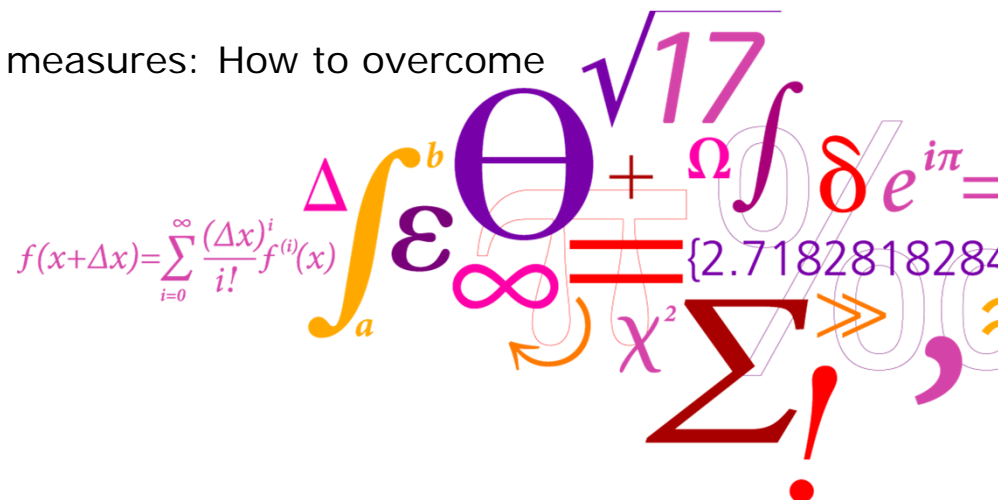


# Global Data

Birgitte Helwigh (bhel@food.dtu.dk)

Danish Zoonoses Centre  
 National Food Institute  
 Technical University of Denmark

International Symposium " Principles and measures: How to overcome  
 a life-threatening crisis in the food chain  
 14-15 November 2013, BfR, Berlin



# European Union

## - Data and sampling information requirements

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- Directive 2003/99/EC (Zoonoses Directive)
- Ensure effective monitoring
  - zoonoses and zoonotic agents
  - antimicrobial resistance
  - investigation of foodborne outbreaks
- Provides the necessary information to evaluate the trends and sources of zoonoses and zoonotic agents
- Identifies hazards, assesses exposures, and risks

# Outbreak data investigations

Directive 2003/99/EC



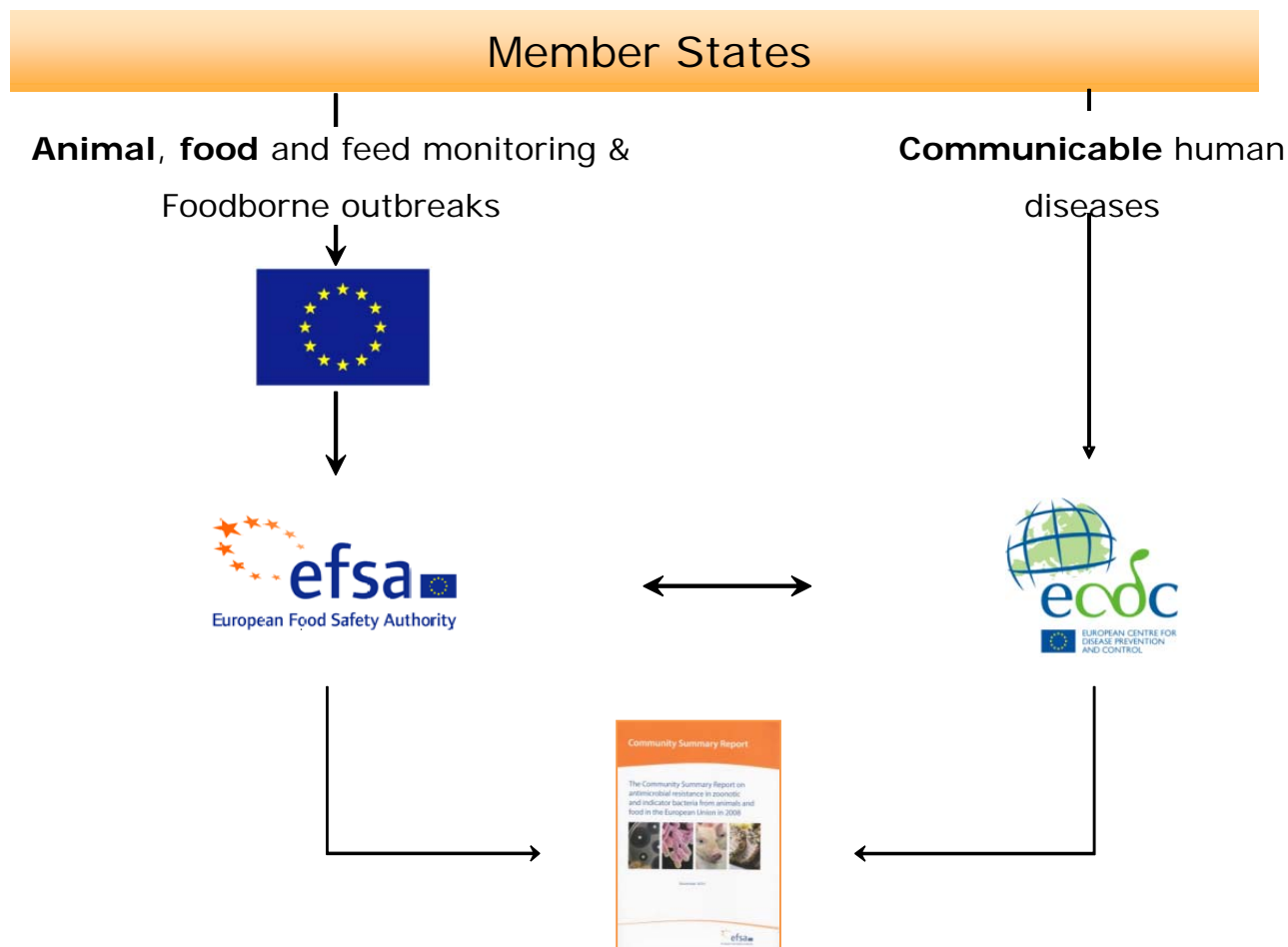
- Mandatory epidemiological investigation of food-borne outbreaks
  - Epidemiological profile
  - Foodstuffs potentially implicated and potential causes



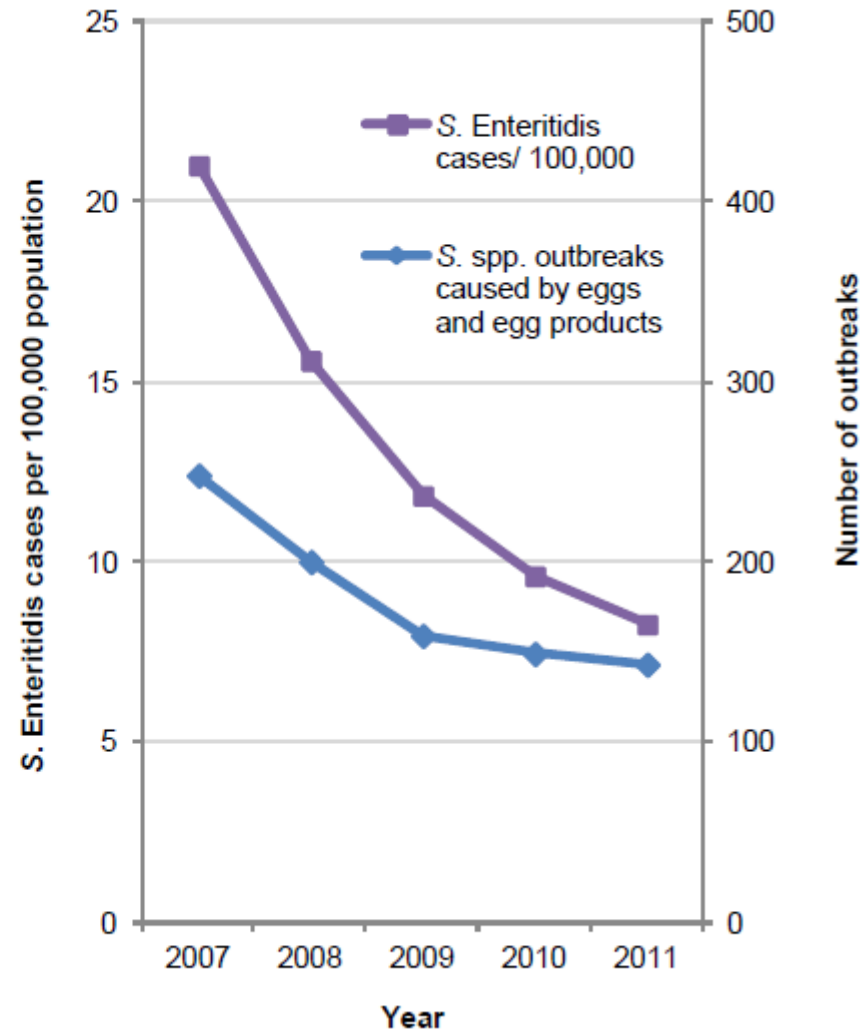
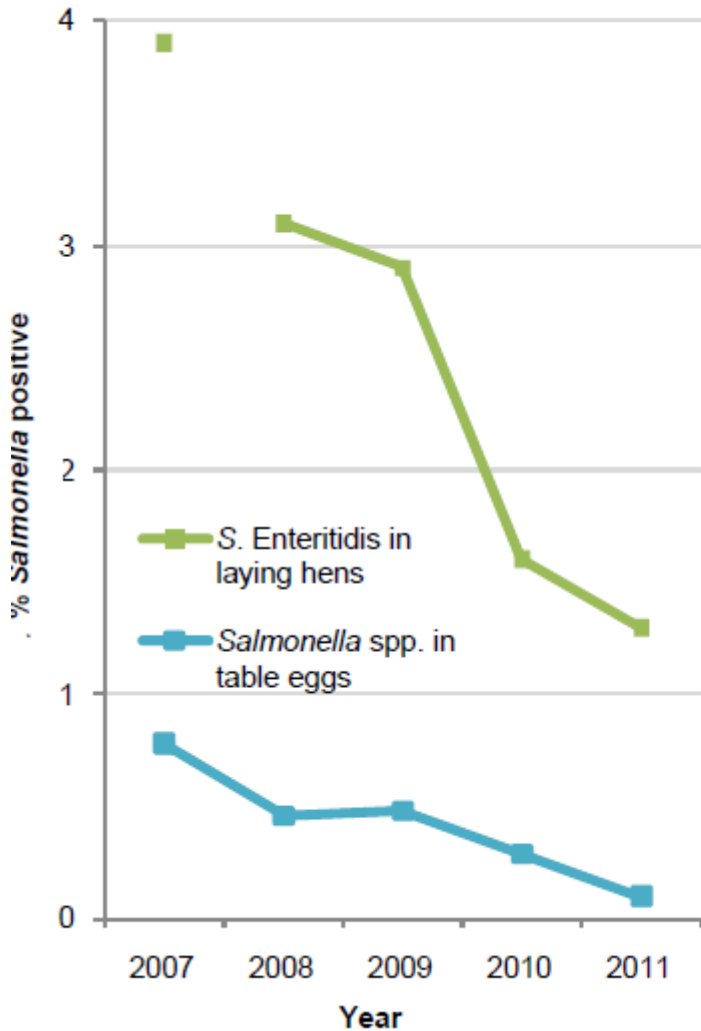
- Missing of information  Possible exclusion of data

# Reporting

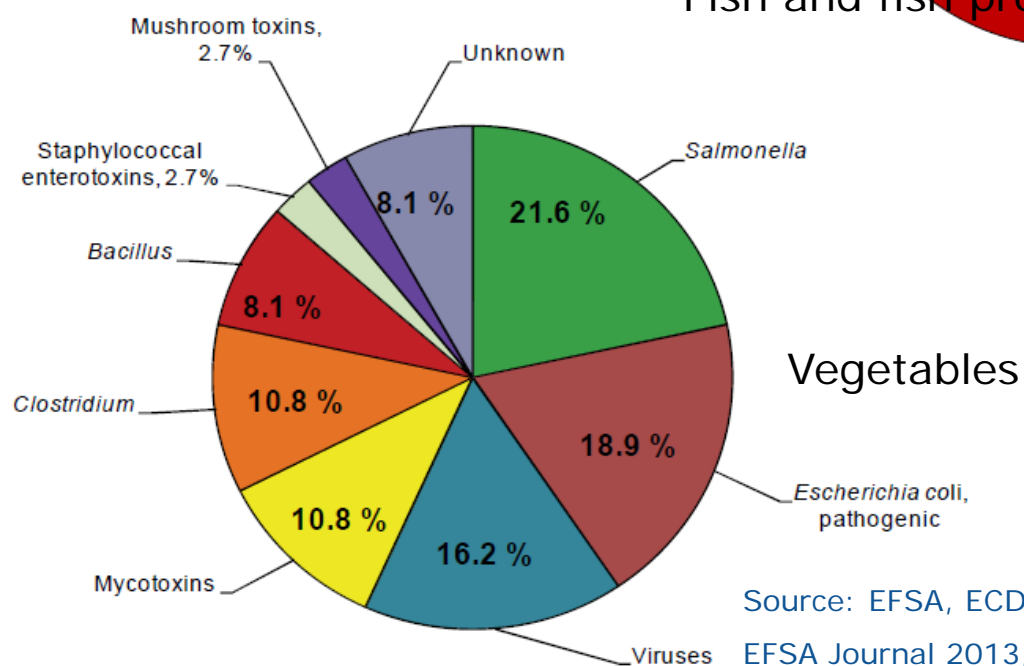
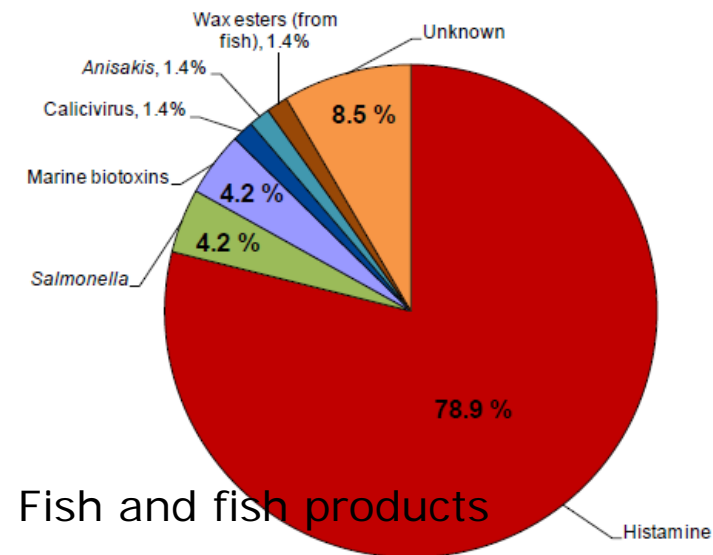
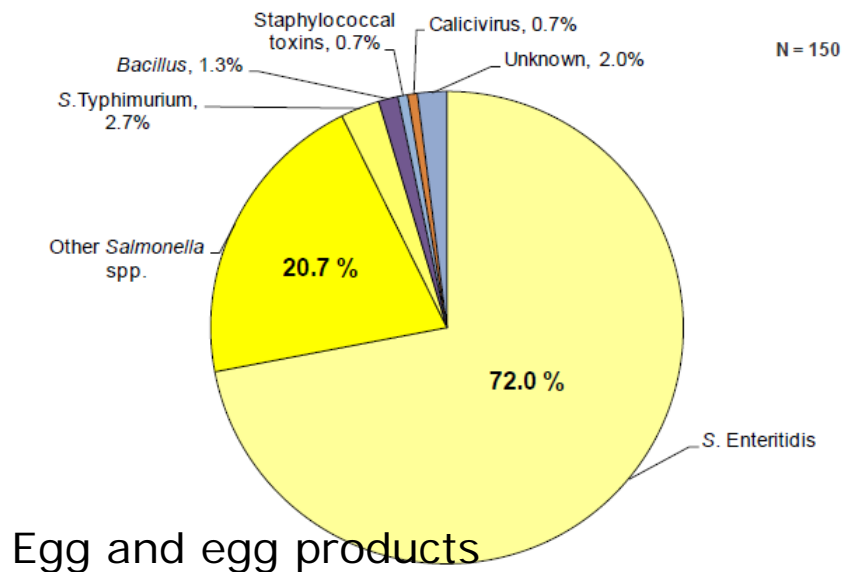
Directive 2003/99/EC



# Salmonella in human cases, eggs and laying hens and the number of *Salmonella* outbreaks caused by eggs, 2007–2011



# Causative agent in outbreaks related to food products in EU, 2011



# Output examples

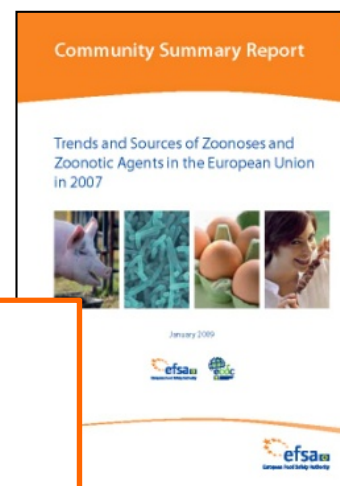
- European Union summary report on Zoonoses, zoonotic agents and foodborne outbreaks
- European Union summary report on AMR
- Scientific opinions
- Technical reports
- Risk assessment.
- EFSA journals
- 

**+ 2500 scientific outputs**

500<sup>th</sup> opinion – 2007

1000<sup>th</sup> opinion – 2009

1.837 opinions in 2012



# Joint ECDC-EFSA rapid outbreak assessment



ECDC + EFSA performed a joint assessment of the outbreak and report about investigative activities in the four affected countries including consumption advices given to consumers

*The Commission have asked EFSA and ECDC to elaborate a Standard Operation Procedure (SOP) for joint risk assessments in the event of outbreaks*

## Main conclusions and recommendations

Between 1 October 2012 and 8 April 2013, 16 confirmed cases of hepatitis A virus (HAV) infections with subgenotype IB and identical RNA sequence were reported in four Nordic countries.

As none of the cases have a travel history outside the EU within their period of potential exposure, this represents a multicountry outbreak, with exposure currently taking place in the EU. The descriptive epidemiology indicates foodborne transmission originating from a persistent common source in the EU with possibly multiple vehicles of infection that are contaminated with viruses sharing an identical sequence.

Epidemiological investigations in affected countries strongly point towards frozen berries as the vehicle of infection. This hypothesis is being further investigated. RNA sequencing, interviews of cases in affected countries, food investigations, and purchase history research should provide additional evidence.

According to the available information, it is likely that additional cases will be identified and reported. ECDC encourages Member States to raise awareness about a possible increase in HAV subgenotype IB cases, report all new cases in EPIS-FWD, and use the common epidemic case definition and questionnaire to interview recent cases (available in EPIS-FWD and upon request).

ECDC, EFSA and the European Commission, in cooperation with the affected countries, will continue to closely monitor this event and will update this outbreak assessment as soon as new relevant information becomes available.

## Public health issue

Multicountry outbreak of hepatitis A (HAV) subgenotype IB in Denmark, Finland, Norway and Sweden.

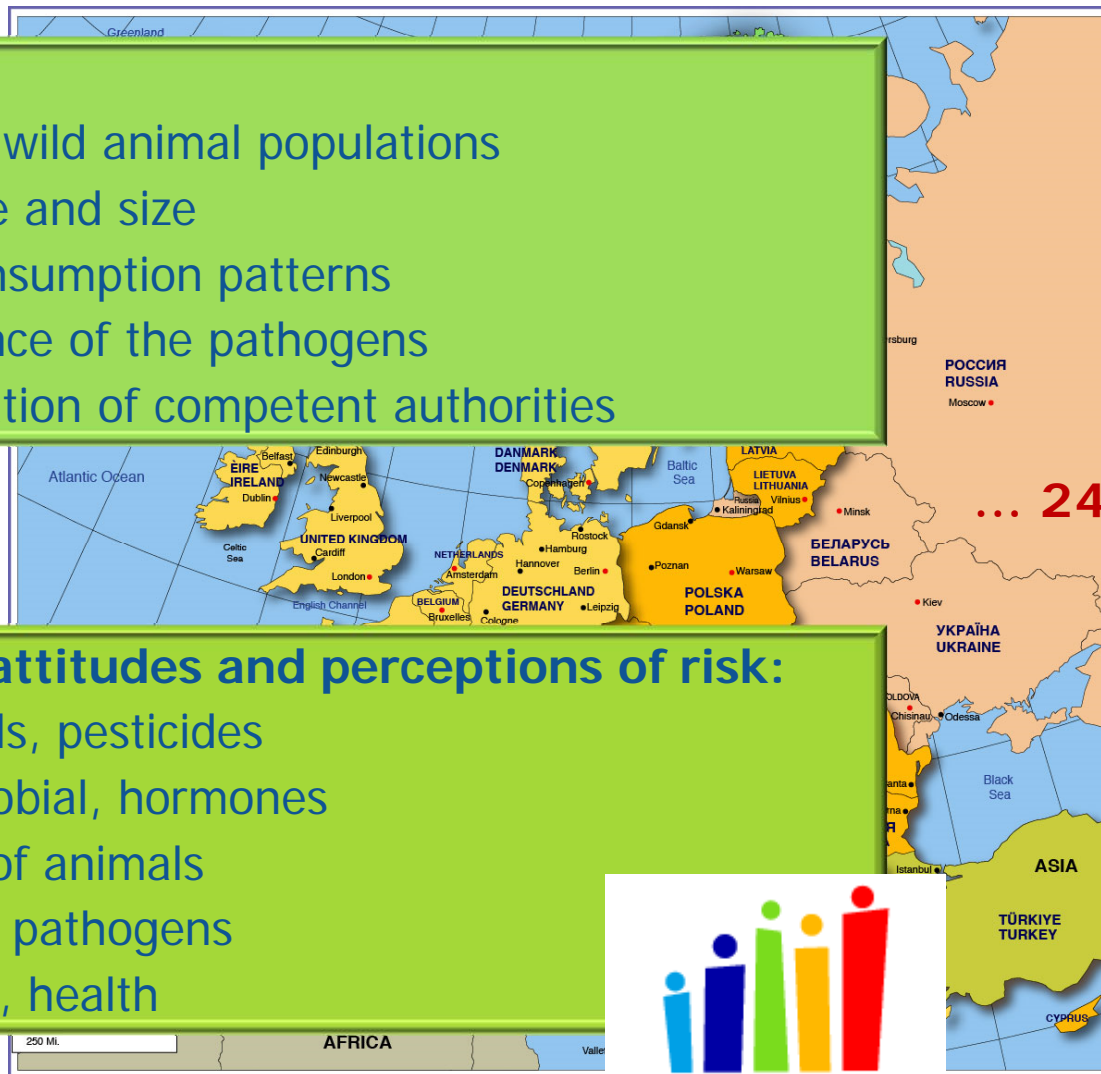


# EU has 28 Member States



## Different

- Climate, wild animal populations
- Structure and size
- Food consumption patterns
- Occurrence of the pathogens
- Organisation of competent authorities



... 24 official languages

## Different attitudes and perceptions of risk:

- Chemicals, pesticides
- Antimicrobial, hormones
- Cloning of animals
- Bacterial pathogens
- Nutrition, health



National Food Institute, Technical University of Denmark

Source: Nations Online Project

# Go Global

- Historical data versus  
real-time data

$$f(x+\Delta x) = \sum_{i=0}^{\infty} \frac{(\Delta x)^i}{i!} f^{(i)}(x)$$
$$\int_a^b \varepsilon \Theta + \Omega \int \delta e^{i\pi} = \{2.7182818284\}$$
$$\sqrt{17}$$
$$\infty$$
$$\chi^2$$
$$\Sigma$$
$$!$$

# WHO Global influenza surveillance and response system (GISRS)

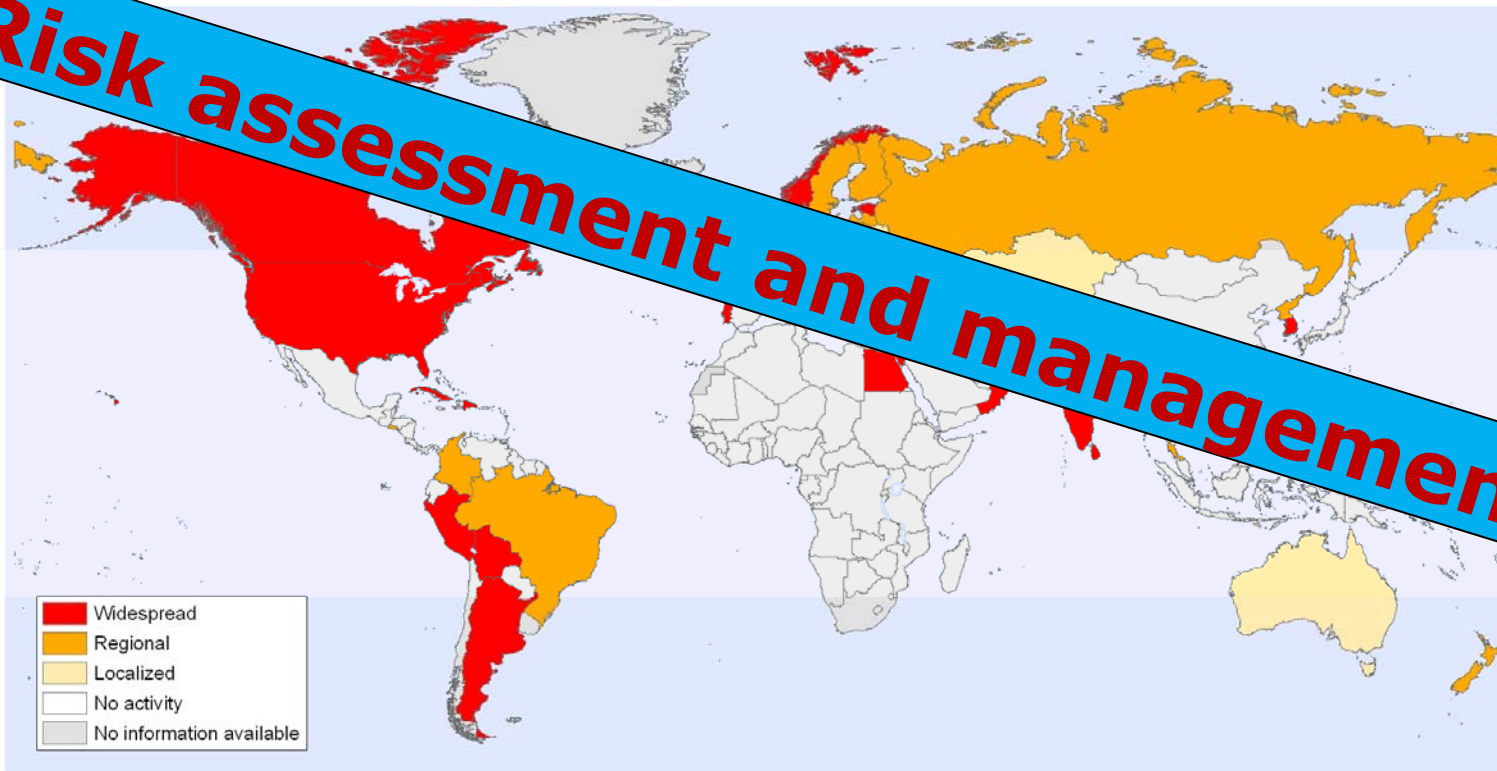


## FluNet

### Geographic spread of influenza activity

(Geographic spread reflects the number and distribution of regions within a country reporting influenza activity.)

Status as of Week 51  
14 Dec - 20 Dec 2009



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

Map produced: 14 January 2010, 09:00 GMT

Data Source: World Health Organization  
Map Production: Public Health Information  
and Geographic Information Systems (GIS)  
World Health Organization



© WHO 2010. All rights reserved

# WHO Global Salm Surv (GSS) country data bank 2002

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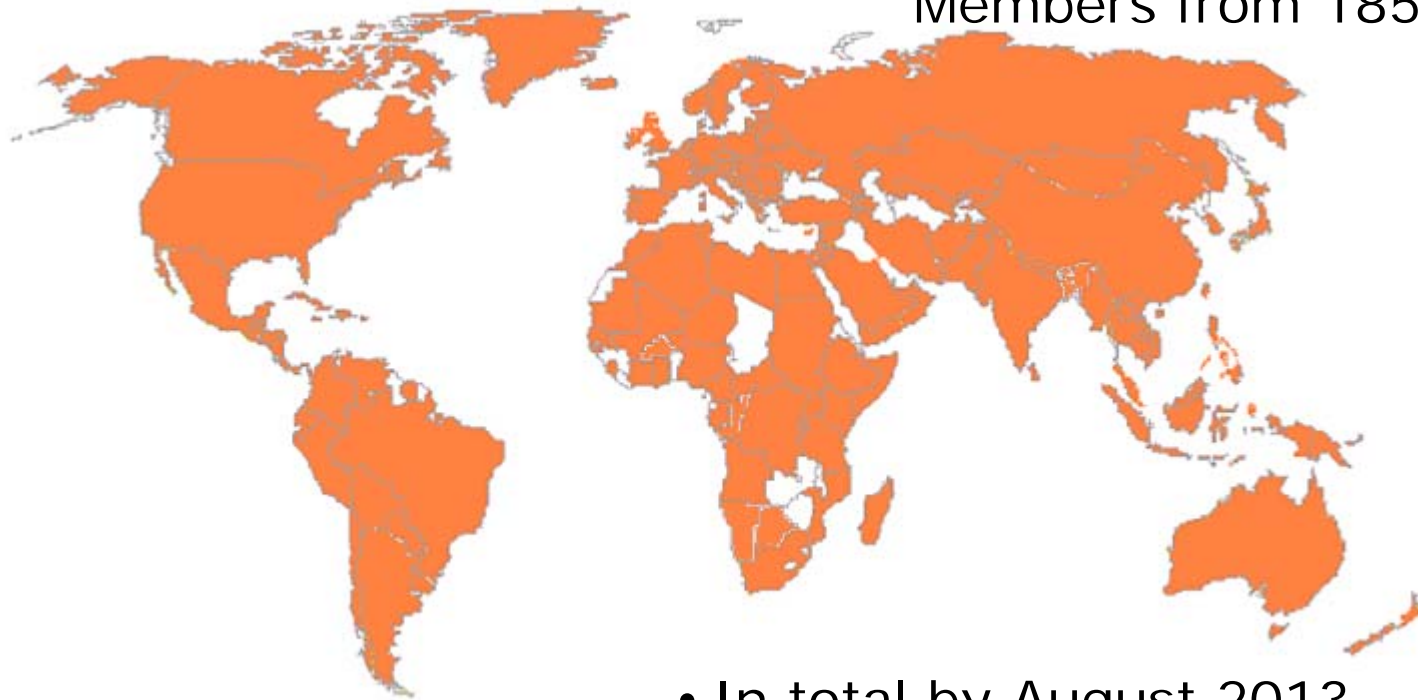


103 countries have signed up to enter data to the database

# WHO Global Foodborne Infections Network (GFN) country data bank, 2012



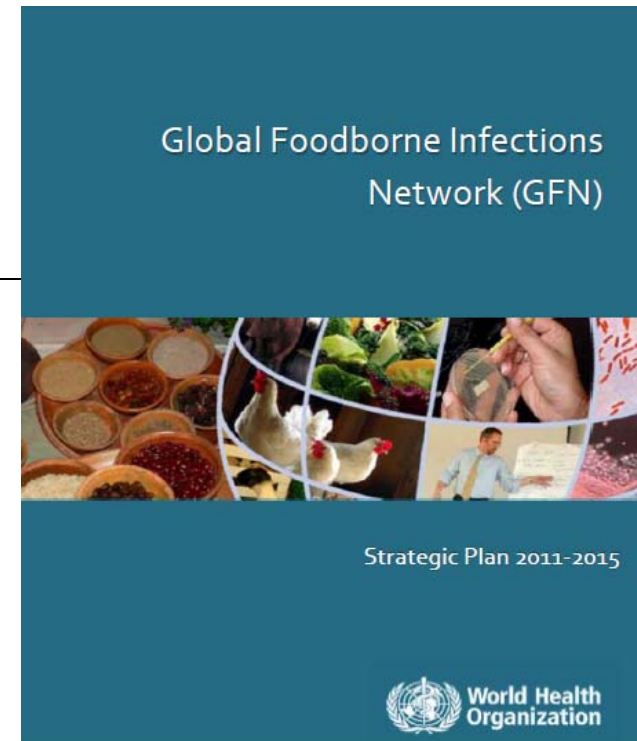
Members from 185 countries



- In total by August 2013
  - 2,247,754 isolates
  - 1,746,601 are from humans
  - 359 different serotypes are reported
    - 1,146,037 are *S. Enteritidis*
    - 410,452 are *S. Typhimurium*

# WHO GFN

- A network of institutions and individuals committed to enhancing the capacity of countries to detect, respond and prevent foodborne and other enteric infections
- Capacity-building program that promotes
  - integrated, laboratory based surveillance
  - intersectoral collaboration among human health, veterinary and food-related disciplines



WHO Global Foodborne Infections Network Country Databank -  
A resource to link human and non-human sources of *Salmonella*

# Upcoming: GFN WHONET database



Whonet Portal - Windows Internet Explorer

http://10.24.10.157/apex/f?p=127:26:25316346784039::NO:::

Google

Whonet Portal

Country(ies)  
Argentina  
Cambodia  
Cameroon  
Kenya  
Lebanon

Organism  
Salmonella

Serotype(s)  
Salmonella Agona  
Salmonella Brandenburg  
Salmonella Chester  
Salmonella Choleraesuis  
Salmonella Enteritidis  
Salmonella Group A (O:2)  
Salmonella Group B (O:4)  
Salmonella Group C3  
Salmonella Group D1  
Salmonella Group O:7 (C1)

Origin(s)  
Food  
Human  
Unspecified

Period  
2013  
2012  
2011  
2010  
2007

Datatype  
Surveillance  
Project

Antimicrobials  
Imipenem  
Imipenem/EDTA  
Levofloxacin  
Meropenem  
Minocycline  
Nalidixic acid  
Nitrofurantoin  
Piperacillin/Tazobactam  
Polymixin B  
Rifampin

Interpretative Standard  
 Clinical  
 Eucast

Display

- Include more data
- Other pathogens
- AMR profiles

Country  
Argentina

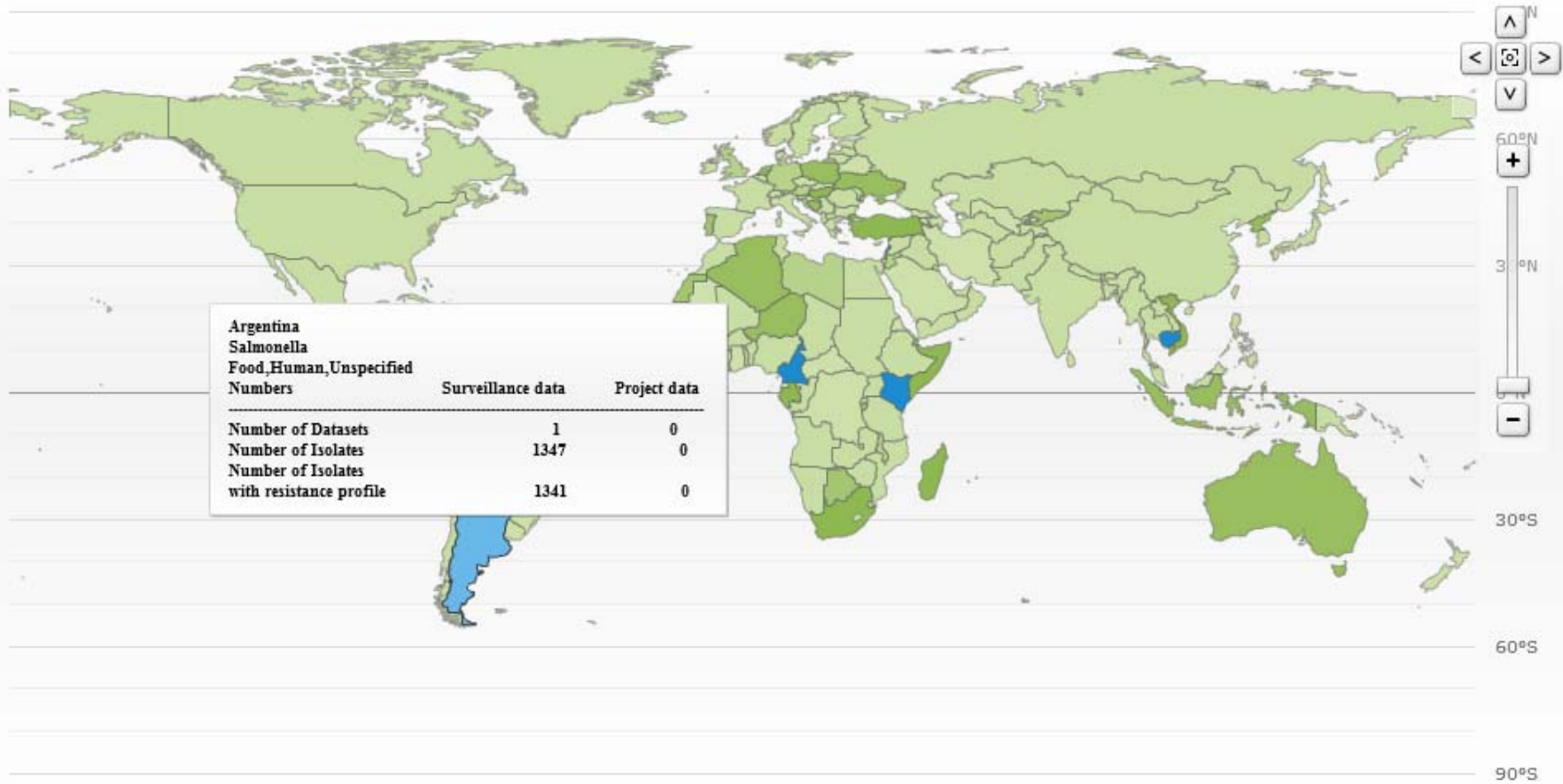
%Resistance according to chosen parameters

Country	%Resistance
Argentina	81.9

Home

Whonet Portal

Click to continue data search





# Whole genome sequencing – the next generation?

$f(x+\Delta x) = \sum_{i=0}^{\infty} \frac{(\Delta x)^i}{i!} f^{(i)}(x)$

$\int_a^b \varepsilon \Theta + \Omega \int \delta e^{i\pi} =$

$\infty = \{2.7182818284\}$

$\chi^2$

$\Sigma$

$\gg$

$!$

# Past or Future

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- **Old school**

- Isolation of pure culture
- One to several weeks to perform full typing
- Very different typing systems for microorganisms (different labs)
- Very specialized knowledge base for different microorganisms

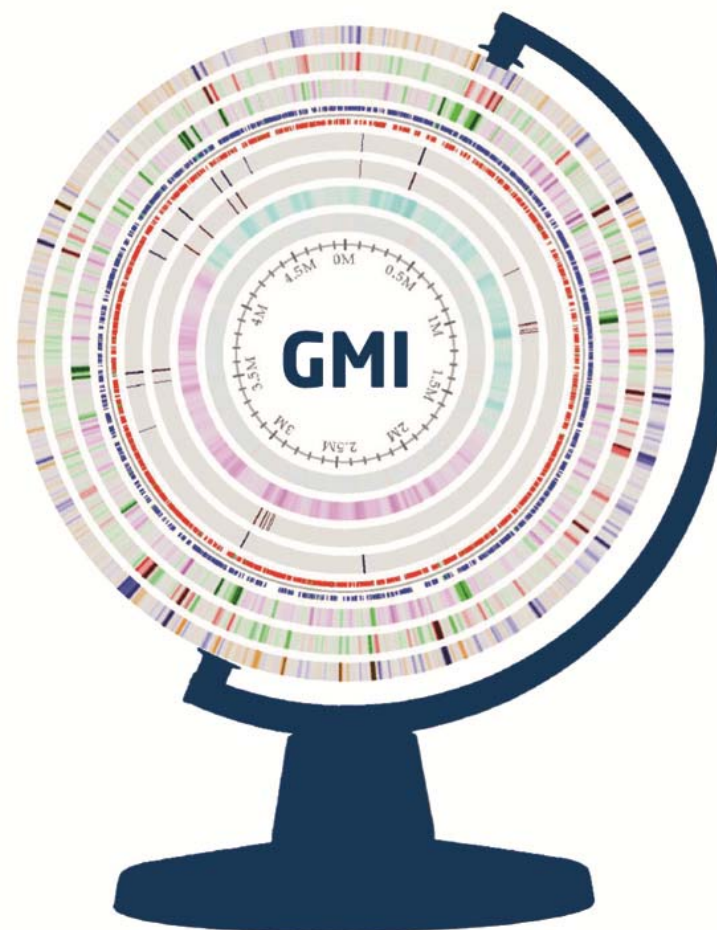
- **New school**

- Isolation of pure culture (although might not be needed)
- Hours to perform full sequencing
- Minutes to get typing result
- One test fits all (virus, bacteria, parasites)
- Same-Same for all microbiology (human, animal, environment)

# Global Microbial identifier (GMI)

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Informal global, visionary taskforce of scientists and other stakeholders who share the aim of making novel genomic technologies and informatics tools available



**Global Microbial Identifier**

# Global Microbial Identifier

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## Vision

GMI is committed to a world where high quality microbiological genomic information from human, animal and plant domains is freely shared among all nations for the use of research and to improve (public) healthcare and a healthy environment for all

# Global Microbial Identifier

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## Mission

GMI mission is to build a global platform linked to an open and interactive worldwide network of DB for standardized identification, characterization and comparison of microorganisms through the storing of whole genome sequences of microorganisms, the connected metadata, and the provision of analytical facilities and shared standards

# Global Microbial Identifier

---

A global system will enable two major lines of action:

- Simple identification of all microorganisms in clinical (or other) settings, making redundant existing systems, and enabling reduction of total time for characterization down to typical time needed to obtain the original isolate
- A total database of sequences of all relevant microbiological strains globally, enabling real-time global surveillance of disease and pathogen developments

# Open source – sharing data



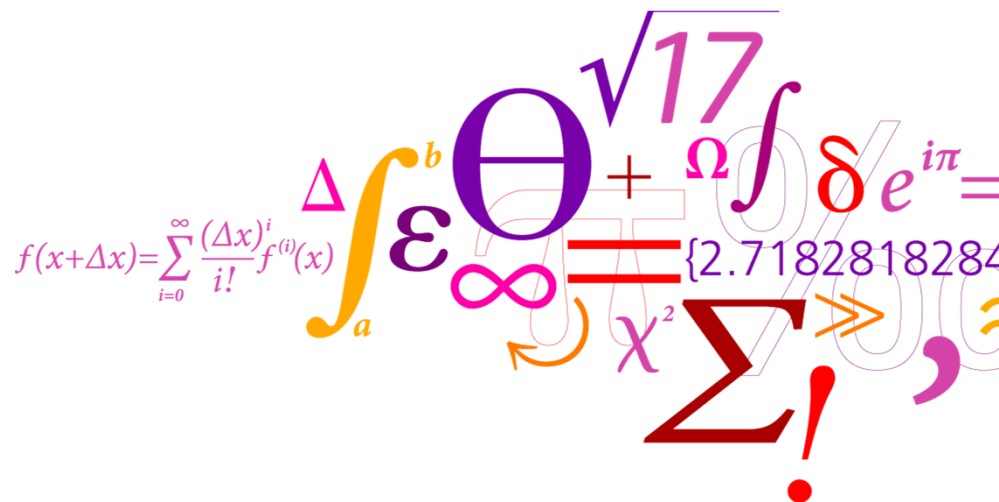
“Building a global system sharing often sensitive data will create barriers, one of which might be the willingness of sharing sequence data and the associated metadata.

In the future, sequence data-bases need to have open access to serve as an early warning system...

It should be realized that relevant sequence data might also be attractive for any industry ....However, important privacy issues concerning future data mining potential clearly exist.”

*Statement from international expert meeting on microbiological genomic identification systems 1-2 September 2011 in Bruxelles, Belgium.*

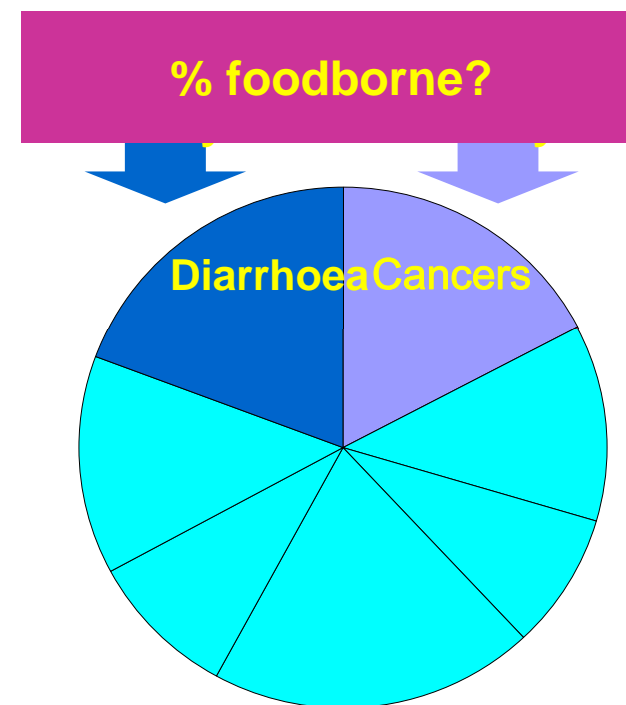
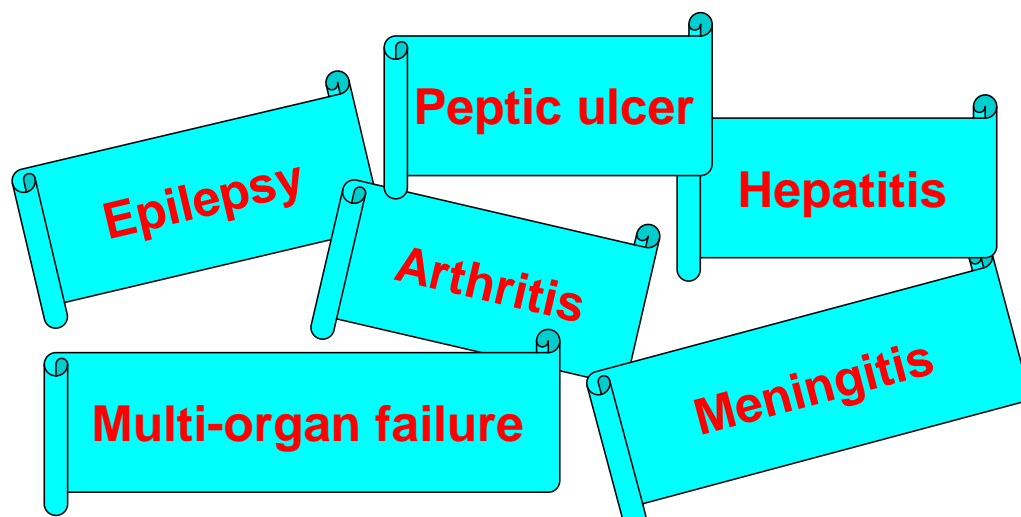
# Burden of Foodborne Disease





# What is "Foodborne Disease Burden"?

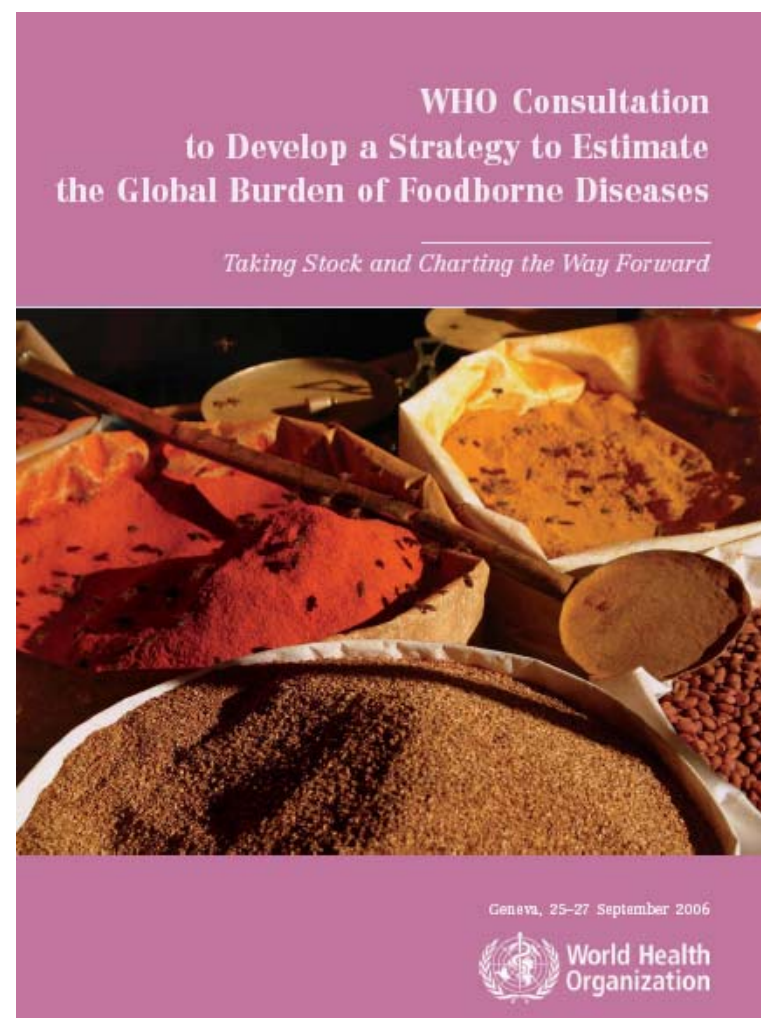
- Diseases *commonly transmitted through food*
- All causes - pathogens, chemicals, parasites
- Acute and chronic diseases
- Long-term complications



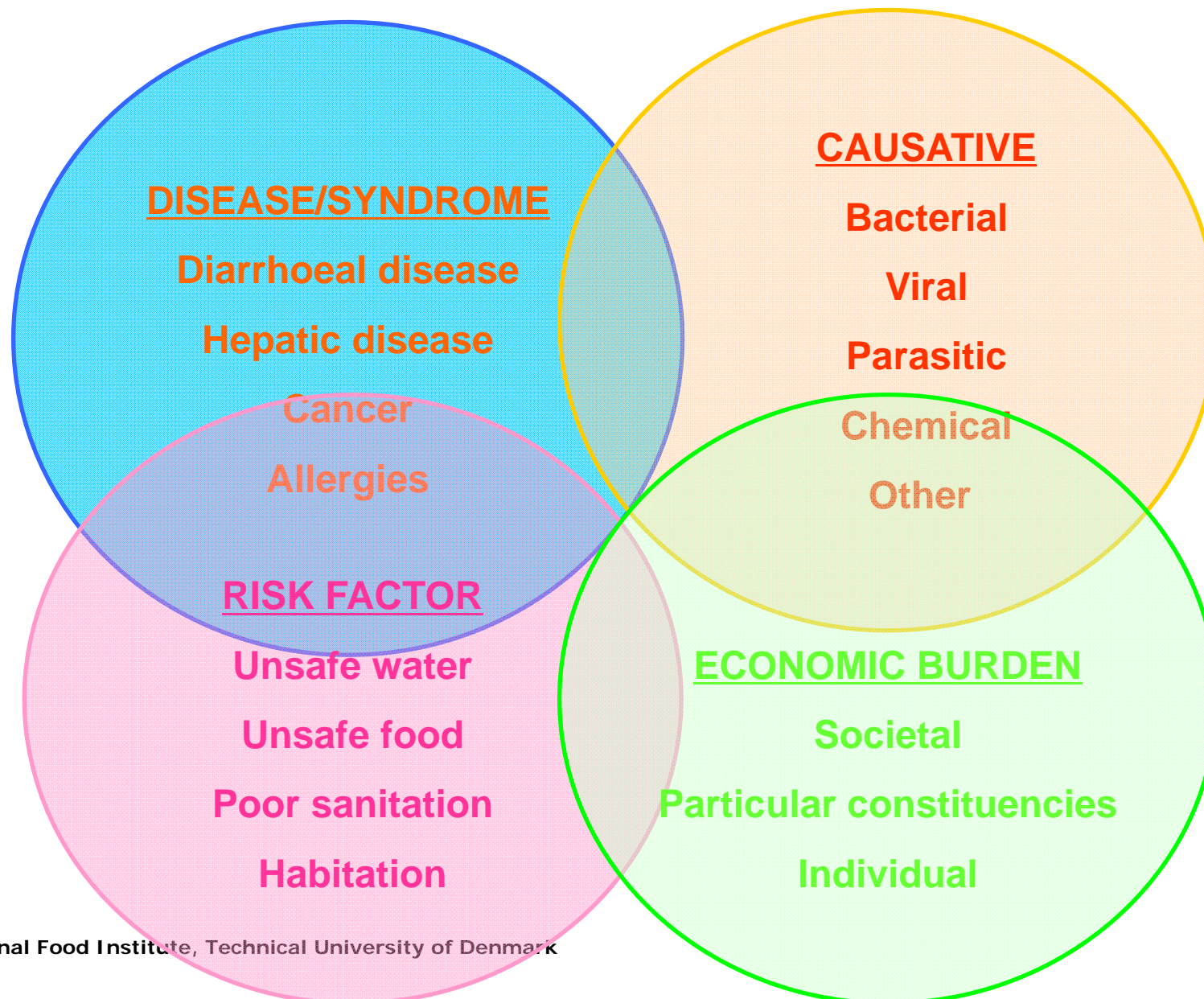
# 2006 WHO Consultation to Develop a Strategy for the Global Burden of Foodborne Diseases

**Recommended  
establishment of  
Foodborne Disease  
Burden Epidemiology  
Reference Group  
(FERG) to execute  
strategy**

National Food Institute, Technical University of Denmark

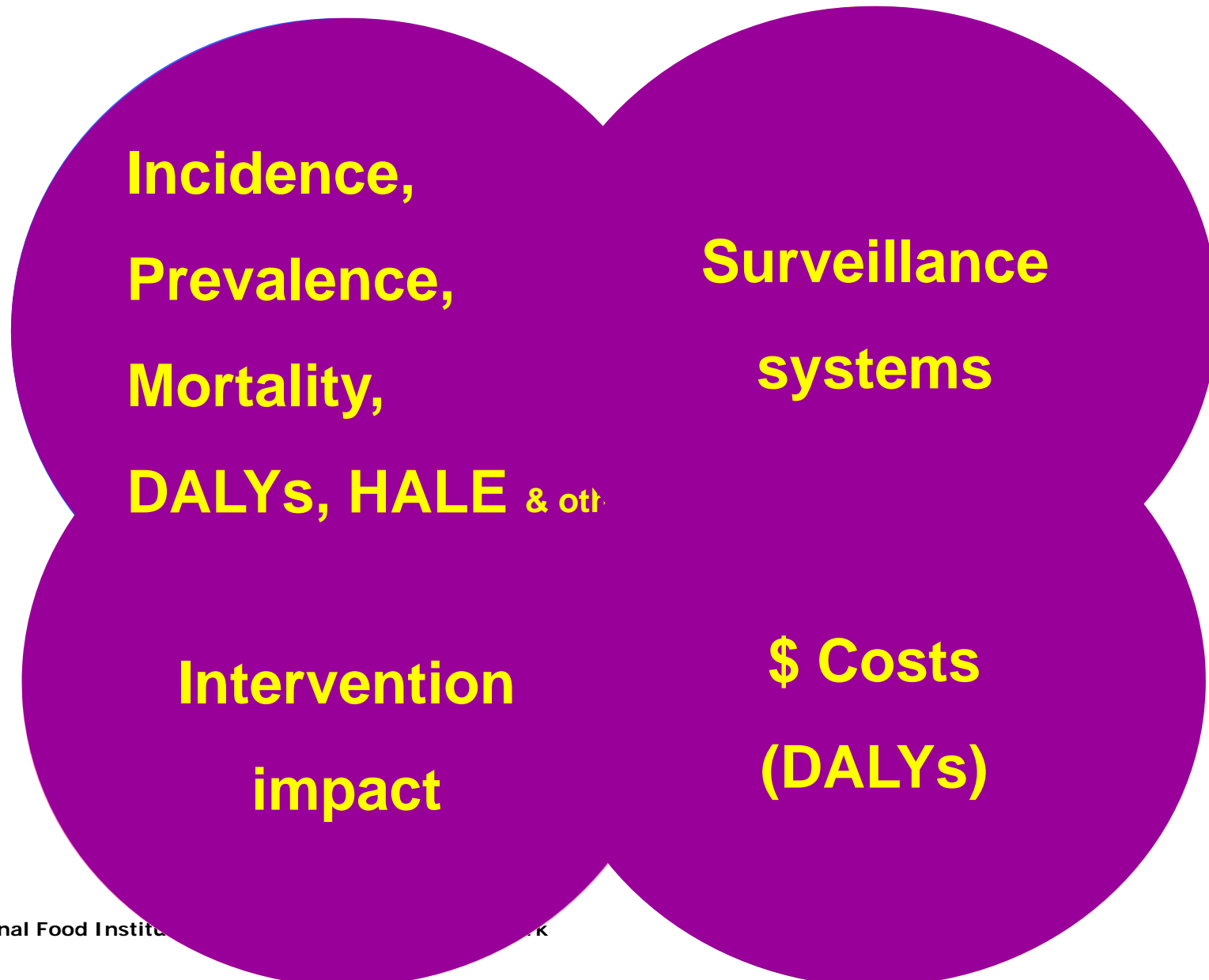


# What do we mean by 'burden'?

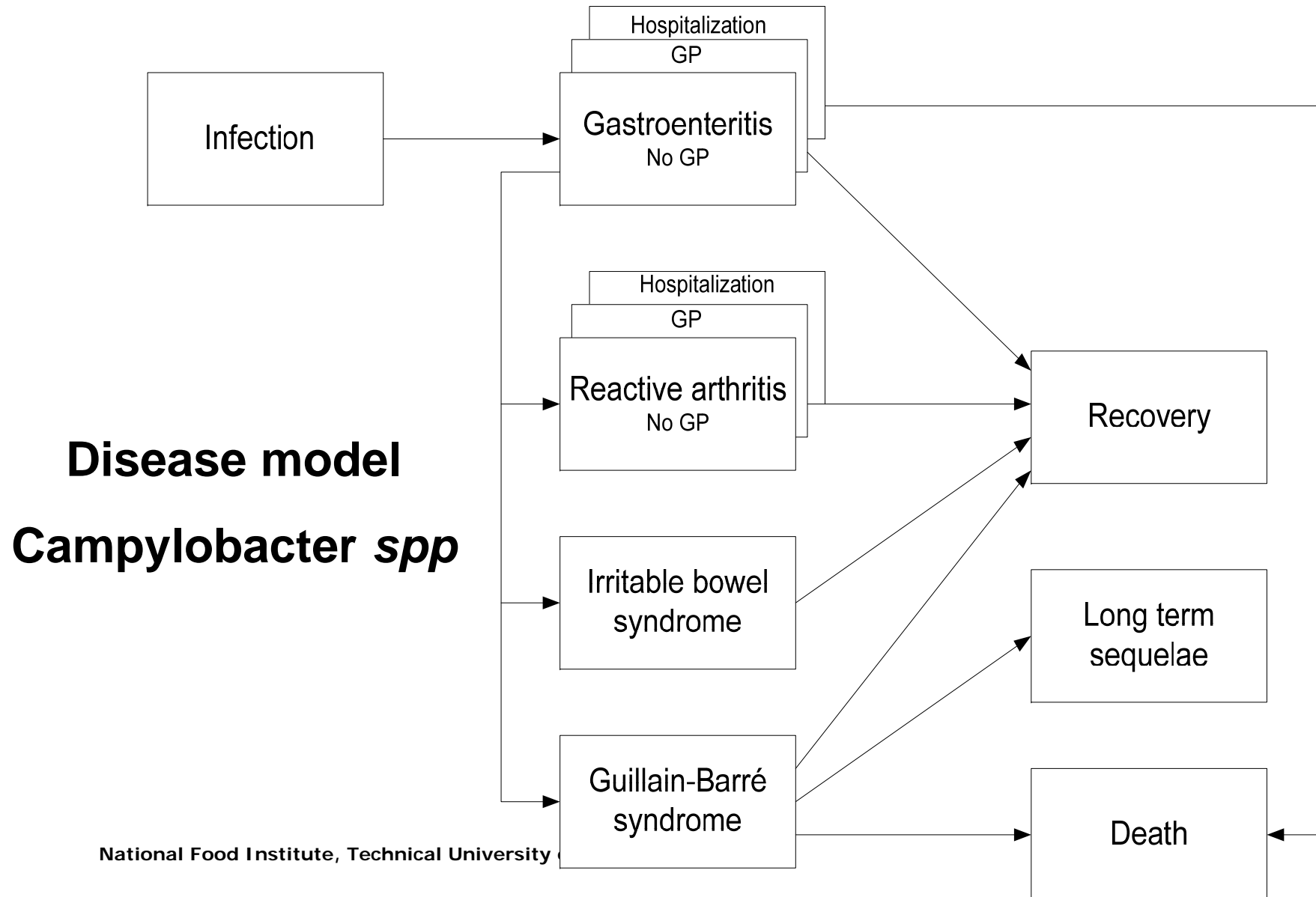


# Which approach to use when?

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# Completing the 'burden' picture



Thank you for your  
attention

Birgitte Helwigh  
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