

Burden of Disease Assessments: *the BCoDE project experience*



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The experience of BCoDE project -
VBornet AGM 2011

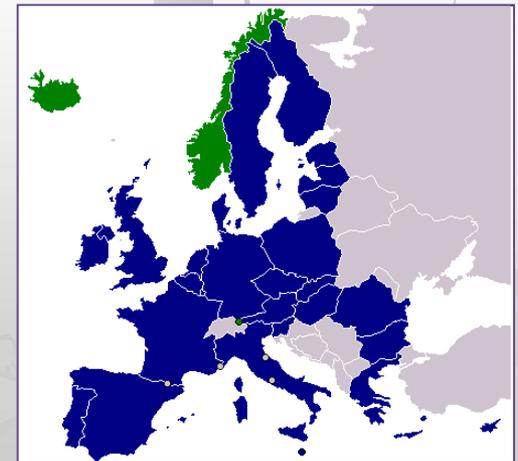


Overview

- An introduction to BCoDE project
- What is burden and what is needed for burden assessments
- Preliminary results from pilot study
- WP2b: Preliminary work on TBE
- Summary and questions

What is the BCoDE project?

- *Burden of Communicable Diseases in Europe* (BCoDE)
- A project funded by ECDC, coordinated by RIVM (NL), and involving several collaborating institutes in Europe
- The primary aim of the BCoDE project is to quantify the burden of communicable diseases in Europe in a consistent manner in order to compare the relative burden of each CD.
- 41 CDs and 30 countries

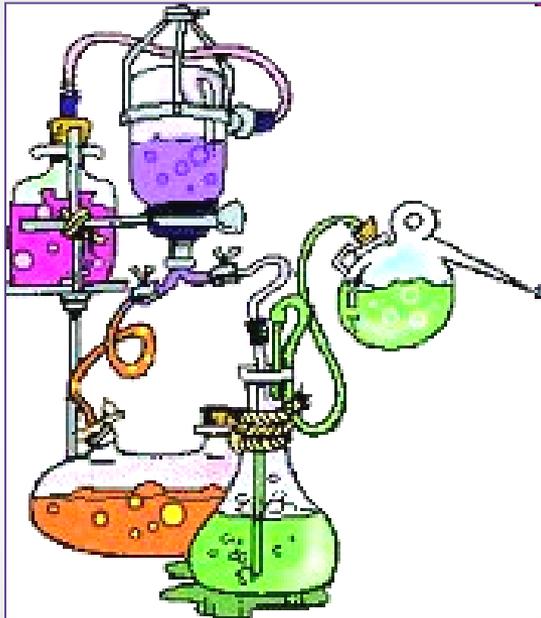




Purpose of estimating burden

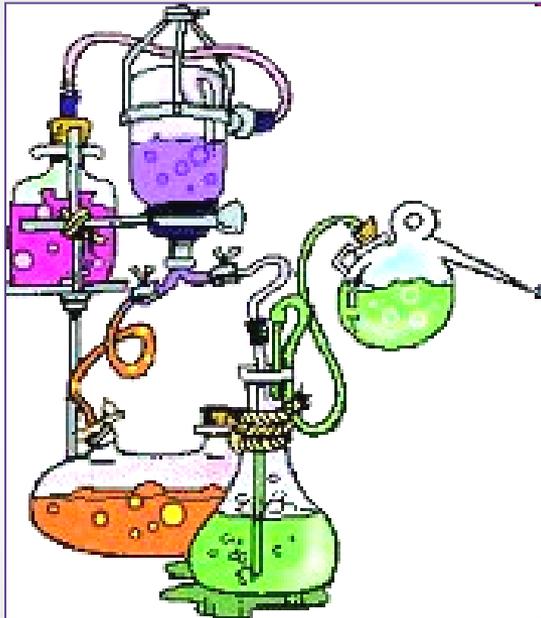
- To understand specific health needs of different countries
- To best allocate limited services and healthcare resources to achieve maximum results
- To improve evidence-based health policy decision making and promote transparency and accountability

What do we mean by 'health burden'?



- Morbidity?
- Mortality?
- Composite measure?
 - *HALYs*
 - *QALYs*
 - *DALYs*

What do we mean by 'health burden'?



- Morbidity?
- Mortality?
- Composite measure?
 - *HAL Ys*
 - *QAL Ys*
 - *DAL Ys*

The BCoDE consortium has chosen Disability Adjusted Life Years (DALYs) to express the burden of disease

$$\text{DALY} = \text{YLL} + \text{YLD}$$

Mortality: Years of life lost due to early death

$$\text{YLL} = \text{N} * \text{L}$$

N = Number of deaths
L = Standard life expectancy at age of death in years

Morbidity: Years of healthy life lost due to disability

$$\text{YLD} = \text{I} * \text{W} * \text{L}$$

I = Number of cases
W = Disability weight
L = Average duration of the case until remission or death (years)

What is needed to make DALY estimates?

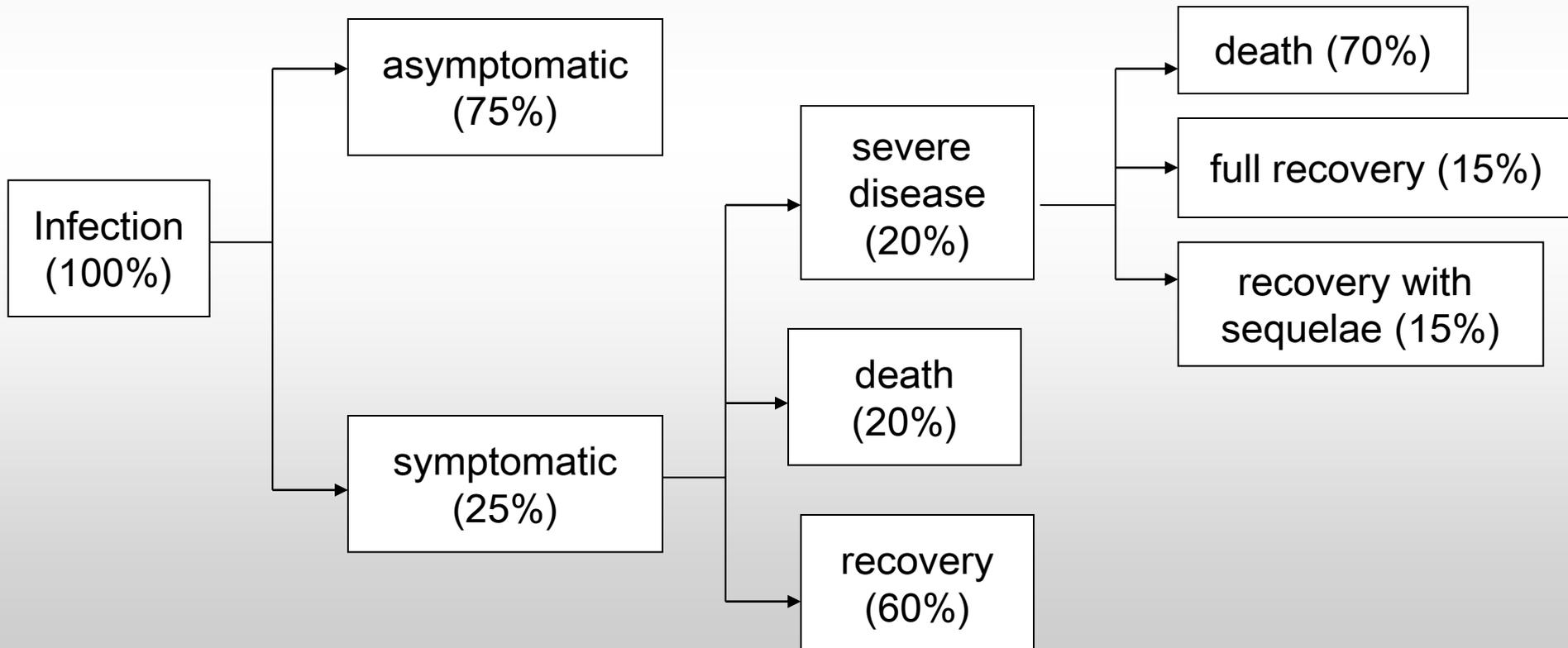
For each disease or condition and each country;

- All notified cases (morbidity)
- All notified deaths (mortality)
- Information on duration of disease outcome
- An outcome tree (showing all possible disease outcomes following infection)
- Disability weights for all disease outcomes
- Correction factors to adjust for underreporting



Representing disease outcomes

- An **outcome tree** is a qualitative representation of the progression of a disease in time.
- To build a tree, we need to know;
 - All **health states** resulting from infection
 - The **percentage** that develop each health state.



Disability weights

A disability weight is a factor that reflects the severity of a disease or condition on a scale from 0 (perfect health) to 1 (equivalent to death).

■ Examples from GBD 2004

■ Dengue

- Dengue fever 0.197 (0.172 - 0.211) varies with age
- Dengue haemorrhagic fever 0.545 (0.475 - 0.583)

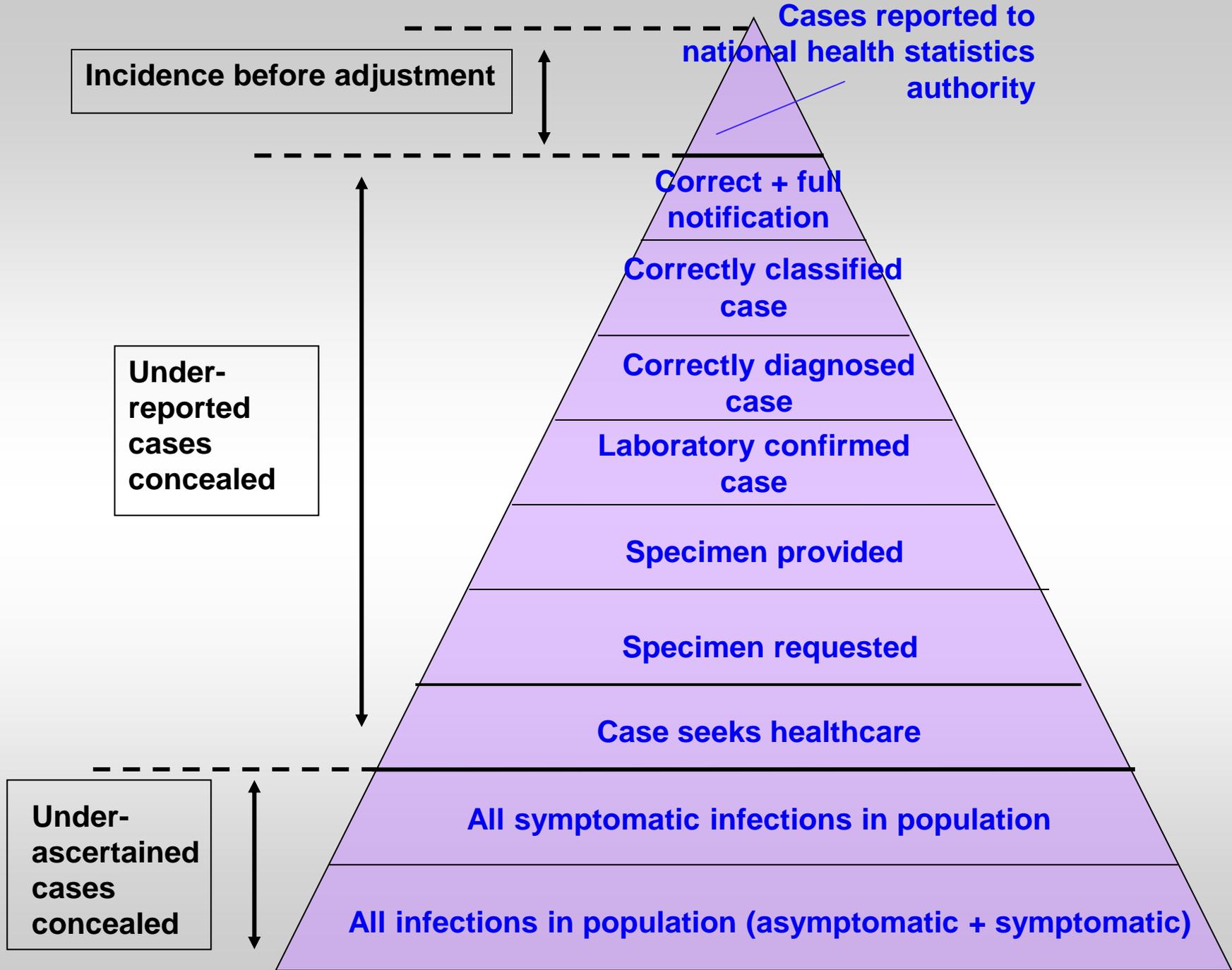
■ Malaria

- Episodes 0.191 (0.172 - 0.211) varies with age and treatment
- Neurological sequelae 0.471 (0.443 - 0.471), varies with age and treatment
- Anaemia 0.012 (0.012 - 0.013), varies with age



Under-reporting

- Under-reporting is a major issue affecting most (if not all) morbidity and mortality datasets.



Under-reporting

- It is vital and justified to correct for under-reporting in order to;
 - Produce the best possible disease estimates that are closer to the true burden
 - Improve comparability between countries (because underestimation heterogeneity between diseases and countries)
 - Produce better, more informed estimates (with a degree of uncertainty) for policy-makers

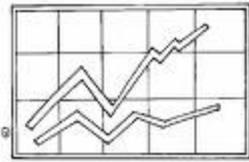
How to correct under-reporting?



- Better surveillance



- Multiplication factors



- Mathematical and statistical modelling



- Community-based studies
(including serological surveys)

How to correct under-reporting?



The BCoDE project has chosen to correct for under-reporting by using multiplication factors.

These factors needed to be disease- and country-specific and sometimes age – and gender-specific.

The pilot study

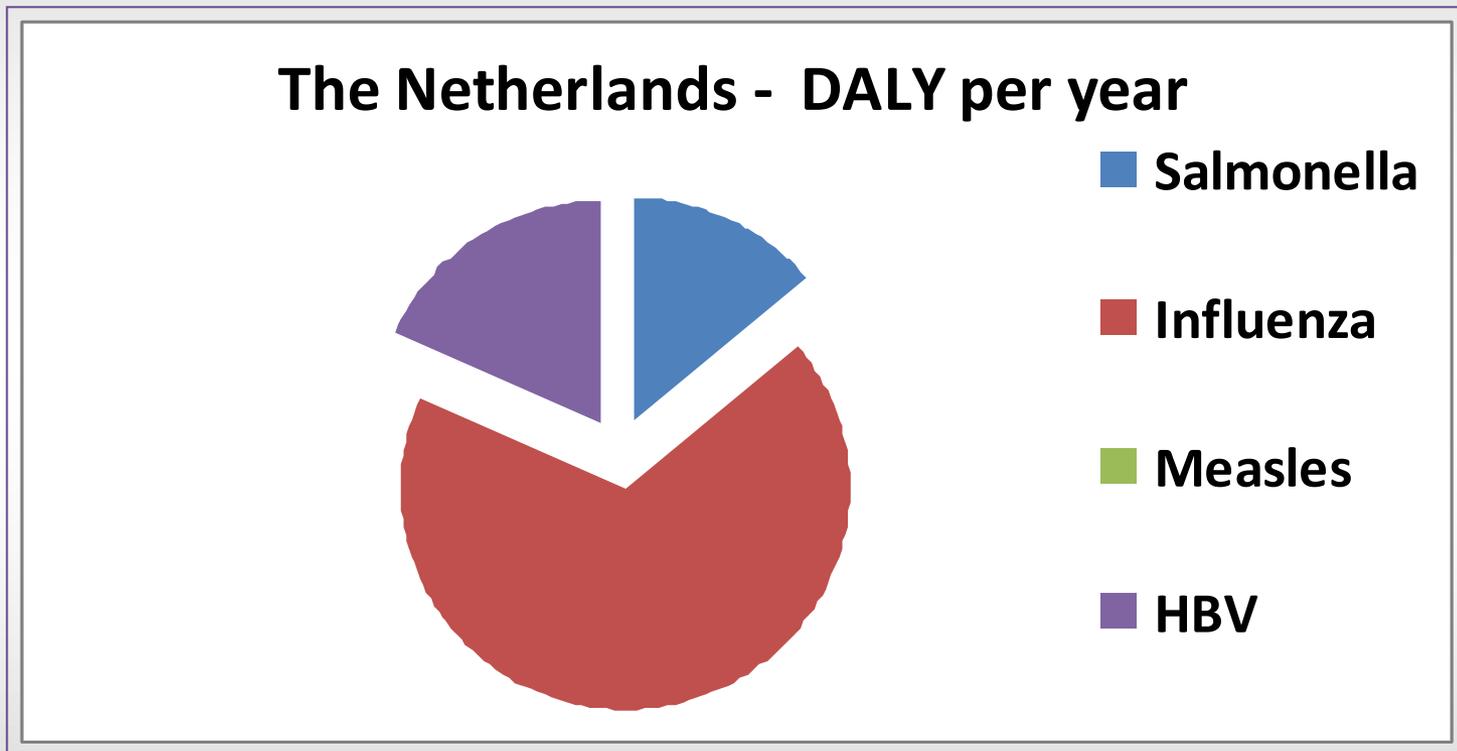
- Following completion of WP1 (development of methodology protocol), BCoDE is now in the pilot field study phase (WP2).

WP2: The pilot

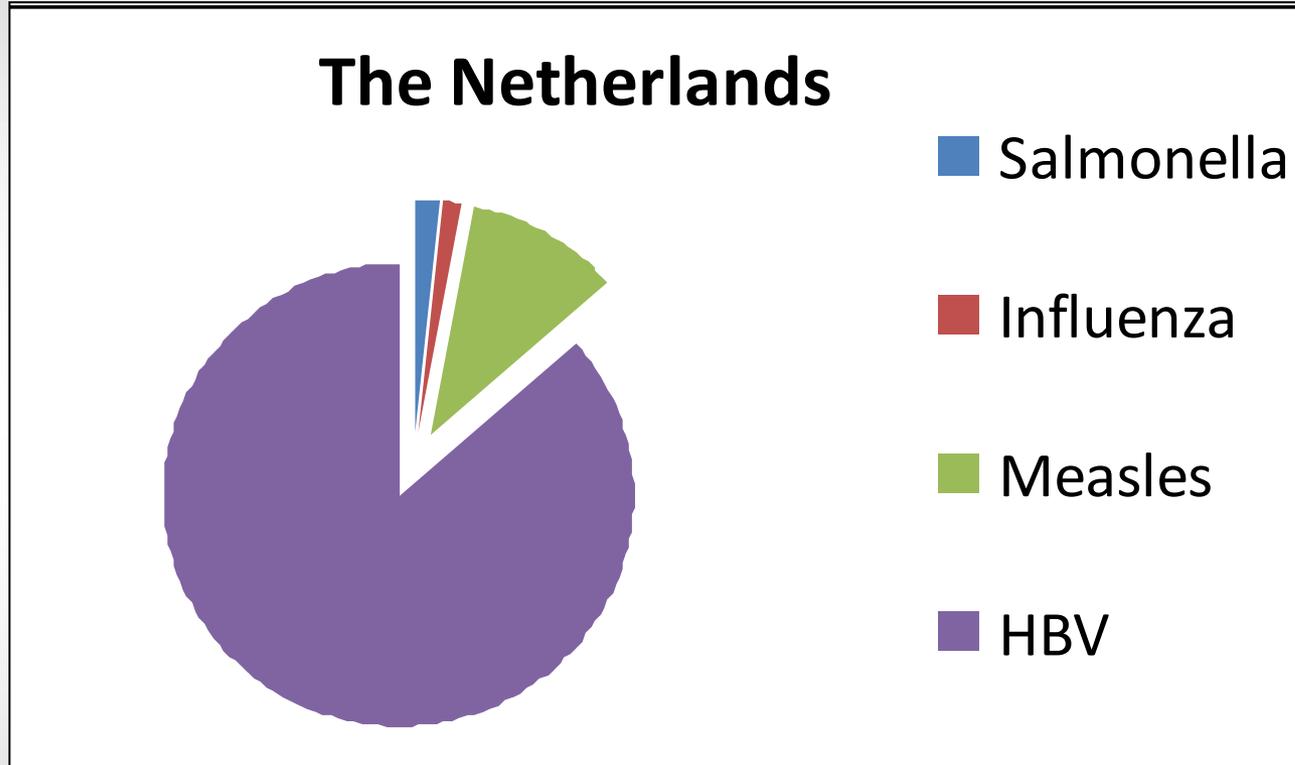
- WP2a - 4 diseases in 4 countries
 - Measles
 - Influenza
 - Hepatitis B
 - Salmonellosis
- in Estonia, Germany, Italy and Netherlands
- WP2b – all 41 diseases in 4 countries



Preliminary results – DALYs per year

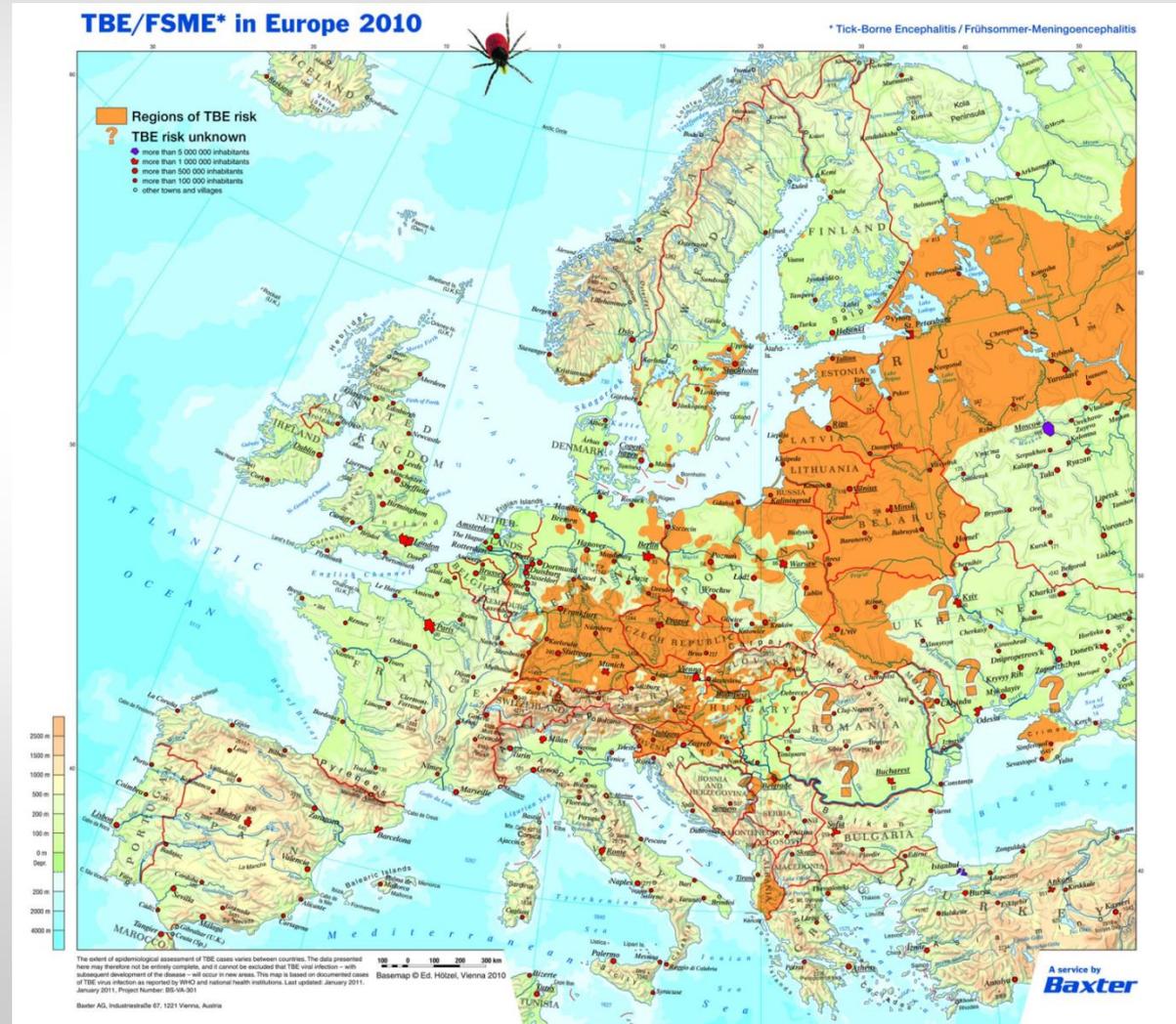


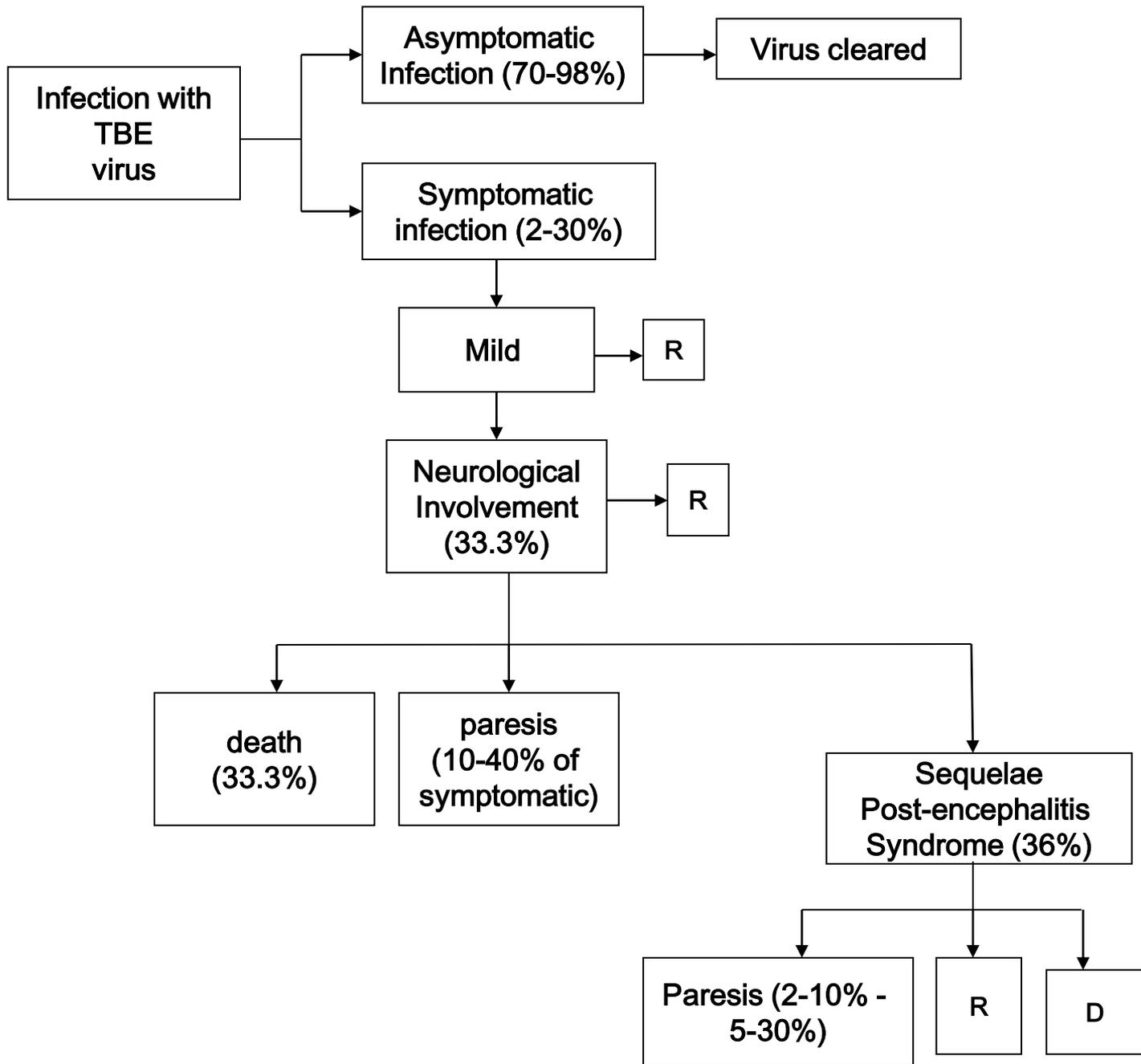
Preliminary results – DALYs per case



WP2b: preliminary work on tick-borne encephalitis (TBE)

- Certain geographic distribution
- Two subtypes of TBEV, Eastern and Western
- Transmitted by ticks
- Rodents are main reservoir of infection, humans are accidental host
- Vaccination is available





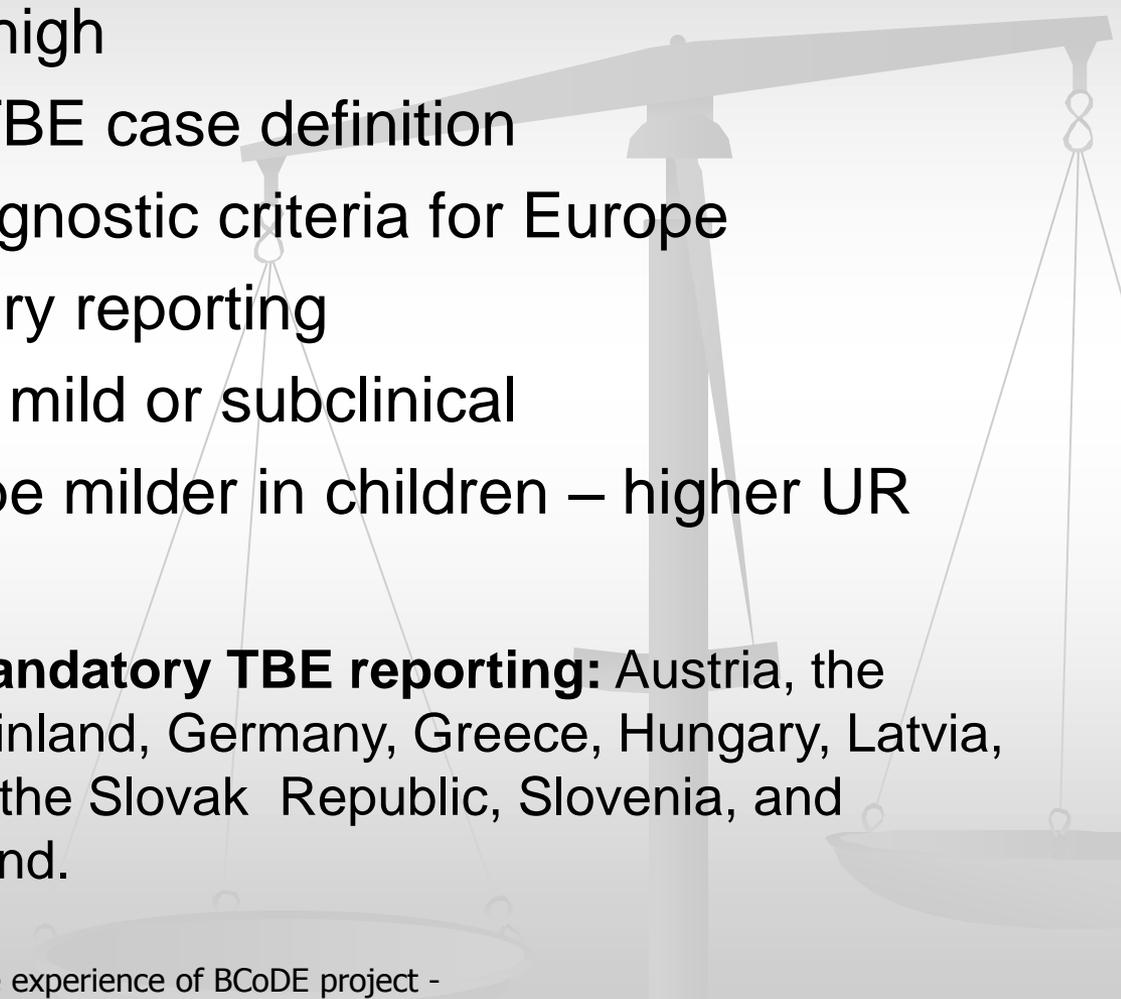
International Scientific Working Group on Tick-Borne Encephalitis (ISW-TBE)
 12th ISW-TBE Newsletter: March 2010
 Table - Number of reported cases in Europe and Russia

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Austria ^m	41	60	54	60	82	54	100	84	45	86	79	*
Croatia	26	18	27	30	36	38	28	20	12	0	0	*
Czech Republic ^m	490	719	411	647	606	500	652	1.029	542	630	816	*
Denmark	4	3	1	1	4	8	4	0	2	0	1	*
Estonia ^m	185	272	215	90	237	182	164	171	140	90	179	*
Finland	12	41	33	38	16	31	17	18	20	24	26	*
France	5	0	0	2	6	7	0	6	6	10	0	*
Germany ^m	115	133	253	226	278	274	431	546	238	285	311	*
Hungary ^m	51	45	76	80	114	59	90	115	170	53	55	*
Italy	5	15	19	6	14	23	22	14	4	3	32	*
Latvia ^m	350	544	303	153	365	251	142	170	171	181	328	*
Lithuania ^m	171	419	298	168	763	425	242	462	234	204	617	*
Norway ^m	1	2	1	2	1	3	0	5	12	12	8	*
Poland ^m	101	170	205	126	339	262	174	316	233	193	335	*
Russia ^m	9.955	5.931	6.339	5.150	4.770	4.235	4.551	3.510	3.098	2.798	3.632	*
Slovak Republic ^m	57	92	76	62	74	70	28	91	46	77	66	*
Slovenia ^m	150	190	260	262	275	204	297	445	196	246	307	*
Sweden ^m	53	133	128	105	105	160	130	163	190	224	211	*
Switzerland ^m	112	91	107	53	116	138	206	259	113	127	118	*

* preliminary data

m=mandatory

Under-reporting of TBE



- Believed to be very high
- Lack of a common TBE case definition
- Lack of common diagnostic criteria for Europe
- Incomplete mandatory reporting
- Most TBE infections mild or subclinical
- Western TBE subtype milder in children – higher UR

EU/EEA countries with mandatory TBE reporting: Austria, the Czech Republic, Estonia, Finland, Germany, Greece, Hungary, Latvia, Lithuania, Norway, Poland, the Slovak Republic, Slovenia, and Sweden, Norway, Switzerland.

TBE expected results

- Under-reporting high and variable between countries
- DALYs per case to be high (even in countries with high vaccine coverage)
- DALYs per 100,000 and DALYs per year for Estonia and Germany to be very high

TBE contributes considerably to the burden of infectious disease in Europe, and to certain countries



Main challenges for BCoDE

- Getting access to all data
- Missing data
- Under-reporting
- Creating accurate outcome trees – rare outcomes?
- Creating new DW
- Budget and time
- HUGE task
- Dealing with a political issue
- Estimate not exact numbers

Further work



- WP2b: Completion of pilot study by August 2011
- WP3a: Creation of toolkit
- November – ECDC-led workshop open to all member states to explain project and introduce toolkit
- WP3b: Roll out of full project
- WP4: Dissemination of results
= Completion of project by end of 2013

- CD/European tailored disability weights
- Economic studies based on cost-effectiveness analysis of intervention and prevention strategies
- Study of risk factors based on DALY results

- Ongoing work: Update methodology and results

Summary

- Introduced BCoDE project, what burden is and what is needed for burden assessments
- The BCoDE project aims to quantify the burden of 41 communicable diseases in Europe in terms of DALYs
- The DALY is a composite health measure taking into consideration short term and long term morbidity and mortality
- Preliminary results from pilot study and shown some preliminary work on TBE
- Huge task with many challenges

Wp2 participants

- **RIVM, the Netherlands:** Arie Havelaar, Alies van Lier, Mirjam Kretzschmar
- **UMCU, the Netherlands:** Marie-Josée Mangen, Juanita Haagsma, John Brooke, Ardine de Wit
- **University of Bielefeld, Germany:** Paulo Pinheiro, Dietrich Plaß, Alexander Krämer
- **University of Edinburgh, Scotland, UK:** Eric Fèvre, Cheryl Gibbons
- **University of the Sacred Heart, Rome, Italy:** Silvia Longhi, Chiara Waure, Walter Ricciardi, Elisabetta Franco
- **UMIT, Hall, Austria:** Beate Jahn, Nikolai Mühlberger, Uwe Siebert
- **National Institute of Public Health, Tallinn, Estonia:** Taavi Lai, Kristi Rüütel, Ardo Matsi
- **ECDC:** Alessandro Cassini, Piotr Kramarz

- Project lead: Mirjam Kretzschmar
- ECDC representatives and advisors: Piotr Kramarz, Alessandro Cassini



Respiratory tract infections

- Seasonal influenza
- Legionellosis
- Tuberculosis

STI, including HIV and blood-borne viruses

- Chlamydia
- Gonococcal infections
- Hepatitis B
- Hepatitis C
- HIV
- Syphilis

Food- and waterborne diseases and zoonoses

- Campylobacteriosis
- Cryptosporidiosis
- Infection with VTEC/STEC
- Giardiasis
- Hepatitis A
- Leptospirosis
- Listeriosis
- Salmonellosis
- Shigellosis
- Toxoplasmosis
- Variant Creutzfeldt-Jakob disease

Emerging and vector-borne diseases

- Q fever
- Tick-borne encephalitis

Vaccine-preventable diseases

- Diphtheria
- Invasive Haemophilus influenza disease
- Invasive pneumococcal infections
- Measles
- Invasive meningococcal disease
- Mumps
- Pertussis
- Poliomyelitis
- Rabies
- Rubella
- Tetanus

Nosocomial infections

- UTI
- SSI
- (LRTI) Pneumonia
- BSI
- (GII) Clostridium difficile

Diseases consequences of infections

- Primary liver cancer (due to HBV and HCV)
- Cervical cancer (due to HPV)
- Gastric cancer (due to H. pylori)
- End stage liver diseases (due to HBV and HCV)

Questions please..



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