived in town!

Indian Ocean tsunami, December 2004



October 2005 Kashmir earthquake



Earthquake/tsunami in urban areas : humanitarian catastrophe



India, Dec. 2004



Indonesia, Dec. 2004



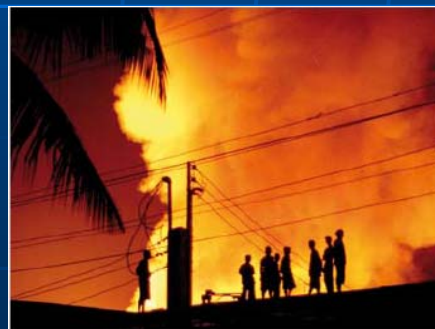
Pakistan, Oct. 2005



Pakistan, Oct. 2005

Hydro-meteorological hazards

- Floods and flash floods
- Tropical cyclones and hurricanes
- Severe storms
- Dust storms
- Droughts
- Heatwaves
- Wildfires





Flooding in Germany, 2002

Flooding in Europe in 2002 caused aggregate economic losses totalling more than 16 billion US dollars.



Aftermath of the Katrina hurricane, August 2005



Dust storms

Dust storms increase the risk of :

- urban traffic injuries
- respiratory diseases, silicosis
- transport of pathogens, heavy metals and agricultural pesticides



Strategies for Disaster Risk Reduction and Urban Health

- Identifying, assessing and monitoring risks
- Establishing and utilising early warning systems
- Reducing vulnerability of communities through emergency preparedness, evacuation strategies and mitigation
- Building a culture of safety and resilience

Impact of Climate Change on Disaster Risk and Urban Health

Increase in :

- Variability of weather
- Frequency of hazard events
- Magnitude of hazard events

Part II :

Human-induced hazards and their impact on urban health

- Unsustainable settlement patterns
- Physical hazards in urban areas
- Infectious and emerging diseases and epidemics
- Air, water and soil pollution

Unsustainable settlement patterns

- Settlement on marginal land such as floodplains, steep slopes, former landfills
- Unsustainable urban drainage patterns – hardening of surfaces, increasing run-off
- Unsustainable urban infrastructure and building practices
- Loss of biodiversity and access to natural environments

Physical hazards in urban areas

- Wars and conflicts
- Terrorism
- Crime-related urban violence
- Sexual violence
- Road traffic injuries

Infectious diseases and epidemics

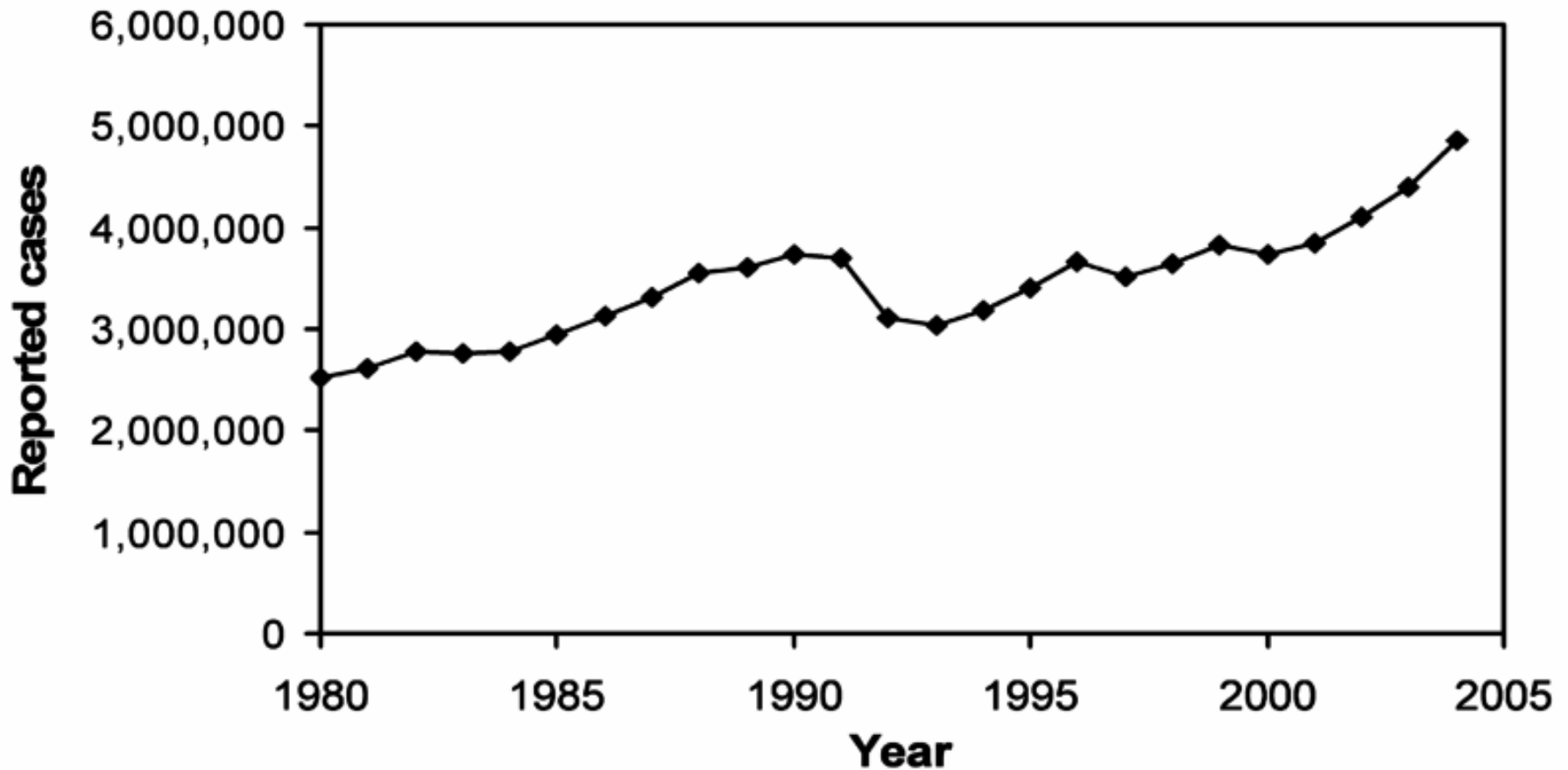
- Diarrhoea
- Tuberculosis and urban poverty
- Other infectious diseases
- Zoonotic diseases from wild and domesticated animals
- Emerging diseases : SARS, avian flu

Tuberculosis and urban poverty

- One-third of world's population is infected with tuberculosis
- Approx 10% have active TB
- >80% of TB patients in SSA and Asia
- Bacilli carried in coughs, sneezes
- Associated with overcrowding and poor ventilation
- Emergence of drug-resistant TB

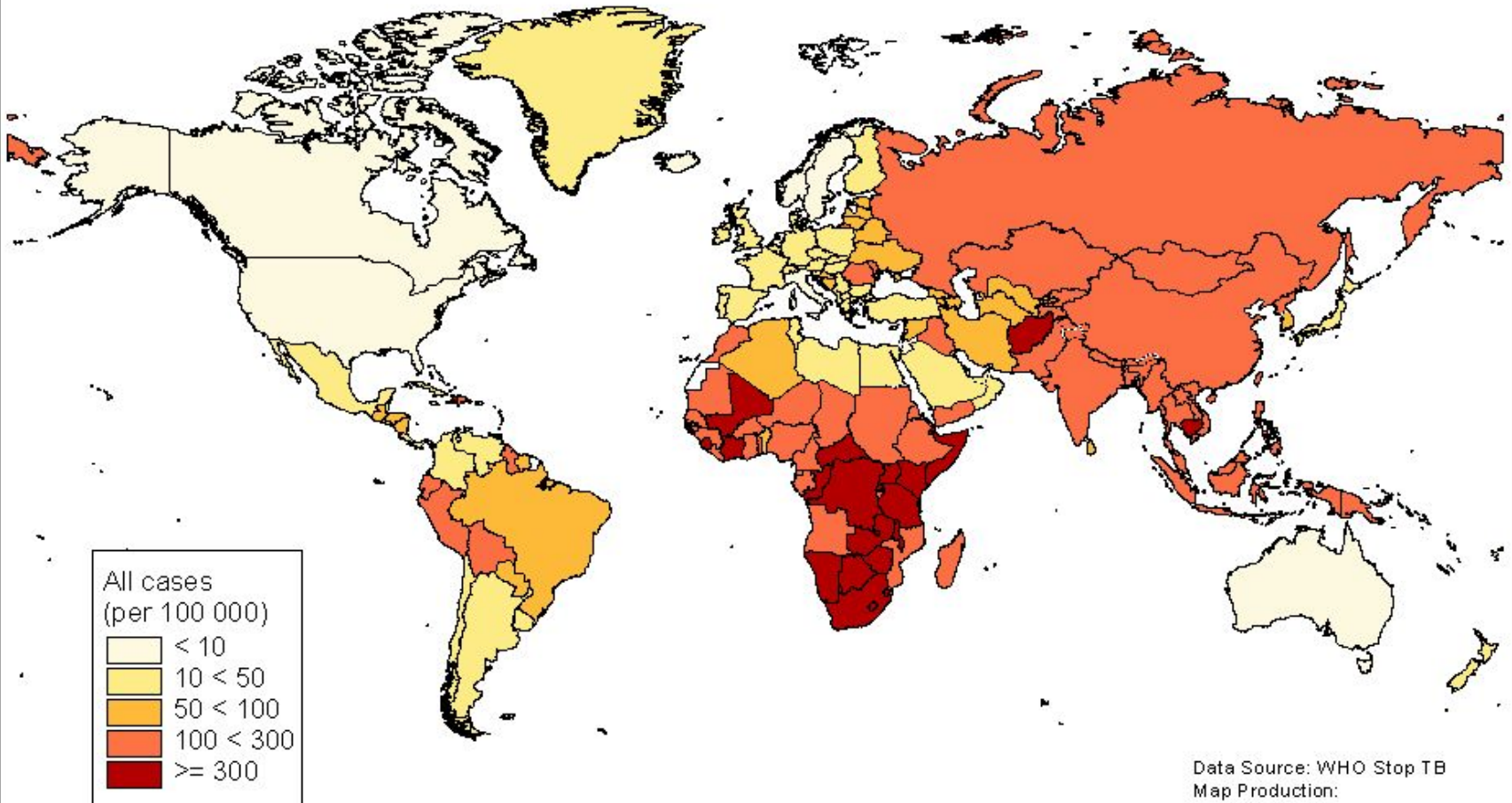
Annual number of new TB cases reported world-wide

Global incidence of TB



>80% of TB patients in SSA and Asia

Estimated Tuberculosis Cases - 2001



All cases
(per 100 000)

- < 10
- 10 < 50
- 50 < 100
- 100 < 300
- ≥ 300

Data Source: WHO Stop TB
Map Production:
Public Health Mapping Group
Communicable Diseases (CDS)
World Health Organization



The presentation of material on the maps contained herein does not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or areas or of its authorities, or concerning the delineation of its frontiers or boundaries.

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Air, water and soil pollution

- Air pollution – outdoor and indoor
- Hazardous chemicals and heavy metals
- Industrial effluent disposal
- Inadequate sanitation practices
- Solid waste disposal

Natural-technological disasters

- Natural disasters which impact on industrialised areas, eg. floods, earthquakes
- Physical damage and loss of electrical power affecting safety and control systems
- Damage to containment
- Release of toxic chemicals into air, water or soil
- Increased risk to human health

The need for an integrated approach to reducing urban health risks : the systems approach

$$\text{Risk} = \text{Hazard} \times \text{Vulnerability}$$

- A multiplicity of hazards
- Different levels of vulnerability
- Risk reduction requires integrated intersectoral action at many levels
- Integrated approaches : urban catchment management; integrated service provision in informal settlements