

Masern auf den Faröen Inseln 1846

20. März 1846 Tischer
Besuch eines Masernkranken



28. März in Torshaven an Land



alle 6000 Einwohner erkrankten
Repopulation durch Dänen

letzte Epidemie 1781

Beim amerikanischen Sezessionskrieg
starben mehr Soldaten an Masern
als an Verwundungen

Infektionskrankheiten 1

✱ Populationswachstum

- Urbanisation
- Infrastruktur des Ges. Wesens

✱ Reisen und Handel

- Touristik
- Vektoren

✱ Kriege und Hungersnöte

Infektionskrankheiten 2

✱ Ökologische Veränderungen:

- Klima

- Rodung

✱ Mikrobielle Adaption

✱ Immunsuppression

✱ Antibiotikaabusus

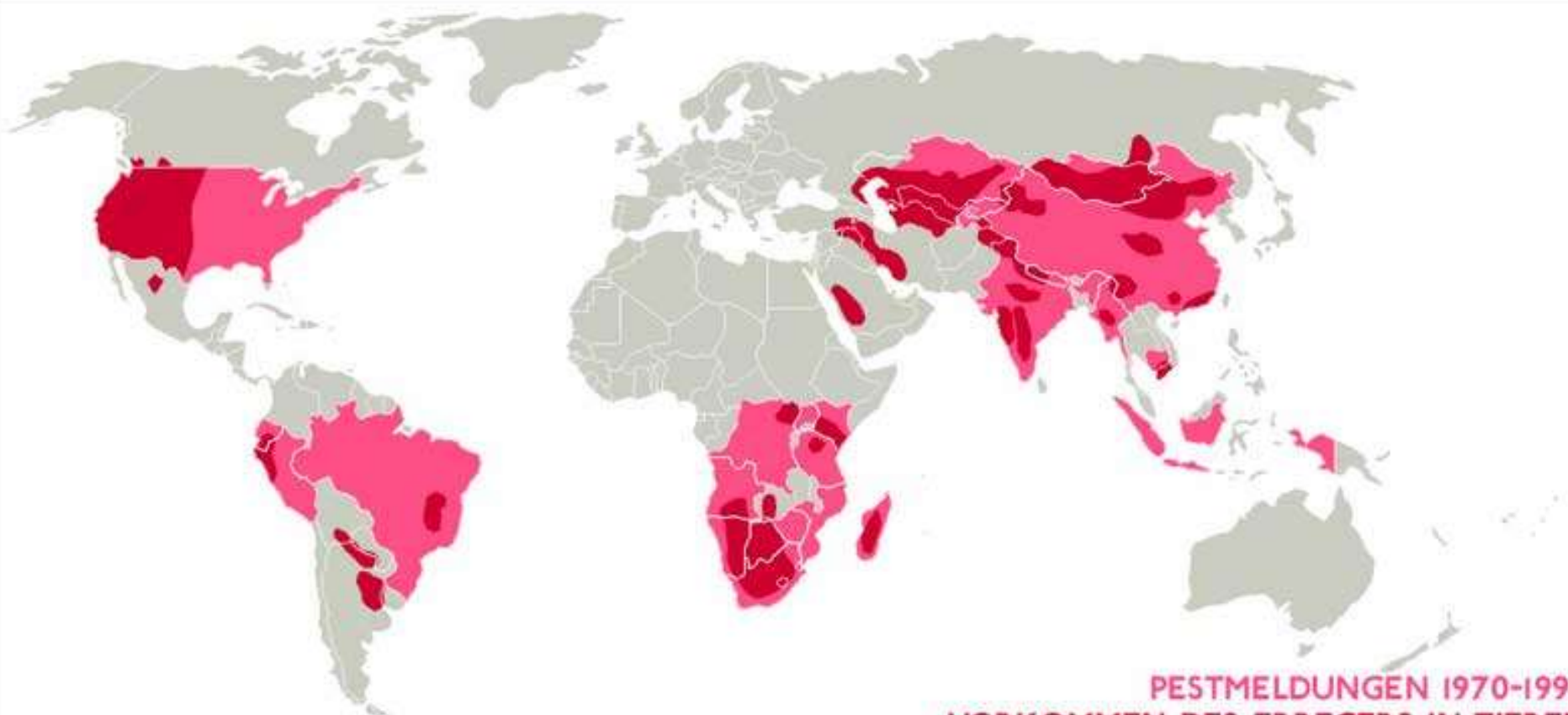
✱ Bioterrorismus

Die Pest

- 1894 von Yersin und Kitasato entdeckt
- 100-500 Bakterien reichen für die Lungenpest
- Lungenpest (Mensch) / Beutenpest (Rattenfloh)
- Inkubationszeit 1-2 Tage
- Impfung möglich
- Biowaffe
 - Kaffa 14 Jh. 58 Tote
 - Japan/China 270.000 Tote
 - Indien 1994

Quarantäne

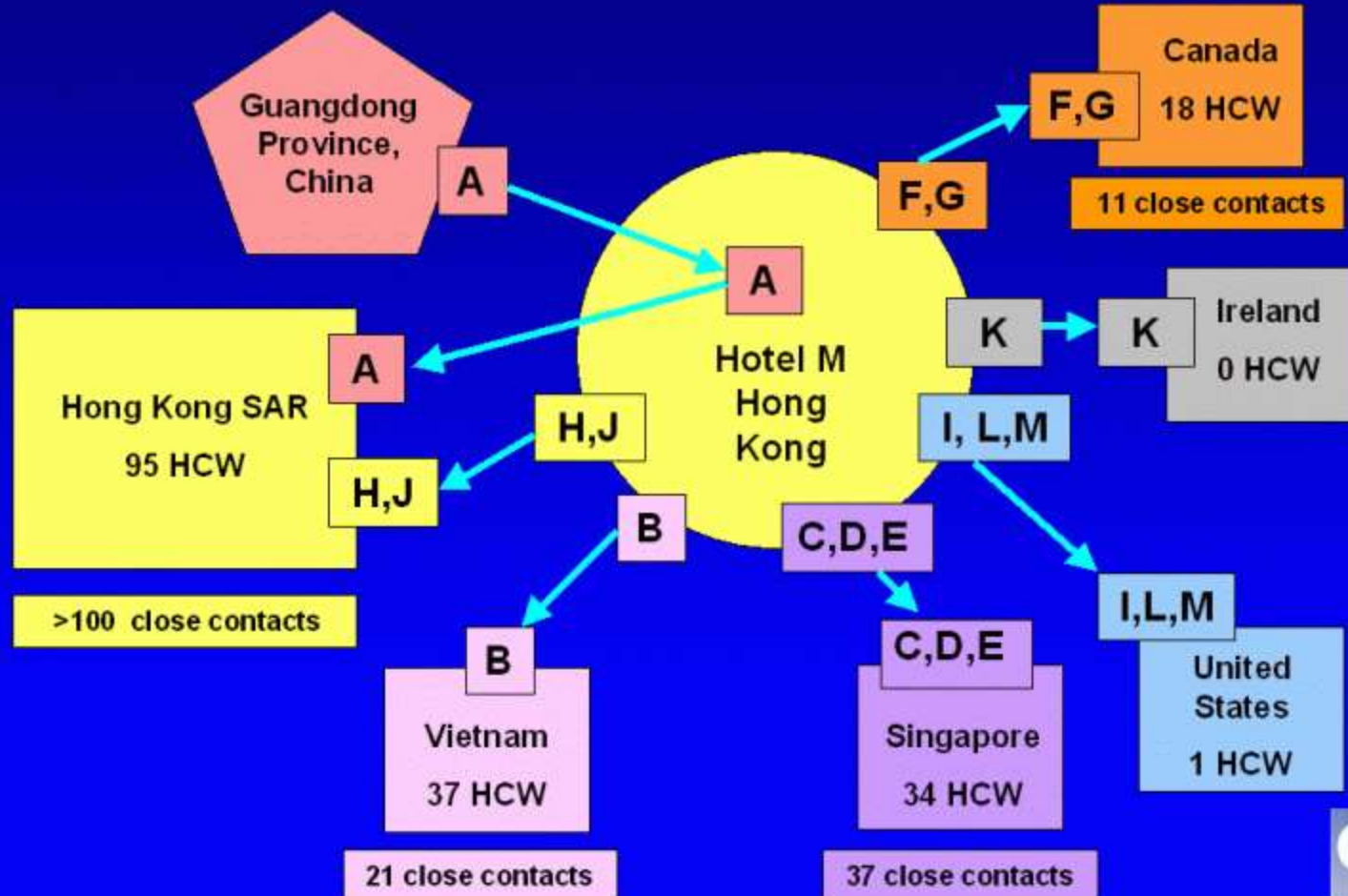
- Einlaufende Schiffe wurden 40 Tage isoliert
= quaranta giorni = 40 Tage
- Geeignet für Kurzläufer (=bakterielle + virale Erkrankungen) nicht geeignet für HIV, CMV, EBV, Tuberkulose, Syphilis
- Eigene dafür vorgesehene Spitäler mit Besucher Isolation, z.B. Lazlo-Hospital in Budapest



**PESTMELDUNGEN 1970-1998
VORKOMMEN DES ERREGERS IN TIEREN**

Spread from Hotel M

Reported as of March 28, 2003



SARS in Toronto

78jährige Frau mit Ehemann kehrt am
13. Feb. 2003 aus Hong Kong zurück



Fieber, Myalgie, Halsweh und Husten

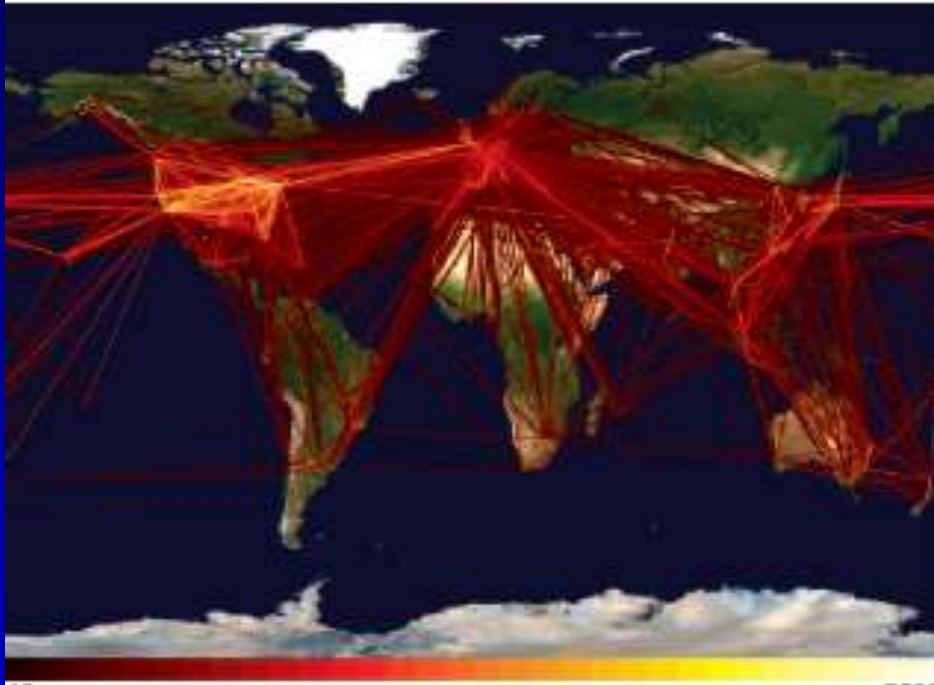
Tot am 5. März



139 SARS-Fälle

128 Verdachtsfälle

Global aviation network



Analysis of 2 Million flights between

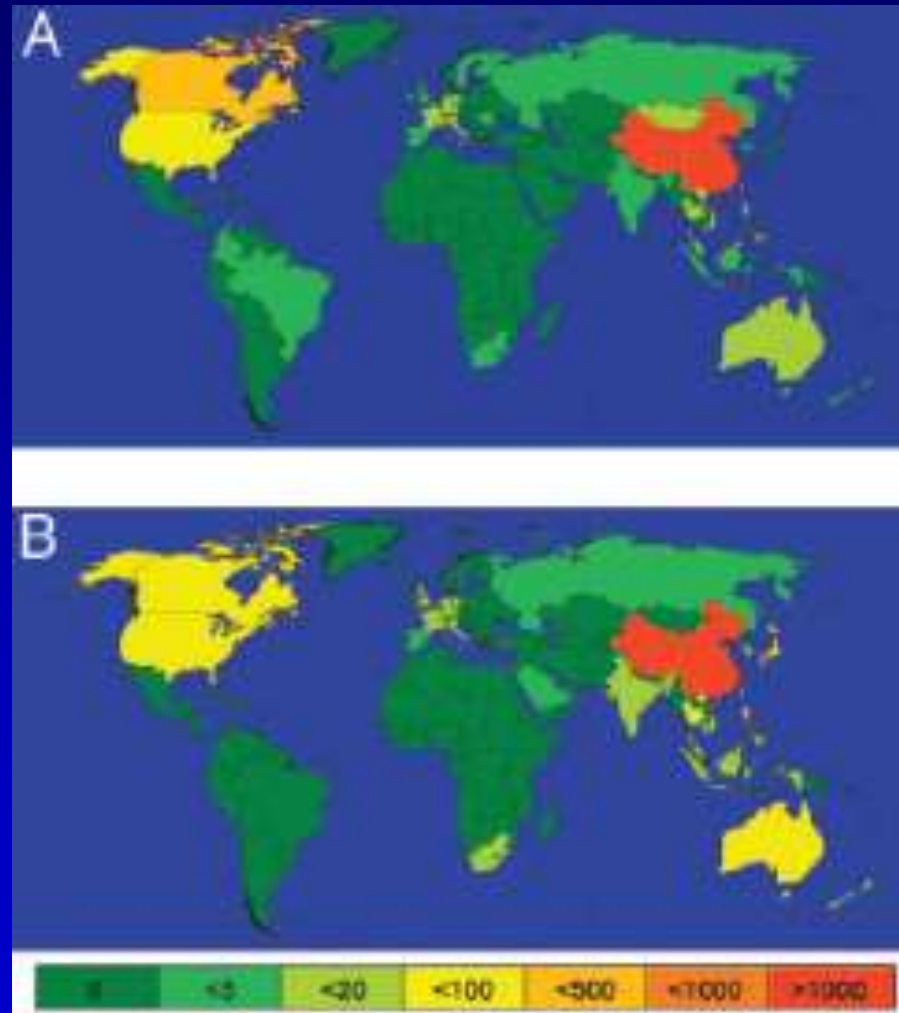
500 'world' airports



95% of civil aviation

Hufnagl, L. PNAS Oct 11 2004

Global spread of SARS



Hufnagl, L. PNAS Oct 11 2004

Travel restrictions to inhibit spread

- Isolation of 2% of the largest cities reduces spread from 75% to 37%
- Shutdown of the strongest connections is less effective, 27% would need to be taken off the network
- Quick response requires only a vaccination of a small fraction of the population

Spanische Grippe 1918

Ursprünglich Vogelvirus H1



Mutation/Speziessprung

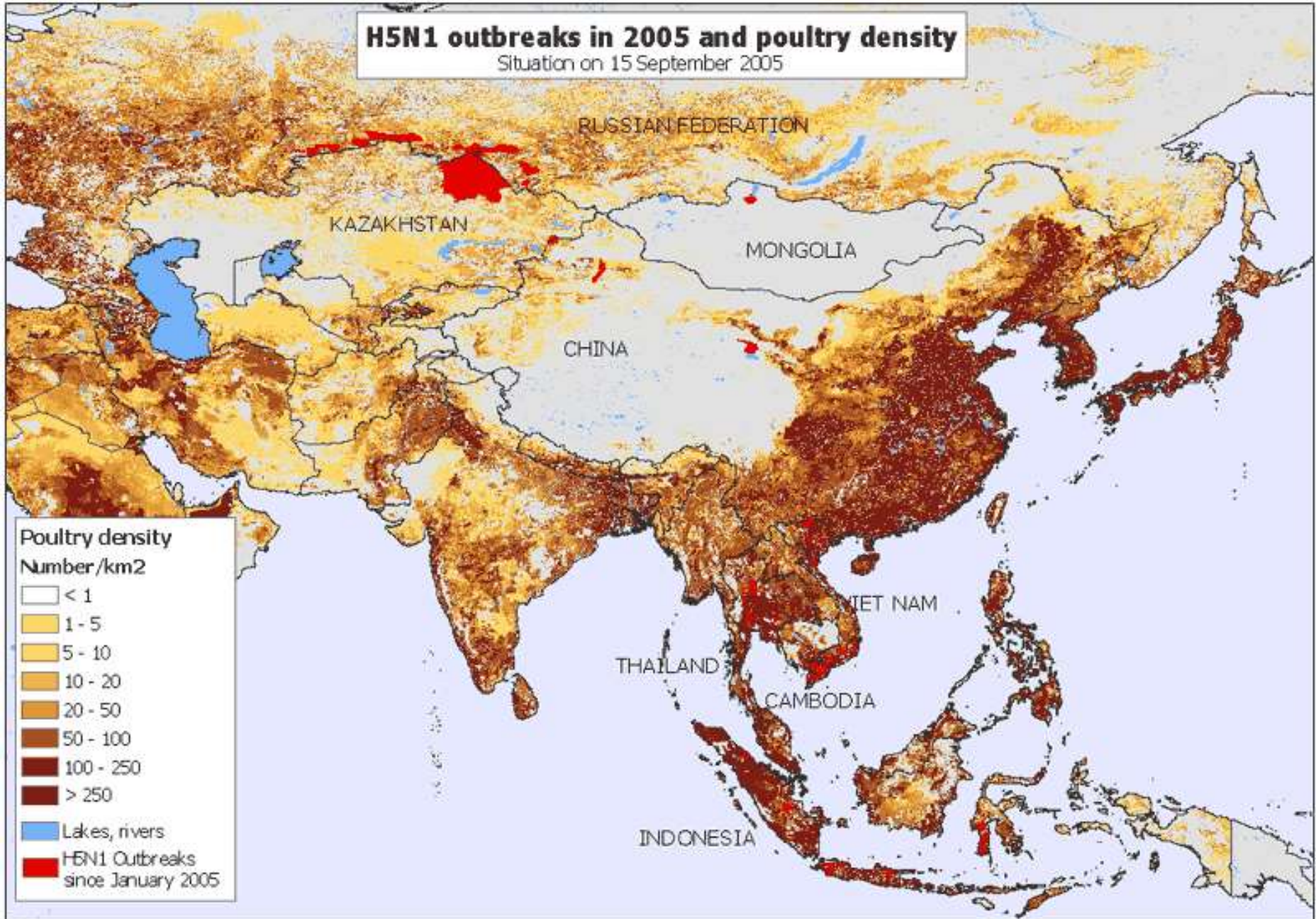


Adaptierung Mensch

... kann das auch 2005/6 vorkommen?

H5N1 outbreaks in 2005 and poultry density

Situation on 15 September 2005



~~... kill all birds~~

~~... kill all insects~~

~~... kill all infected humans~~

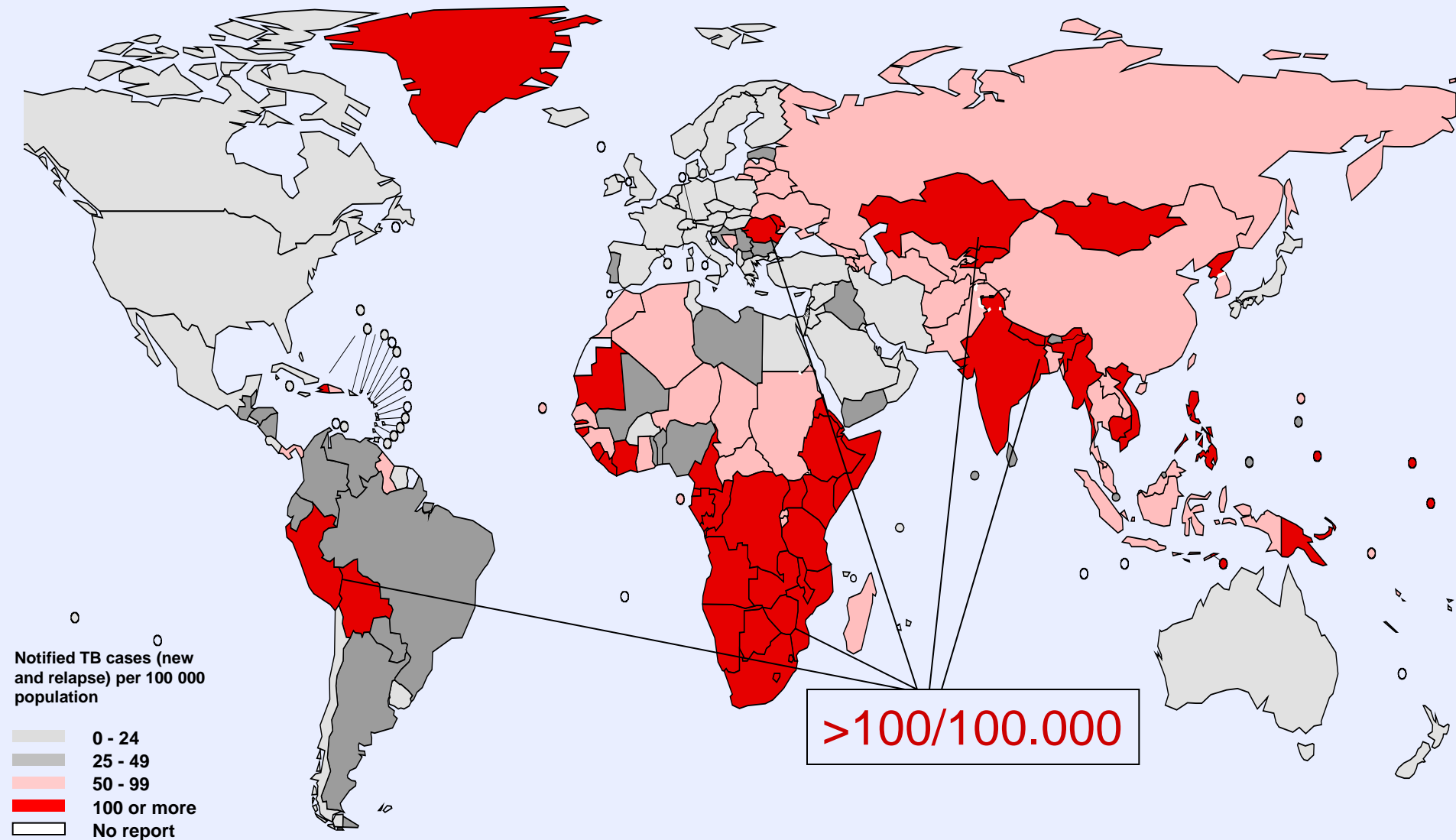
Quarantine – where ?

- Not in a public hospital
- Preferably in a military hospital
- Other locations:
 - Former Tb-hospital
 - Psychiatric hospitals
 - Prerequisite: ID-nurses
- No visitors

Tuberkulose

- 1/3 der Weltbevölkerung latent infiziert
- HIV – Komorbidität
- Resistenzentwicklung durch
Fehlbehandlung

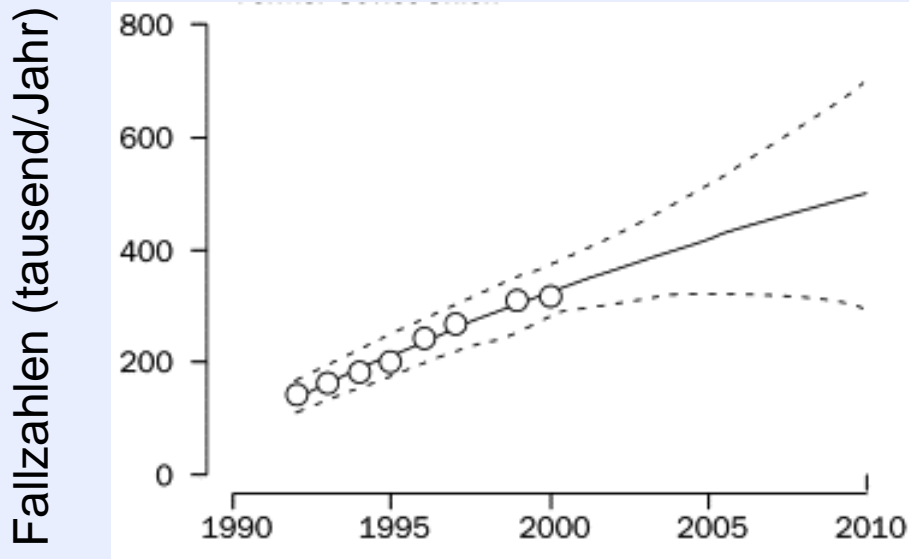
Tuberkulose, 2014



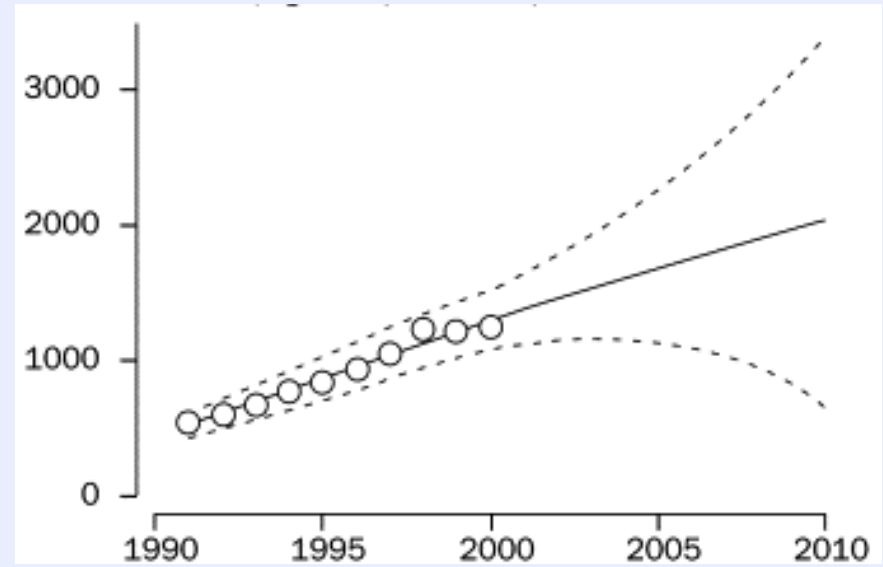
Quelle: WHO

Tuberkulose-Trends

frühere UDSSR



Afrika

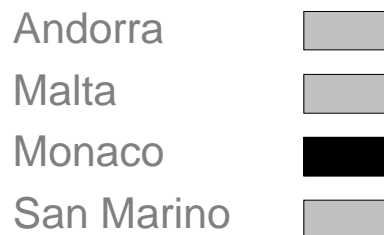


TB Inzidenz/100,000 Europa

Rate per 100,000



≥ 51



MDR: multi-drug resistant-TB

MTB resistent gegen Rifampicin *und* Isoniazid

- Wirts-spezifische genetische Faktoren (div. HLA-Assoziationen)?
- Keim-spezifische Faktoren: W-Beijing-Genotyp assoziiert mit multi-drug resistance
- HIV per se kein prädisponierender Faktor
- **Inkomplette oder inadequate Behandlung** (keine Kombinationstherapie, fehlende Kontrolle der Einnahme, nicht-indizierte INH-Präventivgabe,...)

Multiresistente Tuberkulose

Land	Primär % (multidrug)	Erworben % (multidrug)
Tschechien	2.0 (1.0)	12.5 (6.3)
Frankreich	8.2 (0.5)	21.5 (4.1)
USA	12.3 (1.6)	23.6 (7.1)
Argentinien	12.5 (4.6)	41.3 (22.2)
Bolivien	23.9 (1.2)	42.1 (4.7)
Russland	28.2 (4.0)	100 (27.3)
Estland	28.2 (10.2)	46.2 (19.2)
Lettland	34.5 (14.4)	73.7 (54.4)
Dom. Republik	40.6 (6.6)	52.1 (19.7)



MTB-Resistenzlage in Österreich

Jahr	INH	RMP	PZA	EMB	SM	poly-resist	MDR
2002	13 (1,9%)	2 (0,3%)	6 (0,9%)	0	9 (1,3%)	3 (0,4%)	2 (0,3%)
2003	17 (2,8%)	3 (0,5%)	7 (1,2%)	1 (0,2%)	12 (2%)	8 (1,3%)	12 (2%)
2004	22 (3,4%)	0	5 (0,8%)	1 (0,2%)	15 (2,3%)	12 (1,9%)	18 (2,8%)
2005	26 (4,1%)	2 (0,3%)	7 (1,1%)	0	11 (1,7%)	19 (3,1%)	13 (2%)

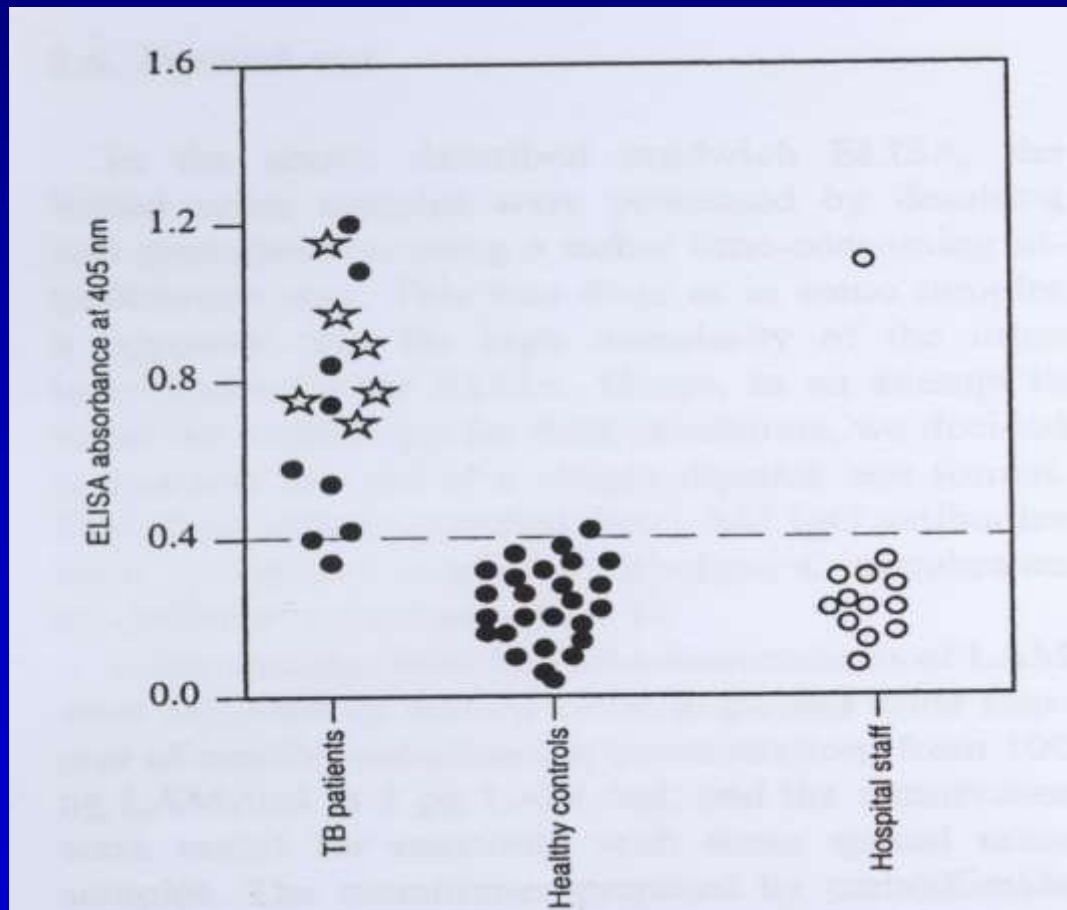
XDR: extensively drug-resistant MTB

- Resistent gegenüber mindestens 3 Klassen von „second line“ Tuberkulostatika
- Praktisch unbehandelbar
- 52 von 53 XDR-Erkrankten verstarben im Durchschnitt innerhalb von 25 Tagen bei einem Ausbruch in Südafrika (alle HIV-positiv)

Diagnosis of latent tuberculosis

- *Skin test*: previous BCG vaccination?
previous tuberculosis?
- *Bacterial components* :
mycobacterial DNA
IF-response to cell wall
components (IGRA)
- *Antibody response* :
Lipoarabinomannan

Rapid Diagnosis of Tuberculosis by Detection of Mycobacterial Lipoarabinomannan in Urine



Hamsur; J. Microb. Methods 2001

Neue Tuberkulostatika

Neue Substanzen n = 5200



BACTEC 460 n = 450

+

Zytotoxizität-Test (Vero-Zellen)



Makrophagen mit M.t. n = 340



Maustest n = 53



Cholera in Peru

- Vibrio cholera 01 mit 2 Biotypen (klassisch+El Tor)
 - Säure, Hitze, Trockenheit
 - 100 Milliarden Erreger → “krank”
 - Toxinwirkung aufgeklärt
- 1991 in Peru Küste 5 Tage 1992 160.000/600
Alliplano 16 Tage 1995 22.000/171
Iquitos 29 Tage
- Ausgangspunkt: Chinesischer Frachter
Zooplankton/El Nino

An Cholera Verstorbene

Tschaikowsky

Hegel

Clausewitz

Bradshaw

Gneisenau

Blake

Armand

Dumas ↑

Durchfallerkrankungen als 'emerging diseases'

- Cholera in Amerika 1991
- *Cyclospora cayetanensis* auf
Himbeeren aus Guatemala
- *E.coli* O157-H7 USA 1982
- Noroviren, Rotaviren
- *Campylobacter jejuni*

Emerging Infectious Diseases in Plants

- Climate change
 - Intensification
 - Globalization
 - Host-pathogen evolution
-

.... 1950 six million citrus trees

had been destroyed in Sao Paulo

(Citrus tristeza virus + *Toxoptera citricidus*)

Trade routes and spread of microbes and their vectors

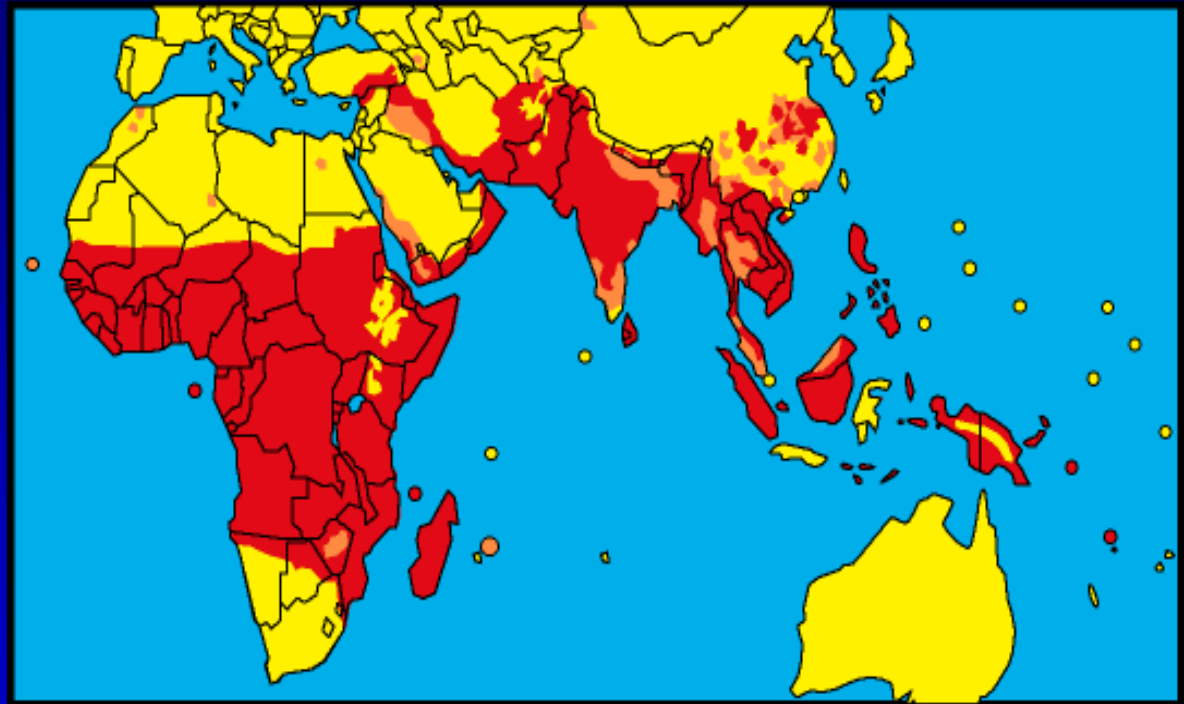
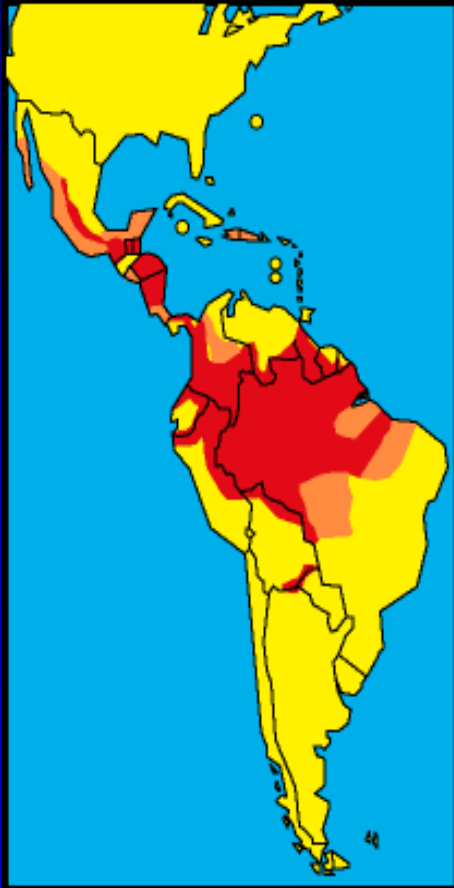
- 14-17th century plague pandemics
- Escape of *Aedes aegypti* from West Africa to US
- Escape of *Anopheles gambiae* to Brazil in 1930
- Spread of *Aedes albopictus*, the Asian tiger mosquito

Aedes albopictus

- Mosquito as vector of 22 arboviruses
 - dengue
 - west nile virus
 - yellow fever
 - chikungunya
- zika
- Spread by shipping

Malaria: 300-500 Mio Erkrankungen

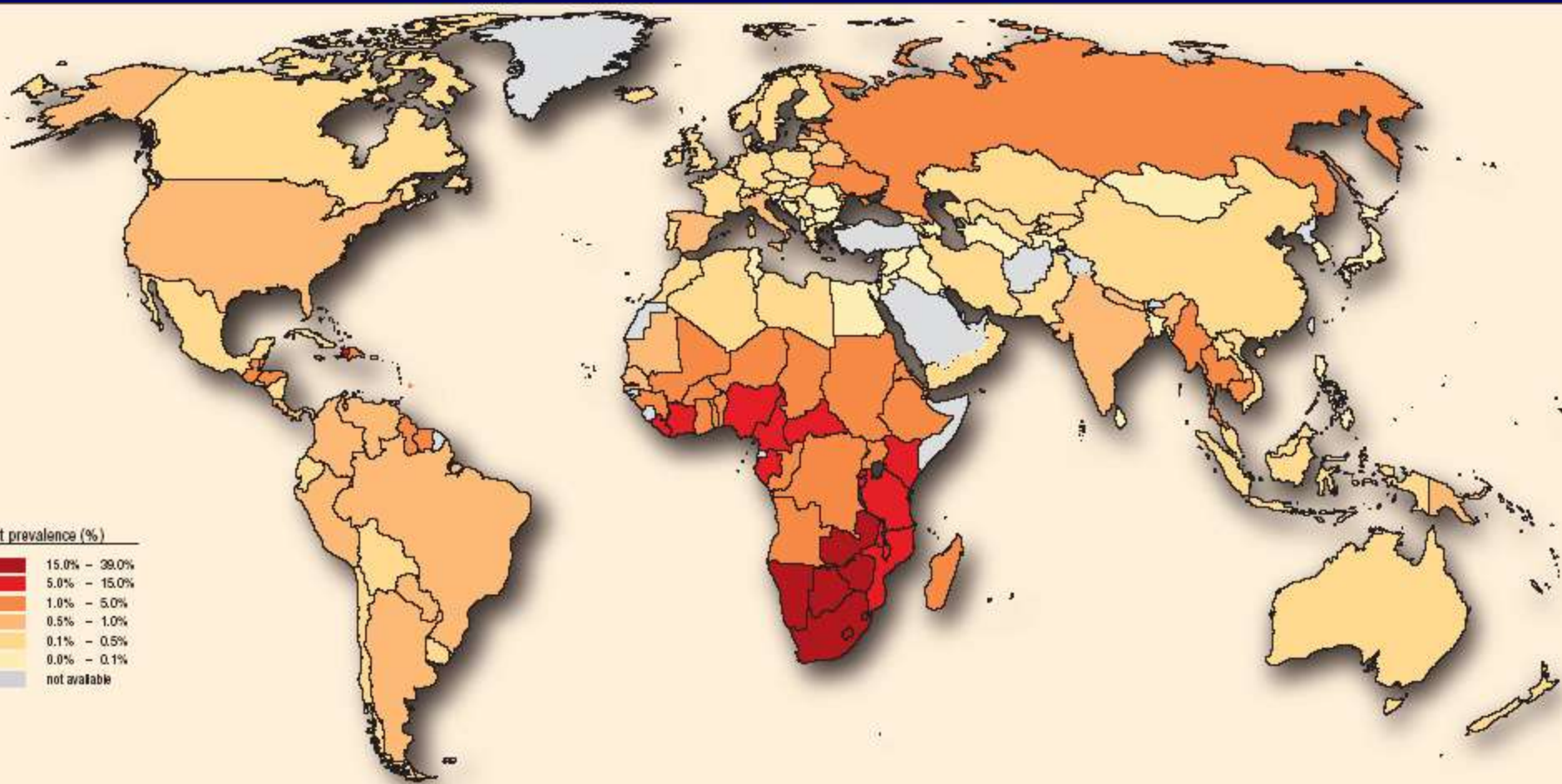
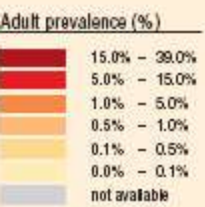
~ 3 Mio Todesfälle jährlich



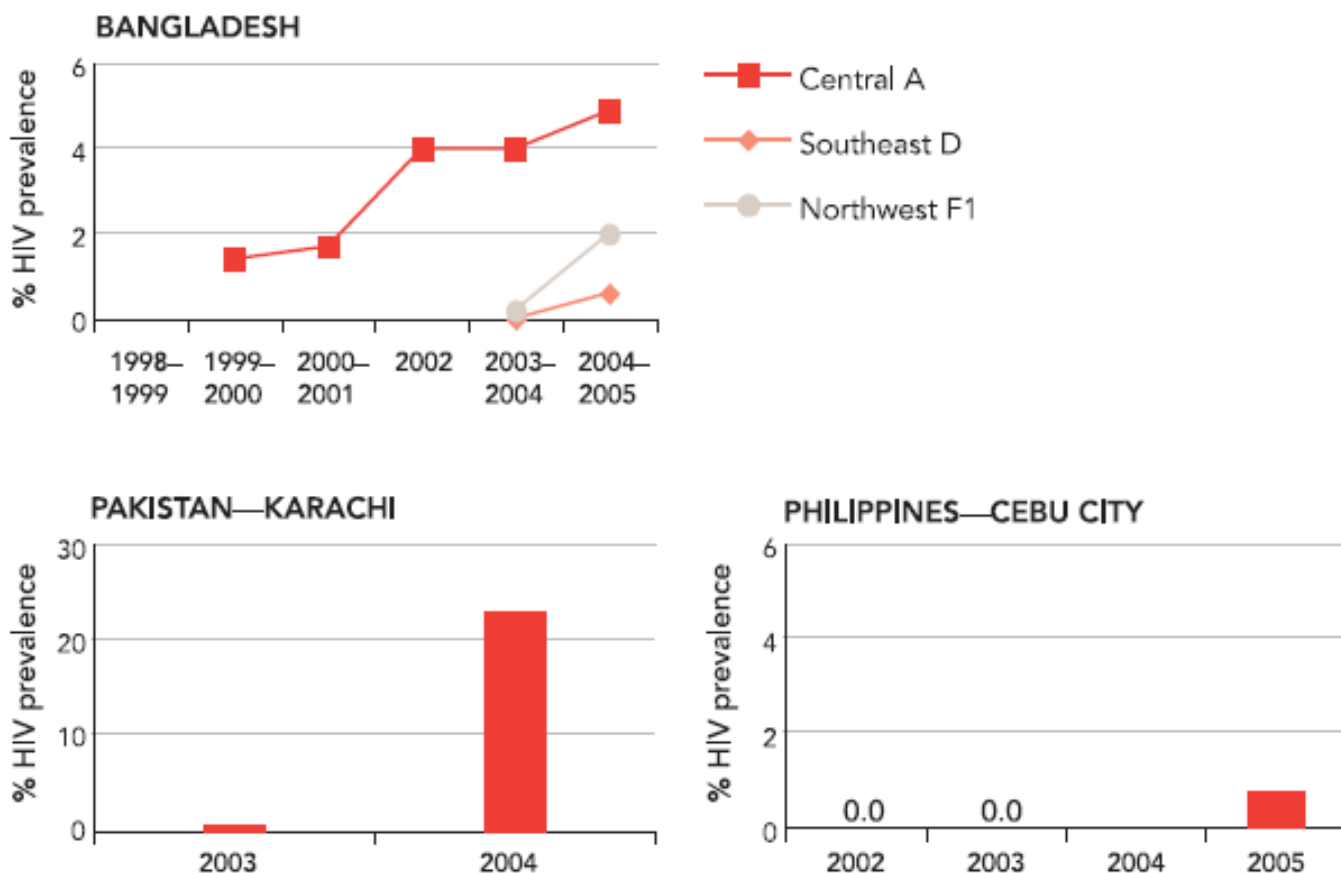
■ Areas in which malaria has disappeared, been eradicated or never existed.

■ Areas with limited risk.

■ Areas where malaria transmission occurs.



HIV prevalence (%) trends among injecting drug users in Bangladesh, Pakistan and the Philippines, 1998 – 2005*



*Other sites in Bangladesh and Pakistan continue to show very low HIV prevalence in their latest surveillance surveys (0% in 13 sites in Bangladesh, and 0.5% in Lahore, Pakistan).

Sources: 2005 Integrated HIV Behavioral and Serologic Surveillance Findings, Summary Report. National Epidemiology Center, Department of Health (Philippines); National HIV Serological Surveillance, 2004-2005, 6th Round Technical Report. National AIDS/STD Programme, Ministry of Health and Family Welfare (Bangladesh); National Study of Reproductive Tract and Sexually Transmitted Infections, Survey of High Risk Groups in Lahore and Karachi, 2005. National AIDS Control Program, Ministry of Health (Pakistan).

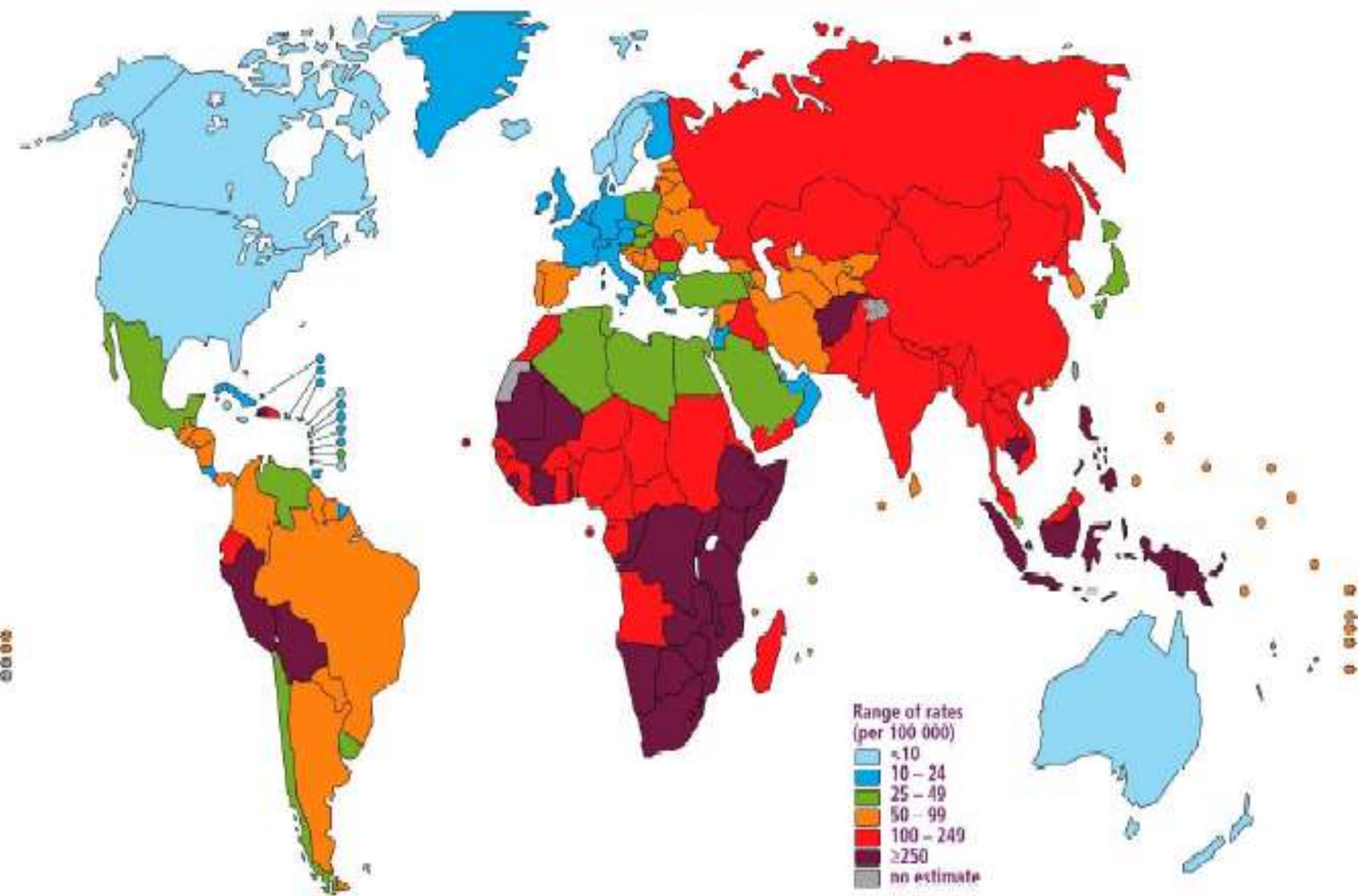
HIV-TB-Koinfektion

- In Entwicklungsländern sind 25-65% aller HIV/AIDS-Patienten auch TB-krank (wichtigste opportunistische Infektion)
- ~ 12 Millionen sind HIV-TB-koinfiziert, davon 70% in Afrika, 20% SO-Asien, 4% Karibik u. Lateinamerika
- TB ist für 13% aller HIV-assoziierten Todesfälle verantwortlich

HIV – Bildung ist die einzige Schutzimpfung

- Ursprung unklar
- Ausgang von einem einzigen Infizierten
- 1959 Afrikaner/ Bantin / Kinshasa
- Dauernde Antigenvariabilität
- Übertragung durch Nadel + Sex
- Todesursache meist opportunistische Infektion
- Nicht eradizierbar

Estimated tuberculosis incidence rates, 1997



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Screening-Untersuchungen bei Immigranten

- Blutbild + Diff
 - Rubella + Hepatitisserologie
 - STD (Syphilis, HIV)
 - PPD/Thoraxröntgen
 - Wurmeier
-
- HIV-2
 - Harnuntersuchung

Tod durch Infektionen in Millionen pro Jahr

Pneumonie	3.8	Masern	0.7
HIV	2.8	Pertussis	0.3
Durchfall	1.8	Tetanus	0.3
Tuberkulose	1.6	STD	0.2
Malaria	1.2	Meningitis	0.3

What did we learn 2017

Rigid isolation – quarantine for SARS in Canada

Fighting the vectors – antilarval campaign

against *A. gambiae* in Brazil by

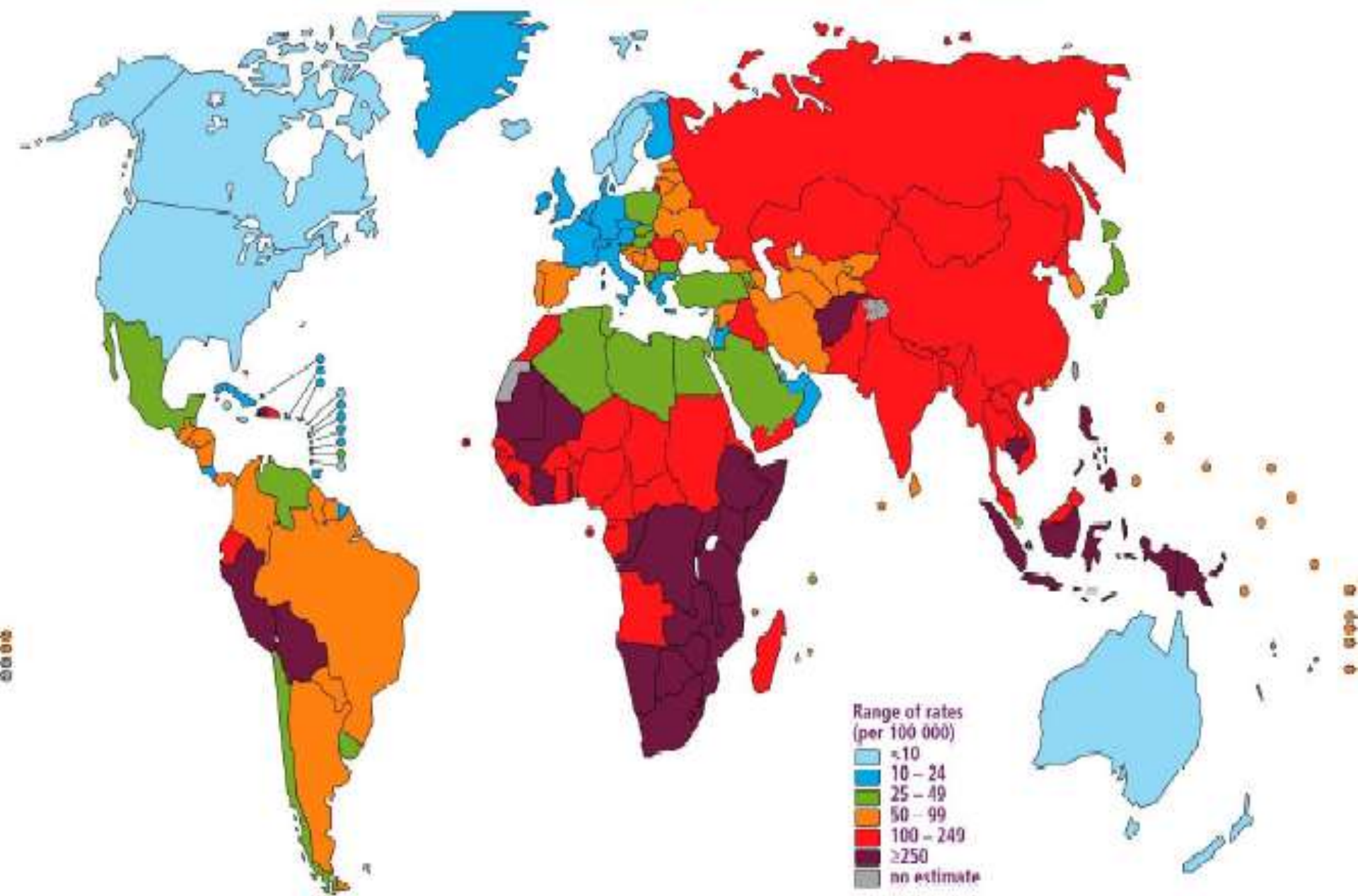
a clearly defined and rigorous organisation

Global warning system – influenza

Stockpiling of antivirals – 80% tamiflu, 20% relenza

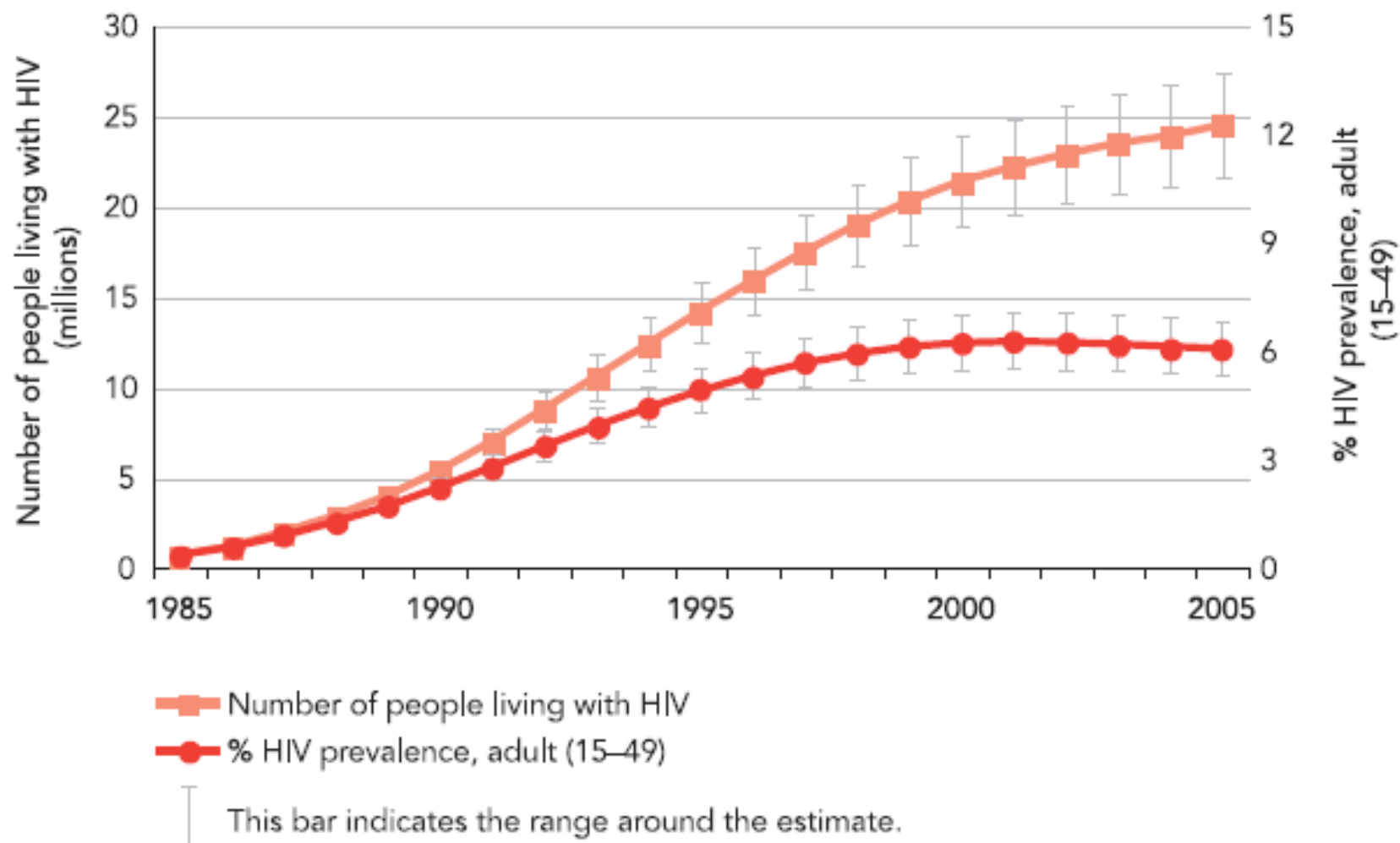
Quick production of vaccines – H5N1

Estimated tuberculosis incidence rates, 1997



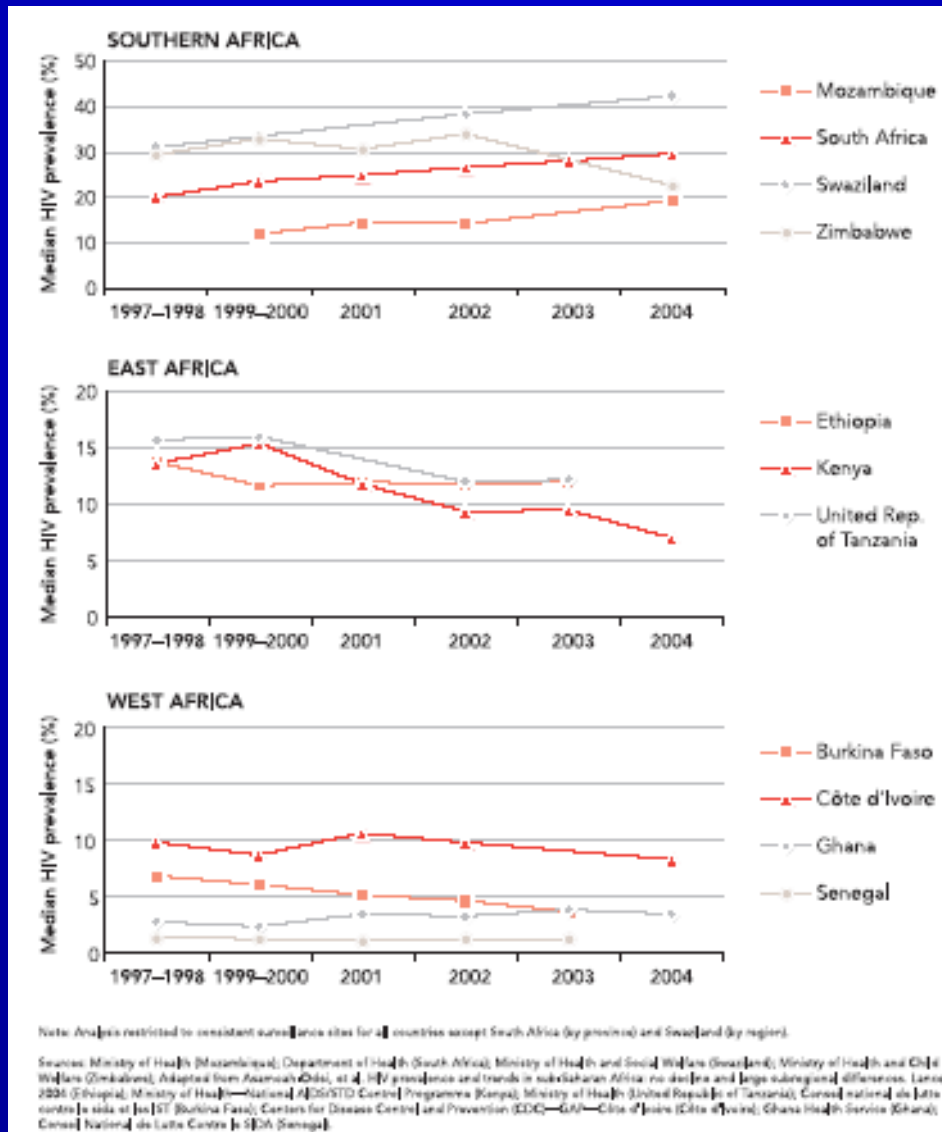
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HIV epidemic in sub-Saharan Africa, 1985–2005

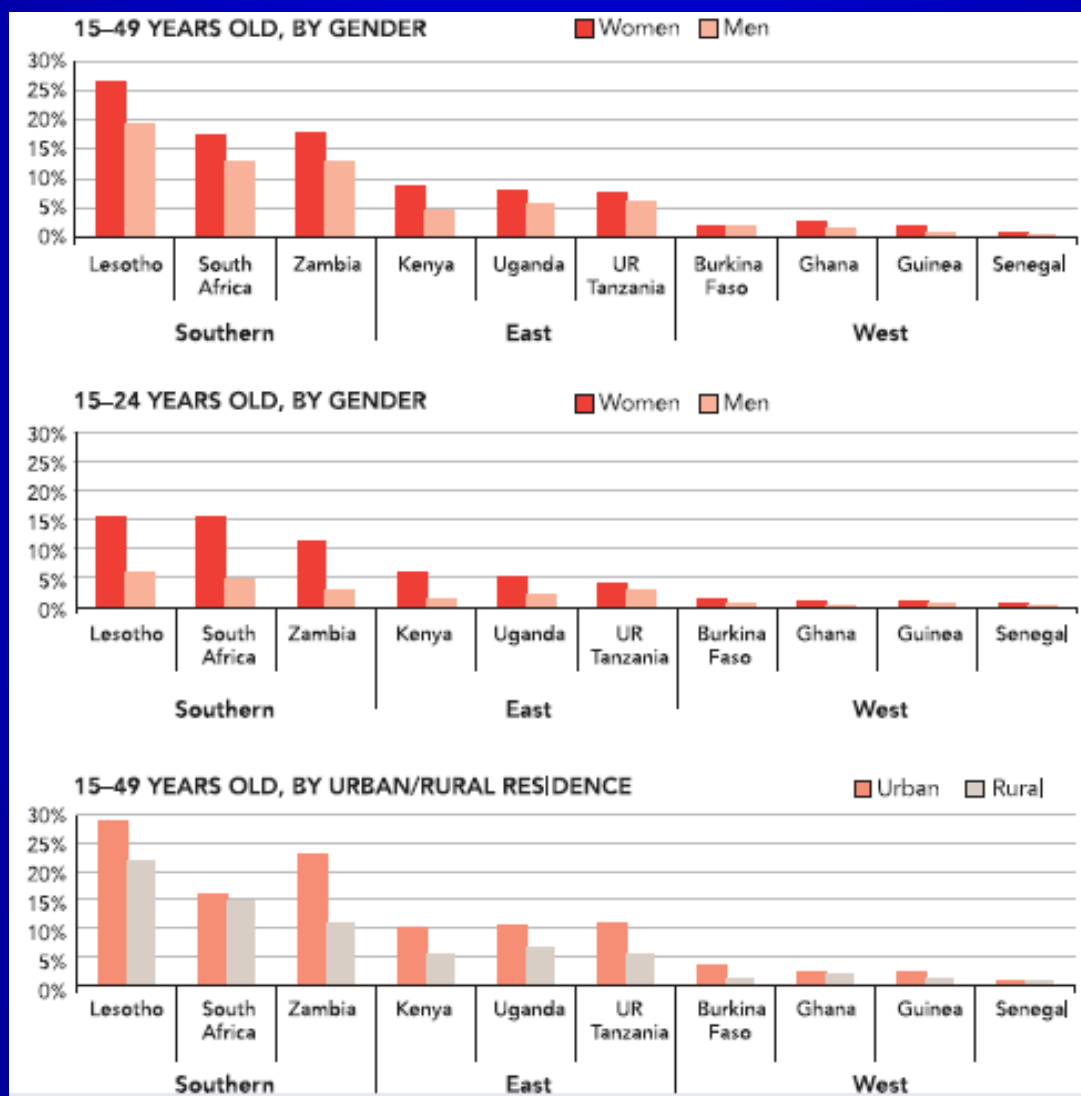


²Even though HIV prevalence rates have stabilized in sub-Saharan Africa, the actual number of people infected continues to grow because of population growth. Applying the same prevalence rate to a growing population will result in increasing numbers of people living with HIV.

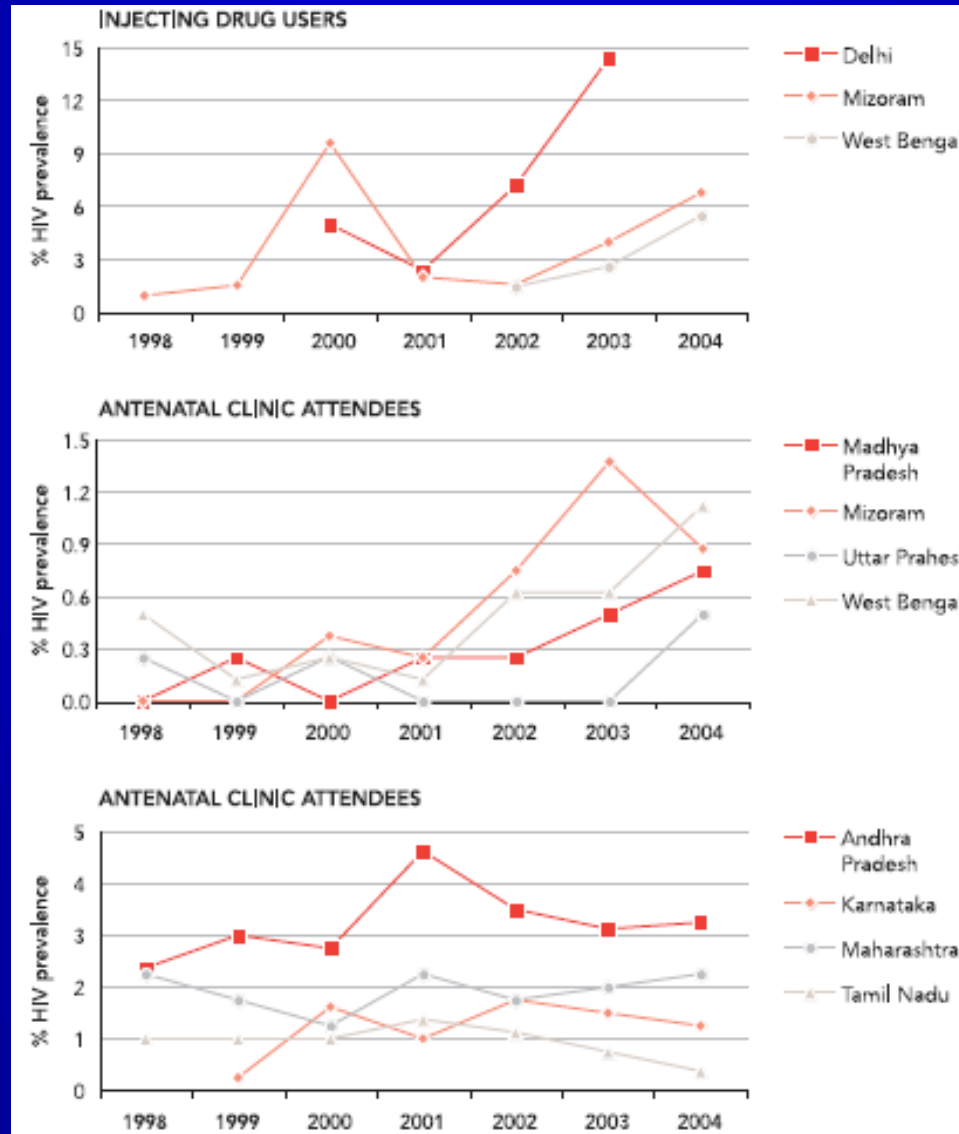
HIV prevalence (%) among pregnant woman attending antenatal clinics in sub-Saharan Africa, 1997/98 - 2004



HIV prevalence (%) by gender and urban/rural residence, selected sub-Saharan African countries, 2001 - 2005



HIV prevalence (%) trends in India among injecting drug users and pregnant women, selected areas, India, 1998 – 2004*



* Data from consistent surveillance sites only