



## **Emerging and Vector borne Diseases**

“Horizontal project”

**“European Network for Arthropod Vector Surveillance”**

**1<sup>st</sup> Annual meeting, Antwerp June 1-3, 2010**

**Herve Zeller, Wim van Bortel**

## Why was ECDC established?

- Emerging and re-emerging communicable diseases revitalised through globalisation, bio-terrorism, interconnectivity, and EU without internal borders
- Health implications of enlarging EU
- Strengthen EU public health capacity to help meet EU citizen's concerns

# What is the role of ECDC?

Identify, assess & communicate current & emerging health threats to human health from communicable diseases  
(ECDC Founding Regulation (851/2004), Article 1)

- EU level disease surveillance
- Scientific opinions and studies
- Early Warning System and response
- Technical assistance and training
- Epidemic intelligence
- Communication to scientific community
- Communication to the public

**Surveillance Unit**  
Andrea Ammon

**Scientific Advice Unit**  
Johan Giesecke

**Preparedness and Response Unit**  
Denis Coulombier

**Health Communication Unit**  
Karl Ekdahl

# Building the knowledge base – ECDC's disease-specific programmes

- Respiratory tract infections (influenza, tuberculosis)
- Sexually transmitted infections including HIV and blood-borne viruses
- Vaccine-preventable diseases
- Antimicrobial resistance and healthcare-associated infections
- Food- and water-borne diseases
- Emerging and vector-borne diseases

## Scientific Advice Unit

Microbiology  
Coordination

Evidence Base for Prevention and  
Control

Scientific and Technical Advice  
Knowledge Services

Future Threats and Determinants

Respiratory Tract Infections (Influenza – Tuberculosis)

STI including HIV and Blood-Borne Viruses

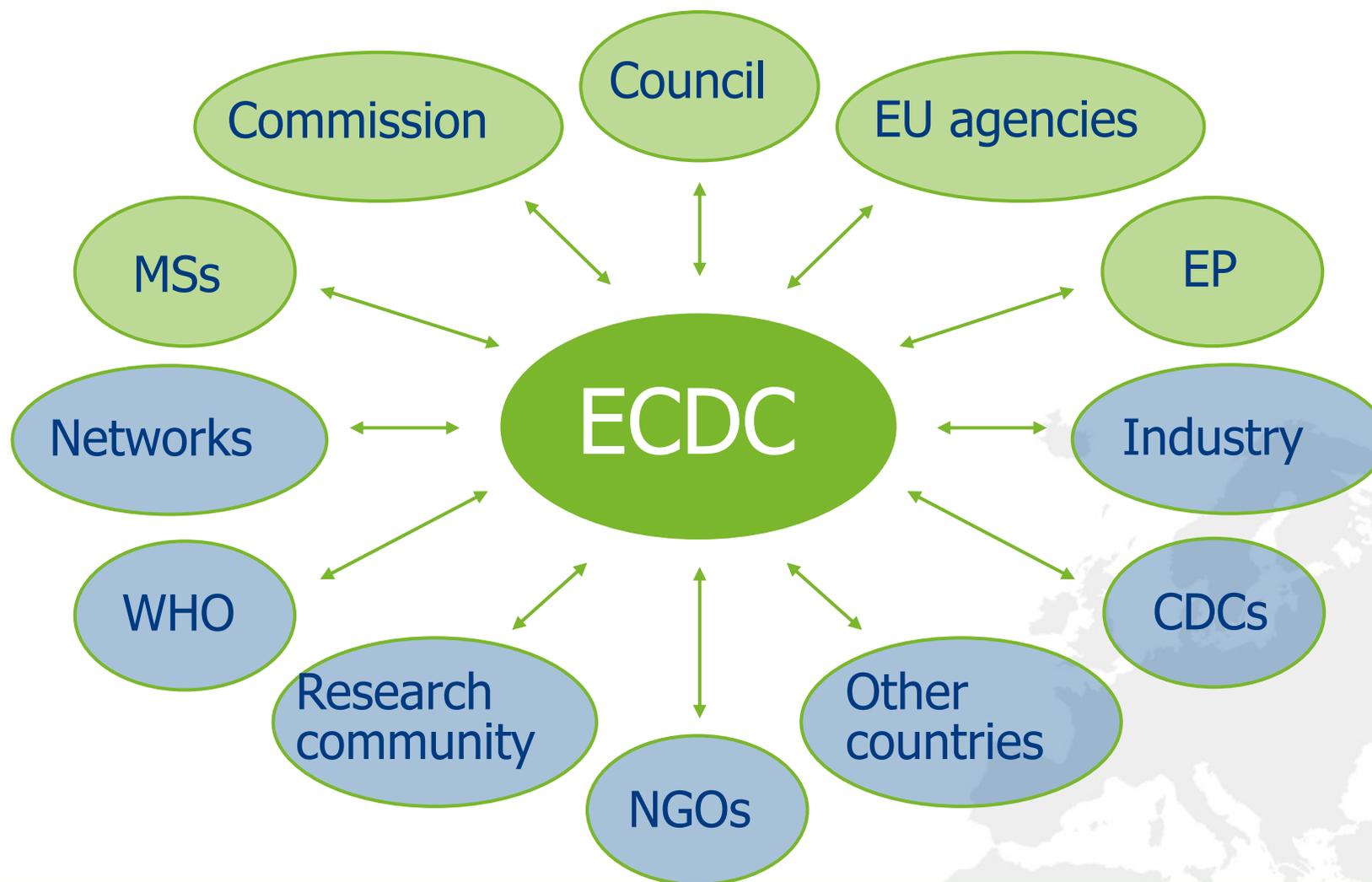
Vaccine Preventable Diseases

Antimicrobial Resistance and Healthcare-Associated Infections

Food and Water-Borne Diseases and Zoonoses

Emerging and Vector-Borne Diseases

# Who are ECDC's strategic partners?



# Risk assessment vs. risk management

A complex interrelation...



# Some outputs of ECDC activities

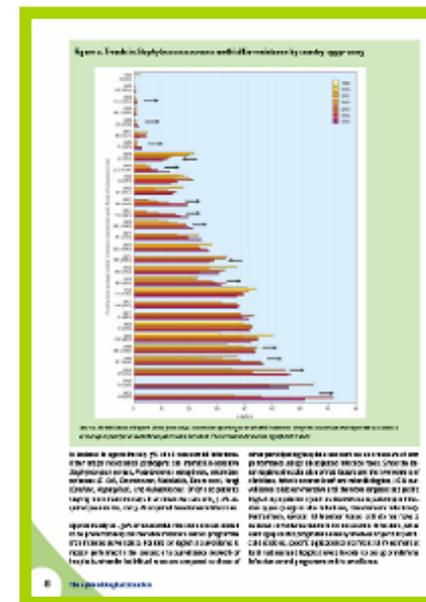
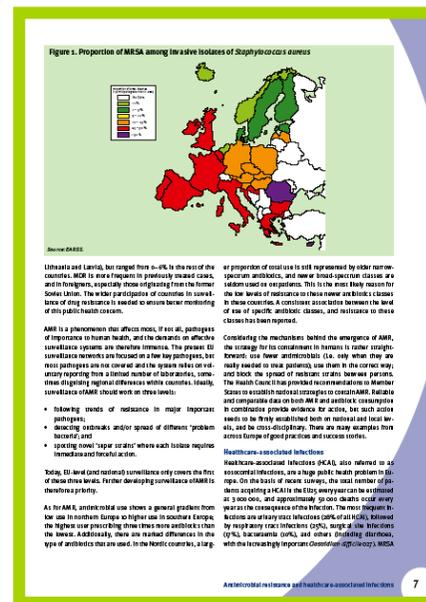
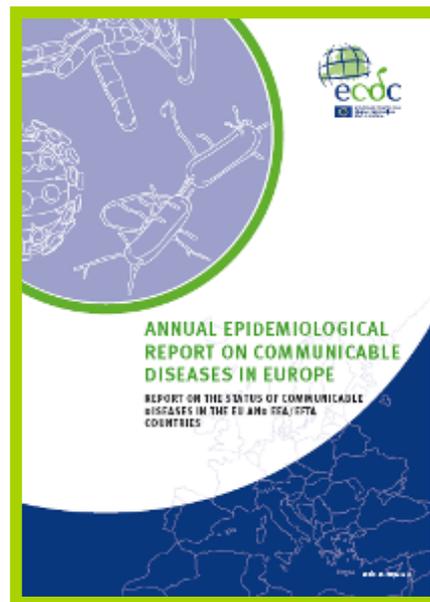


- Website updates and Weekly Threat Report (restricted access)
- Annual Epidemiological Report
- Risk assessments
- Scientific guidance and development of knowledge base
- Hands-on technical support, when requested



# Risk assessment and analysis

- Networking Europe's health knowledge
- Analysing and assessing threats
- Presenting options and expert advice



# Emerging and vector borne diseases



Decision No 2119/98/EC of the European Parliament and of the Council of 24 September 1998 setting up a network for the epidemiological surveillance and control of communicable diseases in the Community 2000/96/EC, 2003/534/EC, 2003/542/EC, 2007/875/EC

## Zoonotic and Vector borne diseases

Rabies, cholera, **malaria, plague**

Viral haemorrhagic fevers (12): **dengue, Yellow fever, Rift valley fever, Crimean Congo HF, Omsk HF**, Lassa and other arenaviruses (Junin, Machupo, Guanarito...), Ebola, Marburg, Hantaviruses

Henipaviruses, Severe Acute Respiratory Syndrome (SARS)

**West Nile**

Others ... e.g. **Chikungunya**

Other communicable diseases of public health importance including diseases caused by deliberate release.“ (to be listed in Annex 1 to Decision 2000/96/EC. A case definition to be included in Decision 2002/253/EC.) : **Smallpox , Anthrax, Tularaemia, Q fever**

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Others not notifiable diseases: **Lyme borreliosis, Tick borne encephalitis, phlebovirosis, leishmaniosis,...**

# Emerging and vector borne diseases

- **Pool expertise** on vector-borne diseases and their vectors and other emerging pathogens from across the EU and internationally
- **Gather scientific evidence** on the **transmission** and on the **epidemiology** of vector borne diseases
- **Enhance surveillance** of vector-borne diseases and their vectors
- **Enhance EU-wide capacity** to **monitor** and **respond** to changing transmission patterns of vector-borne diseases

## Public Health Determinants



# EVD achievements 2008-2009



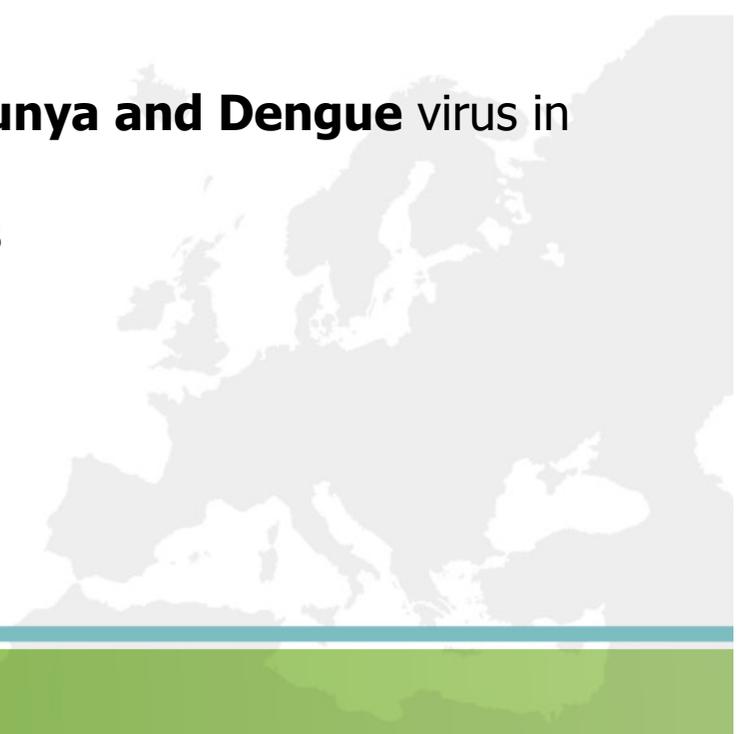
## Assessment of Vector-borne diseases

- **V-Borne project:** Collaboration with EDEN project
  - Identification and prioritisation of relevant vector-borne diseases
  - Multi-disciplinary qualitative risk assessment
  - Identification of priorities for action
    - (priorities vary by country)
- **Modelling risk of introduction of Chikungunya and Dengue virus in the EU**
- Development of ***Aedes albopictus* risk maps**

## Expert consultations

**CCHF Sept 2008** (links with ArboZooNet)

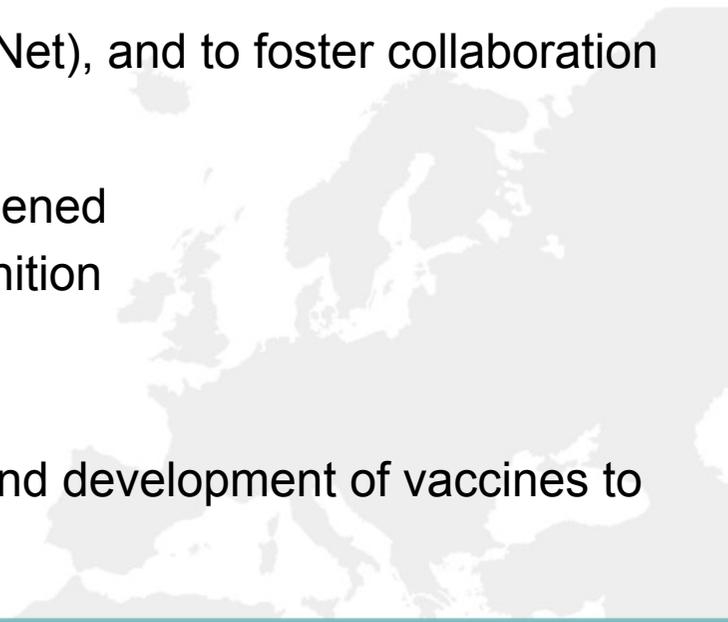
**West Nile April 2009**



# Expert consultation on CCHF (1/3)



- Necessity to develop integrated control measures that include:
  - vector control, vaccination programmes, improved therapy strategies,
  - diagnostic tools and surveillance, public and health care workers awareness,
  - capacity building and improvement of infrastructure in endemic regions.
  
- To link up to existing research networks (ArboZooNet), and to foster collaboration with WHO and OIE
  
- Surveillance of human CCHF cases to be strengthened  
Development and use of a standardised case definition
  
- Development of rapid diagnostic tests
  
- Curative use of ribavirin to be further elucidated, and development of vaccines to be supported.



# Expert consultation on CCHF (2/3)



- **Detection and confirmation of cases** are essential to limit the spread of human disease:

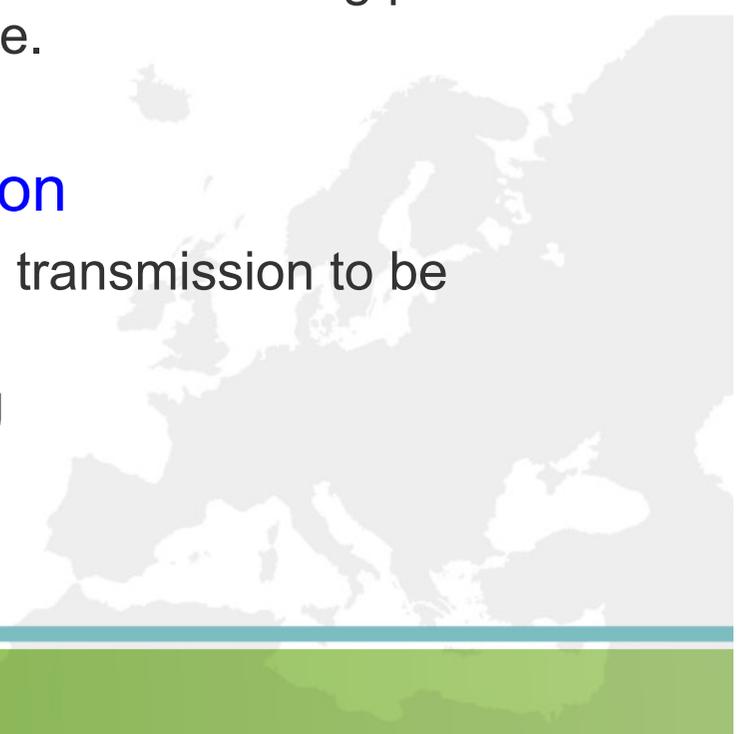
Implementation of alert systems in endemic areas in slaughterhouses and hospitals

Laboratory capacity in endemic areas and areas at risk

. EU laboratories (ENIVD-CLRN) assistance in sharing protocols and materials and external quality assurance.

- **Raising awareness of disease detection**

- in rural settings, as well as of nosocomial transmission to be strengthened.
- Health care workers (continuous) training



# Expert consultation on CCHF (3/3)



- **Vector and animal surveillance** crucial for predicting human risk for CCHF infection but also for other tick-borne diseases.
- **Standardisation of protocols for tick collection** from animals, their identification and screening for possible human pathogens
- **Assessment of the role of environmental changes, and human behaviours**  
in endemic areas and in areas of potential risk for the establishment of the vectors/disease



# Overseas Territories



Bermuda, Anguilla, Montserrat, British Virgin Islands, Cayman Islands, Turks and Caicos Islands, Falklands, South Georgia and South Sandwich Islands, Saint Helena, Pitcairn, British Indian Ocean Territory, British Antarctic Territory

Polynesia, New Caledonia, Wallis and Futuna, French Southern and Antarctic Lands, Mayotte, and St Pierre and Miquelon

Aruba and the Netherlands Antilles, and Greenland

# European Network for Viral Imported Diseases/ Collaborative Laboratory Network for Response: ENIVD CLNR



- WP1 Coordination (M. Niedrig)
- WP2 “Laboratory **Technical Epidemic Intelligence** (A. Tenorio)
- WP3 **Assistance Outbreak Laboratory** support (J.C. Manuguerra)
- WP4 **External Quality Assurance** (H1N1/ Dengue PCR 2009/YF March 2010) (O. Donoso-Mantke)
- WP5 **Training EUPHEM Public Health Microbiology**  
(Marion Koopmans/David Brown)  
2 trainees/year:  
Training sites: NL, UK, DE, FR



# European Travel Medicine network: EuroTravNet



## Objective:

- to support Travel and Tropical Medicine related activities at ECDC.

## Scope:

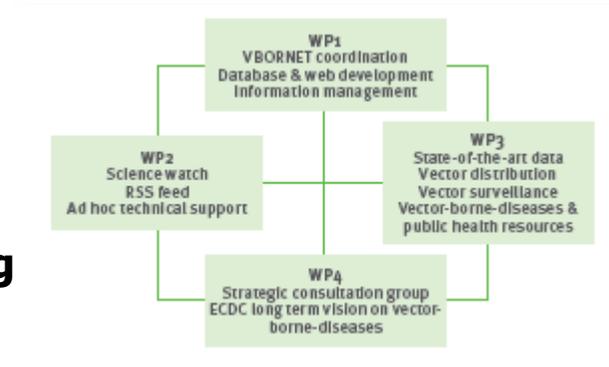
- To support **detection, verification, assessment and communication** of communicable diseases that can be associated with travelling and specifically with tropical diseases.
- To provide **ad'hoc response** to **specific queries** regarding potential outbreaks or trends in travel-related infections



# VBORNET objectives



- **To establish a network of medical entomologists and public health professionals in the EU**
  - to support ECDC in **strengthening vector surveillance activities**
  - **to improve preparedness** towards vector-borne diseases in the EU
  
- **This will be achieved through**
  - Consolidate and further develop a network of VBD specialists to enable **access to vector data** enabling **mapping of vector distribution**
  - Development of a **PH expert network** and **identifying vector** related **surveillance** and **public health resources** and **activities** in EU
  
- **Main deliverables**
  - **Distribution maps** of main vector species: mosquitoes, ticks, phlebotomines, other
  - Monthly **scientific newsletters** including special issues
  - Ad hoc **technical advise** and **risk assessments**
  - **Strategic papers**



# EVD activities 2009-2010



Coordination of three networks (Laboratory/ entomology/ travel medicine/VBORNET)

Dengue risk maps (2009-2010)

Communication tool kit on tick-borne diseases

## Tick-borne diseases priorities for 2010-2011

- Studies to assess the Public Health impact in the EU of :
  - **Lyme borreliosis**
  - **Tick-borne encephalitis** and **Rickettsiosis** & **Q fever**

Calls for tenders 2010: (awarded April 2010)

- Tick-borne diseases expert meeting: November 23-24, 2010

# Dengue risk maps (2009-2010)



## Objective

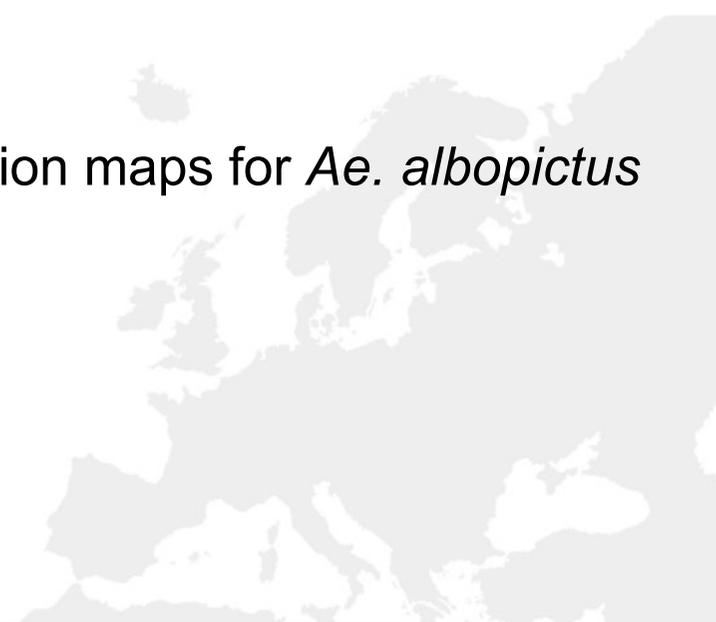
- To develop global and European risk maps for *Aedes aegypti* and *Ae. albopictus*, respectively, and then to develop Dengue risk maps based upon these.

## Deliverables

- A comprehensive database of geo-referenced articles related to *Ae. aegypti*, *Ae. albopictus* and Dengue
- A set of risk maps including updated distribution maps for *Ae. albopictus* in the EU.

## Time-frame

- Final deliverables mid-2010.



# Emerging and vector borne diseases



“One world, one health”

Human medicine/Veterinary medicine/Environment

Endemic and sporadic zoonotic diseases, and animal-origin agents have emerged into high public health impact zoonoses

Close collaborations in ECDC with:

- Scientific advice (Climate changes/Health determinants, Microbiology forum)
- Preparedness and Response (epidemic intelligence, threat assessment, outbreak response, training)
- Surveillance (notifiable diseases)
- Communication
- Database management (IT)

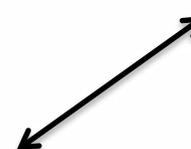
Collaborations to establish or reinforce with other EU and international agencies: EFSA, WHO, OIE, FAO....



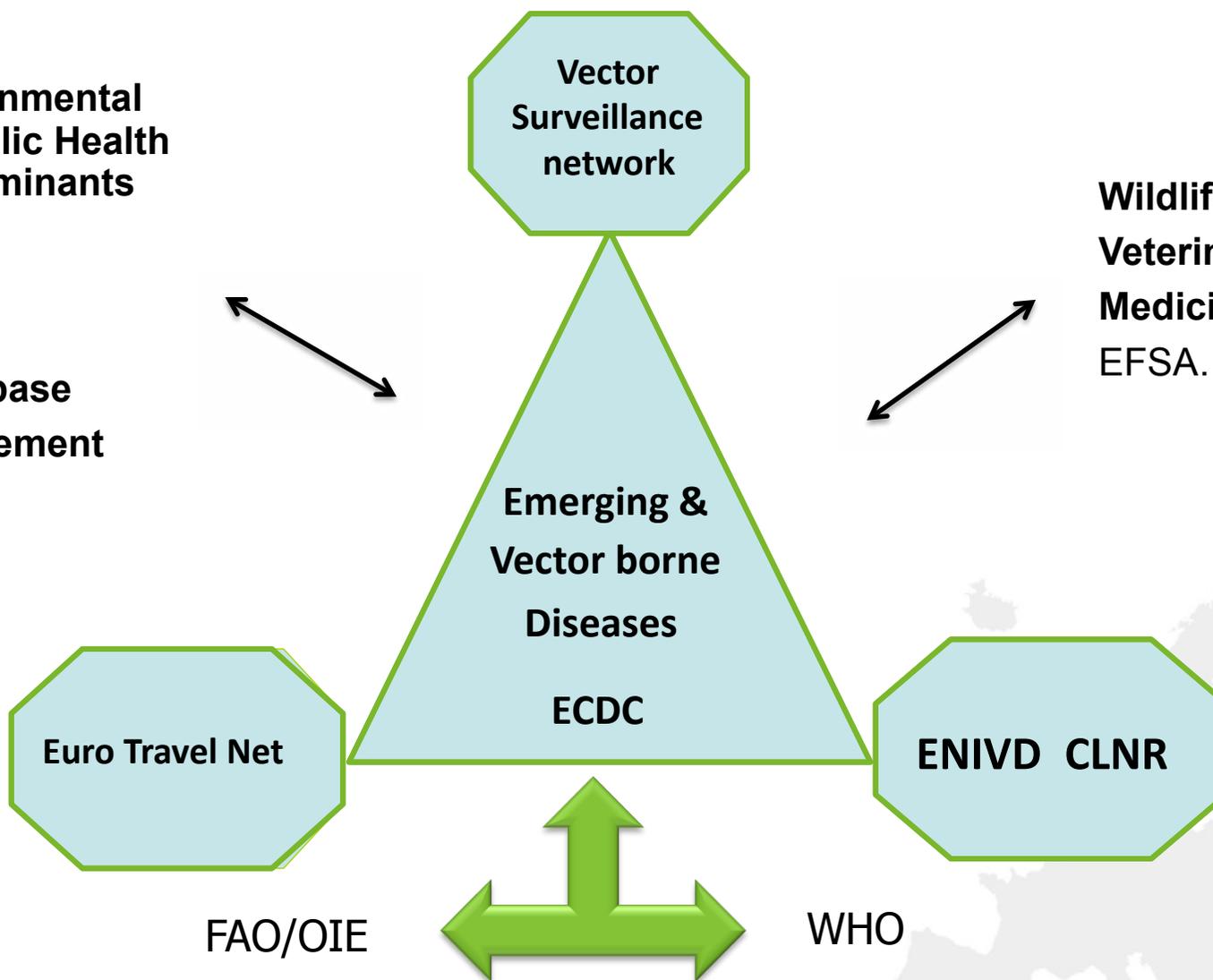
**Environmental  
and Public Health  
determinants**



**Database  
management**



**Wildlife &  
Veterinary  
Medicine  
EFSA...**



FAO/OIE

WHO

Links with Research projects



# VBD other topics



- **Biocides and vector control:**

- Request for recommendations on use of insecticides in light of the new EU directive
- Request to actively contribute to discussions on vector control and insecticides (France, WHO, industry)

- **Vector control activities** are part of risk management and they are not covered by ECDC. The Commission and the Member States are involved in vector control

- Potential role of ECDC as knowledge centre **to improve preparedness** of EU member states towards vector-borne diseases control

- Collating the state of the art of vector control tools for VDB threatening EU (such as insecticides, new developments)
- Collating most recent information on vector control strategies and the expertise present in EU (partially covered by VBORNET)



# VBD other topics



## ■ Bio-invasion: invasion of exotic vector species

- The threat of VBD in EU is partially coming from exotic vector species entering EU
- Invasion is mainly driven by global trade (more than climate change) hence coping with invasive species need a international approach
- Specific awareness , monitoring and control are needed
- More research is also needed to better prepare for control:
  - on the invasion process which determines the success of invasion and establishment
  - on the development of adapted control measures to eradicate newly established mosquito populations and to prevent the further spread of the mosquito

# VBORNET Challenges

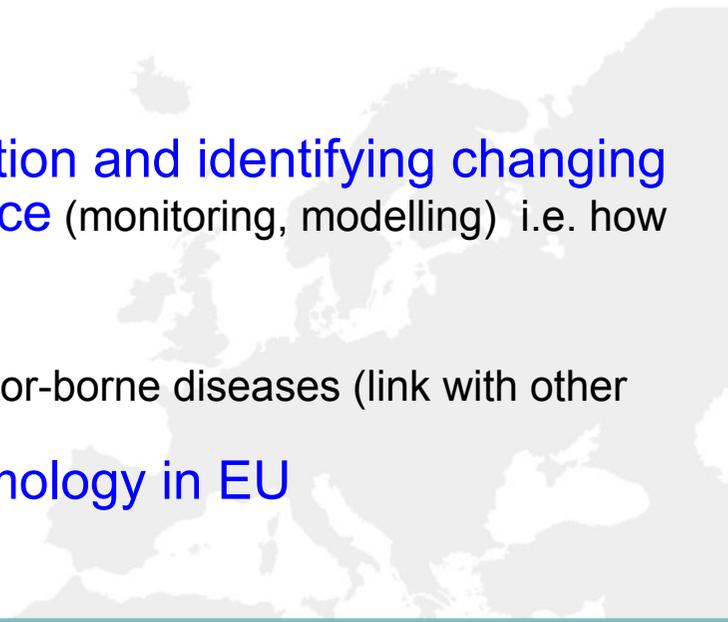


- **Near future:**

- **Visibility of VBORNET (website):** NL and special issues => information sharing with experts, PH specialists, general public
- **Structure of data management system and GIS components** of VBORNET fully compatible with ECDC standards and ongoing initiatives such as E3

- **Long term:**

- **Filling knowledge gaps on vector distribution and identifying changing trends in vector distribution and abundance** (monitoring, modelling) i.e. how keeping the database `alive` :
  - as basic requirement of any risk assessment
  - to identify changing transmission patterns of vector-borne diseases (link with other programmes is essential)
- **Building the necessary expertise in entomology in EU**







# Working plan 2010 (1/2)



- [ENIVD-CLRN](#) Framework contract (3+1 years): YEAR III (from August 2010)
- [EuroTravelNet](#): (framework contract 2 years): YEAR II
  - ECDC report on travel risks, precautions and vaccination requirements for travel within EU/EFTA
- [VBorNet](#) (framework contract 2+2 years): YEAR II (from September 2010)
- [West Nile : risk assessment tool](#) (Decision tree)
  - Call for Offer awarded (March 2010) (Romania coordination)
- [Veterinary Public Health for EVD](#) (links with EFSA, OIE, FAO, WHO)
- [EVD Website](#) (fact sheets, maps, ...)
- [Yellow fever risk mapping meeting](#) (WHO meeting, supported by ECDC and CDC)  
4-5 March 2010



# Type of data



- **Vectors**
  - mosquitoes, ticks, phlebotomines, others
  - Presence/absence, abundance
  - Admin levels: NUTS 1, 2, 3
  - Europe: MS including overseas territories, candidate MS,
  
- **Surveillance data and VBD activities**
  - Questionnaire
  
- **Expert data base**
  - List of VBD specialists and PH specialists



# VBORNET activities Y1



- **Development of a tool to collect data on vector distribution data**

- **Mosquitoes:**

- Ae. japonicus*, *Ae. atropalpus*, *Ae. aegypti* and other invasive mosquito species.

- **Ticks:**

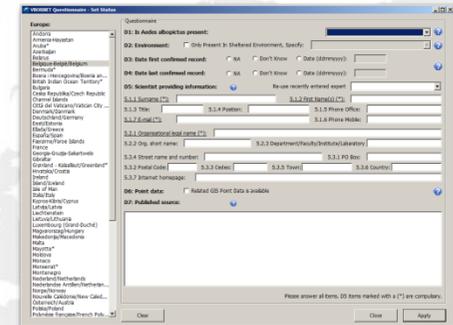
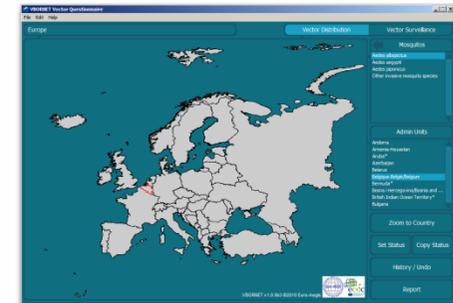
- Hyalomma spp.* and *Ixodes ricinus*. For the latter particular attention will be given to species limits and shifts.

- **Phlebotomines:**

- Distribution limits of species of particular interest in the transmission of leishmaniasis and viruses around the Mediterranean.

- **Other vectors:**

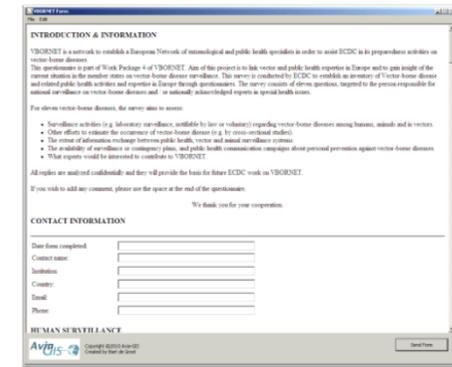
- Focus will be on the identification of disease hotspots transmitted by fleas and lice.



# VBORNET activities Y1



- **Development of questionnaire to compile data on vector related surveillance and public health resources and activities in EU**
  - Strategic document on tick surveillance in preparation
- **Monthly newsletters and special issues**
  - Science watch;
  - Special issues on mosquitoes and ticks;
  - Upcoming on Phlebotomes and 'other' vector species.
- **Fact sheets on exotic mosquito species in preparation**
  - *Aedes aegypti*, *Aedes albopictus*, *Aedes japonicus*, *Aedes atropalpus*, and *Aedes triseriatus*
- **Annual General Meeting: 1-3 June 2010 (Antwerp, Belgium)**





# VBORNET collaboration



- VBORNET includes published '**aggregated data**', i.e. validated data at various administrative unit levels (NUTS 1, 2, 3);
- VBORNET data providers will gain **access to the database** content;
- As part of the quality check mechanism, the VBORNET data base will include detailed records of data source publications, data providers and their contact details through the establishment of relational links between the vector data base and the expert data base;
- Data providers will be identified as 'certified collaborative' partners in the VBORNET expert list which is open to the public through a searchable web-tool **promoting exchanges and collaborations** between European experts.

## **Activities in 2008 contributing to assessing the risk of Chikungunya in the EU**



# Assessing the risk of Chikungunya in the EU - 2008 activities



- Consultation on vector-related risk for Chikungunya virus transmission in Europe

[http://ecdc.europa.eu/Publications/Meeting\\_reports.html](http://ecdc.europa.eu/Publications/Meeting_reports.html)

- Development of *Aedes albopictus* risk maps

Map current distribution of vector in Europe

Map risk for establishment

- Risk assessment of the introduction of Dengue and Chikungunya in the European Union



# Assessing the risk of Chikungunya in the EU - 2008 activities (1/3)



- Q. What is the magnitude and importance of Chikungunya in EU and other vector borne diseases?
  
- Assessment of magnitude and importance of vector-borne diseases (VBD) – VBorne project
  - Consortium of 16 institutions, 22 experts
  - Identification & documentation VBD relevant for PH in Europe
  - Identify available data and resources
  - Multi-disciplinary qualitative risk assessment
  - Identification of priorities for action at EU level
  - Final workshop 11-12 June 2008, Stockholm



# Assessing the risk of Chikungunya in the EU - 2008 activities (2)



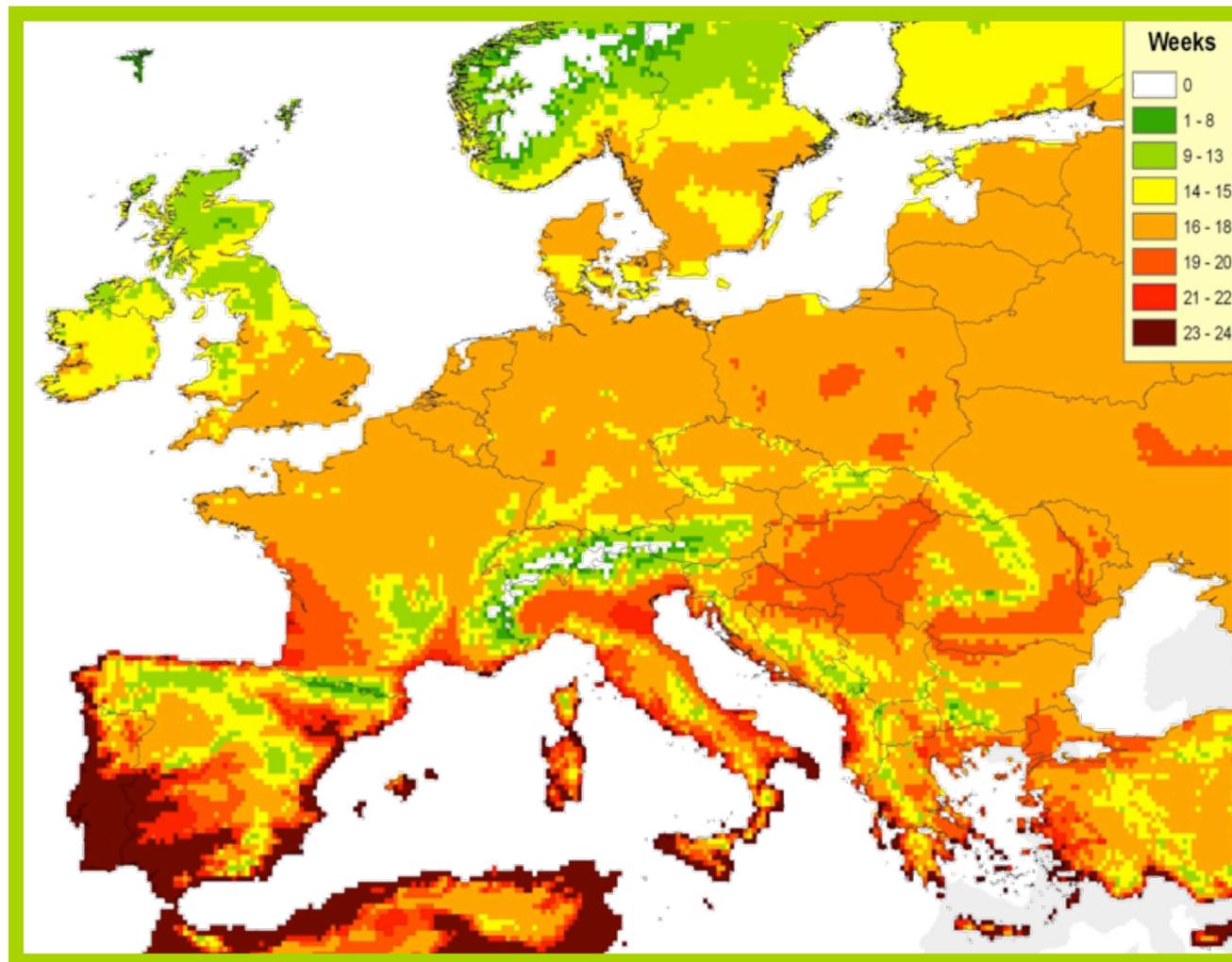
- Q. Where is the geographical risk related to the vector?
- Need for available maps on vector distribution in the EU
  - Entomologist expert meeting Sept 2007 – series of maps recommended
- Development of 'Tiger Maps' project
  - Distribution of the vector
  - *Aedes albopictus* risk maps for establishment
  - Results presented elsewhere in this workshop



[http://ecdc.europa.eu/en/Activities/Disease\\_Projects/\\_ezo/maps.aspx](http://ecdc.europa.eu/en/Activities/Disease_Projects/_ezo/maps.aspx)

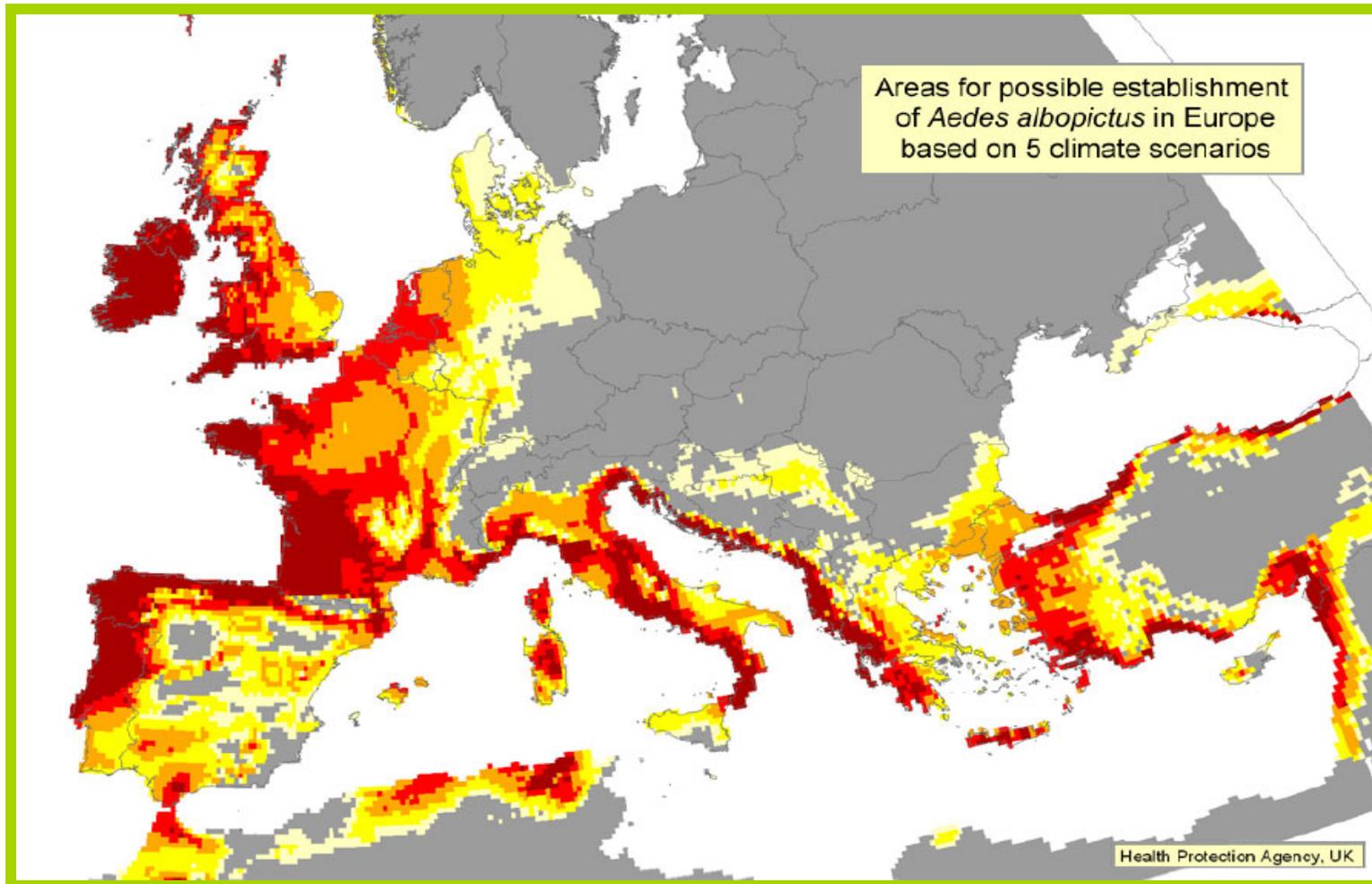
# Potential weeks of activity of *Aedes albopictus* in Europe

Spring hatching to autumn diapause



Source: Schaffner, F. Development of *Aedes albopictus* risk maps. TigerMaps project. ECDC, Stockholm 2008. (Forthcoming.)

# Areas for possible establishment of *Aedes albopictus* in Europe based on 5 climate scenarios



# Assessing the risk of Chikungunya in the EU - 2008 activities (3)



- Q. What is the risk for imported Chikungunya virus into the EU?
- Project to model risk of introduction of Chikungunya and Dengue viruses into EU
  - Undertaken by Francesco Grandesso (InVS France, EPIET), Thomas Seyler (ISS Italy, EPIET) and Evelyn Depoortere (ECDC)
  - Risk for introduction of virus into vector populated areas via viraemic persons
  - Deterministic model used to estimate the no. of viraemic person-days (VPD) among travellers arriving in the EU, by quarter, in geographical areas where vector is established.



## CHIKUNGUNYA FEVER

### Information for travellers



Chikungunya is a virus that is transmitted from human to human mainly by *Aedes* mosquitoes (*Aedes albopictus* and *Aedes aegypti*). The virus causes sudden onset of high fever, severe joint pain, muscle pain and headache. While Chikungunya fever is usually non-fatal, a small number of patients may develop serious complications or chronic conditions.

As no vaccine or medication is available, it is important to seek protection from mosquito bites when staying in the affected areas in order to prevent becoming infected with the virus.

#### TAKE PRECAUTIONS:

<p>1</p>  <p>Wear long-sleeved shirts and long trousers</p>	<p>2</p>  <p>Use mosquito repellents, coils or other devices that will help fend off mosquitoes*</p>	<p>3</p>  <p>If possible, sleep under bed nets treated with insecticides</p>	<p>4</p>  <p>If possible, set the air-conditioning on low at night</p>
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In case of sudden onset of fever, joint pain, muscle pain, and headache occurring 1-12 days after staying in affected areas:

- Consult a doctor who can make the correct diagnosis
- Limit the risk of further mosquito bites as much as possible - this will help prevent the virus from spreading to others in case you do have Chikungunya



\* Specialised advice should be sought for pregnant women and for newborn children

For the latest data on the risk of Chikungunya in Europe and information affected areas, please visit the website of the European Centre for Disease Prevention and Control:  
[http://ecdc.europa.eu/Health\\_topics/Chikungunya\\_Fever/Chikungunya\\_Fever.html](http://ecdc.europa.eu/Health_topics/Chikungunya_Fever/Chikungunya_Fever.html)

Advice to the general public in areas where the vector is present

## A common effort

### Controlling the risk of Chikungunya



Chikungunya is a virus that is transmitted from human to human mainly by *Aedes* mosquitoes (*Aedes albopictus*, *aegypti*, *polynesiensis*). The virus causes severe joint pain, muscle pain, fever and headache. While Chikungunya fever is usually non-fatal, a small number of patients may develop serious complications or chronic conditions. As no vaccine or medication is available to medically prevent or cure the disease, it is important to seek protection from mosquito bites when staying in affected areas.

#### How do humans become infected by Chikungunya?

The virus is spread by the bites of infected *Aedes* mosquitoes (*Aedes albopictus*, *aegypti*, *polynesiensis*). These mosquito types are all characterised by white stripes on their black bodies and legs.

#### What can I do to reduce the spread of the *Aedes* mosquito in my community?

*Aedes* mosquitoes live in bushes and gardens. The presence of water is of great importance for their breeding as their eggs require stagnant water in order to develop into adult mosquitoes. Thus, it is important that everybody takes action to avoid stagnant water gathering in the vicinity of the house:

- Avoid water left over in flower pots, wading pools and watering cans
- Cover water tanks and any other bins filled with rain water
- Check that gutters are clean and not obstructed
- Keep fountains and other ornamental tanks clean by treating the water with larvicides

#### How can I protect myself from mosquito bites?

- Wear long-sleeved shirts and long trousers or skirts
- Use mosquito repellents, coils or other devices that will help fend off mosquitoes
- Pregnant women, people with immune disorders or severe chronic illnesses, and children under 12 years should see their doctor to receive personalised recommendations on options for protection

- For newborn children under three months, repellents are not recommended
- If possible, set up and sleep under bed nets treated with insecticides
- If possible, set the air-conditioning on low at night - mosquitoes do not like cold temperatures

#### What are the symptoms of Chikungunya?

The symptoms of Chikungunya include severe joint pain, muscle pain, fever and headaches. Some patients, particularly children, may also experience bleeding from the nose and gums. The symptoms will appear 1 to 12 days after being bitten by an infected mosquito.

While most patients recover after a few days to a couple of weeks, a small number of patients may develop chronic joint pains. Other possible, but rare, complications include respiratory failure or serious complications in the heart or brain.

#### How is Chikungunya treated?

No vaccine or medication is currently available to cure the disease. The physician can only prescribe symptomatic treatment.

#### What should I do if I suspect that I have Chikungunya?

If you experience the symptoms described above, please see a doctor who can make the correct diagnosis by blood test, and limit the risk of further mosquito bites by, as much as possible, staying indoors or sleeping under a mosquito net - if you do have Chikungunya, this will help prevent the virus from spreading to others in your community.

# Results V-borne project



- Include the following expert recommendations:
  - High priority diseases:
    - Mosquitoes: dengue, chikungunya
  - Priority public health activities for EU:
    - Surveillance of human cases
    - Vector surveillance & control
    - Communication
    - Preparedness
- Outputs include:
  - Disease factsheets on ECDC website
  - Project reports and translation of RA and recommendations into public health considerations for EU, pending publication on website



# Current distribution of *Aedes albopictus* in Europe, January 2008

