

Le Malattie infettive emergenti e riemergenti

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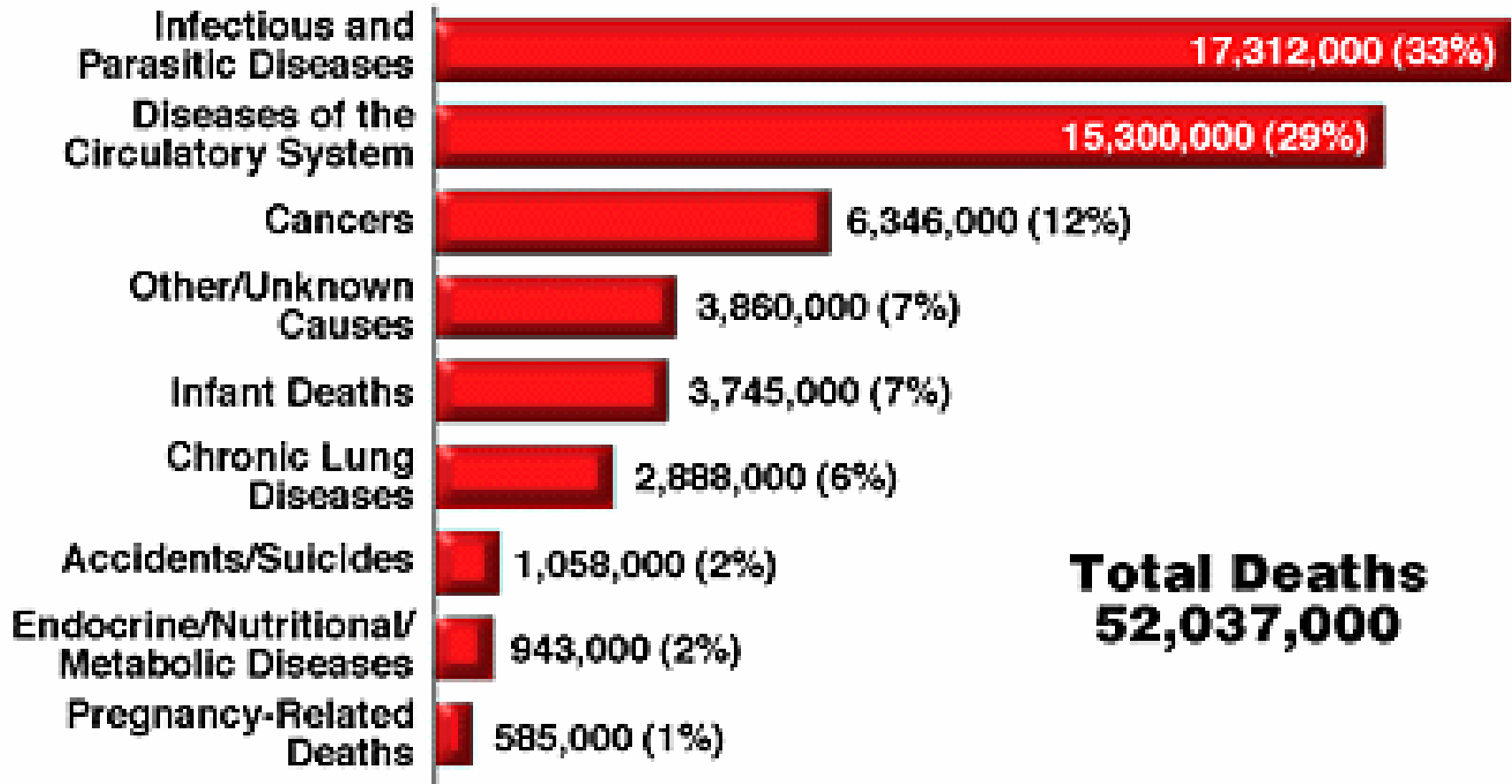
Lazzaro Spallanzani - Roma

Public Health and Sanitation

Achievements of the 20th century:

- Improvements in hygiene practices
- Improvements in food handling (refrigeration)
- Improvement in Water and sewage treatment
- Vaccination practices

Worldwide Causes of Death



Source: The World Health Report 1997, WHO

Mortalité par Maladies Infectieuses en France

- **Jusqu'au XX^{ème} siècle : 1^{ère} cause de Mortalité**
- **Variation de la mortalité due aux M.I. de 1979 à 1996**
 - Hommes : + **31 %**
 - Femmes : + **17 %**
 - **Résistances, vulnérabilité avec l'age, virus nouveaux, relâchement des vaccinations et de l'hygiène, comportement à risque**

Global Change and Human Health: Key Issues

- Global Environmental Change & Health (e.g. climate change, biodiversity loss, water, POPs)
- The Global Economy, Technology & Health (e.g. biotechnology)
- Global Governance for Health
- New and Resurgent Infectious Diseases

The
Specter
of
Infection

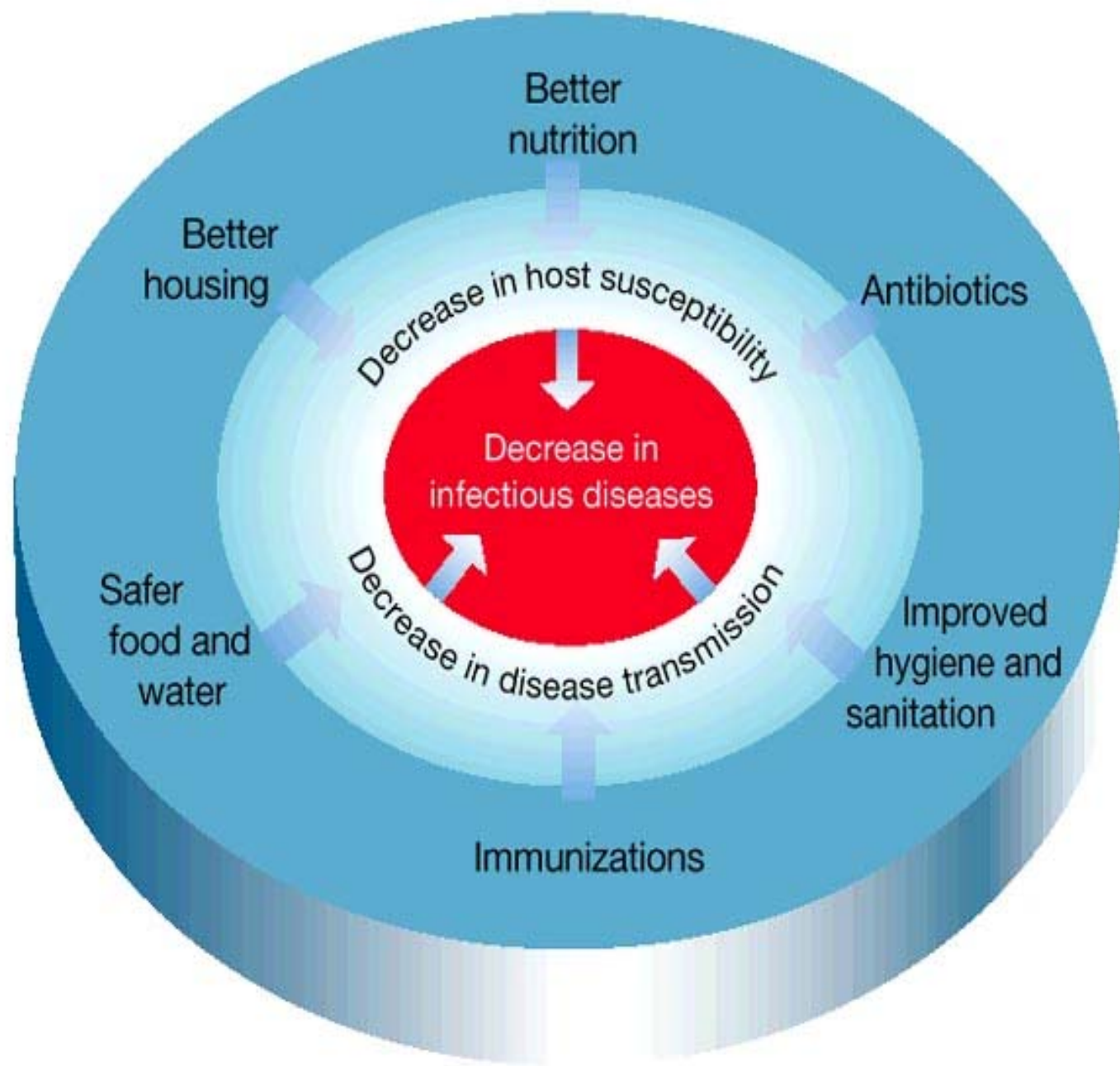


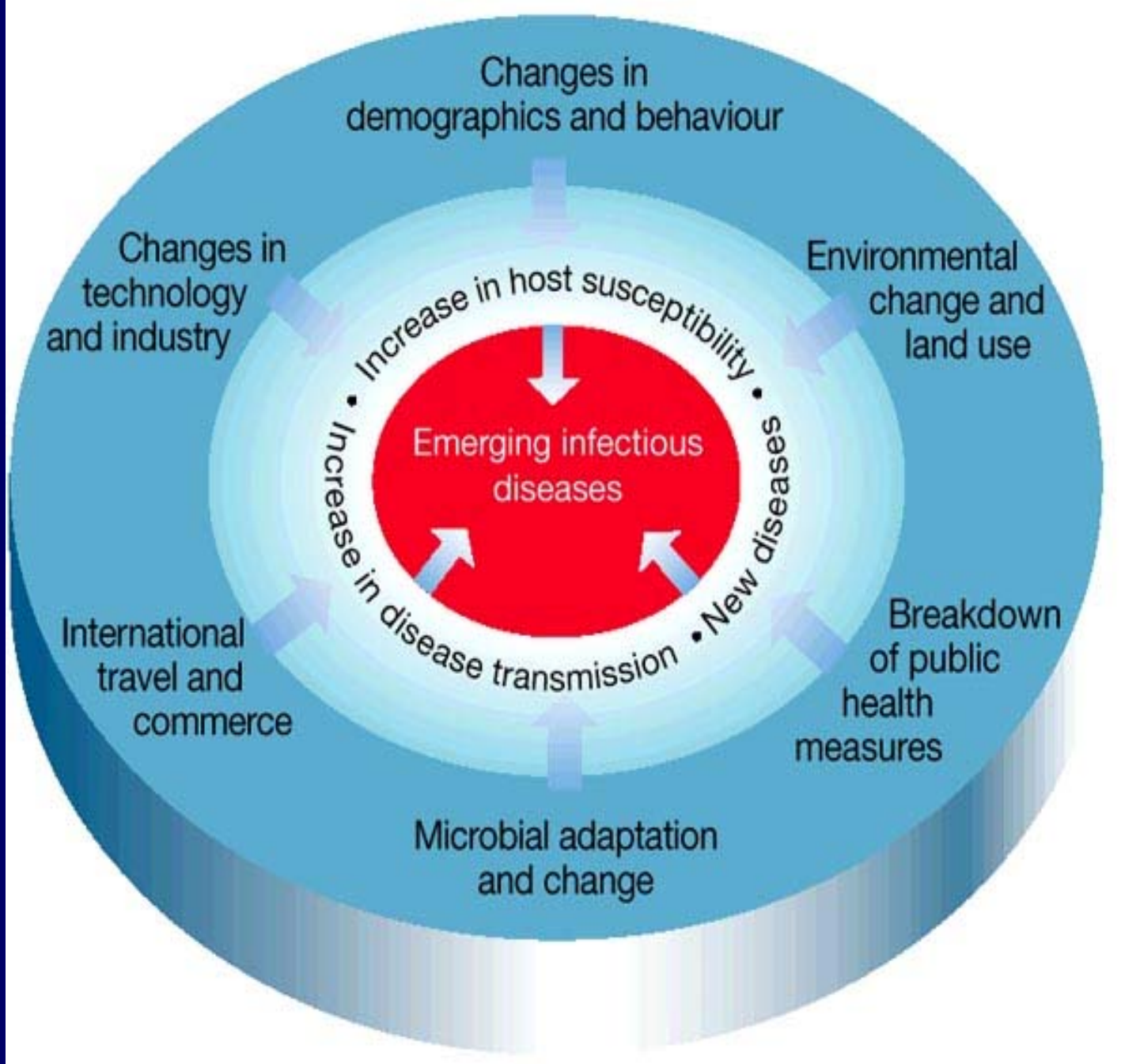
Le Monde

MERCREDI 19 MARS 2003

FONDATEUR : HUBERT BEUN







Factors contributing to emergence re-emergence of infectious diseases

Categories

examples

Societal events

**Economic impoverishment;
war or civil conflict;
population growth and
migration; urban decay**

Health care

**New medical devices; organ
or tissue transplantation;
drugs causing immunosuppression;
widespread use of antibiotics**

- 1 -

US Institute of Medicine, 1992, adapted

Factors contributing to emergence re-emergence of infectious diseases

Categories

examples

Food production

Globalization of food supplies; changes in food processing, packaging, and preparation

Human behavior

Sexual behavior; drug use; travel; diet; outdoor recreation; use of day care facilities

- 2 -

US Institute of Medicine, 1992, adapted

Factors contributing to emergence re-emergence of infectious diseases

Categories

examples

**Environmental
changes**

**Deforestation/reforestation;
changes in water ecosystems;
flood/drought;
famine; global warming**

**Microbial
adaptation
and change**

**Changes in virulence and toxin
production; development of
drug resistance; microbes as
cofactors in chronic diseases**

Factors contributing to emergence re-emergence of infectious diseases

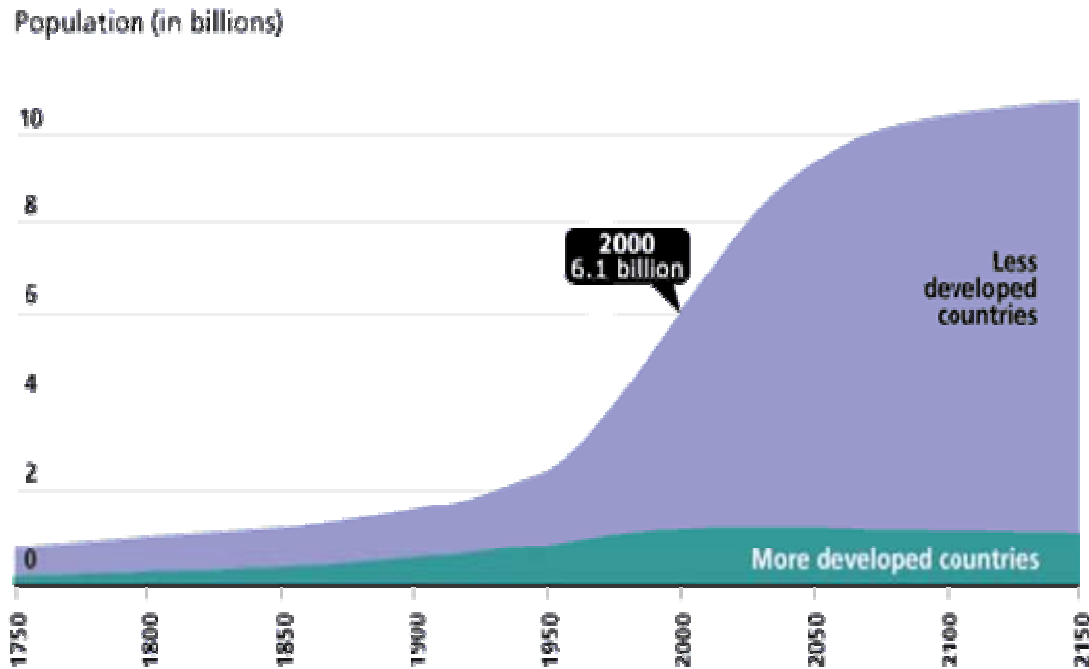
Categories

examples

**Public health
infrastructure**

**Curtailment or reduction of
prevention programs;
inadequate communicable
diseases surveillance; lack
of trained personnel**

Rapidly Increasing Human Population



- 6.1 Billion people in 2000
- ~9.4 to 11.2 Billion in 2050

Source: United Nations, *World Population Prospects, The 1998 Revision*; and estimates by the Population Reference Bureau.

Rapidly Increasing Urbanization



- 2000
 - 47% world population living in urban areas
- 2030
 - 60% world population living in urban areas

By 2020, There Will Be 1 billion People Over the Age of 60

- 30% of US population are baby boomers
- Immuno-compromised population

A New Environment Favoring Agents of Disease

- Disruption of land
- Contaminated water
- Climate warming
- Population growth
- Tourism
- Migration
- Global trade
- Integrated ecosystems

Re-emerging viral infections during the last two decades and factors contributing to their re-emergence

Rabies Breakdown in public health measures;
changes in land use: travel

Dengue/dengue hemorrhagic fever Transportation,
travel and migration; urbanization

Yellow Fever Drug and insecticide resistance;
civil strife; lack of economic resources

Re-emerging parasitic infections during the last two decades and factors contributing to their re-emergence-2

Schistosomiasis Dam construction, improved irrigation, and ecological changes favoring the snail host

Neurocysticercosis Immigration

Acanthamebiasis Introduction of soft contact lenses

Visceral leishmaniasis War, population displacement, immigration, habitat changes favorable to the insect vector, an increase in immunocompromised human hosts

Re-emerging parasitic infections during the last two decades and factors contributing to their re-emergence-3

Malaria Favorable conditions for mosquito vector

Toxoplasmosis Increase in immunocompromised human hosts

Giardiasis Increased use of child-care facilities

Echinococcosis Ecological changes that affect the habitats of the intermediate (animal) hosts

Re-emerging bacterial infections during the last two decades and factors contributing to their re-emergence-1

Group A Streptococcus Uncertain

Trench fever Breakdown of public health measures

Plague Economic development; land use

Diphtheria Interruption of immunization program due to political changes

Tuberculosis Human demographics and behavior; industry and technology; international commerce and travel; breakdown of public health measures; microbial adaptation

Re-emerging bacterial infections during the last two decades and factors contributing to their re-emergence-2

- Pertussis Refusal to vaccinate in some parts of the world because of the belief that injections or vaccines are not safe
- Salmonella Industry and technology; human demographics and behavior; microbial adaptation; food changes
- E.coli O157 Food processing and shipment

Re-emerging bacterial infections during the last two decades and factors contributing to their re-emergence-3

Pneumococcus	Human demographics; microbial adaptation; international travel and commerce; misuse and overuse of antibiotics
Cholera	Travel: a new strain (0139) apparently introduced to South America from Asia by ship, with spread facilitated by reduced water chlorination and also food

- **People movements & health**
- **Clandestine movements**



**Human traffic spreads
SARS
at the speed of a jumbo jet**

Rapid Movement of Pathogens

- 1.4 billion people travel by air annually
- Millions of people traveling
- Billions of people on earth
- Trillions of tons of cargo transported globally

Multihost Pathogens

- 60% of all human infections
- 80% of livestock and domestic animals

Infectious Organisms Pathogenic to Humans and Percent Zoonotic

Type of Pathogen		# Zoonotic(%)
Viruses & Prions	217	165 (76%)
Bacteria & Rickettsia	538	269 (50%)
Fungi	307	113 (37%)
Protozoa	66	43 (65%)
Helminths	287	278 (97%)
Total	1,415	868 (61%)

Source, Taylor LH et al. 2001; *Phil. Trans. R. Soc. Lond. B.* Vol. 356:983-989

Economic Impact of SARS



Economic Impact of SARS

- Main impact
 - Health Sector
 - Tourism Sector
 - Retail Sales
 - External Trade

IMPACT ON HEALTH SECTOR

- Health workers at high risk
- Hospital acquired infections high
- Public health workers directly involve in epidemic control and reduce public panic
- Budget for public health programme very small
 - 25% to 35% of health care budget

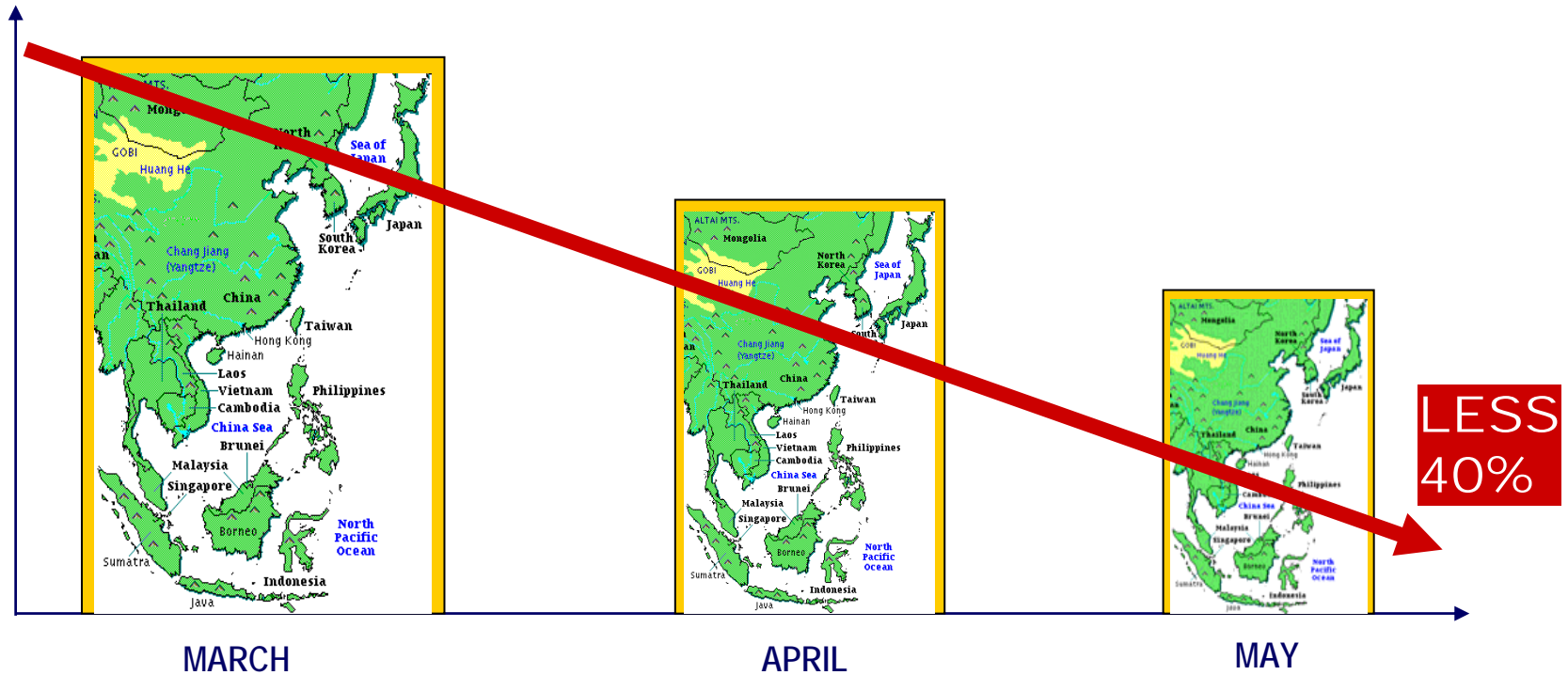
IMPACT ON HEALTH SECTOR

- Health Care Cost
 - Direct Cost
 - Cost of admission to acute wards
 - Cost of intensive care
 - Cost of controlling epidemics
 - Cost of controlling hospital acquired infections
 - Indirect Cost
 - Loss of productivity
 - Admission
 - Quarantine
 - » Home
 - » Institution

Economic Impact

- Countries mainly affected
 - China
 - Taiwan
 - Hong Kong
 - Singapore
 - Canada

SARS and Asian economies: tourism-related income, 2003



Construction Market Size and Growth

Top 5 Markets By Size

US\$ Billion, 2002

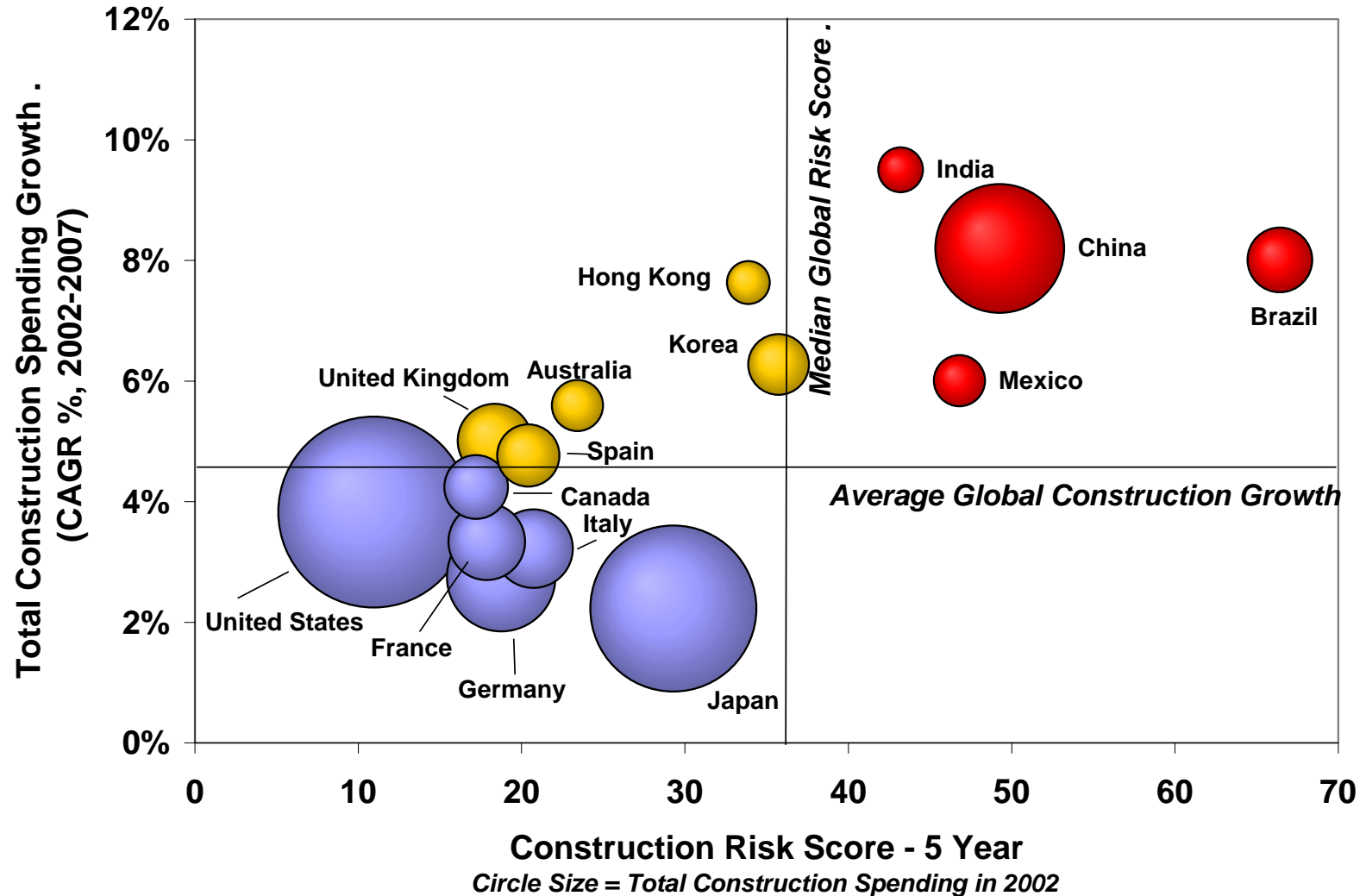
1. USA - \$889
2. Japan - \$672
3. China - \$404
4. Germany - \$287
5. Italy - \$151

Top 5 Growth Markets

Annual % Ch, 2002-07

1. India – 9.5%
2. Thailand – 8.5%
3. Kuwait – 8.3%
4. China – 8.2%
5. Brazil – 8.0%

Strategic Markets – Construction Growth & Risk



Strategic Areas of Focus

- China and India offer the best market opportunity from the 15 largest construction markets, but not without risk.
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- Hong Kong and Korea are just below median global risk.
- Canada is just below average global construction growth.

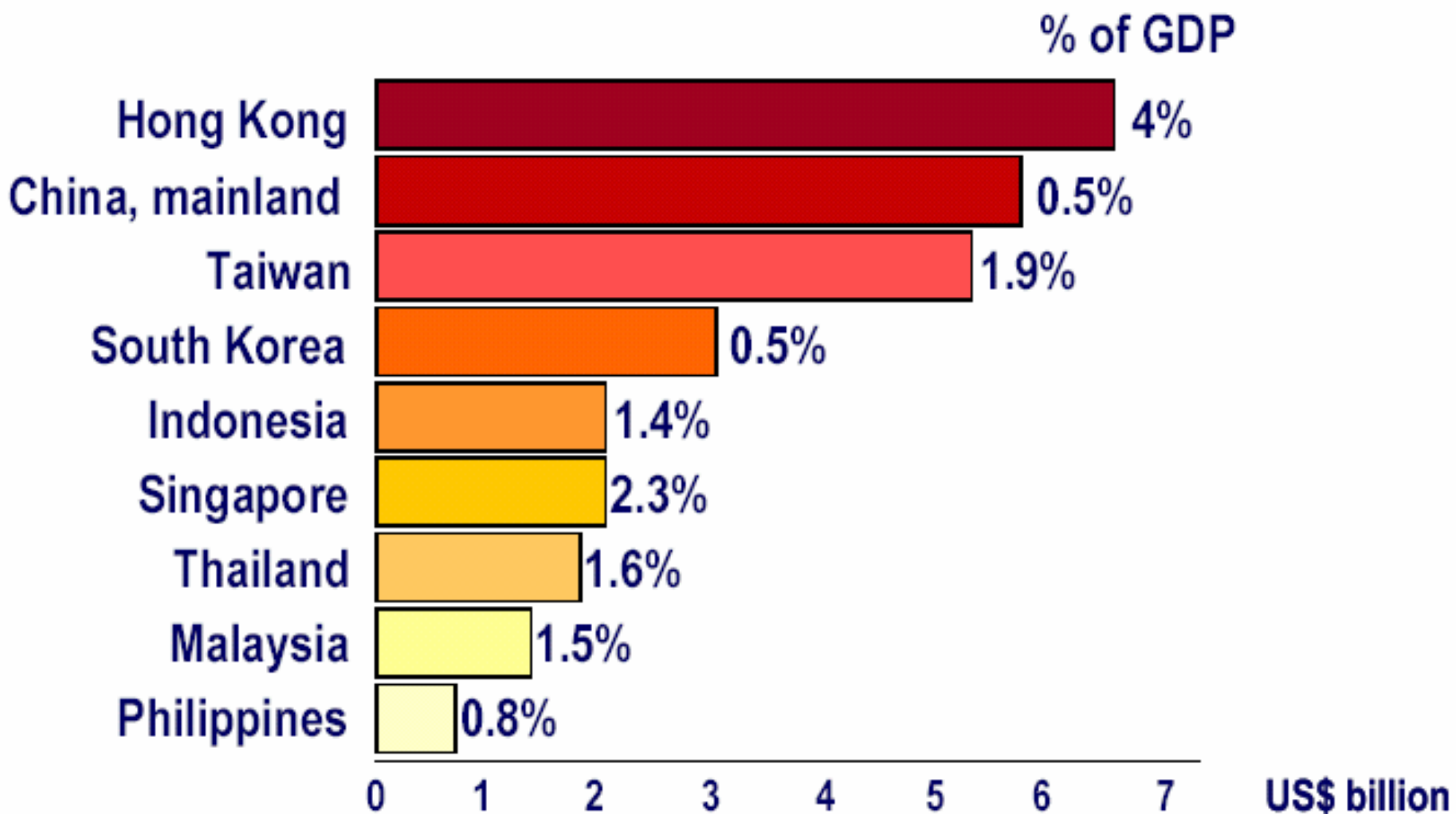
Strategic Areas of Focus

High-Growth & Low-Risk		High-Growth & High-Risk	
Korea	Hong Kong	China	India
UK	Spain	Mexico	Brazil
Australia			
Low-Growth & Low-Risk		Low-Growth & High-Risk	
Canada	USA	No countries	
France	Italy		
Germany	Japan		

SARS Cause Reduction in Demand

- SARS affects economic growth by reducing demand through:
 - Decrease in consumer consumption
 - Uncertainty of risk
 - Fear of contracting the disease
 - Reduction Service Exports
 - Tourism-related exports badly affected
 - **Consumers stay home**
 - Reduction in flow of investment
 - Uncertainties and increasing risk
 - Delay in foreign investments
 - Inability of government to revive the economy

The cost of SARS: initial estimates, Asian Development Bank



SRAS : la Chine menacée d'un séisme social



Le Monde

DIMANCHE 11 - LUNDI 12 MAI 2003

FONDATEUR : HUBERT

L'ÉPIDÉMIE de pneumonie atypique (SRAS) anémie la vie économique de la Chine. A Pékin, le secteur des services (70 % du PIB de la ville) est touché par la désertion des hôtels et la fermeture imposée de bars, discothèques et piscines. Dans les campagnes, la situation est tendue.

La Chine compte quelque 80 millions de migrants se déplaçant de ville en ville. Ce flux s'est arrêté et ce sera autant de **revenus**

~~en moins~~ pour les familles de ces travailleurs.

L'impact sur l'économie de l'Asie pour 2003 est évalué à 28 milliards de dollars.

Global and Regional Impact

- WHO
 - Estimates global costs of SARS is approaching USD 30 billion
- World Bank
 - Economic growth in Asia reduced by one eighth i.e from 5.8 to 5%
- ADB
 - Economic growth in Asia reduced by 0.3% to 5.3%
- ILO
 - Global Tourism Industry lost further 5 million jobs in 2003 due to SARS, terrorism and weak global economy

Public Panic in SARS

Project on Public and Biological Security and Health

- Canada and USA
- Main findings
 - 42% Residents of Toronto concerned that they or someone in their immediate family may get SARS
 - Toronto residents take various form of precautions
 - 47% using disinfectants at home or at work
 - 14% buys face masks
 - 19% avoid using Asian restaurants and stores
 - 16% avoid public places
 - 10% who has traveled outside Canada avoid international air travel
 - 35% of Americans belief that it is unsafe to travel to Canada

Sars cost Asia seven million jobs

Business Day, 26 September 2003

The SARS crisis cost Asian economies over seven million jobs and slashed at least 30 billion dollars off growth estimates for 2003

Asia's tourism and travel industry was ravaged by SARS, which prompted a plunge in travel in the region earlier this year, dampening the economies.

Sars cost Asia seven million jobs

Business Day, 26 September 2003

Indirect job losses brought on by Sars were widespread in service industries and hit everyone from restaurant staff to drinking water suppliers and air conditioner producers

In May, the World Travel and Tourism Council reported that 25 percent of China's tourism industry earnings would be lost, along with a total of 2.8 million industry jobs, or one-fifth of the country's total industry employment.

Sars cost Asia seven million jobs

Business Day, 26 September 2003

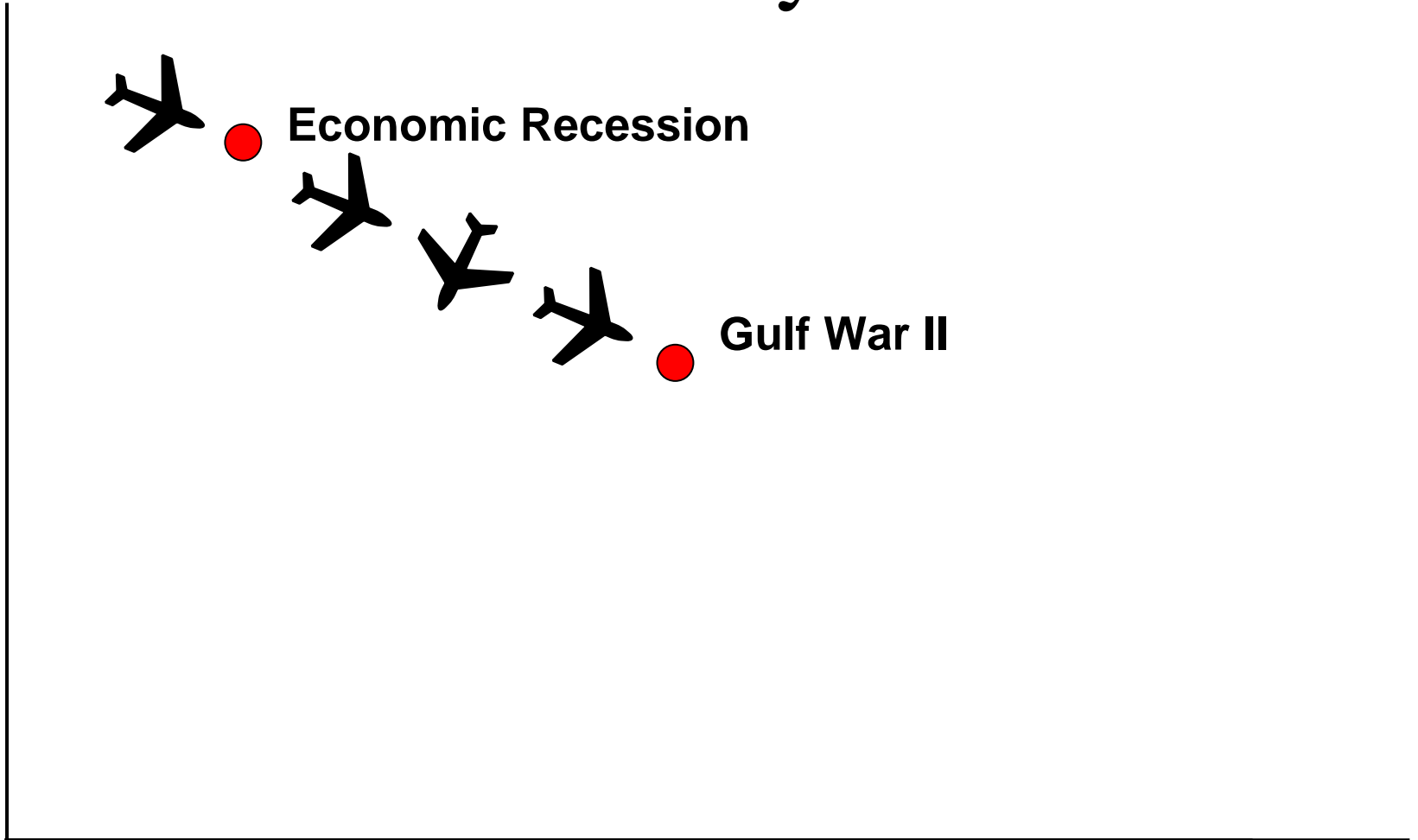
Load levels on Hong Kong's Cathay Pacific collapsed from one million per month to just over 200,000 in May, and the company teetered on the edge of bankruptcy before recovering to 90% levels in August.

State of the European Airline Industry

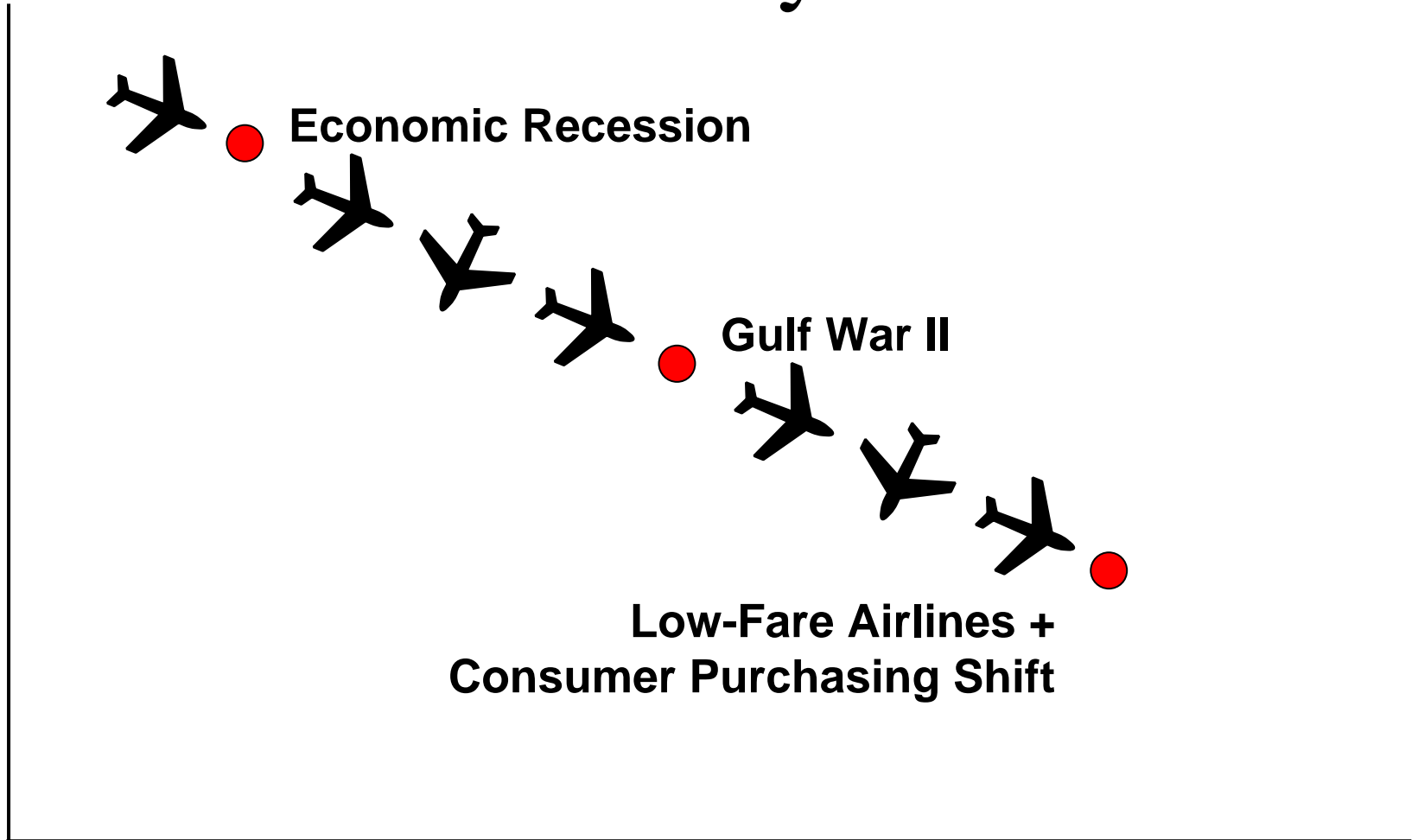


Economic Recession

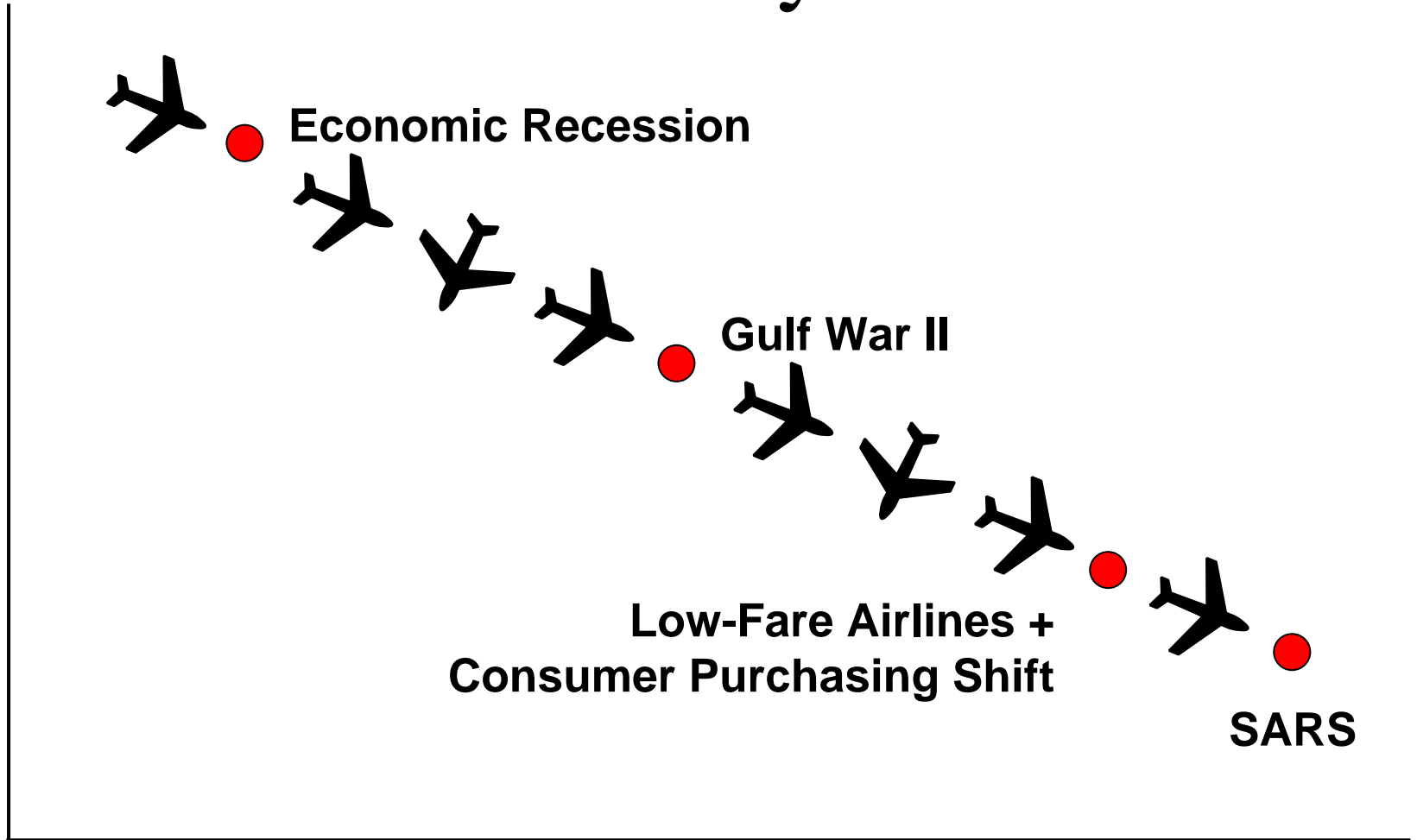
State of the European Airline Industry



State of the European Airline Industry



State of the European Airline Industry



Time Flight	Destination	Gate	Status
17:00 GA 859	Singapore	16	Est at 19:10
	Jakarta		
17:20 MU 596	Shanghai/Pudong		Cancelled
17:45 KA 894	Shanghai/Pudong		Cancelled
17:50 KA 430	Kaohsiung		Cancelled
17:50 KA 604	Xiamen		Cancelled
17:50 KA 904	Beijing		Cancelled
17:55 KA 700	Gulin		Cancelled
17:55 MU 5020	Nanjing	66	Now Boarding
18:00 CA 420	Chongqing	64	
18:00 MU 204	Xian	26	Boarding Soon
18:00 PR 307	Manila	24	
18:05 AI 315	Delhi	33	Boarding Soon
	Mumbai		
18:05 KA 660	Fuzhou		Cancelled
18:20 CX 402	Taipei	67	
18:25 MU 510	Shanghai/Pudong	19	
18:30 SQ 865	Singapore	23	Boarding Soon
18:35 KA 622	Hangzhou		Cancelled
18:40 AC 008	Vancouver		Cancelled
	Toronto		
18:45 CI 616	Taipei	28	
18:50 TG 633	Bangkok	42	
18:55 KA 812	Nanjing		Cancelled
19:10 CX 111	Sydney	47	

Time Flight	Destination	Gate	Status
19:10 CX 135	Melbourne		Cancelled
19:10 QF 088	Melbourne	18	
19:15 MU 536	Shanghai/Pudong	15	
19:15 NZ 070	Auckland	35	
	LH 9810		
19:20 KA 906	Beijing		Cancelled
19:20 SQ 869	Singapore		Cancelled
19:25 BR 872	Taipei		Cancelled
19:25 CZ 3078	Haikou	32	
19:40 5J 119	Manila	21	
19:40 CA 116	Beijing		Cancelled
19:40 CX 468	Taipei		Cancelled
19:40 CX 913	Manila		Cancelled
19:45 CI 642	Taipei	25	
19:50 MU 7002	Taiyuan		Cancelled
20:00 CX 715	Singapore		Cancelled
20:00 UA 805	Singapore		Cancelled
20:05 CI 658	Kaohsiung	26	
20:10 CZ 3079	Guangzhou	30	
20:10 QF 086	Brisbane		Cancelled
	Sydney		
20:15 KA 806	Shanghai/Pudong	29	
20:15 TG 630	Taipei		Cancelled
20:25 CX 107	Auckland	1	
	BA 4551		

Time Flight	Destination	Gate	Status
20:35 KA 438	Kaohsiung		Cancelled
20:45 CX 464	Taipei		Cancelled
20:45 TG 607	Bangkok	42	
20:50 CI 618	Taipei		Cancelled
20:50 CZ 3002	Gulin	32	
21:00 BR 858	Taipei	36	
21:05 PR 311	Manila		
21:10 QF 128	Sydney	19	
21:45 KA 434	Kaohsiung	27	
21:45 KA 488	Taipei		Cancelled
21:50 CX 408	Taipei	4	
21:50 CX 905	Manila	31	
21:55 CI 672	Kaohsiung		
21:55 SQ 002	San Francisco		
22:00 VN 763	Ho Chi Minh		
	CX 763		
22:05 CI 666	Taipei		Cancelled
22:05 CX 709	Bangkok		Cancelled
22:25 EK 383	Bangkok	62	
	Dubai		
22:55 CX 462	Taipei		Cancelled
23:10 LH 731	Munich		Cancelled
	NZ 4631		
23:20 CX 103	Cairns		
	Brisbane		

Sars cost Asia seven million jobs

Business Day, 26 September 2003

Singapore's arrivals in May contracted by a stunning 70% but the island nation reported that in the last week of August, international arrivals were just 6% behind the same period last year.

Its hotel occupancy rates have also surged back to 69%, nearly reaching the 2002 average of 70%.

The SARS pneumonia-like coronavirus was reported in 27 countries, sucking an estimated to \$140 billion out of the world economy

**Stephen Corber
manager of disease prevention and control
the Pan American Health Organization**

Conclusions

- SARS has caused serious disruption to short-term economic growth especially in countries depending on tourism and service sector
- Long-term negative economic impact of SARS has been contained with implementation of fast and effective public health measures by government
- Accurate, timely and transparent provision of information about real risk will allay fears and reduce public uncertainties and panic.
- Real need to intensify global cooperation and coordination for early identification and control of infectious disease

Response to SARS vs Influenza Pandemics

SARS

- Goal = Containment

Flu Pandemic

- Goal = Reducing Morbidity and Mortality
- Major challenge to national capacity

Influenza pandemics and recent outbreaks, 1918–2003

<i>Year</i>	<i>Colloquial name & subtype</i>	<i>affected age group</i>	<i>No. deaths</i>
• 1918	Spanish flu (H1N1)	all ages	20-40 million
• 1957	Asian flu (H2N2)	> 65 and <5	} 4.5 million
• 1968	Hong Kong flu (H3N2)	> 65 and <5	
• 1976	Swine flu (H1N1)	all ages	2
• 1997	Avian flu (H5N1)	all ages	18
• 2003	Avian flu (H5N1) China/Hong Kong		2/2
• 2003	Avian flu (H7N7) The Netherlands		2/80
• ?			

SARS: what we are learning

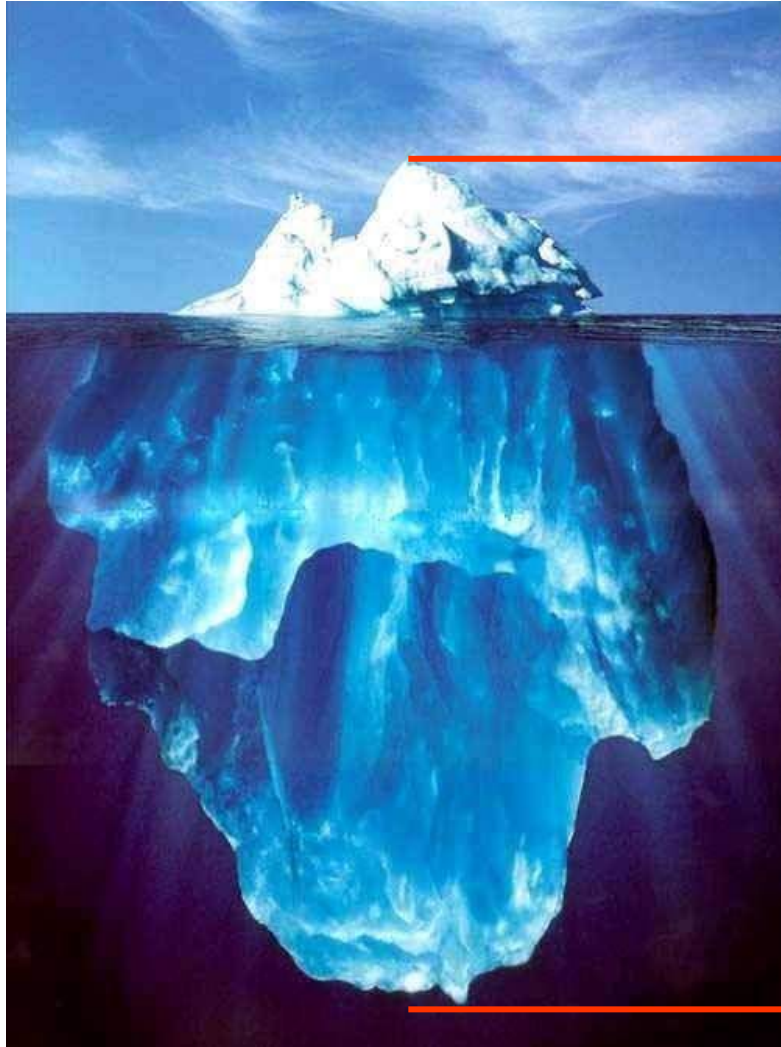
- In the world today an infectious disease in one country is a threat to all: SARS *does not respect national borders*
- Information provided early has contained the international spread of SARS
- SARS outbreaks can be contained by case detection and protection
- In addition to human suffering and death, SARS is having an unnecessary negative economic impact on tourism, travel and trade due in part to discrepancy between real and perceived risk



The fear that new plagues are in the making is not unjustified. In most parts of the world we are unprepared for any new pestilence. We have not enough water, not enough food, not enough shelter, and no peace.

I.J.P. Loeffler Lancet 1996

The visible effects of infection



Overt Disease

Inapparent

Infection

Today's mingling of people, animals and microbes in new environments has no historical precedent.

- "We await the coming plague"

Garrett