

## *Convegno*

# MIGRAZIONI E SALUTE. QUALI RISPOSTE AI BISOGNI SOCIO-SANITARI?

## **Il controllo delle malattie emergenti e ri-emergenti. Il parere dell'infettivologo**

**Prof. Francesco Castelli**

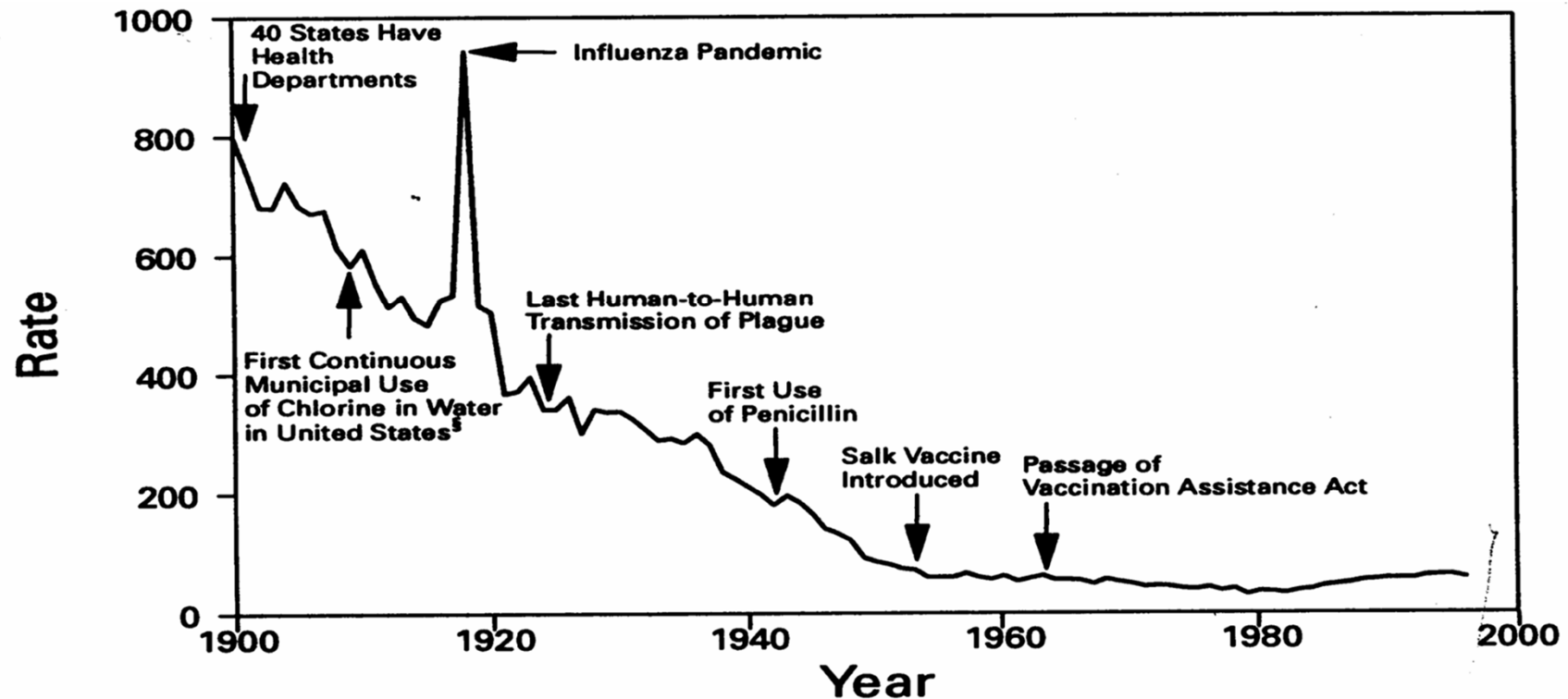


University of Brescia (Italy)

WHO Collaborating Center  
for the implementation of TB/HIV collaborative activities



FIGURE 1. Crude death rate for infectious diseases - United States, 1900 – 1996



\*Per 100,000 population per year.

†Adapted from Armstrong GL, Conn LA, Pinner RW. Trends in infectious disease mortality in the United States during the 20th century. JAMA 1999;281:61–6.

‡American Water Works Association. Water chlorination principles and practices: AWWA manual M20. Denver, Colorado: American Water Works Association, 1973.

**U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES**

***... it is time to close the book on  
infectious diseases. The war against  
pestilence is over...***

William Stewart, Surgeon General  
in a message to Congress, 1969

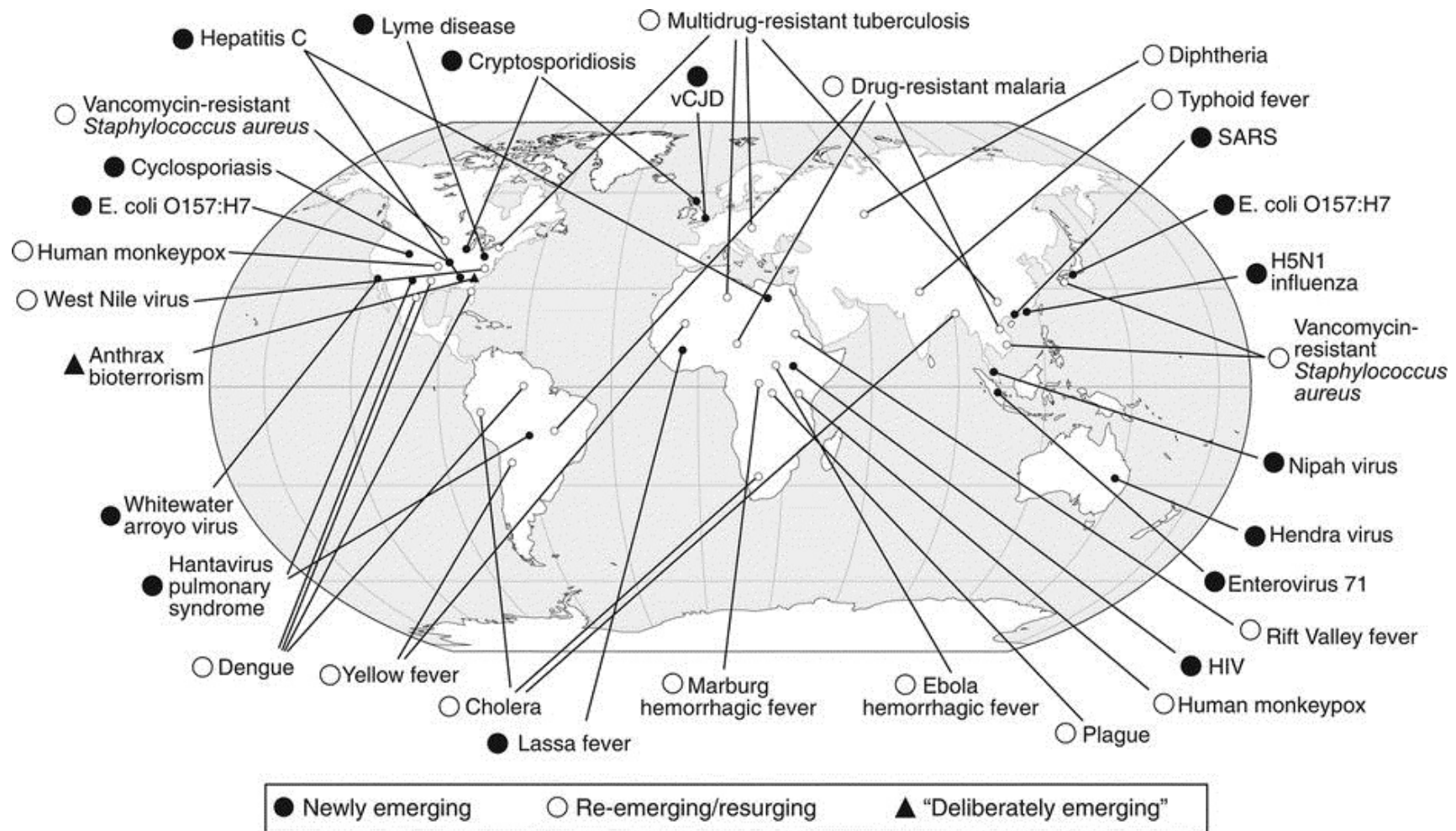
- **Emerging infectious disease:**

una malattia di natura infettiva che ha fatto di recente la sua comparsa in una popolazione

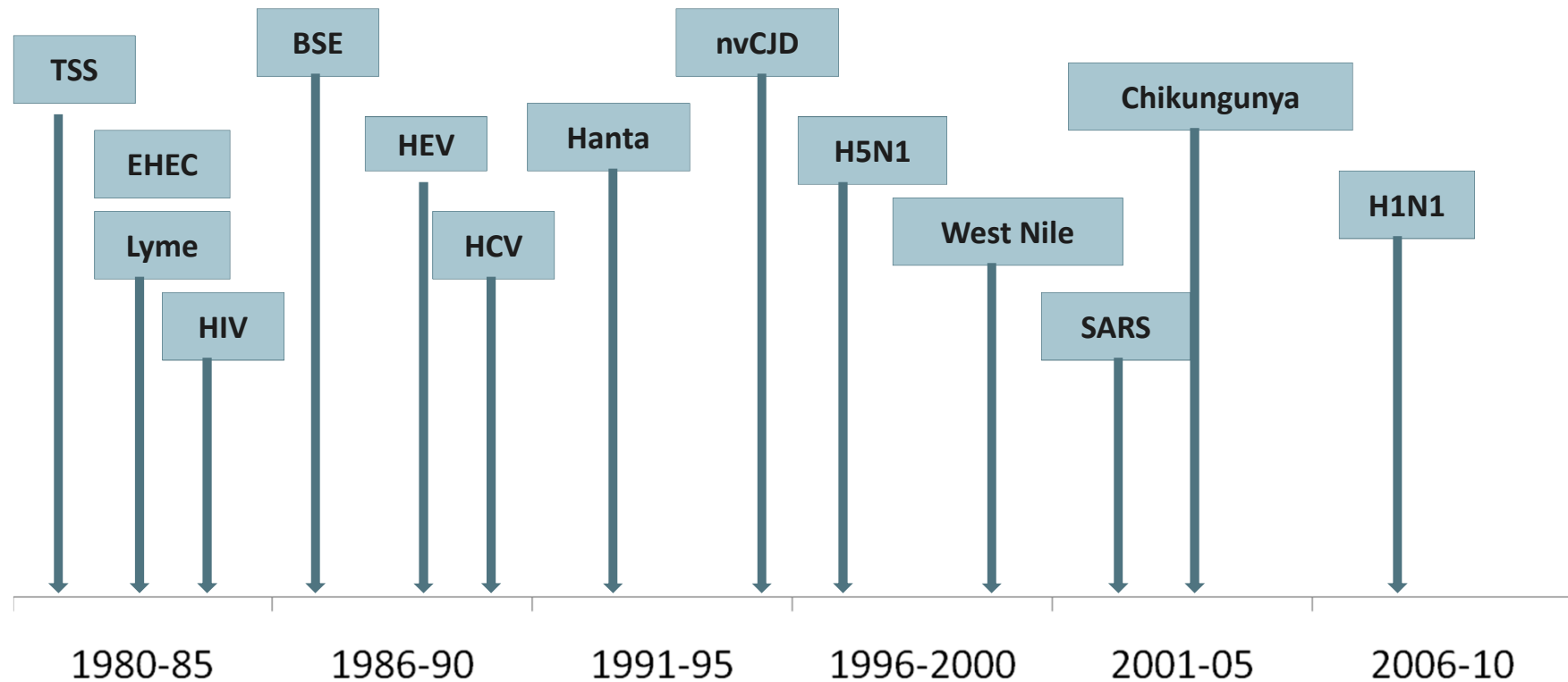
- **Re-emerging infectious disease:**

una malattia di natura infettiva che, seppur nota da tempo, ha rapidamente aumentato la sua incidenza o diffusione geografica

# Esempi recenti di malattie infettive emergenti e/o riemergenti nel mondo



# New kids on the block



# Cause infettive di malattie croniche

## Disease

Cervical cancer  
Chronic hepatitis, liver cancer  
Lyme disease (arthritis)  
Whipple's disease  
Bladder cancer  
Stomach cancer  
Peptic ulcer disease

## Cause

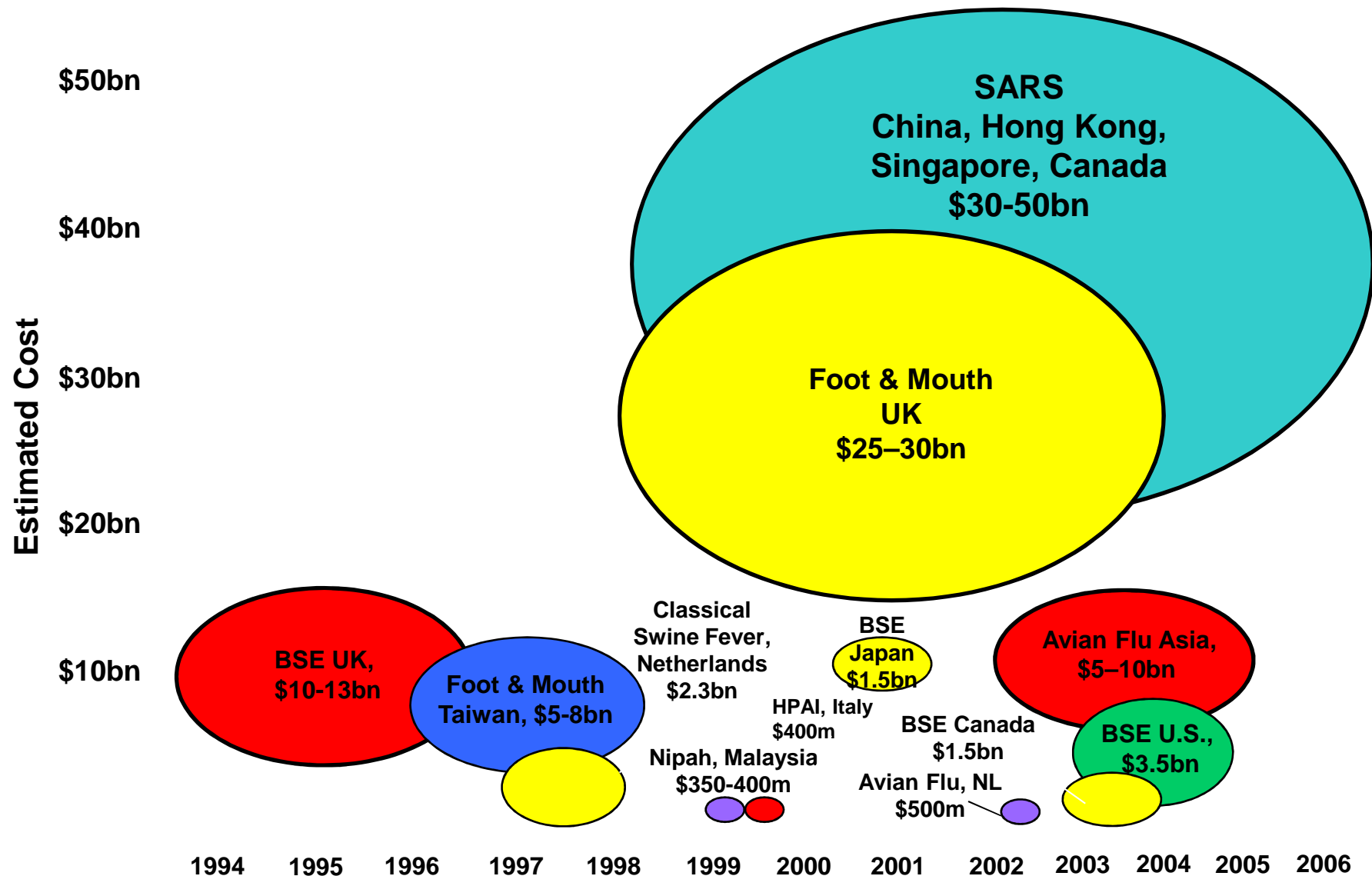
Human papilloma virus  
Hepatitis B and C viruses  
*Borrelia burgdorferi*  
*Tropheryma whippelii*  
*Schistosoma haematobium*  
*Helicobacter pylori*  
*Helicobacter pylori*

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Atherosclerosis (CHD)  
Diabetes mellitus, type 1  
Multiple sclerosis  
Inflammatory bowel disease

*Chlamydiae pneumoniae*  
Enteroviruses (esp. Coxsackie)  
*Epstein-Barr v, herpes vv?*  
*Mycobacterium avium* sub-spp.  
*Paratuberculosis, Yersinia*

# Economic Impact of Selected Infectious Diseases



Figures are estimates and are presented as relative size.



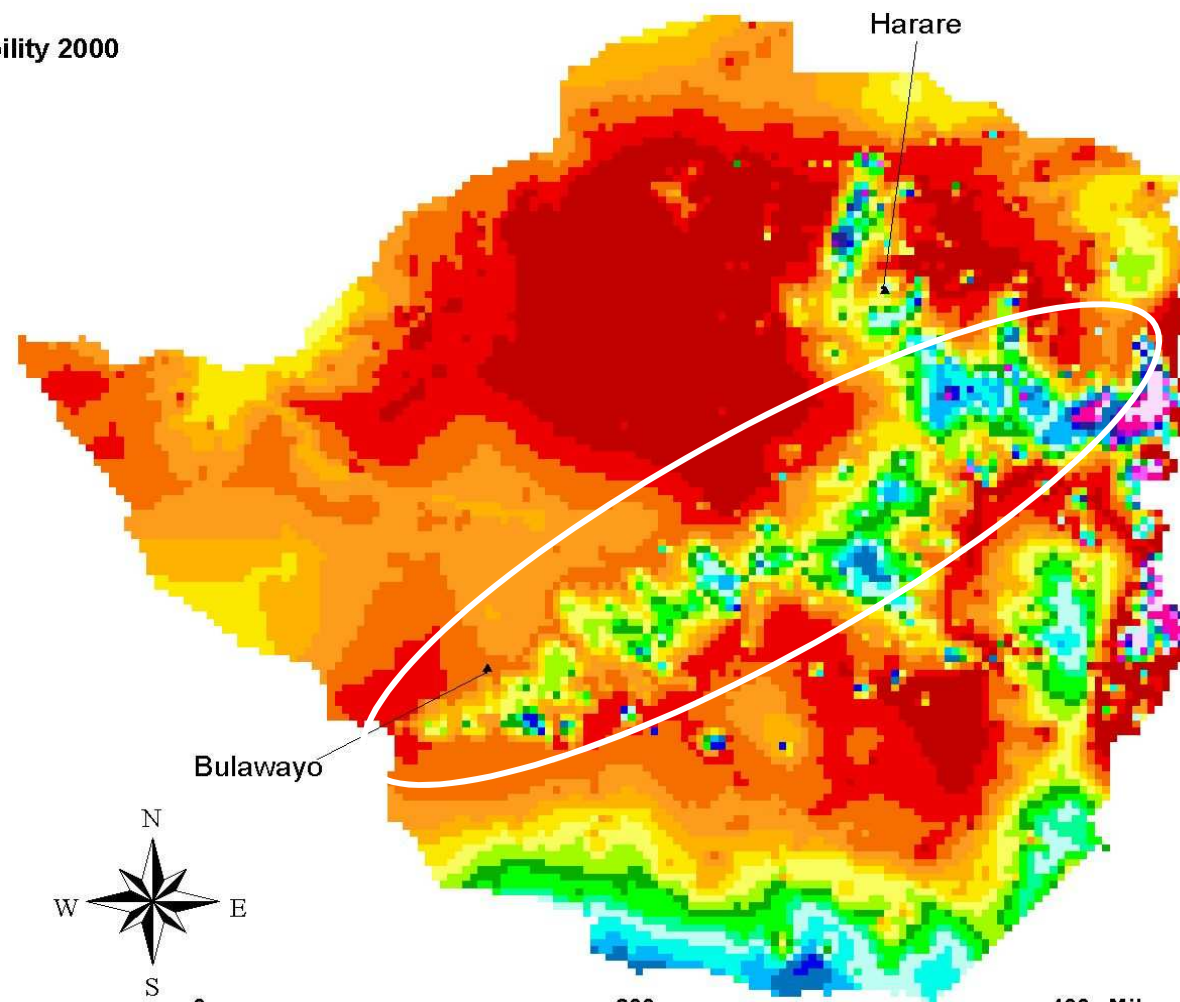
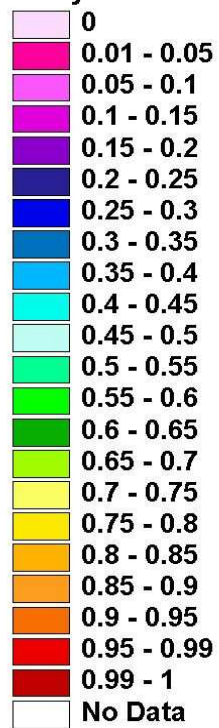
# **Fattori che determinano l'emergere/riemergere di malattie infettive**

- **Adattamento microbico**
- **Suscettibilità umana alle infezioni**  
invecchiamento, HIV, IV drugs, trapianti, trasfusioni
- **Incremento e densità demografica**
- **Urbanizzazione, affollamento – relazioni sociali e sessuali**
- **Globalizzazione dei viaggi e del commercio**
- **Mercati di animali vivi**
- **Allevamento intensivi di bestiame**
- **Uso scorretto degli antibiotici (uomo, animali domestici)**
- **Cambi nell'ecosistema (deforestazione, perdita di biodiversità)**
- **Modificazioni climatiche globali**

# MALARIA IN ZIMBABWE, UNDER CLIMATE CHANGE

2000 2025 2050 2075 2100

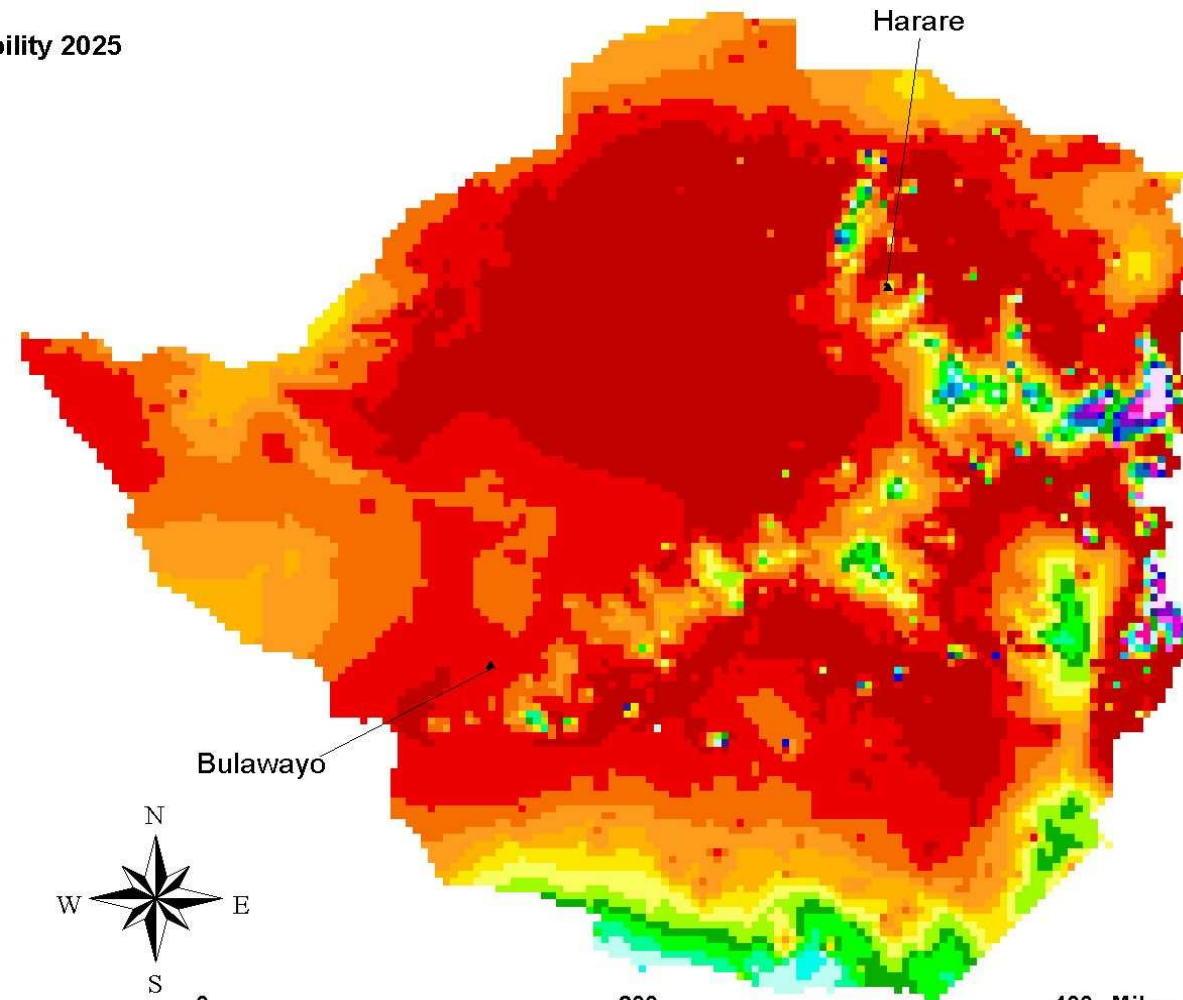
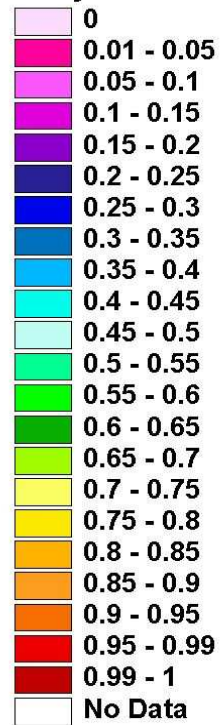
▲ Cities  
Fuzzy Climate Suitability 2000



200 0 200 400 Miles

2025 2050 2075 2100

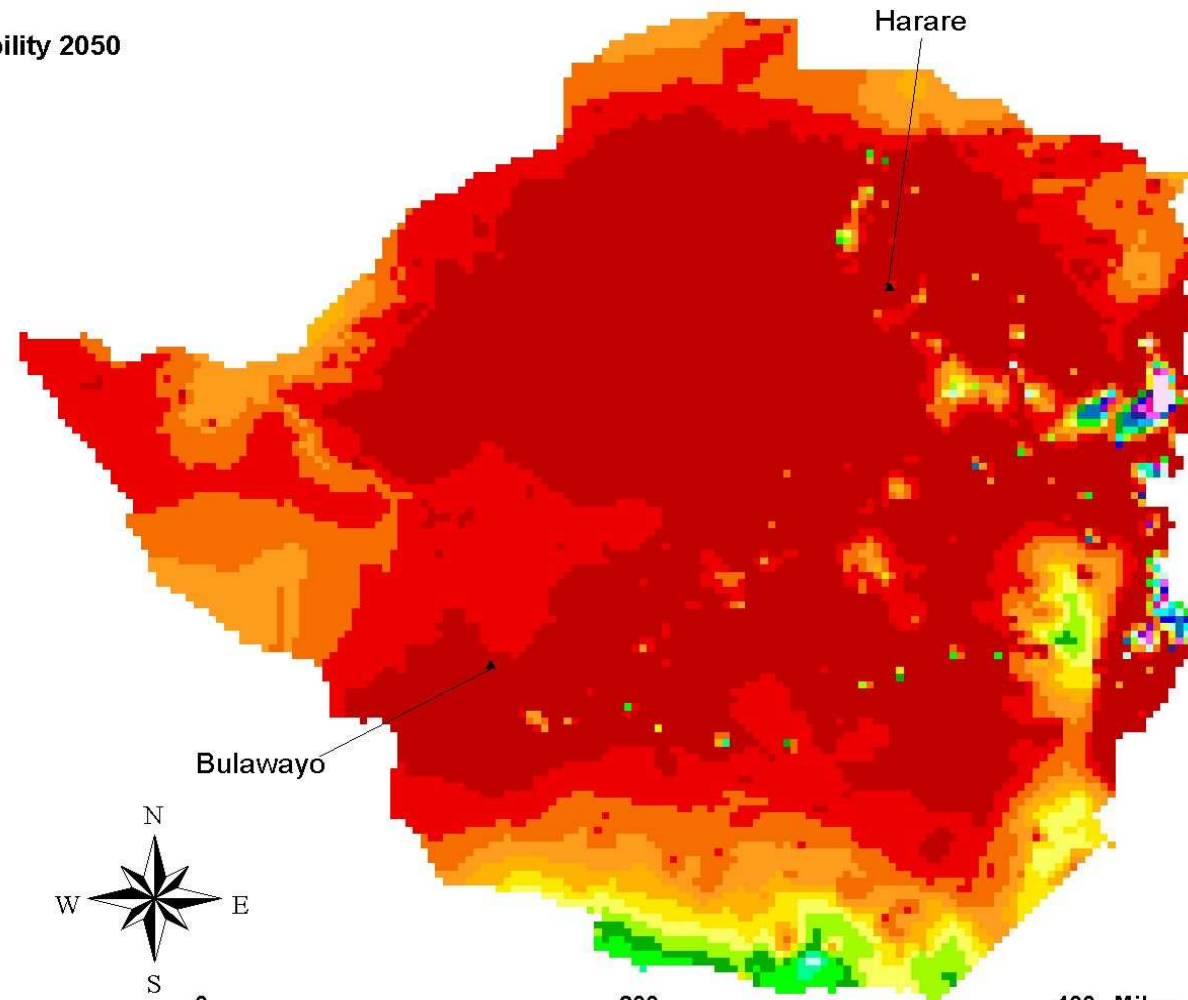
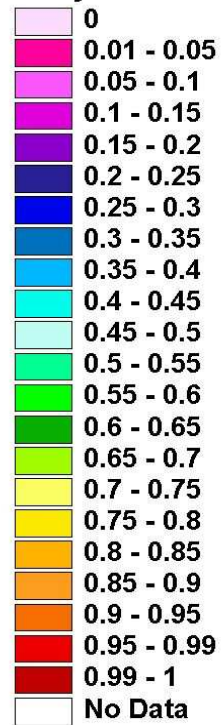
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Fuzzy Climate Suitability 2025



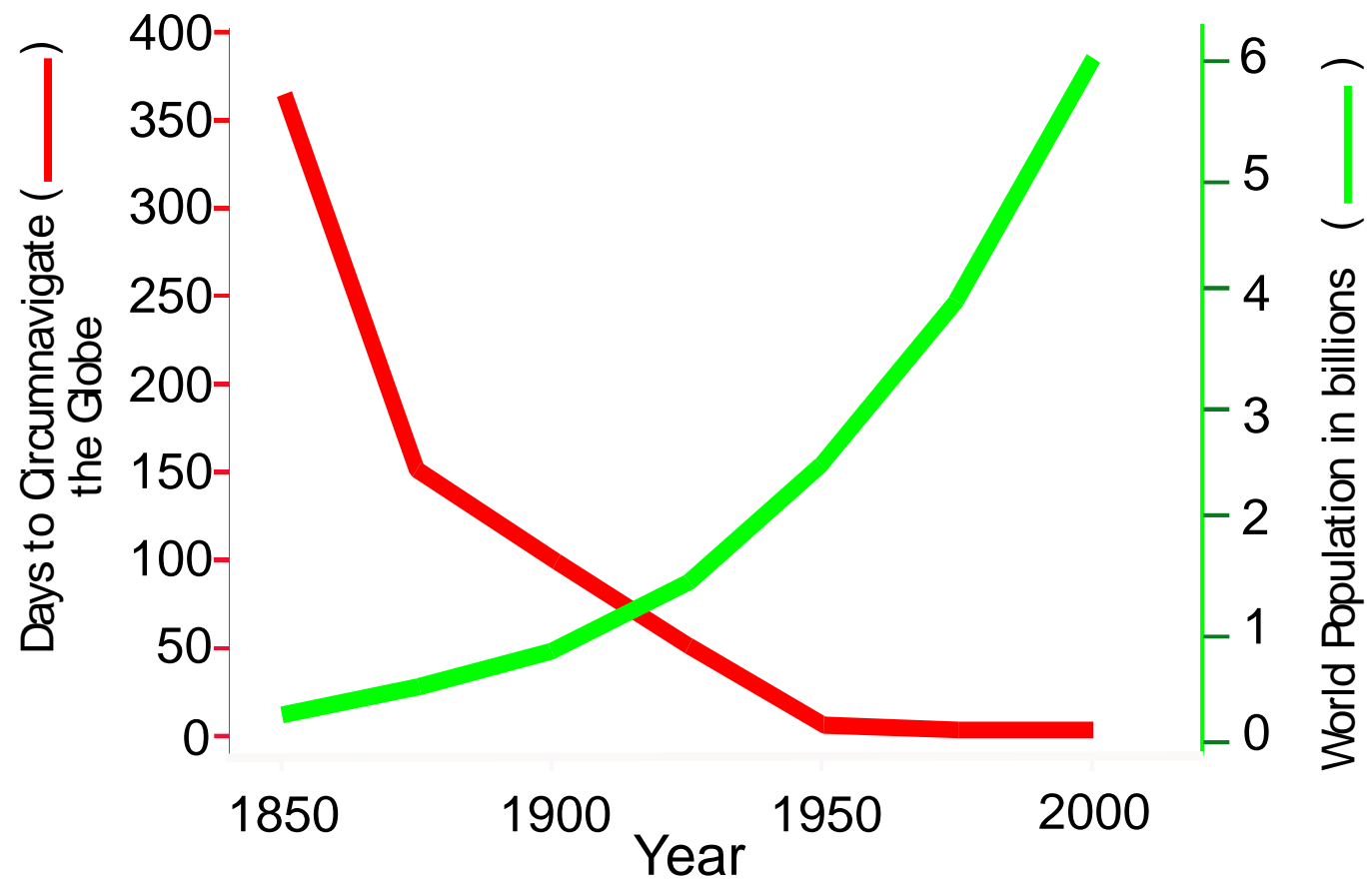
200 0 200 400 Miles

2050 2075 2100

▲ Cities  
Fuzzy Climate Suitability 2050



## Speed of Global Travel in Relation to World Population Growth



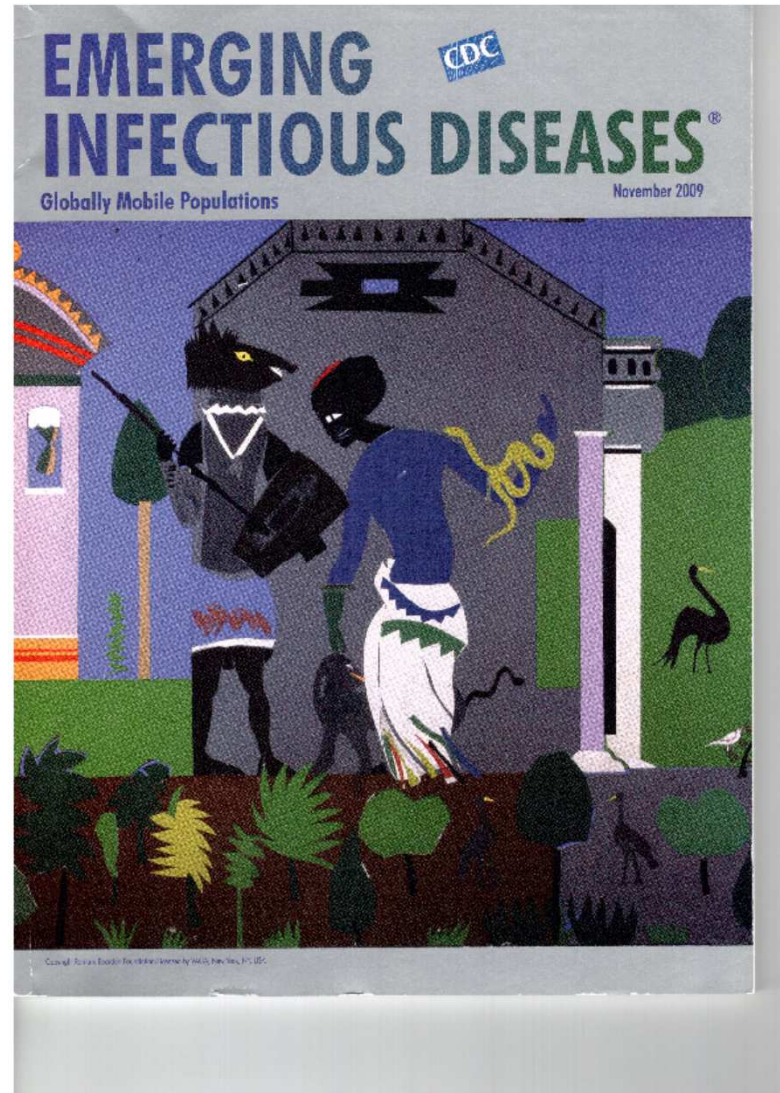
# Inbound tourism: World 2011



Source: World Tourism Organization (UNWTO)

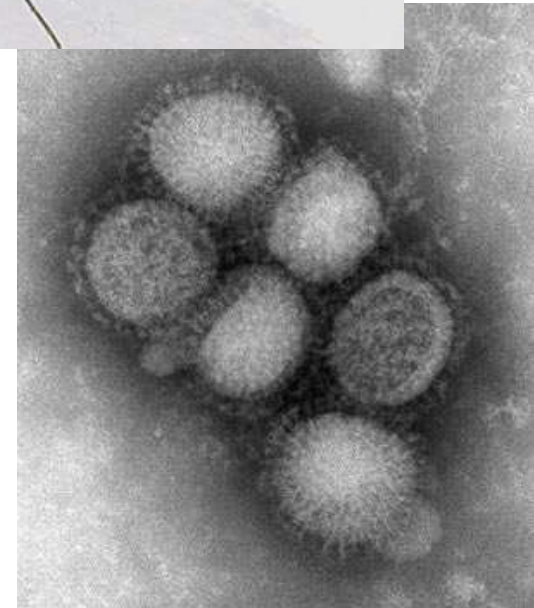
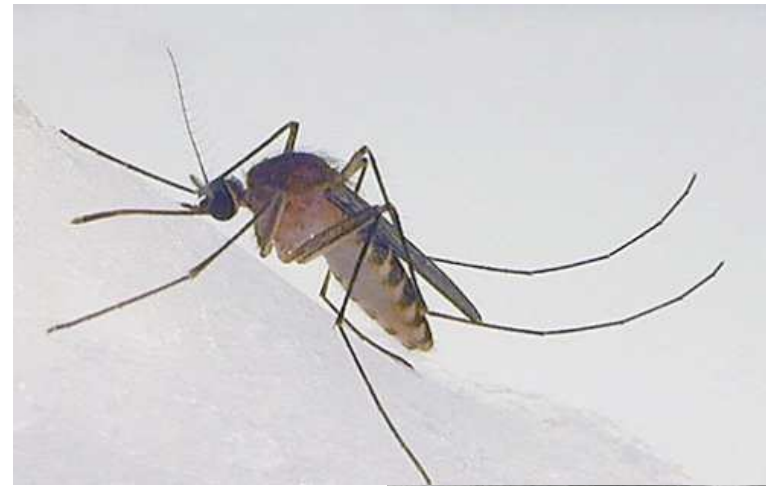


- <http://flowingdata.com/2008/10/08/commercial-air-traffic-seen-around-the-world/>



## • Chi viaggia?

- ➡ Persone
- ➡ Vettori
- ➡ Ospiti intermedi
- ➡ Batteri, virus, parassiti
- ➡ Alimenti





# GRAM NEGATIVE BACILLI, MULTIDRUG RESISTANT - CHILE: ex ITALY KPC, NOSOCOMIAL

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A ProMED-mail post

<<http://www.promedmail.org>>

ProMED-mail is a program of the  
International Society for Infectious Diseases

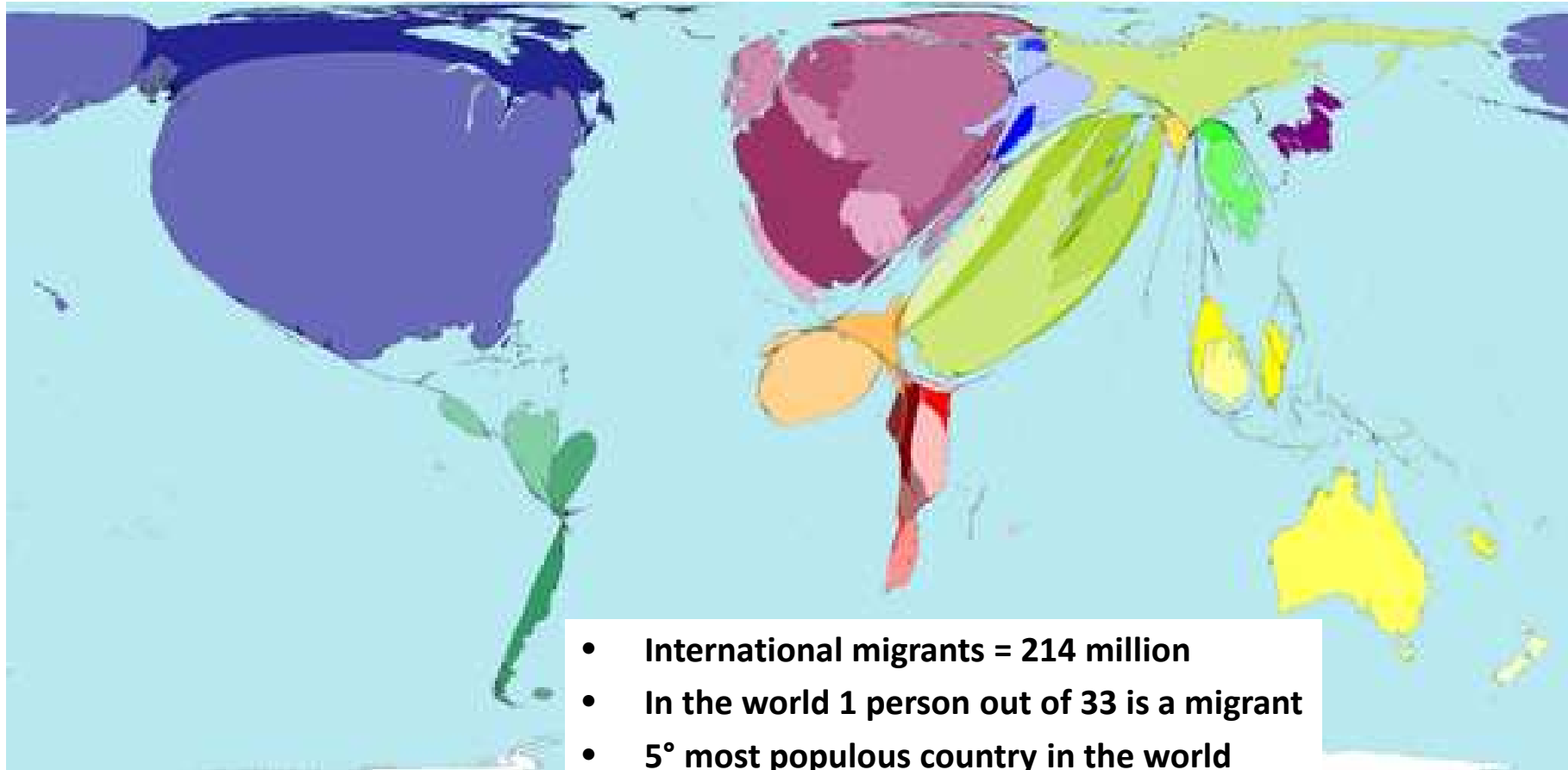
<<http://www.isid.org>>

Date: Sun 18 Mar 2012

From: Marcela Cifuentes <[marcelacifuentesdiaz@gmail.com](mailto:marcelacifuentesdiaz@gmail.com)> [edited]

We report the 1st isolation in our country [Chile] of *Klebsiella pneumoniae* carbapenemase (KPC)-producing [microorganism] in a patient admitted from Italy. The patient has non-Hodgkin lymphoma treatment and renal failure on hemodialysis, and he was hospitalized several times in Italy. On 28 Feb [2012, he was] admitted to a hospital in Santiago [Chile] to continue treatment. During hospitalization, he developed fever and microbiological studies were performed. *K. pneumoniae* was isolated from urine. The antibiogram showed resistance to quinolones, aminoglycosides, cephalosporins, and carbapenems and susceptible only to tigecycline and colistin.

The presence of this bacterium in urine was interpreted as asymptomatic bacteriuria, as central venous catheter-associated blood stream infection due to another organism (*Achromobacter denitrificans*) was demonstrated.



Territory size shows the relative levels of net immigration in all territories (immigration less emigration).

[http://knowledge.allianz.com/demographics/migration\\_minorities/?668/real-earth-population-patterns-demographics-worldwide](http://knowledge.allianz.com/demographics/migration_minorities/?668/real-earth-population-patterns-demographics-worldwide)

# I migranti sono troppi?

**Table 1: Perceived and actual percentage of the population made up of migrants, in four transatlantic countries, 2010**

Country	Perceived	Actual
Italy	25	7
Spain	21	14
United States of America	39	14
Canada	39	20

Source: Transatlantic Trends, 2010: 6.



IL SOLITO IMMIGRATO  
PROTAGONISTA DI UN  
FATTO DI CRONACA.

PIÙ DI UN MILIONE LAVORA NEI SERVIZI, 951.028 NELL'INDUSTRIA, 196.932 NELLA PESCA E NELL'AGRICOLTURA E 199.259 NEL COMMERCIO. GLI IMMIGRATI SONO UNA RISORSA PER IL SISTEMA ECONOMICO ITALIANO E, PER QUESTO, DA PIÙ DI CINQUANT'ANNI CREDIAMO NEL LORO VALORE. ECCO LA BUONA NOTIZIA.

# Definitions

## Health is ....

*“a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity “(WHO)*

## Migration health...

*“addresses the physical, mental and social needs of migrants, and the public health needs of hosting communities” (IOM / WHO)*

**TABLE 1. GLOBAL ESTIMATES OF MIGRANT POPULATIONS**

Category of migrant	Population estimates
Internal migrants	~ 740 million (stock in 2009) <sup>2</sup>
Immigrants	Annual flow between 2005-2010 ~ 2.7 million with a stock of ~ 214 million international migrants in 2010 <sup>3</sup>
Migrant workers	~ 100 million (stock in 2009) <sup>4</sup>
International students	~ 2.1 million (stock in 2003) <sup>5</sup>
Internally displaced persons	51 million (stock in 2007) includes those displaced by natural disasters and conflict. (UNHCR)
Refugees	15.2 million (stock beginning of 2009) <sup>6</sup>
Asylum seekers or refugee claimants	838 000 (stock beginning of 2009) <sup>7</sup>
Temporary – recreational or business <sup>8</sup> travel	922 million in 2008 <sup>9</sup>
Trafficked persons (across international borders)	Estimated 800 000 per year (2006) <sup>10</sup> There are no accurate estimates of the stocks and flows of people who have been trafficked <sup>11</sup>

- **Migranti internazionali = 214 milioni**
- **Nel mondo, 1 persona su 33 è migrante**
- **5° nazione più popolosa al mondo**



# Processo migratorio e salute

FASE	Fattori di rischio sanitario
<b>Pre-partenza</b>	Biological characteristics, Local chronic disease patterns and pathogens, Environmental factors, Political and personal circumstances, Depletion of healthcare workers...
<b>Viaggio</b>	Transports and travel circumstances, Epidemiological characteristics of crossed areas, Sexual violence, Human trafficking...
<b>Fermate intermedie</b>	Poor living conditions affecting both physical and mental health, Human rights abuses, Inadequate medical care
<b>Destinazione</b>	Socio-economic conditions, Access to care, Refugee or irregular status, Occupational risks...
<b>Ritorno (e.g. VFR)</b>	Poor medical assistance, Reduced immunity against local pathogens

[drug-resistant infections \(antimicrobial resistance\)](#)  
[bovine spongiform encephalopathy \(Mad cow disease\)](#)  
[and variant Creutzfeldt-Jakob disease \(vCJD\)](#)  
[campylobacteriosis](#)  
[Chagas disease](#)  
[cholera](#)  
[cryptococcosis](#)  
[cryptosporidiosis \(Crypto\)](#)  
[cyclosporiasis](#)  
[cysticercosis](#)  
[dengue fever](#)  
[diphtheria](#)  
[Ebola hemorrhagic fever](#)  
[\*Escherichia coli\* infection](#)  
[group B streptococcal infection](#)  
[hantavirus pulmonary syndrome](#)  
[hepatitis C](#)  
[hendra virus infection](#)  
[histoplasmosis](#)  
[HIV/AIDS](#)  
[influenza](#)  
[Lassa fever](#)  
[legionnaires' disease \(legionellosis\) and Pontiac fever](#)  
[leptospirosis](#)  
[listeriosis](#)  
[Lyme disease](#)

[malaria](#)  
[Marburg hemorrhagic fever](#)  
[measles](#)  
[meningitis](#)  
[monkeypox](#)  
[MRSA \(Methicillin Resistant \*Staphylococcus aureus\*\)](#)  
[Nipah virus infection](#)  
[norovirus \(formerly Norwalk virus\) infection](#)  
[pertussis](#)  
[plague](#)  
[polio \(poliomyelitis\)](#)  
[rabies](#)  
[Rift Valley fever](#)  
[rotavirus infection](#)  
[salmonellosis](#)  
[SARS \(Severe acute respiratory syndrome\)](#)  
[shigellosis](#)  
[smallpox](#)  
[sleeping Sickness \(Trypanosomiasis\)](#)  
[tuberculosis](#)  
[tularemia](#)  
[valley fever \(coccidioidomycosis\)](#)  
[VISA/VRSA - Vancomycin-Intermediate/Resistant \*Staphylococcus aureus\*](#)  
[West Nile virus infection](#)  
[yellow fever](#)

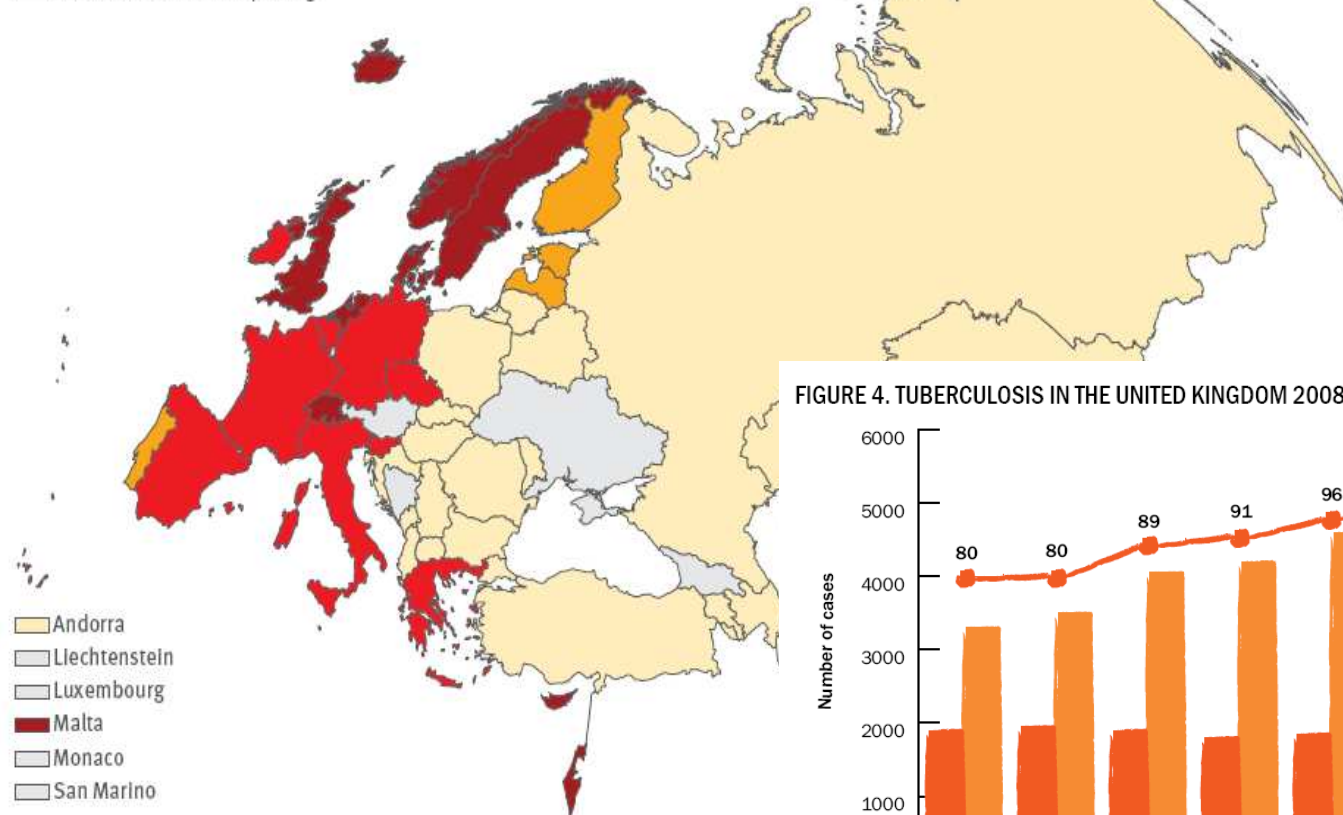
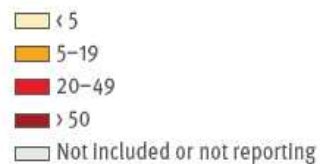


# Presentation planning

- Migrants: definition and epidemiological overview
- Migrants' health
- **Migration and emerging infections:**
  - Air borne infections
    - Tuberculosis
  - Sexually transmitted infections
    - HIV infection
    - Resistant STIs
  - Vector borne diseases
    - Malaria
    - Chikungunya
  - Vertically transmitted infections
    - Chagas
  - Blood borne and transplant related infections / reactivations
    - Chagas
    - Malaria
    - Strongyloidiasis
- Conclusions and acknowledgements



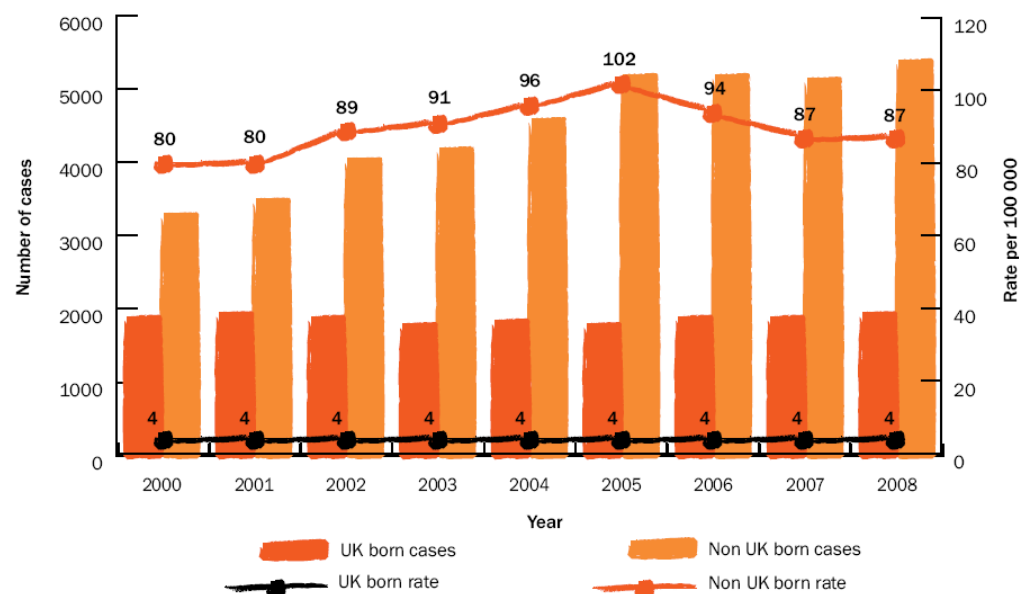
Map 4: Percentage of notified TB cases of foreign origin, Europe, 2008<sup>a</sup>



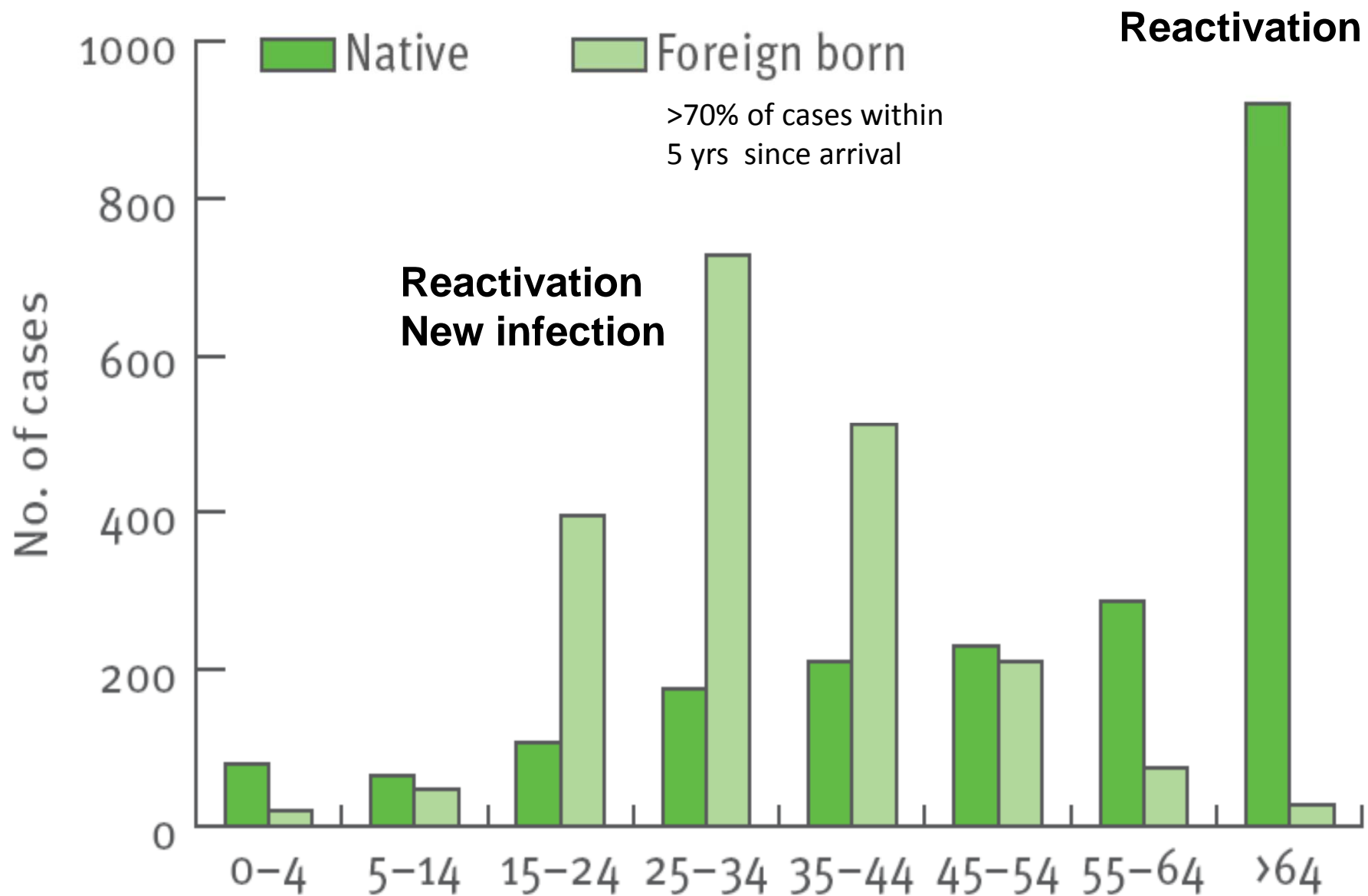
<sup>a</sup> Data from Kosovo (in accordance with Security Council Resolution 1244 (1999)) is not included

## Air-borne infections: Tuberculosis

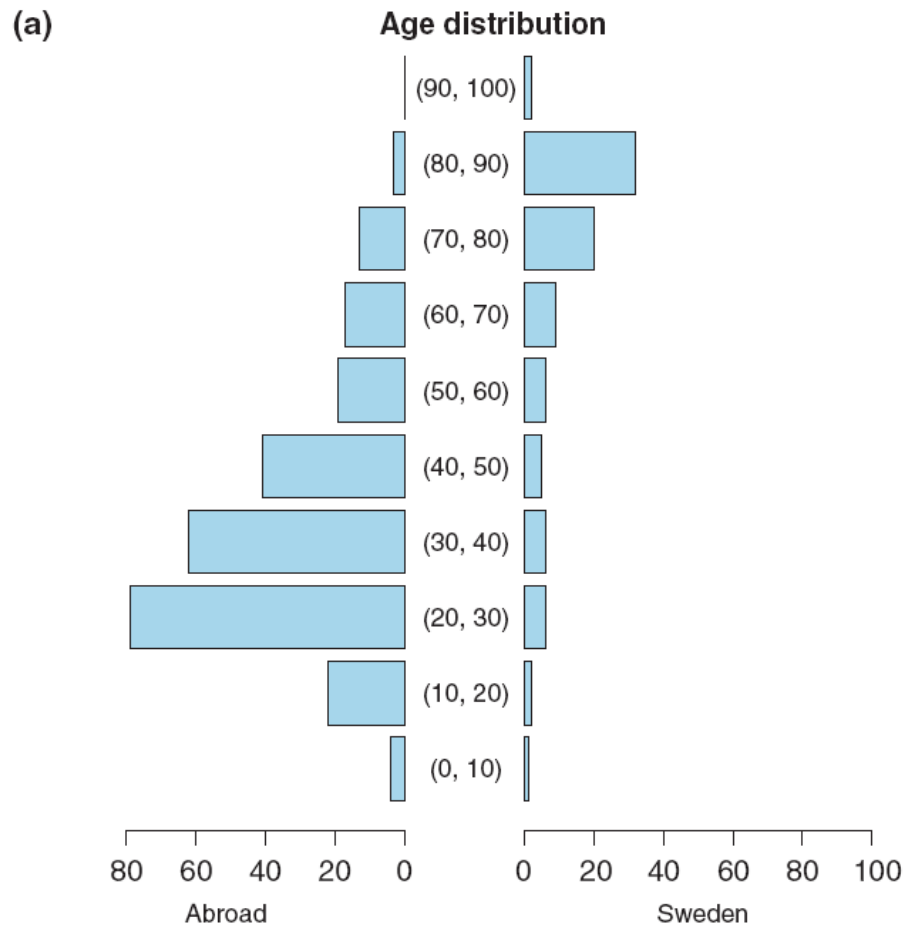
FIGURE 4. TUBERCULOSIS IN THE UNITED KINGDOM 2008<sup>21</sup>



## Tuberculosis cases by age group, 2008

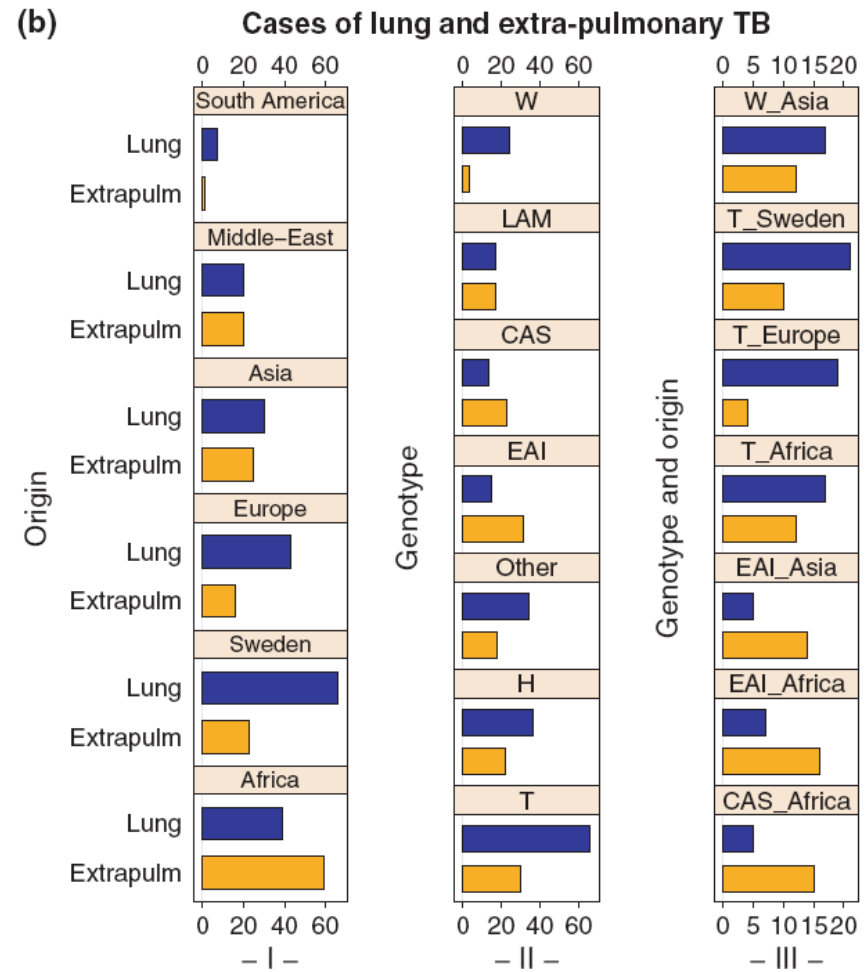


Country: Italy – Source: EuroTB 2010



**Impact of immigration on tuberculosis epidemiology in a low-incidence country**

*Clin Microbiol Infect* 2011; **17**: 881–887

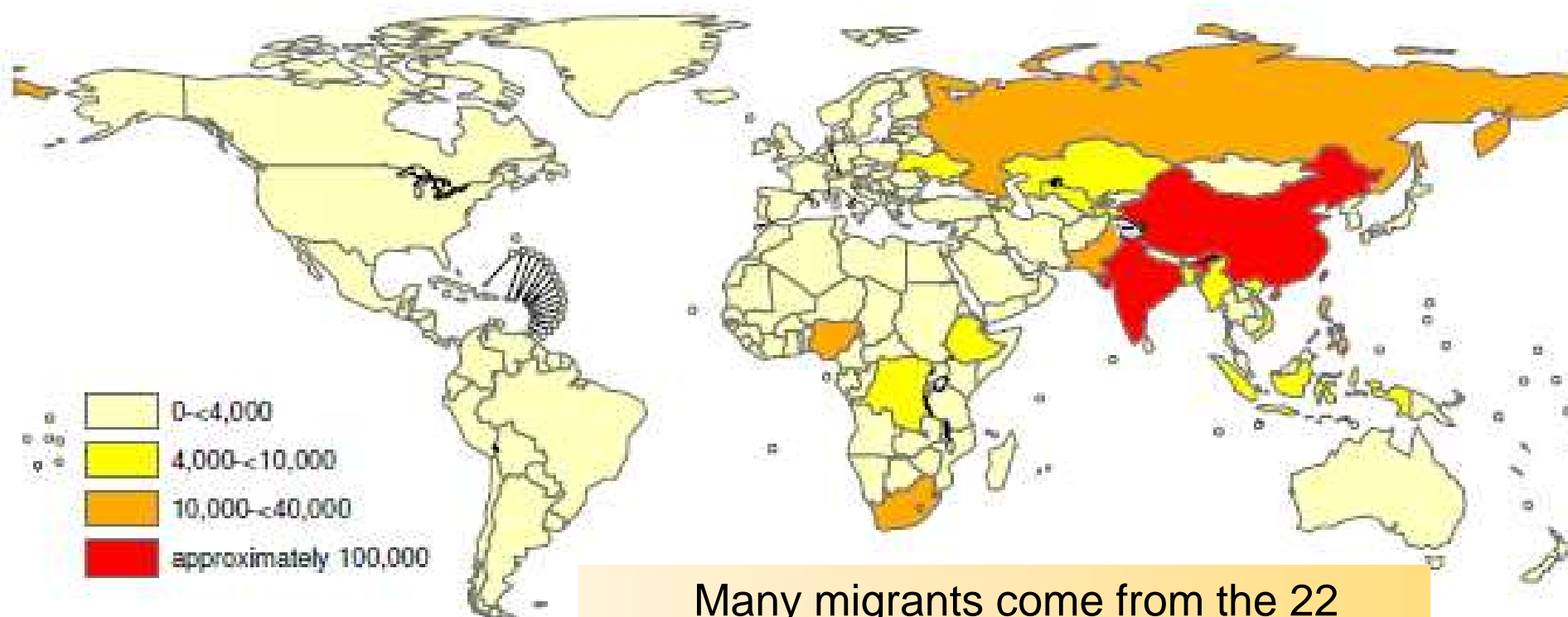


**FIG. 1.** (a) Age distribution of patients born in Sweden and abroad. (b) Distribution of cases with lung TB (blue bars) and extrapulmonary TB (orange bars). (I) Patients from different geographical areas; (II) patients infected with different genotypes; (III) selected combinations of geographical origin with associated *M. tuberculosis* genotype.

# Pattern of drug resistance among new TB cases by country of birth, Italy, 1998-99

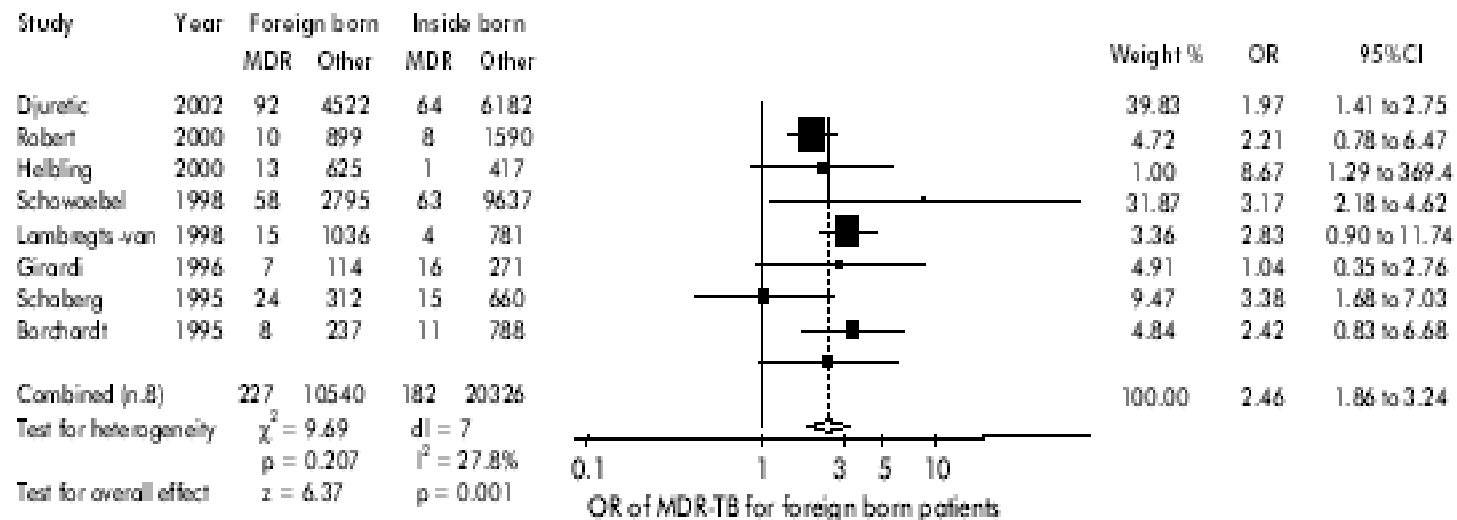
	IMM		ITA				
	N°	%	N°	%	P value	RR	95% CI
Primary mono H	13/ 207	6.3	7/ 476	1.5	0.0014	2.22	1.58-3.13
Primary any H	16/ 207	7.7	22/ 476	4.6	0.14	1.42	0.96-2.10

# Estimated absolute number of MDR-TB cases, 2009



Many migrants come from the 22 countries with highest TB-disease burden which make up 80% of global TB cases and a substantial proportion of MDR and XDR TB cases

# MDR-TB and immigration



**Figure 3** Odds ratio (OR) of multidrug resistant tuberculosis (MDR-TB) for foreign born patients.

Faustini et al., Thorax. 2006;61;158-163;

MDR-Tb represented 2.7% of new cases in Italy in 2008

MDR-tb was 5-times more likely to present in migrants

Daniela Cirillo, WHO-Collaborating Center, Milan, Italy (personal communication)

# Clustering of TB among foreign borne persons in Italy

Clusters are more common among Senegalese than among Italians (OR=5.9, CI 1.4-23.9)

Among senegalese clusters are associated to area of residence (OR=3.5, CI 1.3-9.3)

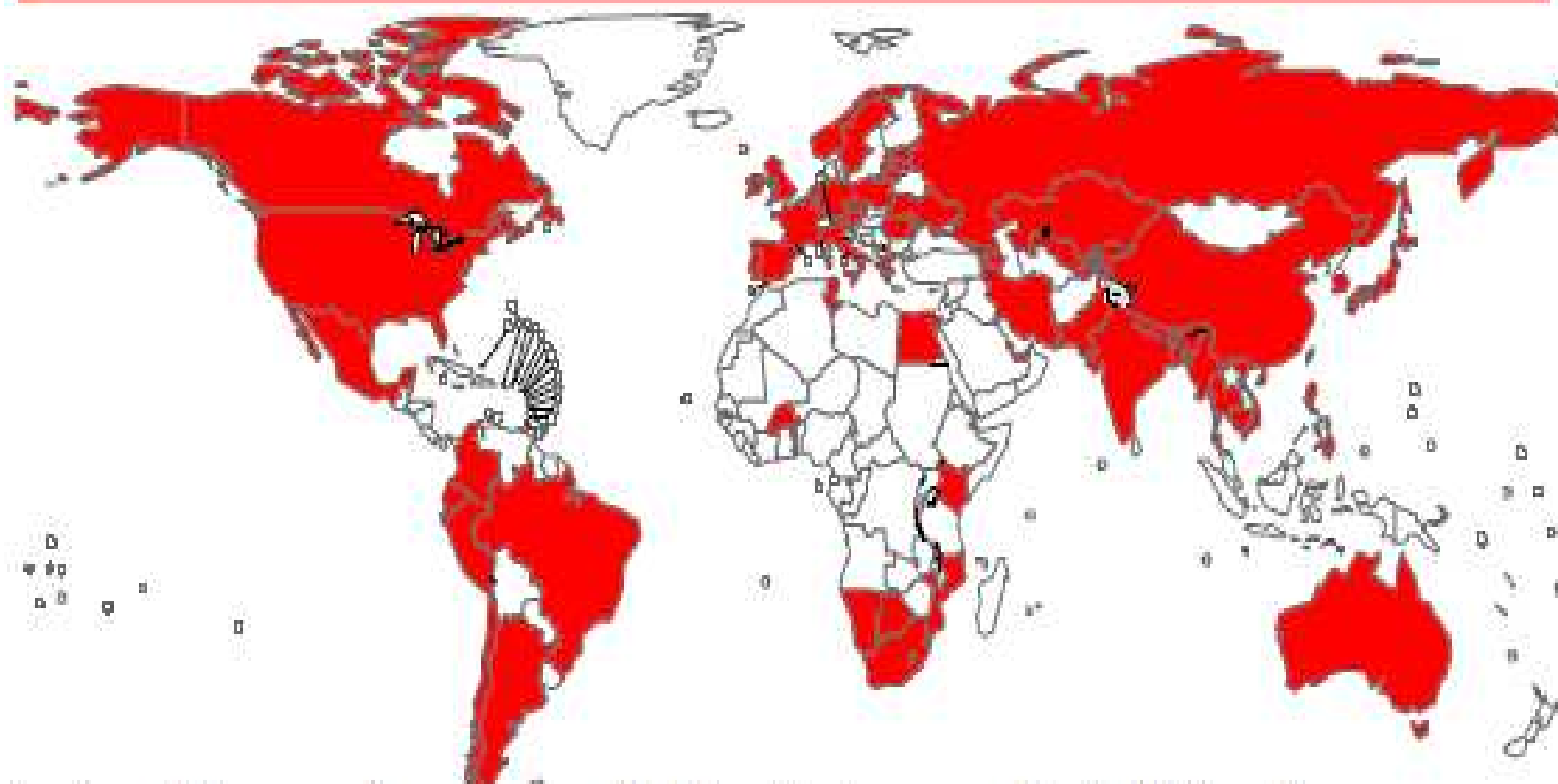
Only 3 mixed clusters identified: in two of them the index case was likely to be Italian



# What is the risk that immigration will increase transmission of MDR ?

More than 30 000 former Soviet citizens arrived in Norway since 2001. Only four of these were diagnosed with multidrug resistant tuberculosis on arrival, and their infections were not transmitted to other people in Norway

Countries that had reported at least one  
XDR-TB case by end 2010



**The global rise of extensively drug-resistant tuberculosis:  
is the time to bring back sanatoria now overdue?**



**The 3500 bed Sondalo Tuberculosis Hospital in Italy**

*Keertan Dheda, Giovanni B Migliori, Lancet 2012; 379: 773–75*

# Estimating the Impact of Newly Arrived Foreign-Born Persons on Tuberculosis in the United States

Yecai Liu<sup>1\*</sup>, John A. Painter<sup>1</sup>, Drew L. Posey<sup>1</sup>, Kevin P. Cain<sup>2</sup>, Michelle S. Weinberg<sup>1</sup>, Susan A. Maloney<sup>3</sup>, Luis S. Ortega<sup>1</sup>, Martin S. Cetron<sup>1</sup>

**Table 1.** Estimates of incident cases of TB and MDR-TB among newly arrived foreign-born persons in the United States, 2001–2008.\*

Visa category	Admissions (%)	Person-years (%)†	TB†			MDR-TB†		
			no. (%)	no./100,000 person-years (95% CI)	no./100,000 admissions (95% CI)	no. (%)	no./100,000 person-years (95% CI)	no./100,000 admissions (95% CI)
Immigrant and refugee‡	3,625,619 (0.2)	3,625,619 (17.3)	4,783 (41.6)	131.9 (128.2, 135.7)	131.9 (128.2, 135.7)	127 (43.6)	3.5 (2.9, 4.1)	3.5 (2.9, 4.1)
Student/exchange visitor and temporary worker	22,328,345 (1.5)	6,667,917 (31.8)	4,211 (36.6)	63.1 (61.2, 65.1)	18.9 (18.3, 19.4)	111 (38.1)	1.7 (1.4, 2.0)	0.5 (0.4, 0.6)
Tourist and business traveler	230,673,431 (15.6)	4,423,874 (21.1)	1,589 (13.8)	35.9 (34.1, 37.7)	0.7 (0.6, 0.7)	34 (11.7)	0.8 (0.5, 1.0)	<0.1
Diplomat and other representative	2,215,260 (0.1)	115,315 (0.5)	84 (0.7)	72.5 (56.8, 88.9)	3.8 (3.0, 4.6)	2 (0.7)	1.7 (0, 4.6)	0.1 (0.0, 0.2)
Canadian and Mexican nonimmigrant visitor without an I-94 form	1,220,700,000 (82.5)	6,157,014 (29.3)	834 (7.3)	13.5 (12.6, 14.5)	0.1 (0.1, 0.1)	17 (5.8)	0.3 (0.1, 0.4)	<0.1
<b>Total</b>	1,479,542,654 (100.0)	20,989,738 (100.0)	11,500 (100.0)	54.7 (53.8, 55.8)	0.8 (0.8, 0.8)	291 (100.0)	1.4 (1.2, 1.6)	<0.1
<b>Per year</b>	184,942,832	2,623,717	1,438			36		

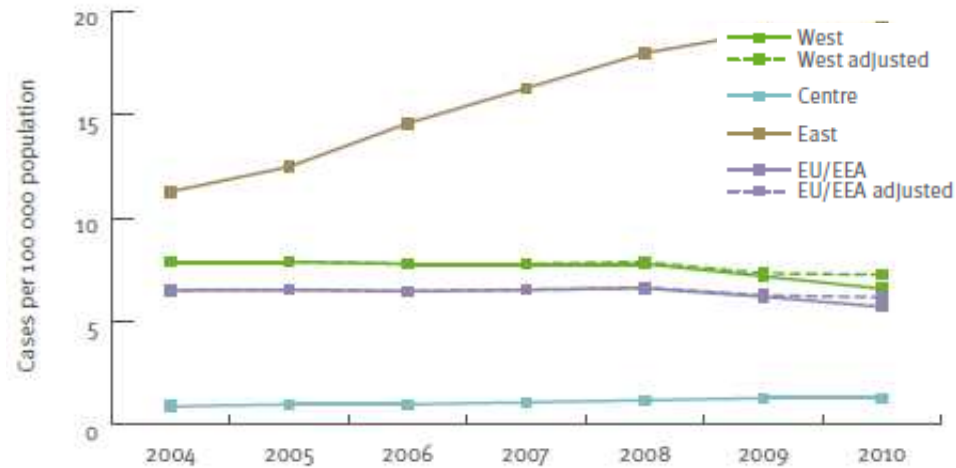
\*Newly arrived foreign-born persons are those who have resided in the United States for up to 1 year after their arrival.

†See the Methods Section for details of the estimations.

‡The number of person-years is the same as the number of admissions, since immigrants and refugees are assumed to stay in the United States for at least 1 year after their arrival.

doi:10.1371/journal.pone.0032158.t001

## HIV infection rates by geographical area, WHO European and EU/EEA, 2004-2010



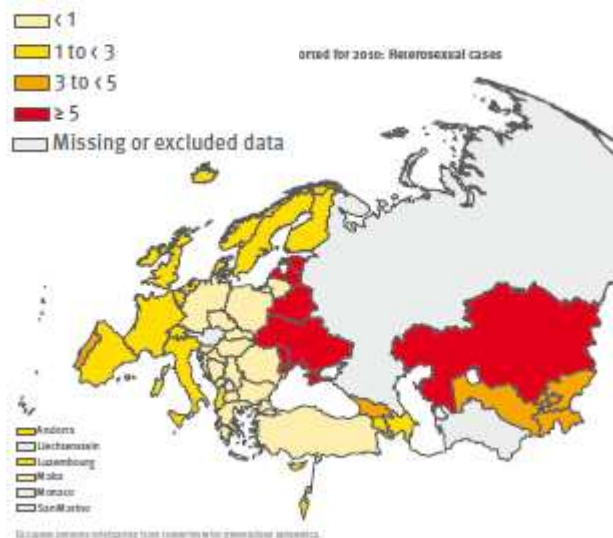
No data from Austria, Monaco.  
Data from Russia not included.



## Sexually Transmitted Infections:

- HIV infection
- Resistant *STIs*

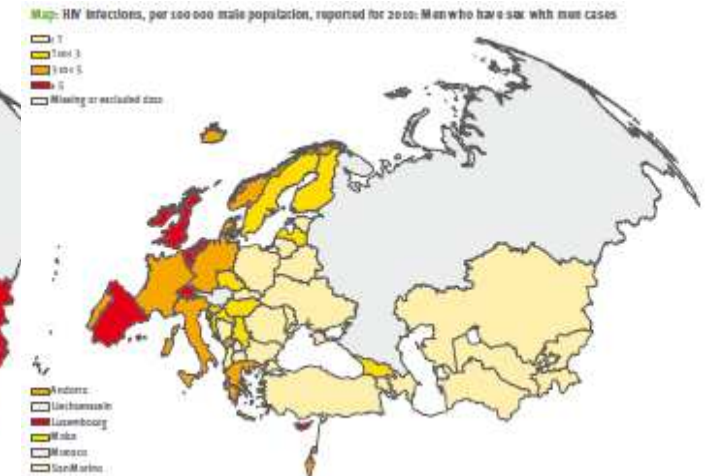
### Heterosexuals



### IVDUUsers

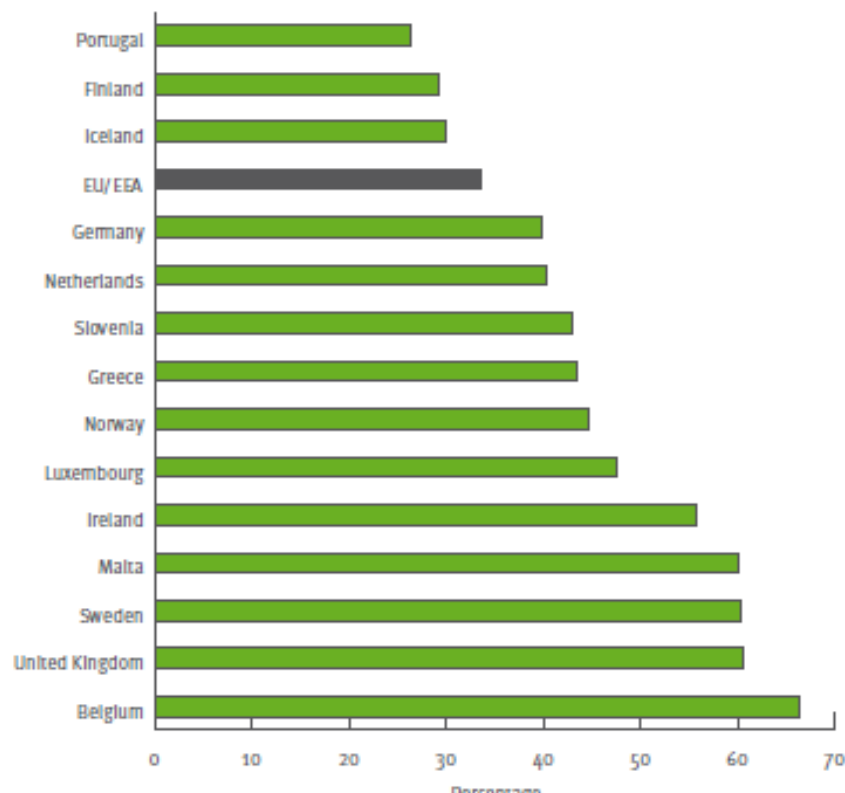


### MSM





**Figure B:** Distribution of percentage of persons originating from countries with generalised epidemics among all cases reported as heterosexually acquired, EU/EEA countries with percentages >25%, 2010



**Table B:** Total number and proportion of newly diagnosed cases of HIV infection and cases from countries with generalised epidemics, by mode of transmission in the WHO European Region, 2010

Reported HIV cases	Transmission mode							Total*
	Heterosexual	IDU	MSM	Mother-to-child	Use of blood products/transfusion	Nosocomial	Unknown*	
Cases from countries with generalised epidemic	4 116 (17%)	16 (0.1%)	165 (1.5%)	125 (19%)	24 (32%)	9 (25%)	305 (4%)	4 760 (9%)
Number and proportion of cases and excluding cases originating from countries with generalised epidemics	19 964 (39%)	12 763 (25%)	10 836 (21%)	521 (1%)	51 (0.1%)	27 (0.1%)	7 137 (14%)	50 994 (100%)
Total number and proportion of HIV reported cases	24 080 (43%)	12 779 (23%)	11 001 (20%)	646 (1.2%)	75 (0.1%)	36 (0.1%)	7 137 (13%)	55 754 (100%)

\* Data from Russia not included.

# Sexual and HIV risk behaviour in Central and Eastern European migrants in London

Fiona M Burns,<sup>1</sup> Alison R Evans,<sup>1</sup> Catherine H Mercer,<sup>1</sup> Violetta Parutis,<sup>2</sup>  
Christopher J Gerry,<sup>2</sup> Richard C M Mole,<sup>2</sup> Rebecca S French,<sup>3</sup> John Imrie,<sup>1,4</sup>  
Graham J Hart<sup>1</sup>

*Sex Transm Infect* 2011;**87**:318–324.

**Table 4** Multivariate analysis of risk behaviours comparing SALLEE respondents with Natsal\* respondents

Behaviour	SALLEE† (n=2323) %	Natsal† (n=2883, 1526)‡ %	Crude OR (95% CI)	Adjusted OR (95% CI)§	p value
<b>Men</b>	n=1102	n=1216, 773‡			
2+ partners (past 5 years)	77.3	58.9	2.4 (1.9 to 2.9)	2.1 (1.6 to 2.6)	<0.001
2+ partners (past year)	45.0	29.4	2.0 (1.6 to 2.4)	1.7 (1.3 to 2.1)	<0.001
Ever paid for sex with a woman	35.5	15.8	2.9 (2.3 to 3.7)	3.2 (2.5 to 4.0)	<0.001
Ever injected drugs	5.9	2.4	2.6 (1.5 to 4.5)	2.2 (1.3 to 3.9)	0.005
Consistent condom use (past 4 weeks)¶	36.6	29.2	1.4 (1.1 to 1.8)	1.2 (1.0 to 1.6)	0.099
Ever diagnosed with STI	8.9	13.6	0.6 (0.5 to 0.8)	0.7 (0.5 to 1.0)	0.045
<b>Women</b>	n=1221	n=1667, 753‡			
2+ partners (past 5 years)	52.9	40.9	1.6 (1.3 to 2.0)	1.2 (1.0 to 1.5)	0.058
2+ partners (past year)	18.7	15.6	1.2 (1.0 to 1.6)	1.0 (0.8 to 1.3)	0.915
Ever injected drugs	2.2	0.7	3.3 (1.3 to 8.8)	3.0 (1.1 to 8.1)	0.035
Consistent condom use (past 4 weeks)¶	28.2	21.7	1.4 (1.1 to 1.8)	1.3 (1.0 to 1.8)	0.034
Ever diagnosed with STI	12.8	18.1	0.7 (0.5 to 0.9)	0.7 (0.6 to 1.0)	0.038

\*National Survey of Sexual Attitudes and Lifestyles 2000.

†Restricted to London respondents aged 18–44 who reported ever having had sex (age range related to Natsal upper limit and SALLEE lower limit).

‡Unweighted, weighted denominator.

§Adjusted for age, relationship status, education: comparing SALLEE with Natsal respondents.

¶Condoms used on all occasions of vaginal and/or anal sex in the past 4 weeks.

# HIV Infection among Illegal Migrants, Italy, 2004–2007

Maria Chiara Pezzoli, Issa El Hamad,  
Carmelo Scarcella, Francesco Vassallo,  
Fabrizio Speziani, Graziella Cristini,  
Carla Scolari, Barbara Suligoi, Anna Maria Luzi,  
Daniela Bernasconi, Miriam Lichtner,  
Giuseppina Cassara', Nino Manca,  
Giampiero Carosi, Francesco Castelli,  
and the PRISHMA Study Group<sup>1</sup>

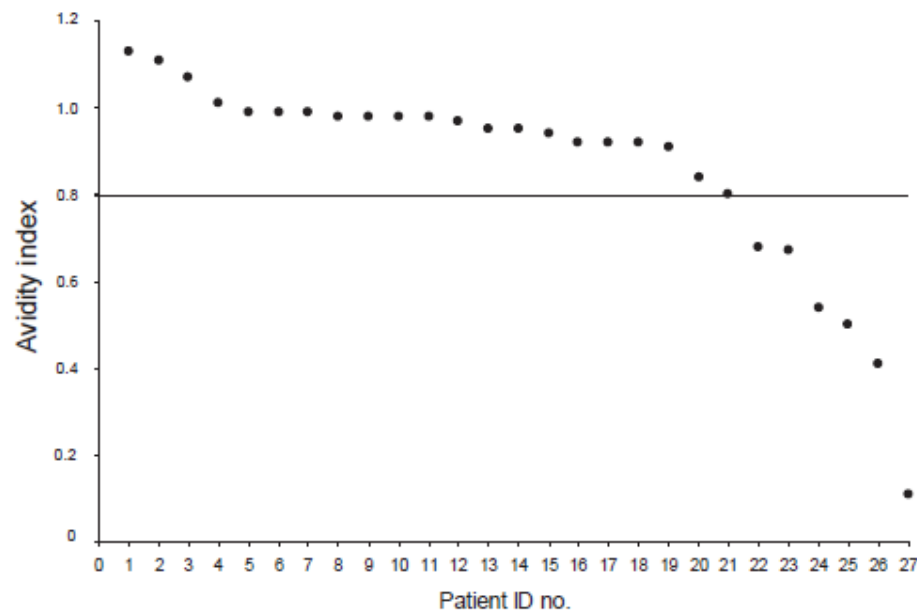


Figure. Antibody avidity indices for 27 HIV-infected migrants, Italy, 2004–2007. Horizontal line indicates the cutoff value. ID, identification.

To determine HIV prevalence and place of exposure for illegal migrants in Italy, we tested 3,003 illegal adult migrants for HIV; 29 (0.97%) were HIV positive. Antibody avidity index results (indicators of time of infection) were available for 27 of them. 6/27 (22.2%) presumably acquired HIV after migration.

Table 2. Likely time and place of infection for 27 HIV-infected migrants, Italy, 2004–2007

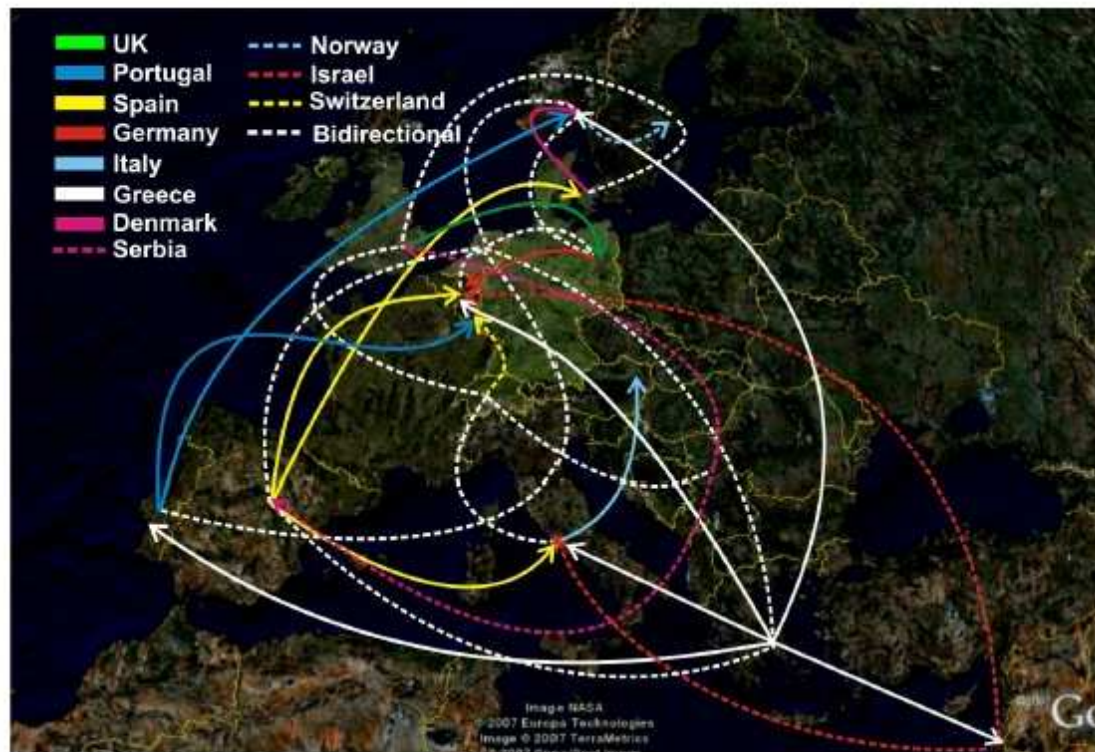
	Antibody avidity index $\leq 0.8$ (infection acquired in past 6 mo), no. (%)	Antibody avidity index $> 0.8$ (infection acquired $> 6$ mo earlier), no. (%)
Time of migration		
Past 6 mo	1 (3.7) (place of infection is undetermined)	4 (14.8) (likely place of infection is country of origin)
$> 6$ mo before HIV testing	6 (22.2) (likely place of infection is Italy)	16 (59.3) (place of infection is undetermined)



Research

Open Access

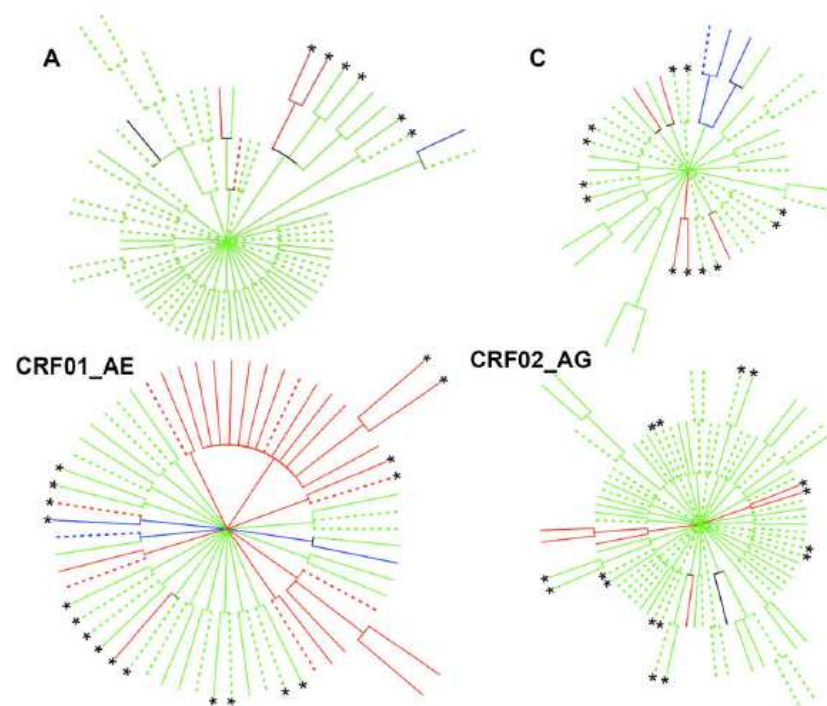
## Tracing the HIV-1 subtype B mobility in Europe: a phylogeographic approach



**Figure 3**  
**Significant HIV migratory pathways across Europe.**  
Arrowheads indicate the targets of migration shown in different colours and styles by country of origin.

# The Role of Migration and Domestic Transmission in the Spread of HIV-1 Non-B Subtypes in Switzerland

Viktor von Wyl,<sup>1,a,b</sup> Roger D. Kouyos,<sup>3,a</sup> Sabine Yerly,<sup>4</sup> Jürg Böni,<sup>2</sup> Cyril Shah,<sup>2</sup> Philippe Bürgisser,<sup>5</sup> Thomas Klimkait,<sup>7</sup> Rainer Weber,<sup>1</sup> Bernard Hirschel,<sup>8</sup> Matthias Cavassini,<sup>6</sup> Cornelia Staehelin,<sup>9</sup> Manuel Battegay,<sup>10</sup> Pietro L. Vernazza,<sup>11</sup> Enos Bernasconi,<sup>12</sup> Bruno Ledergerber,<sup>1</sup> Sebastian Bonhoeffer,<sup>3</sup> Huldrych F. Günthard,<sup>1</sup> and the Swiss HIV Cohort Study



**Figure 2.** Swiss-specific subepidemics for subtypes A and C and CRFs AE and AG. Only tips belonging to Swiss patients in a Swiss transmission cluster are depicted. Each edge emerging from the center corresponds to one transmission cluster. Colors indicate the transmission group (*green*: heterosexual, *red*: MSM, *blue*: IDU, *turquoise*: unknown transmission group). Dashed lines indicate patients of nonwhite ethnicity. Stars indicate possible transmission pairs

**Conclusions.** Of all non-B infections diagnosed in Switzerland, <25% could be prevented by domestic interventions. Awareness should be raised among immigrants and Swiss individuals with partners from high prevalence countries to contain the spread of non-B subtypes.

# The European gonococcal antimicrobial surveillance programme, 2009

Euro Surveill. 2011;16(42)

M J Cole (michelle.cole@ecdc.europa.eu)

*Neisseria gonorrhoea* Prevalence of decreased susceptibility to cefixime among *Neisseria gonorrhoea* isolates from 10 EU/EEA countries, 2009 (n=908)

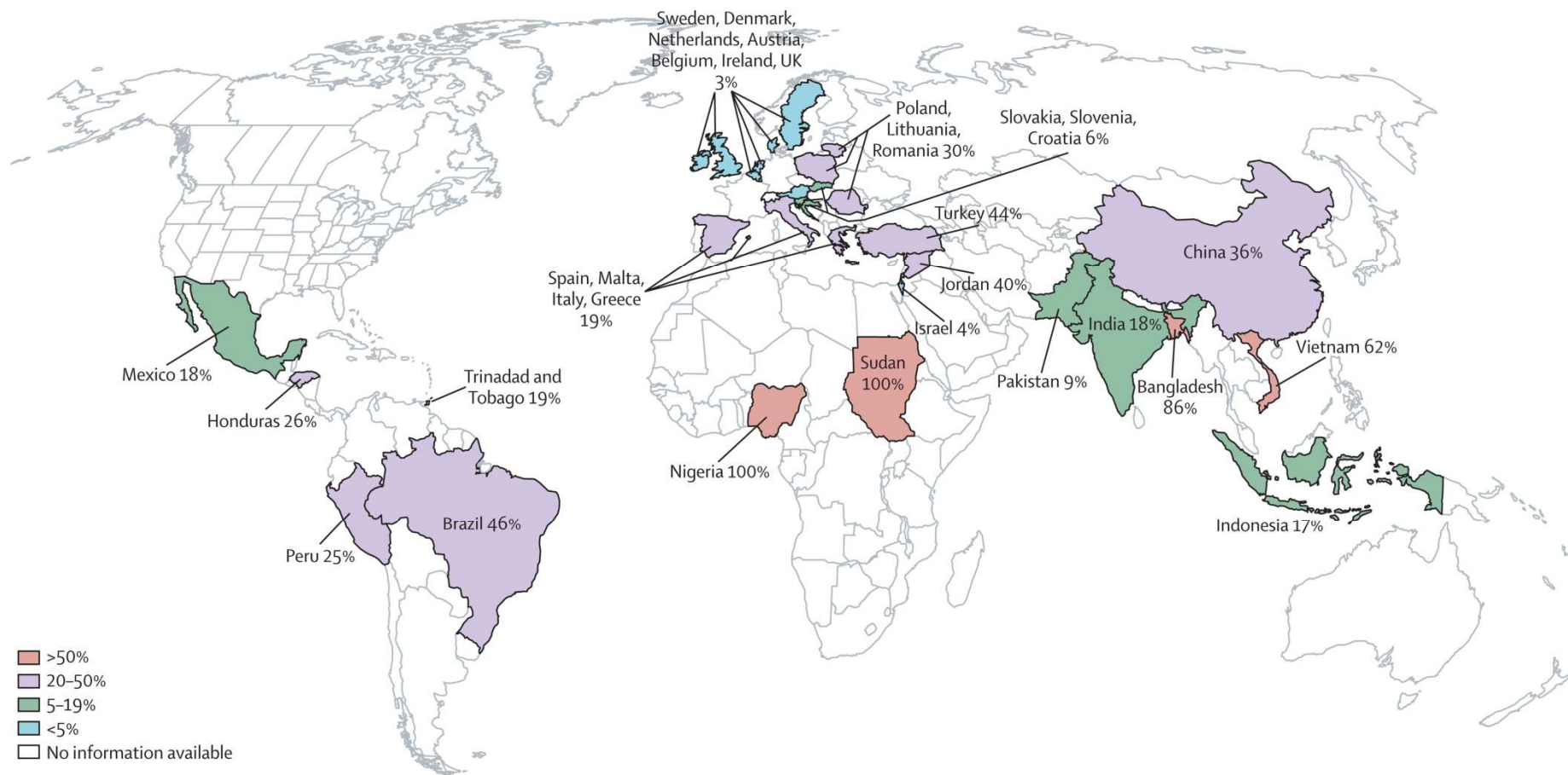
Perspective  
FEBRUARY 9, 2012

## The Emerging Threat of Untreatable Gonococcal Infection

Gail A. Bolan, M.D., P. Frederick Sparling, M.D., and Judith N. Wasserheit, M.D., M.P.H.

Latvia	Belgium (110)	7 (6.4)	0 (0.0)
Malta	Sweden (108)	3 (2.8)	0
The Netherlands	Germany (45)	1 (2.2)	58 (51)
Norway	France (104)	2 (1.9)	14 (13)
Portugal	The Netherlands (114)	1 (0.9)	46 (58)
Slovakia	Norway (110)	1 (0.9)	0
Slovenia			3 (13)
Spain			33 (32)
Sweden			25 (23)
United Kingdom <sup>b</sup>	120	5 (4)	42 (35)
Total	1,366	180 (13)	857 (63)
95% CI		(11.4–15)	(60.2–65.3)





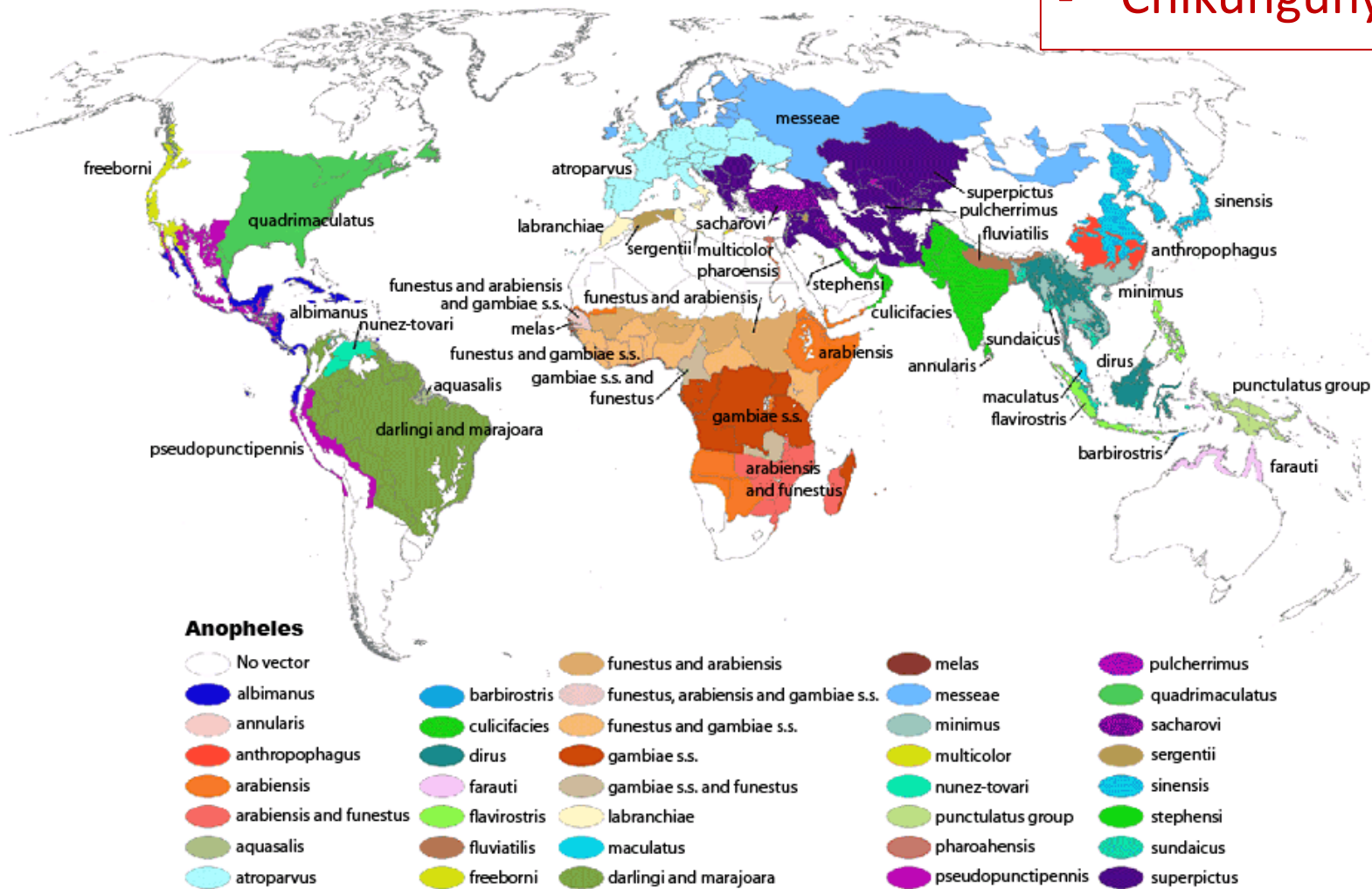
Daniel J Morgan. Non-prescription antimicrobial use worldwide: a systematic review, *Lancet Infect Dis* 2011; 11: 692–701

## Global Distribution (Robinson Projection) of Dominant or Potentially Important Malaria Vectors

From Kiszewski et al., Am. J. Trop. Med. Hyg., 2004; 70:486-498.

### Vector borne infections:

- Malaria
- Chikungunya



## Travel-related imported infections in Europe, EuroTravNet 2009

S. Odolini<sup>1</sup>, P. Parola<sup>2</sup>, E. Gkrania-Klotsas<sup>3</sup>, E. Caumes<sup>4</sup>, P. Schlagenhauf<sup>5</sup>, R. López-Vélez<sup>6</sup>, G.-D. Burchard<sup>7</sup>, F. Santos-O'Connor<sup>8</sup>, L. Weld<sup>9</sup>, F. von Sonnenburg<sup>10</sup>, V. Field<sup>11</sup>, P. de Vries<sup>12</sup>, M. Jensenius<sup>13</sup>, L. Loutan<sup>14</sup> and F. Castelli<sup>1</sup>

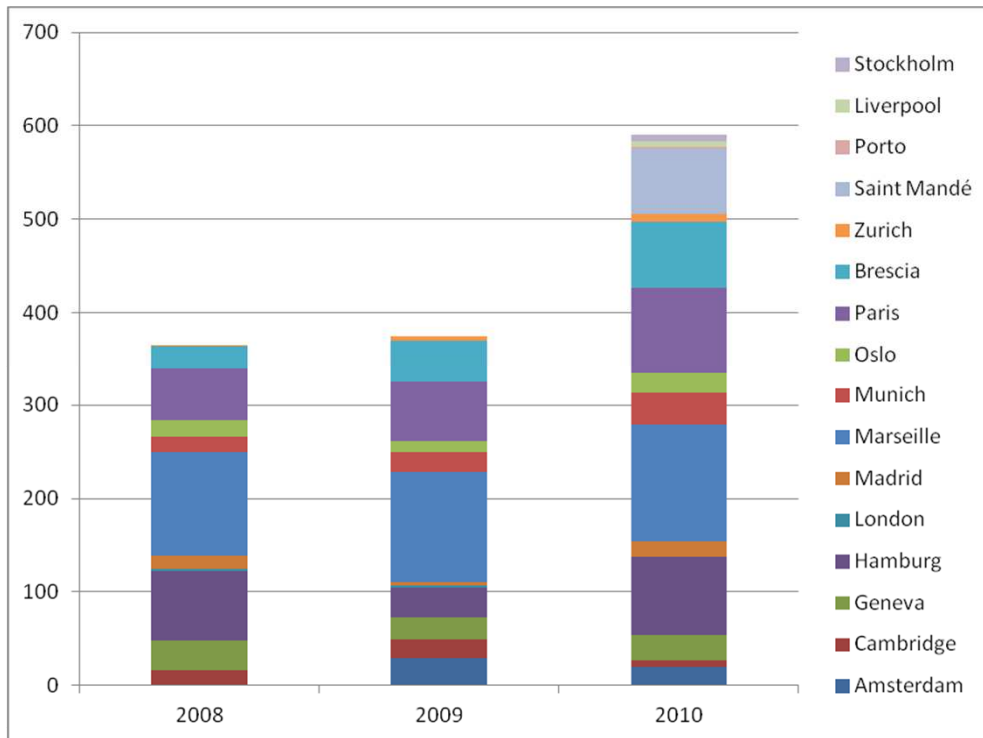
**TABLE 1.** Demographic characteristics of travellers

Site	2008	2009	p-value
Gender (%)			
Female	48.9	50.3	
Travel reason (%)			
Business	10.5	11.0	<0.001
Immigration	9.4	7.7	
Medical tourism	0.1	0.4	
Military	0.6	1.0	
M/V/AW/R	22.6	20.0	
Student	1.3	2.5	
Tourism	43.5	45.0	
VFR	11.9	12.5	
Risk level (%)			
Expatriate	6.9	8.6	<0.001
Pre-arranged or organized travel	22.6	26.6	
Risk travel <sup>a</sup>	69.8	63.7	
Missing	0.8	1.2	
Clinical setting (%)			
Immigration only	9.4	7.7	0.001
Seen after travel	82.0	84.4	
Seen during travel	8.5	7.9	
Inpatient	11.0	14.6	<0.001
Pre-travel advice (%)			
Yes	45.4	43.2	<0.001
No	22.4	26.1	
Do not know	32.2	30.7	

During the last few years, the number of imported malaria cases in Europe has decreased, possibly reflecting malaria control activities in endemic countries [4,5]. However, malaria in Europe remains an important travel medicine issue, given the large number of imported cases [6]. Moreover, there is potential for the reappearance of malaria in countries where it was previously eradicated, and limited outbreaks do occur in Europe, where *Anopheles* mosquitoes are still present, mainly in the Mediterranean area [7], making the slight, although not statistically significant, increase observed in our dataset in 2009 a phenomenon that requires attention. In August 2006, one case of indigenous *P. vivax*

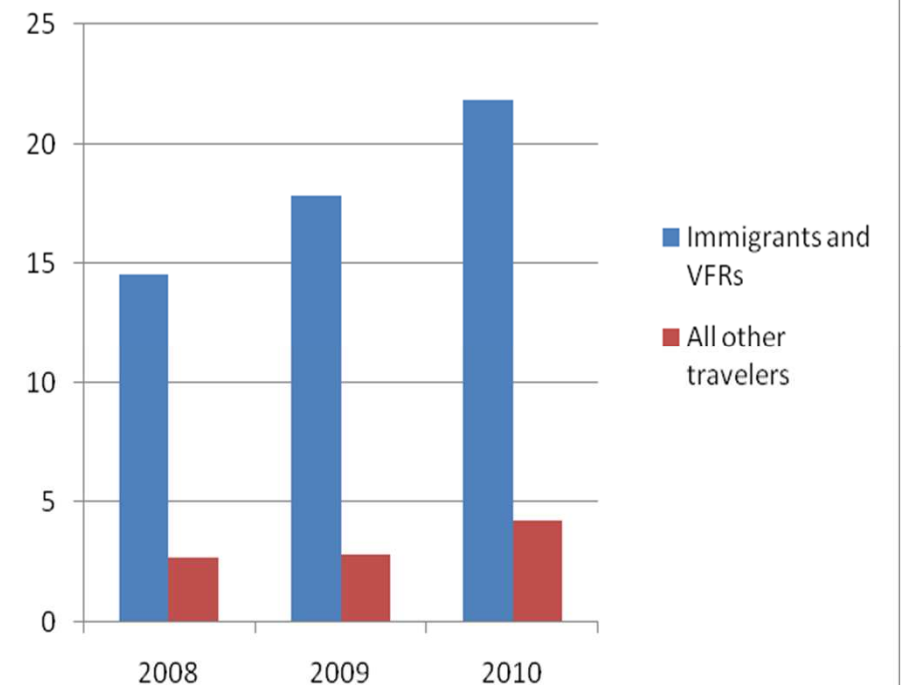
## Travel-related imported infections in Europe, EuroTravNet 2010

Gautret P. et al, under submission



Number of malaria cases per year  
reported by EuroTravNet sites.  
Malaria (all cases) by reporting site.

Proportion of immigrants/VFRs and other  
travelers with malaria among all ill  
immigrants/VFRs and other travelers  
returning to EuroTravNet sites





# Autochthonous *Plasmodium vivax* malaria in Greece, 2011

K Danis (daniscostas@yahoo.com)<sup>1</sup>, A Baka<sup>2</sup>, A Lenglet<sup>3</sup>, W Van Bortel<sup>4</sup>, I Terzaki<sup>1</sup>, M Tseroni<sup>1</sup>, M Detsis<sup>1</sup>, E Papanikolaou<sup>1</sup>, A Balaska<sup>1</sup>, S Gewehr<sup>1</sup>, G Dougas<sup>1</sup>, T Sideroglou<sup>1</sup>, A Economopoulou<sup>1</sup>, N Vakalis<sup>1</sup>, S Tsioltras<sup>1</sup>, S Bonovas<sup>1</sup>, J Kremastinou<sup>1</sup>

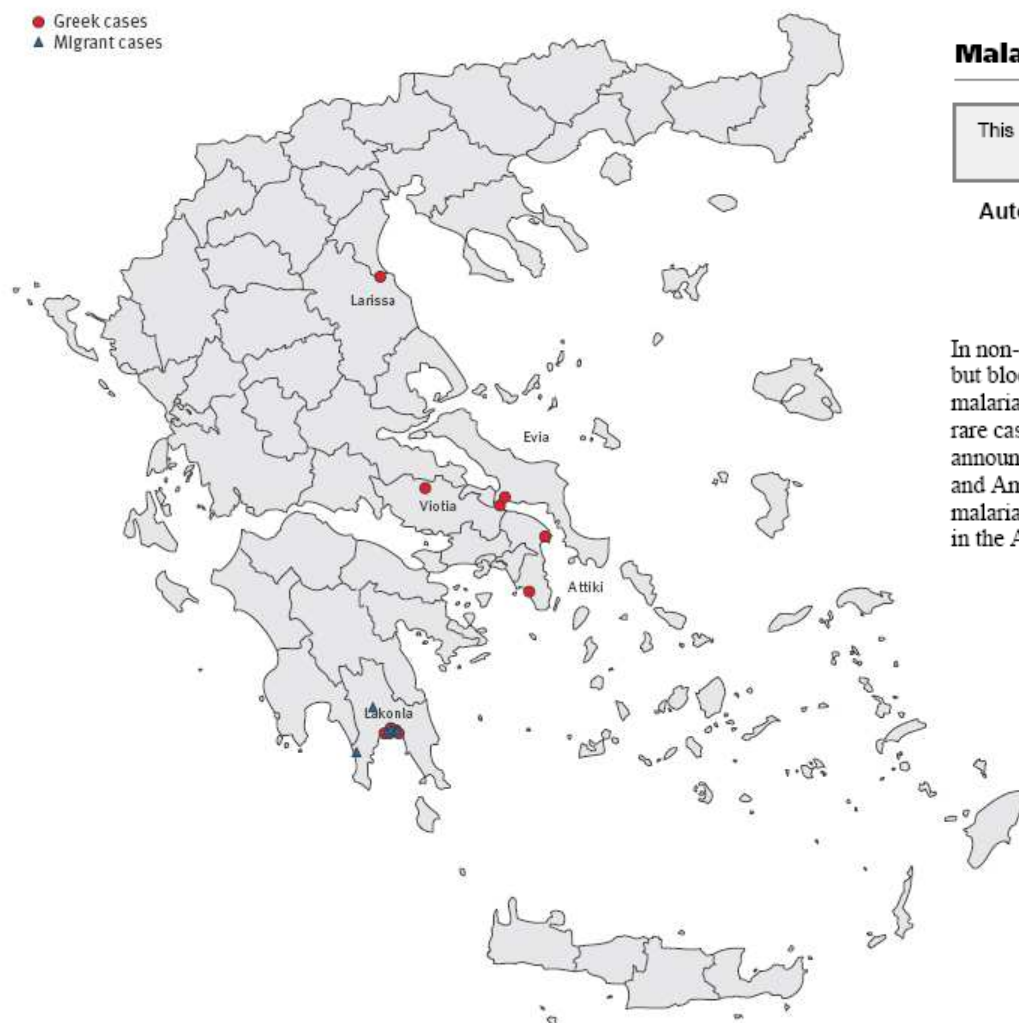
1. Hellenic Centre for Disease Control and Prevention, Athens, Greece  
2. European Centre for Disease Prevention and Control (ECDC), Stockholm, Sweden  
3. Ecodevelopment S.A., Thessaloniki, Greece  
4. National School of Public Health, Athens, Greece

Citation style for this article:  
Danis K, Baka A, Lenglet A, Van Bortel W, Terzaki I, Tseroni M, Detsis M, Papanikolaou E, Balaska A, Gewehr S, Dougas G, Sideroglou T, Economopoulou A, Vakalis N, Tsioltras S, Bonovas S, Kremastinou J. Autochthonous *Plasmodium vivax* malaria in Greece, 2011. *Euro Surveill.* 2011;16(42):pii=19993. Available online: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19993>

Article published on 20 October 2011

## FIGURE 1

Place of residence of reported malaria cases, Greece, May–September 2011 (n=36)



## Malaria Journal



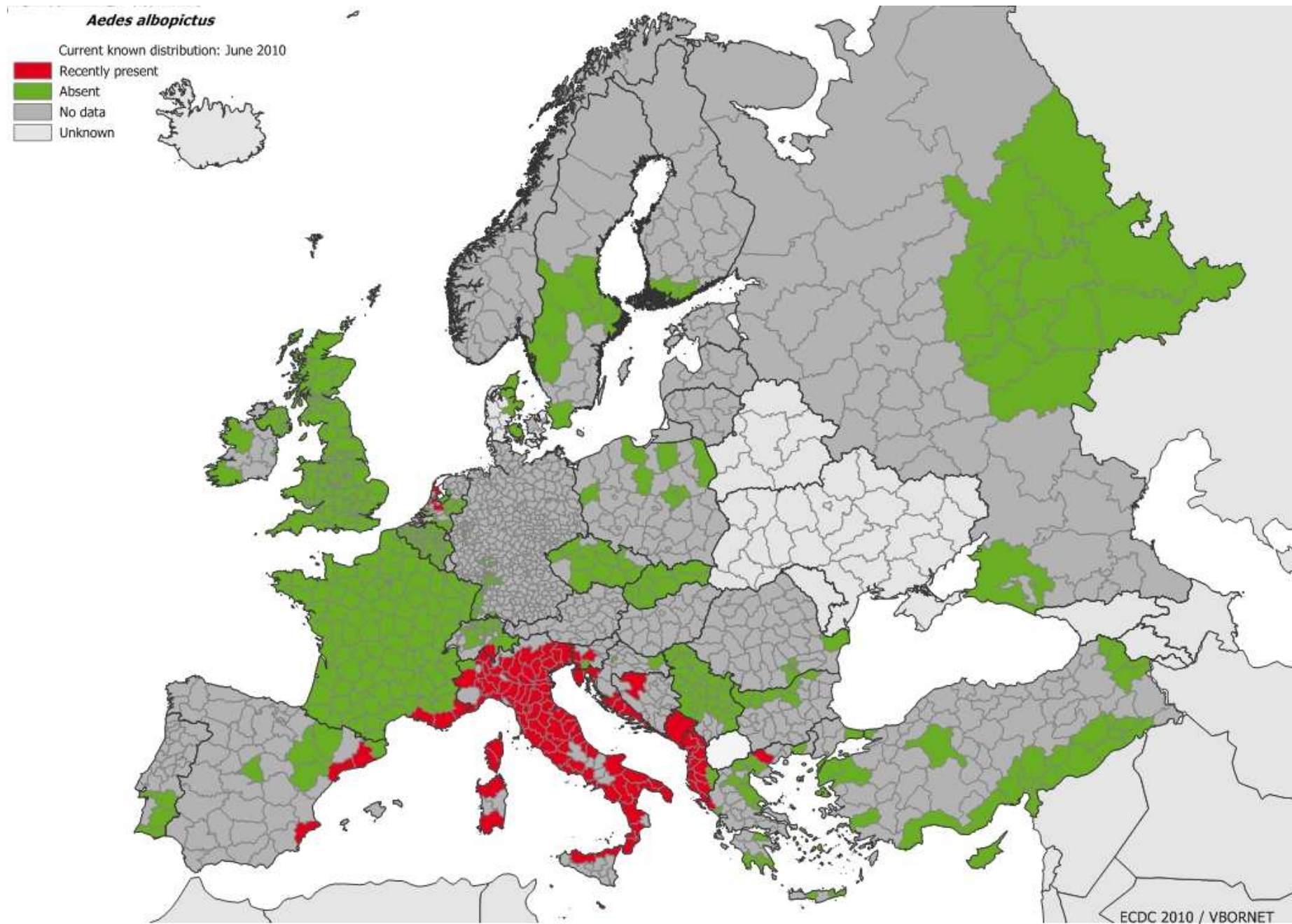
This Provisional PDF corresponds to the article as it appeared upon acceptance. Fully formatted PDF and full text (HTML) versions will be made available soon.

## Autochthonous plasmodium vivax malaria in a Greek schoolgirl of the Attica region

*Malaria Journal* 2012, **11**:52 doi:10.1186/1475-2875-11-52

In non-endemic countries, malaria cases are mostly imported (from travelers or immigrants), but blood transfusion malaria, or malaria in transplant recipients, or even cases of “airport malaria” can occasionally be seen [1]. Greece has been malaria free since 1974. However, rare cases of autochthonous malaria are occasionally reported. Recently, in August 2011, an announcement was posted by European Centres for Disease Prevention and Control (ECDC) and American Centers for Disease Control and Prevention (CDC) that six autochthonous malaria cases were reported in southern Greece [2,3]. An autochthonous case in a schoolgirl in the Attica region in 2009 is hereby described.





Current known distribution of *Aedes albopictus*

# Epidemic Curve by Presumed Place of Infection

## Secondary clusters:

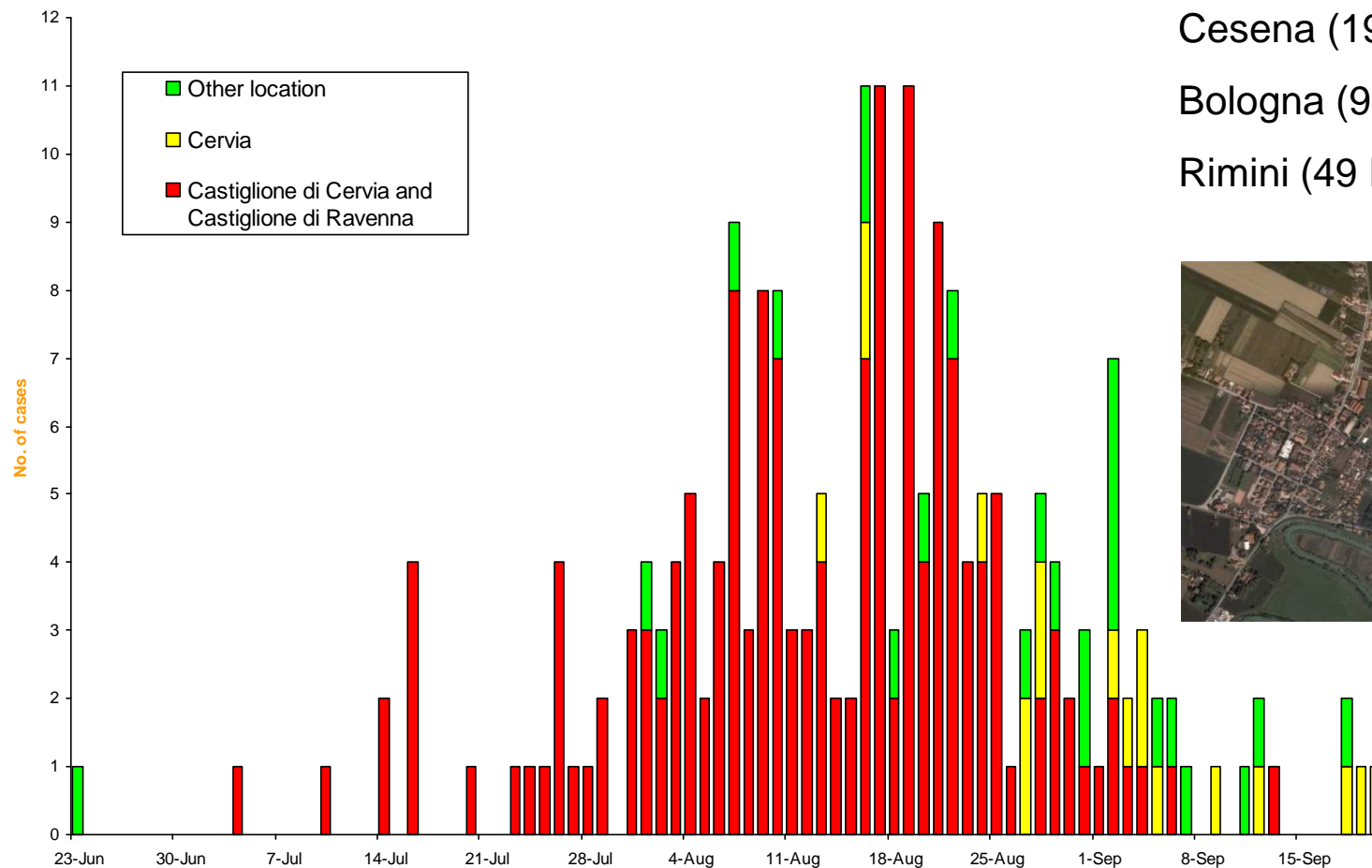
Cervia (9 Km) 19 cases

Ravenna (23 Km) 9 cases

Cesena (19 Km) 15 cases

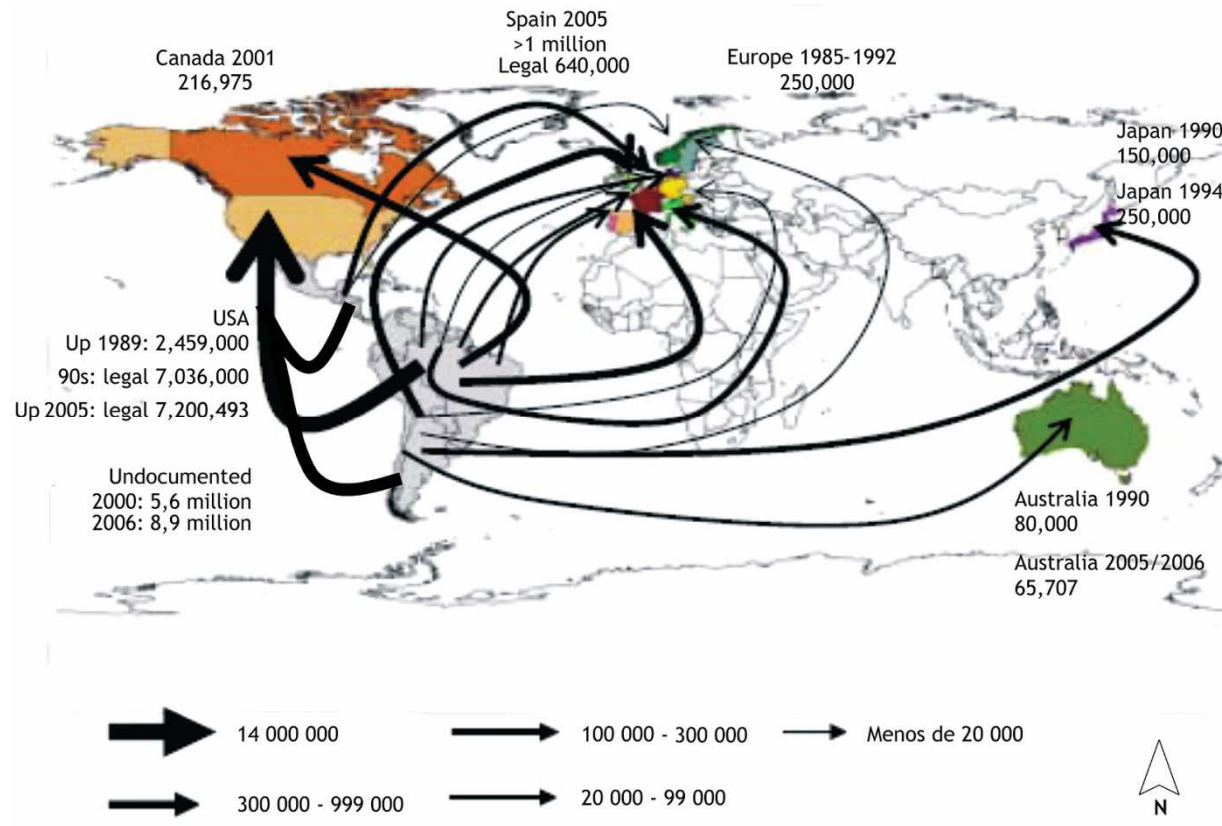
Bologna (90 Km) 5 cases

Rimini (49 Km) 6 cases



## Vertically transmitted infections:

- Chagas disease
- (rubella, HBV, etc.)



OPEN ACCESS Freely available online



## Expert Commentary

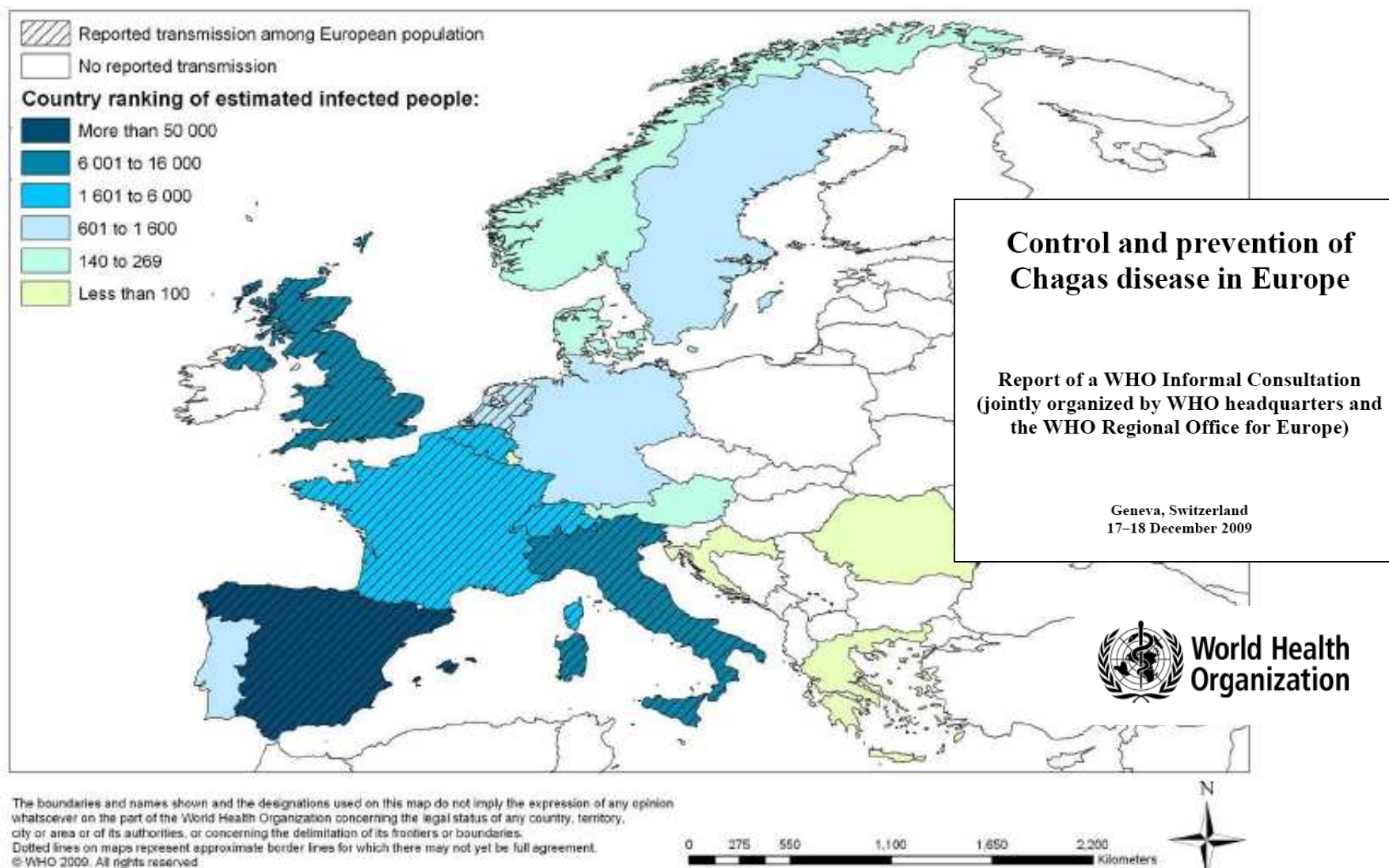
# Chagas Disease Has Now Gone Global

Herbert B. Tanowitz<sup>1,2,3,4\*</sup>, Louis M. Weiss<sup>1,2,3</sup>, Susan P. Montgomery<sup>5</sup>

**1** Department of Pathology (Division of Parasitology), Albert Einstein College of Medicine, Bronx, New York, United States of America, **2** Department of Medicine (Division of Infectious Disease), Albert Einstein College of Medicine, Bronx, New York, United States of America, **3** Global Health Center, Albert Einstein College of Medicine, Bronx, New York, United States of America, **4** Jacobi Medical Center (Diagnostic Parasitology Laboratory), Bronx, New York, United States of America, **5** Division of Parasitic Diseases and Malaria, Centers for Disease Control and Prevention, Atlanta, Georgia, United States of America



**Map A3.** Distribution of cases of *Trypanosoma cruzi* infection in Europe by country, and reported transmission (autochthonous, transfusional or congenital transmission of infection acquired among European travellers to disease-endemic areas) among the European population (data reported to WHO as of December 2009)



## PERSPECTIVES

# EuroTravNet: imported Chagas disease in nine European countries, 2008 to 2009

J A Perez-Molina (jose.perezmolina@gmail.com)<sup>1</sup>, A Perez-Ayala<sup>1</sup>, P Parola<sup>2</sup>, Y Jackson<sup>3</sup>, S Odolini<sup>4</sup>, R Lopez-Velez<sup>1</sup>, for the EuroTravNet Network<sup>5</sup>

### TABLE

Demographic data and characteristics of *Trypanosoma cruzi*-infected patients detected through EuroTravNet, 2008–2009 (n=124)

Item	Data	Number of patients (%) <sup>a</sup>
EuroTravNet core site visited (also the place of diagnosis)	Madrid, Spain	121 (97.6)
	Geneva, Switzerland	3 (2.4)
Sex	Female	81 (65.3)
	Male	43 (34.7)
Median age in years (Q1–Q3)	35 (29–45)	124
Median number of months of residence <sup>b</sup> (Q1–Q3)	38 (26–55)	123 <sup>c</sup>
Country of birth (also the probable country of exposure)	Bolivia	119 (96.0)
	Argentina	2 (1.6)
	Paraguay	2 (1.6)
	Ecuador	1 (0.8)
Probable area of exposure (all in Bolivia, where known)	Cochabamba	40 (32.3)
	Santa Cruz	37 (29.8)
	Sucre	5 (4.0)
	Tarija	4 (3.2)
	Guayaquil	1 (0.8)
	Santa Fe	1 (0.8)
	Not reported	36 (29.0)
Clinical setting	Migrant healthcare	123 (99.2)
	Seen after travel	1 (0.8)
Patient type	Outpatient	123 (99.2)
	Inpatient	1 (0.8)
Diagnosis	Chronic Chagas disease	124 (100.0)
Reason for presentation	Screening (while asymptomatic)	115 (92.7)
	Abnormal laboratory test <sup>d</sup> and screening (while asymptomatic)	3 (2.4)
	Musculoskeletal symptoms	2 (1.6)
	Abnormal laboratory test <sup>d</sup> and gastrointestinal symptoms	1 (0.8)
	Gastrointestinal symptoms	1 (0.8)
	Opthamological symptoms	1 (0.8)

Citation style for this article:

Perez-Molina JA, Perez-Ayala A, Parola P, Jackson Y, Odolini S, Lopez-Velez R, for the EuroTravNet Network. EuroTravNet: Imported Chagas disease in nine European countries, 2008 to 2009. Euro Surveill. 2011;16(37):pii=19966. Available online: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19966>

# ***T. cruzi* transmission modalities**

(mainly during the indeterminate, low parasitaemia, phase of the disease)

☐ Vector – borne

☐ Oral



☐ Blood transfusion

(Single 500 ml unit risk: 12-20%)

☐ SOT

(Kidney from infected donor: 35%)

☐ Immune-depression

(Risk of reactivation: 30%)

☐ Mother to Child

(Risk of transmission: 0.1-12%)

# Congenital Chagas disease

**Respiratory Distress: 25% in Bolivia**

**Hepatosplenomegaly**

**Fever**



**Muscle hypotonia**

**Seizures**

**Jaundice**

**Anasarca**

**Tachicardia**

**Heart failure**

**Meningoencephalitis**

# Main blood/SOT transmissible tropical infections

Blood borne or transplant-related infections:

- ✓ Blood (es. *malaria*);
- ✓ Transplanted organ (es. *HTLV-1*);
- ✓ Reactivation of latent infection (es. *strongyloidiasis*, *HTLV1*, *T. cruzi*, *malaria*);
- ✓ De novo infection in the immunosuppressed host (es. *visceral leishmaniasis*)

HTLV-I/II, West Nile Virus  
(WNV), SARS, Chikungunya  
Virus

Tuberculosis and non TB  
mycobacteria

*Plasmodium* spp, *Leishmania*  
spp, *Trypanosoma cruzi*,  
*strongyloides stercoralis*,  
*Schistosoma* spp,  
*Echinococcus* spp.

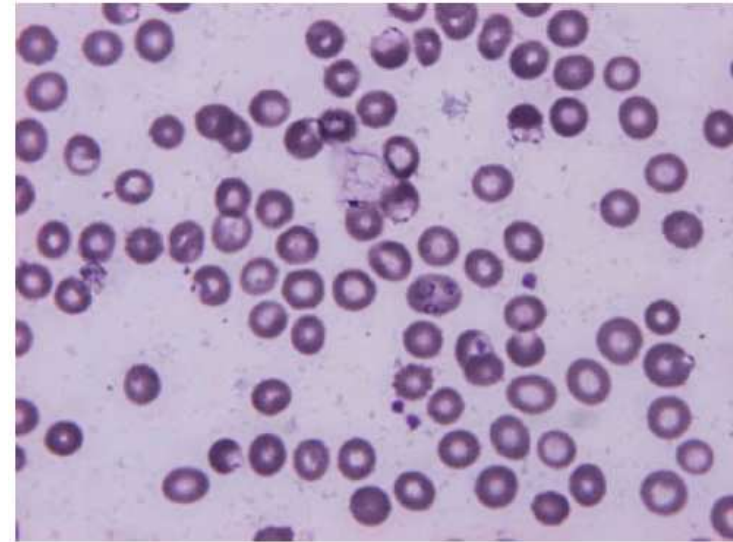
*Coccidioides immitis*,  
*Histoplasma capsulatum*



## Fever, Mental Impairment, Acute Anemia, and Renal Failure in Patient Undergoing Orthotopic Liver Transplantation: Posttransplantation Malaria

Francesco Menichetti,<sup>1</sup> Maria Lucia Bindi,<sup>1</sup> Carlo Tascini,<sup>2</sup> Lucio Urbani,<sup>3</sup> Gianni Biancofiore,<sup>2</sup> Roberta Doria,<sup>1</sup> Massimo Esposito,<sup>2</sup> Roberto Mozzo,<sup>2</sup> Gabriele Catalano,<sup>3</sup> and Franco Filippini<sup>3</sup>

<sup>1</sup>Department of Infectious Diseases, <sup>2</sup>Postsurgical and Transplant I.C.U., and <sup>3</sup>Liver Transplant Unit, Azienda Ospedaliera Universitaria Pisana, Pisa, Italy



A systematic review of the donor's charts revealed that he was a 30-yr-old black male who had returned to Italy from Ghana 1 month before his sudden death in a road traffic accident.

Blood films: *P. falciparum* trophozoites

**NOTE:** two kidney recipients from the same donor also developed malaria (1 in Brescia)

In non endemic areas, *P. falciparum* malaria recrudescence may occurs during immune suppression conditions such as **pregnancy, splenectomy and tumors**

**Clinical Infectious Diseases 2005;40:e97–100**

Acute *Plasmodium falciparum* Malaria  
Following Splenectomy for Suspected  
Lymphoma in 2 Patients

Frédéric Bidegain,<sup>1,2</sup> Antoine Berry,<sup>1</sup> Muriel Alvarez,<sup>2</sup> Olivier Verhille,<sup>3</sup>  
Françoise Huguet,<sup>3</sup> Pierre Brousset,<sup>4</sup> Jacques Pris,<sup>3</sup> Bruno Marchou,<sup>2</sup>  
and Jean François Magnaval<sup>1</sup>

International Journal of Infectious Diseases (2005) 9, 234–235



LETTER TO THE EDITOR

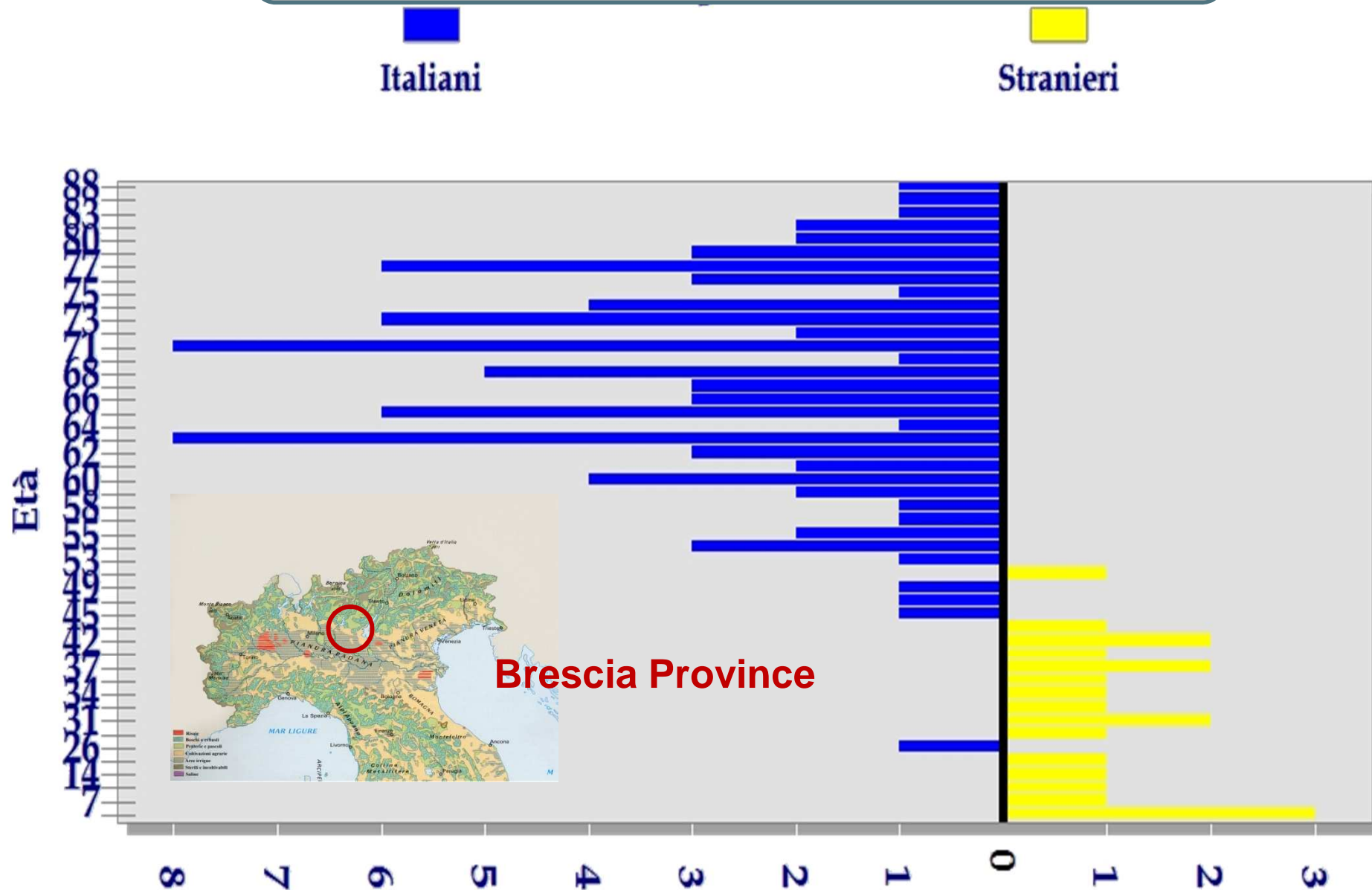
Late recrudescence of *Plasmodium falciparum*  
malaria in a pregnant woman: a case report

**Clinical Infectious Diseases 2008;47:e39–41**

Febrile *Plasmodium falciparum* Malaria  
4 Years after Exposure in a Man with  
Sickle Cell Disease

Tatiana Greenwood,<sup>1</sup> Tomas Vikerfors,<sup>2</sup> Maria Sjöberg,<sup>2</sup>  
Gunnar Skeppner,<sup>1</sup> and Anna Färnert<sup>3</sup>

# Patients with strongyloidosis in Brescia Age distribution by origin



## Health conditions of international migrants seen at Geosentinel clinics

a) Age < 19 years old (n. 854)

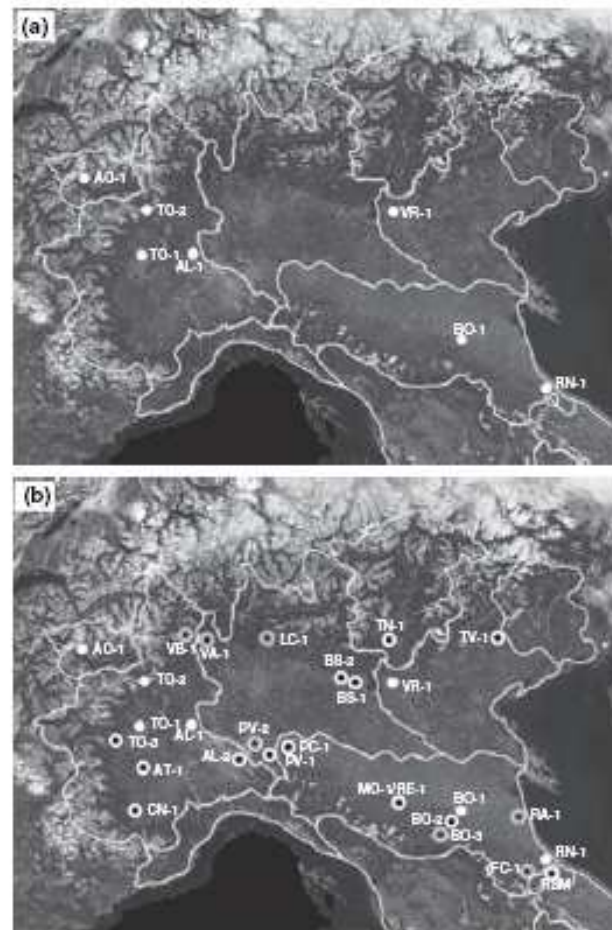
Diagnosis	#	%
Malaria	170	20.0
LTBI	82	10.8
No health condition	723	10.7
Schistosomiasis	510	7.6
Giardiasis	370	5.5
Active TB	346	5.1
Hepatitis B, acute and chronic	11	1.3
Strongyloidiasis	40	4.7
Eosinophilia	25	2.9
Intestinal Ascaris	19	2.2

b) Age 19 years and older (n. 6751)

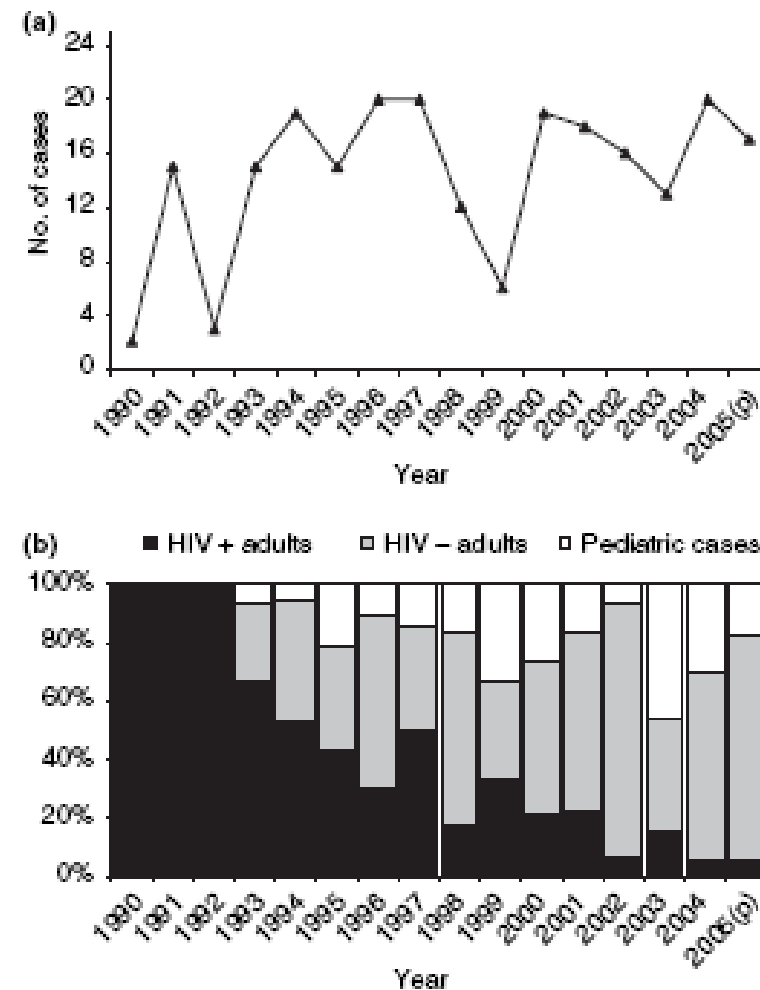
Diagnosis	#	%
LTBI	1619	24.0
Hepatitis B, acute and chronic	864	12.8
No health condition	723	10.7
Schistosomiasis	510	7.6
Giardiasis	370	5.5
Active TB	346	5.1
Strongyloidiasis	344	5.1
No health condition	326	4.8
Malaria	321	4.8
Eosinophilia	182	2.7

### Timing of presentation to Geosentinel Clinics (after resettlement)

< 1 year	42%
1-5 years	31%
> 5 years	27%



**Figure 3** Map providing the regional outlines of northern Italy with geographic distribution of autochthonous leishmaniasis foci detected after 1990. (a) (●), foci recognized through the 1990–2002 retrospective study; (b) as in a, plus (○) new foci detected during the 2003–2005 prospective survey, as shown in Tables 2 and 3 and (□) sites where autochthonous canine leishmaniasis (CanL) cases and/or phlebotomine vectors were detected, but that did not fulfil criteria for the classification of an undisputable leishmaniasis focus. Focus labels include province acronyms; RSM, Republic of San Marino.



**Figure 2** Annual trend of 230 visceral leishmaniasis (VL) cases recorded in regions of northern continental Italy from 1990 to 2005 (provisional) (a) and their distribution according to age and HIV co-infection condition (b).

**Table 4** Location and number of sites surveyed during two consecutive sandfly seasons (2003–2004) and *Leishmania* vector species identified in each focus

Focus label*	No. of sites surveyed	Positive sites	Specimens of <i>Phlebotomus</i> ( <i>Larroussius</i> ) species collected				
			<i>P. perniciosus</i>	<i>P. perfiliewi</i>	<i>P. neglectus</i>	<i>P. ariasi</i>	Total
Pre-Alpine territories							
AO-1	15	4	23	0	1	0	24
CN-1	19	4	22	0	0	1	23
TO-2	24	5	10	0	13	0	23
TO-3	21	7	0	0	15	0	15
BS-1	15	8	33	0	27	0	60
BS-2	18	3	4	0	0	0	4
TN-1	4	2	33	0	0	0	33
TV-1	4	3	365	0	1	0	366
VR-1	10	6	279	0	183	0	462
Total (%)	130	42 (32.3)	769 (76.1)	0 (0.0)	240 (23.7)	1 (0.2)	1010 (100)
Pre-Apennine/Po valley territories							
AL-2	16	6	25	0	0	0	25
AT-1	19	8	29	0	0	0	29
PV-1	10	1	2	0	0	0	2
PC-1	8	2	8	0	0	0	8
BO-2	2	2	0	46	0	0	46
MO-1/RE-1	4	4	27	512	0	0	539
RSM	3	3	0	37	0	0	37
Total (%)	62	26 (41.9)	91 (13.3)	595 (86.7)	0	0	686 (100)
Overtotal (%)	192	68 (35.4)	860 (50.7)	595 (35.1)	240 (14.1)	1 (0.1)	1696 (100)

RSM, Republic of San Marino.

\*Labels include province acronyms.

## Asymptomatic *Leishmania infantum* Infection in an Area of Northwestern Italy (Piedmont Region) Where Such Infections Are Traditionally Nonendemic<sup>▽</sup>

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The prevalence of *Leishmania infantum*-specific antibodies and asymptomatic infection was assessed in a randomized sample of 526 healthy adults from a continental area of Northwestern Italy where *L. infantum* is not endemic and where autochthonous cases of visceral leishmaniasis (VL) were recently reported. *L. infantum*-specific antibodies were detected by Western blotting (WB) in 39 subjects (7.41%), while *L. infantum* kinetoplast DNA was amplified from buccal coat in 21 out of 39 WB-positive subjects, confirming asymptomatic infection in 53.8% of seropositives. Risk factors significantly associated with WB positivity were uninterrupted residence since childhood in a local rural environment (odds ratio [OR], 3.5; 95% confidence interval [CI], 1.7 to 7.3), daily contact with animals though not exclusively with dogs (OR, 3.7; 95% CI, 1.3 to 10.7), older age (OR, 2.31; 95% CI, 1.2 to 4.5), and agricultural/other outdoor activities (OR, 3.8; 95% CI, 0.99 to 3.7.) Logistic regression analysis showed that uninterrupted residence in a local rural environment and an age of >65 years were the only independent predictors of seropositivity assessed by WB. Follow-up at 24 months did not show evidence of VL in either seropositive or PCR-positive subjects. The detection of a high seroprevalence rate, confirmed as asymptomatic infection by PCR in more than half of the cases, among healthy residents in a continental area of northwestern Italy makes local *L. infantum* transmission very likely. In a region where VL is considered nonendemic, these findings warrant further epidemiological investigations as well as interventions with respect to both the canine reservoir and vectors, given the possible risks for immunosuppressed patients.

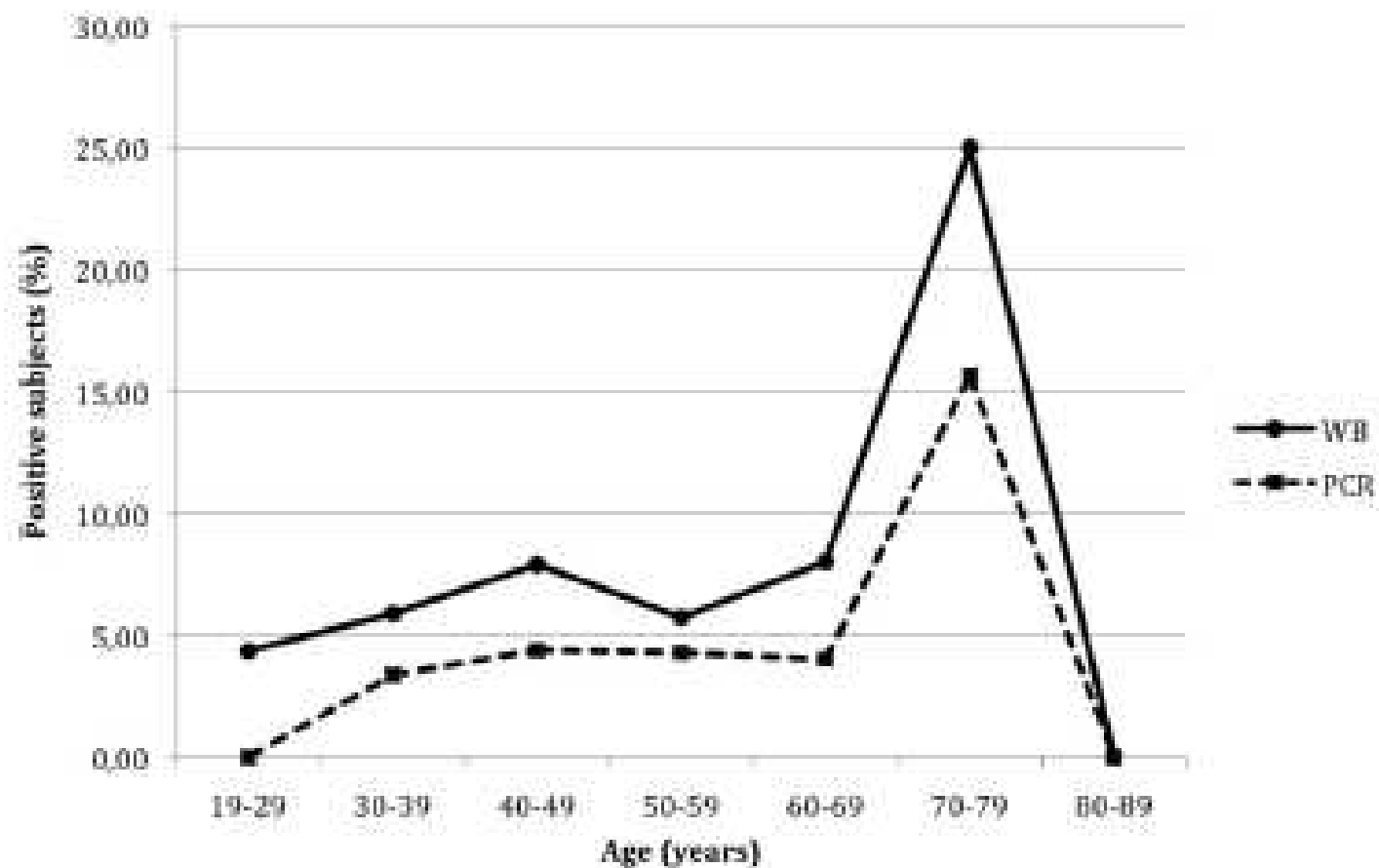
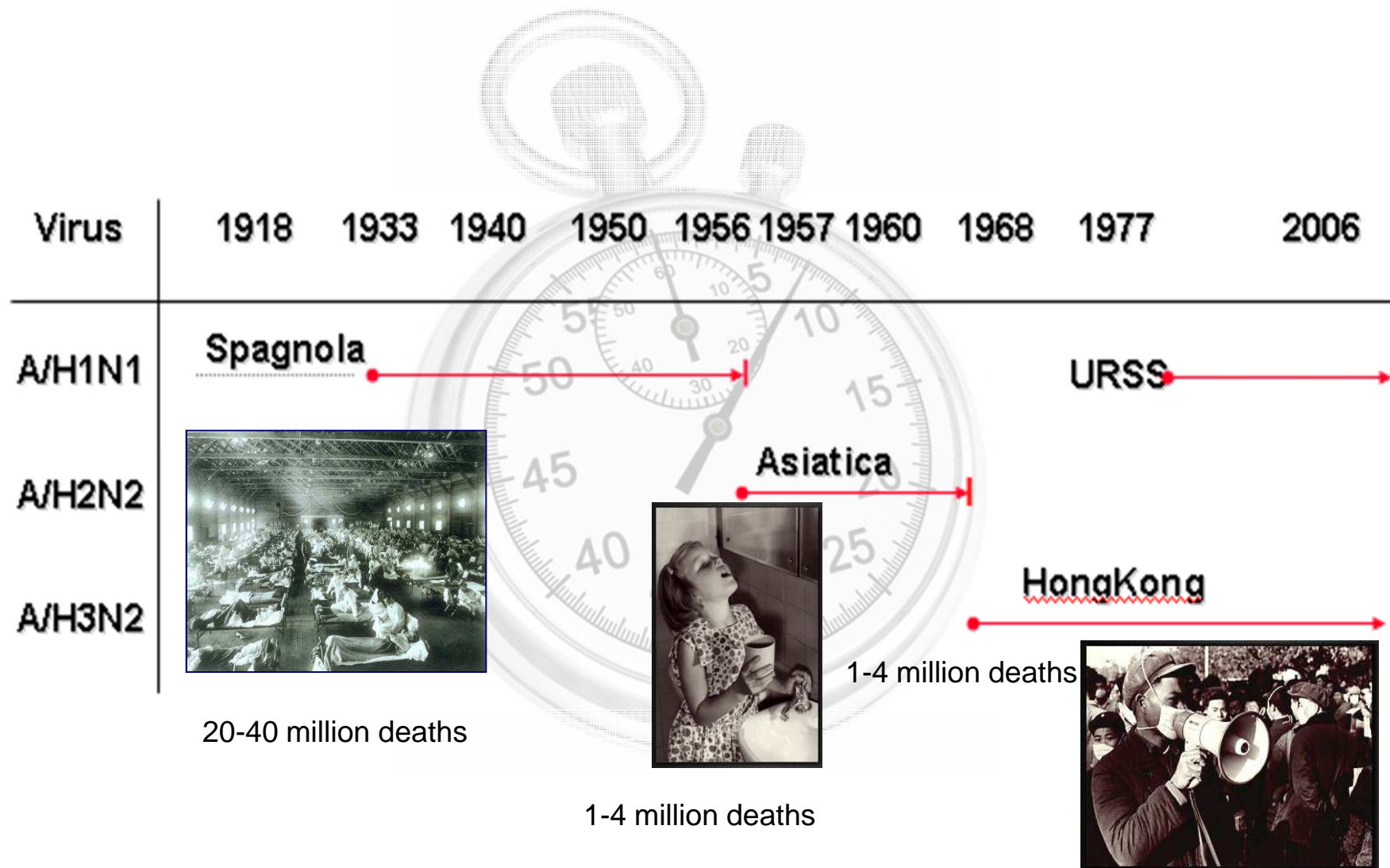
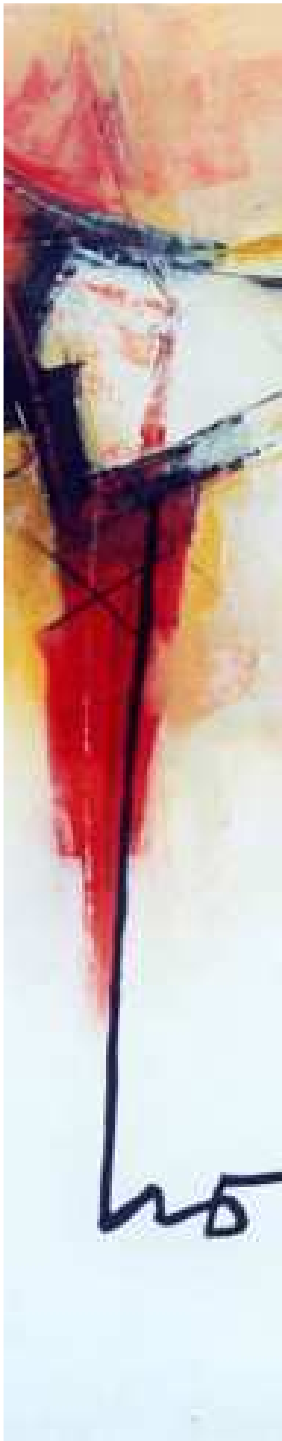


FIG. 1. Age-prevalence curves of asymptomatic infection detected using WB and kDNA PCR as indicated.



## Cronologia di comparsa delle principali pandemie influenzali





## Timeline della pandemia influenzale da virus 2009 A/H1N1

### 24 Febbraio 2009

Primo paziente = bambina di 6 mesi nel nord del Messico

(Cohen J. Swine flu outbreak, day by day. ScienceInsider. July 17, 2009. )

### 3 Marzo 2009

I primi casi a Messico City.

### 6 Aprile 2009

Outbreak nel paese di La Gloria, Mexico, con un tasso di attacco del 60%.

### 15 Aprile 2009

Primi casi virologicamente confermati in Messico. In California primo caso fuori dai confine del Messico= ragazzo di 10 anni

### 26 Aprile 2009

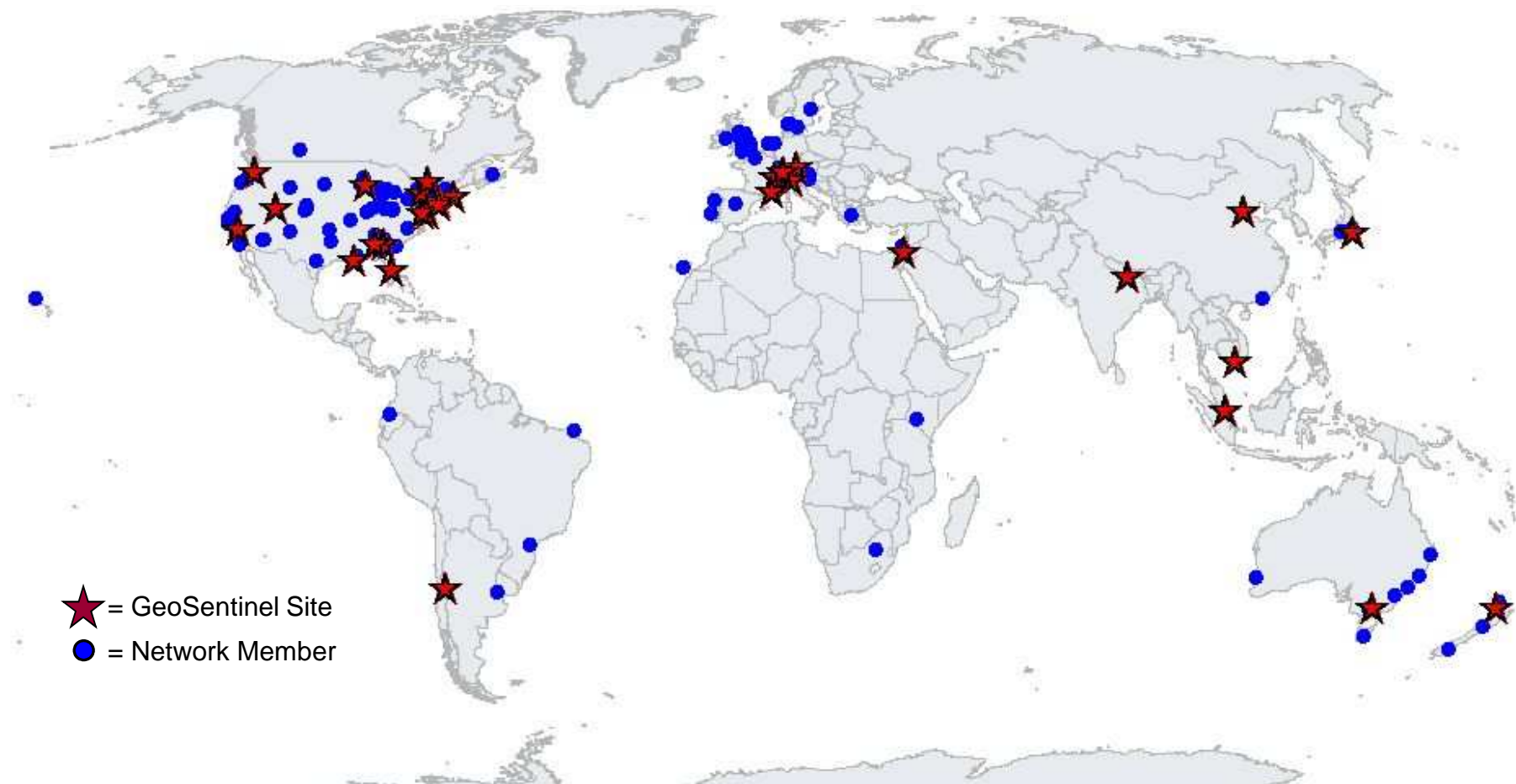
Gli Stati Uniti dichiarano l'emergenza sanitaria

<http://www.istm.org/geosentinel/sitemap.html>

<http://healthmap.org/geosentinel/index.php>

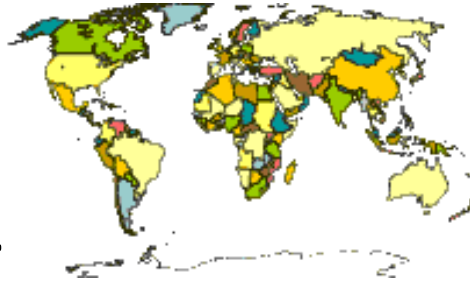
<http://www.tropnet.net/index.php?id=21>

# GeoSentinel



- Provider based surveillance of international travelers and migrants.
- Does not cover endemic diseases in local populations.
  - ★ 31 travel/tropical medicine clinics globally (since 1996)
  - 145 Network Members on all 6 continents (since 2002)

**October 31<sup>o</sup>, 2011**



**GeoSentinel**

The Global Surveillance Network  
of the ISTM and CDC

a worldwide communications & data collection  
network of travel/tropical medicine clinics

- 23 cases of probable zoonotic infection in returning travelers seen at 9 different clinics in 6 countries;
- All travelers had vacationed on Tioman Island (east coast of Peninsular Malaysia) between June and August 2011;
- Most but not all of these travelers visited Perhentiau Island;
- All patients had fever, myalgia, musculoskeletal complaints and marked eosinophilia.



## The largest cluster of 8 cases:

- 8 cases reported by Dr. Stich (Missionsrrztliche Klinik in Wurzburg, Germany)
- A group from Southern Germany, who visited Tioman Palau in July during a month long trip in Malaysia
- All had mild diarrhea at the end of the trip; 1 week after return they developed fever and myalgias which became severe during the second week of August;
- In mid September all of the 5 who were directly examined had elevated CPK and marked eosinophilia;
- Some had cardiac involvement (right bundle branch block, tachicardia);
- One patient consented to muscle biopsy which revealed the presence of *Sarcocystis*.



# TropNet



- November 2002-March 2003: 17 cases of malaria (1 fatal) were observed in illegal Chinese immigrants who traveled to Italy through Africa (in particular, Cote d'Ivoire);
- A further cluster of 12 was reported in August 2002;
- Some immigrants entered through France, which also had reports of *P.falciparum* in Chinese immigrants.

Table. Characteristics of 17 cases of malaria in illegal Chinese immigrants, Italy

Case	Sex, age <sup>a</sup>	Date first seen by physician	Country of transit	Time spent in country of transit	Mode of travel	Mode of travel to Europe	<i>Plasmodium</i> species	Clinical outcome
1	M, 21	11/05/02	Côte d'Ivoire	8 mo	Air	Air	<i>P. falciparum</i>	Recovered
2	M, 24	11/11/02	"Africa"	3 mo	Unknown	Air	<i>P. falciparum</i>	Recovered
3	F, 20	11/12/02	Côte d'Ivoire	22 d	Road/sea	Air	<i>P. falciparum</i>	Recovered
4	M, 22	11/15/02	Côte d'Ivoire	1 mo	Air	Air	<i>P. falciparum</i>	Recovered
5	M, 24	11/16/02	Côte d'Ivoire	14 d	Road/sea	Air	<i>P. falciparum</i>	Recovered
6	M, 28	01/09/03	Côte d'Ivoire	2 mo	Unknown	Air	<i>P. falciparum</i>	Recovered
7	F, 20	01/13/03	Côte d'Ivoire	Few days	Unknown	Air	<i>P. falciparum</i>	Died
8	M, 21	02/01/03	Côte d'Ivoire	Unknown	Unknown	Air	<i>P. falciparum</i>	Recovered
9	F, 32	02/02/03	Congo	Unknown	Unknown	Air	<i>P. falciparum</i>	Recovered
10	M, 22	02/03/03	Côte d'Ivoire	6 mo	Air	Air	<i>P. falciparum</i>	Recovered
11	M, 19	02/08/03	Côte d'Ivoire	Unknown	Unknown	Air	<i>P. falciparum</i>	Recovered
12	M, 34	02/13/03	Congo	2 mo	Road/sea	Air	<i>P. falciparum</i> and <i>P. malariae</i>	Recovered
13	F, 24	02/13/03	Côte d'Ivoire	50 d	Air	Air	<i>P. falciparum</i>	Recovered
14	M, 40	02/22/03	Côte d'Ivoire	Unknown	Road/sea	Air	<i>P. falciparum</i>	Recovered
15	M, 22	02/24/03	Côte d'Ivoire	2 mo	Road/sea	Air	<i>P. falciparum</i>	Recovered
16	M, 28	03/01/03	"Africa"	Unknown	Unknown	Air	<i>P. falciparum</i>	Recovered
17	M, 23	03/15/03	Côte d'Ivoire	50 d	Road/sea	Air	<i>P. malariae</i>	Recovered

<sup>a</sup>M, male; F, female.

# Summary

- Human fight against infection is not over yet (will it ever be?)
- Humans, domestic animals and wildlife are inextricably linked by epidemiology of infectious diseases (IDs).
- IDs will continue to emerge, re-emerge and spread.
- Human-induced environmental changes, inter-species contacts, altered social conditions, demography and medical technology affect microbes' opportunities.