

EDENext
Biology and control of vector-borne
infections in Europe

EDENext is a research project (2011-2014) funded under the Health component of the European Commission's 7th Framework Programme (FP7)



Developing new surveillance and control tools for vector-borne infections

Boosting knowledge for improved control programmes

The Public Health and economic importance of vector-borne infections, caused by pathogens and transmitted to their hosts by blood-sucking arthropods (such as mosquitoes, ticks etc.), is increasing. Evidence for this includes the spread of Crimean-Congo haemorrhagic fever (CCHF) in Turkey, the unprecedented bluetongue epizootic in Europe and, more recently, the spread of Schmallenberg virus across the continent.

The mass use of insecticides is not an option for controlling vector populations and breaking epidemiological cycles, and vaccines are rarely available against the diseases transmitted by these vectors. Most control programmes should therefore follow an integrated pest control strategy, requiring a range of components.

Developing the tools needed to improve prevention and intervention at the start of an epidemic, when it is still possible to take action, requires a greater understanding of the biological, ecological and epidemiological mechanisms involved.

Putting research to work: supporting Public Health

EDENext's research is conducted through five vector-focused groups (see Vector groups) supported by teams providing modelling, data management and Public Health expertise. The role of the latter is crucial in ensuring the project has a real impact on animal and human health.

The Public Health team is helping vector groups to maintain a focus on the Public Health implications of their work and making their research results more visible, comprehensible, and applicable for the public and policy makers (see Ensuring an impact on Public Health).

Publications
By May 2014,
more than 200 publications
had been generated by
the project.
They are available at
www.edenext.eu

Monitoring drains for mosquitoes in Albania.
Copyright: IPH/NVEU



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Research for better prevention and intervention

EDENext's 47 partners from 22 countries are dedicated to investigating the biological, ecological and epidemiological components of vector-borne disease introduction, emergence and spread, and the creation of new tools to control them.

In particular, EDENext is:

- Explaining the bio-ecological processes of the introduction, establishment and spread of human and animal vector-borne diseases
- Developing and assessing methods and tools for the prevention, surveillance and control of vectors and vector-borne diseases
- Delivering Public Health tools and strategies based on actual risk perceptions.

Focusing on vectors

EDENext's research is conducted through five vector-focused groups, each group working on both emergence and spread, and intervention and control, supported by teams providing modelling and data management expertise. Over-arching the work of the vector groups is a focus on Public Health, with a specialist team working with each group to ensure the relevant Public Health messages are succinctly and appropriately disseminated (see Ensuring an impact on Public Health).



Collecting sand flies in a human leishmaniasis focus in south-eastern Anatolia, Turkey, using a mouth aspirator.
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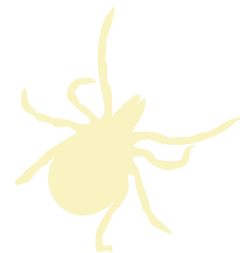
Vector groups

Each vector group is examining the mechanisms by which vectors and pathogens emerge and spread, and an assessment of the methods available to control vector and reservoir populations. The aim is to offer appropriate and environmentally friendly control strategies.

- Ticks and the risk of transmission of 'new' pathogens such as *Anaplasma* and *Bartonella*, and Crimean-Congo haemorrhagic fever virus.
- Mosquitoes such as *Aedes albopictus* and the risk of transmission of dengue and chikungunya viruses, and *Culex* mosquitoes and the risk of transmission of West Nile virus.
- Phlebotomine sand flies and the risk of transmission of *Leishmania* and of viruses that cause summer encephalitis in several Mediterranean countries.
- Culicoides* biting midges and the risk of transmission of viruses that cause animal diseases such as bluetongue, African horse sickness and Schmallenberg viruses.
- Rodent and insectivore-borne pathogens, such as hantaviruses, orthopox viruses and the lymphocytic choriomeningitis virus complex.



Tick warning sign in a German forest.
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*A recently emerged hotspot for TBE, the Tokkekøb forest just north of Copenhagen, Denmark.
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Ensuring an impact on Public Health

Efficient preventive, surveillance and control programmes also require relevant and accurate data on risk perception in both public health agencies, relevant stakeholder groups and the exposed human population. This will help identify the necessary content and style of the human and veterinary Public Health messages needed to reach those most at risk.

To meet these challenges EDENext's Public Health team is working in close collaboration with stakeholders in the human and animal health sectors, as well as national and international Public Health agencies. The team is also working closely with the modelling group to produce new models better suited to the needs of Public Health practitioners. These models incorporate the results of risk perception studies as well as statistical data, providing best and worst case scenarios for emerging diseases.

The team's Public Health White Paper and guidelines to vector groups, alongside workshops, are helping to improve the Public Health impact of the project.

The team actively monitors the project's research results for their Public Health significance and is sharing these with Public Health agencies and other relevant stakeholders through the PUBLICise HEALTH newsletter.

Developing capacities, ethical focus

Particular attention is being paid to developing scientific capacities in less well developed countries and to ensuring local populations benefit from EDENext results, for example better control of African horse sickness in Senegal. An ethical board ensures EDENext's research complies with European regulations and, more importantly, that ethical questions are increasingly integrated into European research.

Modelling's central role

Mathematical and statistical modelling are important tools for assessing, analysing and predicting the emergence and spread of vector-borne diseases and the potential impact of new and existing control and intervention methods. A common goal for all the disease systems under study is to develop predictive quantitative models of vector-population dynamics or disease transmission and spread. To help achieve this, the modelling team is working directly with vector groups and members from every group have attended modelling workshops.



Extensive and reliable data, ready for use



Data management was a key strength of the EDEN project (2004-2010), providing data and related services to a broad network of partners involved in specific research tasks (<http://www.edenextdata.com>). This is being improved still further in EDENext, with the data management team seeking collaborations with other European Union funded projects and networks. There is a particular focus on host distribution mapping and wind spread models, and both online distance-learning courses and workshops have been organised.



Sand fly resting area and light trap.
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Flagging in Georgia.
Copyright: NCDC, Georgia



Danish researchers investigating bluetongue, specifically transmission parameter estimation and spatial spread models.
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Partners

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2. Charles University - Czech Republic
3. Istituto Superiore di Sanità - Italy
4. Institut de Recherche pour le Développement - France
5. National Center for Disease Control and Public Health - Georgia
6. University of Crete - Greece
7. Instituto de Higiene e Medicina Tropical - Portugal
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