

# Health Examination Surveys and Human Biomonitoring – the added value of combined studies

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# Human Biomonitoring (HBM) surveys

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- **Include:**
  - Questionnaire (interviewed and/or self-administered); and
  - Collection of biological samples for the determination of internal human exposure or of exposure effects.
- **May identify particularly vulnerable or exposed subgroups.**
- **May associate body burden/reactions to health effects.**

**Information on “Determinants of Health”**

# HBM surveys

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- **Czech Environmental Health Monitoring System (EHMS)**  
(since 1994).
- **Flanders human biomonitoring network (FLEHS)**  
(since 2002).
- **Japan Environmental and Children's Study (JECS)**  
(since 2010).
- **Spanish monitoring programme BIOAMBIENT.ES**  
(2009 – 2010).
- **Programme for Italian population exposure (PROBE)**  
(2008 – 2011).
- **Slovenia's national HBM programme** (since 2010).

# HBM projects

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- **ESBIO (Expert Team to Support Biomonitoring in Europe)** (2005-2008).
- **ECNIS (Environmental Cancer Risk, Nutrition and Individual Susceptibility)** (2005-2013).
- **INTARESE (Integrated Assessment of Health Risks from Environmental Stressors)** (2005-2010).
- **PHIME (Public Health Impact of Long-Term, Low-Level Mixed Element Exposure in a susceptible population strata)** (2006-2011).
- **NewGeneris (Newborns and Genotoxic Exposure Risks)** (2005-2010).
- **EnviroGenomarkers (Genomics Biomarkers of Environmental Health)** (2009-2013).
- **COPHES (Consortium to Perform Human Biomonitoring on an European Scale) and its Life pilot survey (DEMOCOPHES)** (2009-2013).
- **EXPOsOMICs** (2013-2018).
- **HELIX (The Human Early Life Exposome)** (2013-2018).
- **HEALS (Health and Environment-wide Associations based on Large Population Surveys)** (2013-2019).

# Health Examination Surveys (HES)

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- **Include:**
  - Questionnaire (interviewed and/or self-administered);
  - Physical measurements such as anthropometric measurements, blood pressure and functional capacity; and
  - Collection of biological samples, such as blood and urine.
- **Contents of the survey are based on needs of individual countries.**
- **Usually starts with a few core measurements and is extended in next rounds as more experience is gained.**

# HES - European level initiatives

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- **Feasibility of the European Health Examination Survey (FEHES) Project (2006-2008)**
  - Prepared European level guidelines and recommendations
- **European Health Examination Survey (EHES) Pilot Project**
  - 2009-2012 - Establishment of the EHES Reference Centre and EU level coordination activities
  - Preparation of the EHES Manuals
  - 2010-2011 Pilot surveys



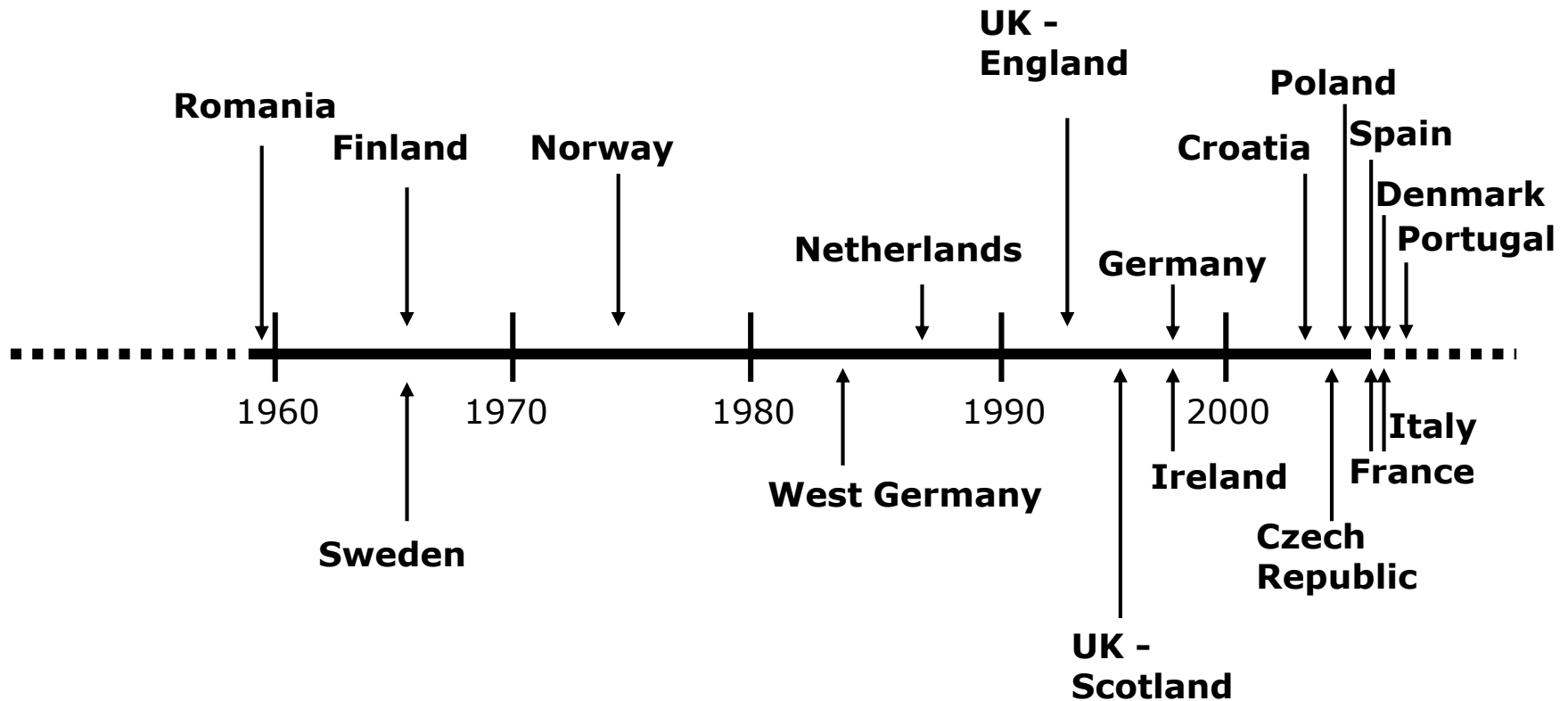
# European level initiatives

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- Initiative to set up sustainable European health information system (EU/DG SANTÉ)
  - BRIDGE Health project <http://www.bridge-health.eu>
  - bridged the best of EU projects in domains of population and health system monitoring, indicator development, health examination surveys, environment and health, population injury and disease registries, clinical and administrative health data collection systems and methods of health systems monitoring and evaluation.



# History of HES in Europe

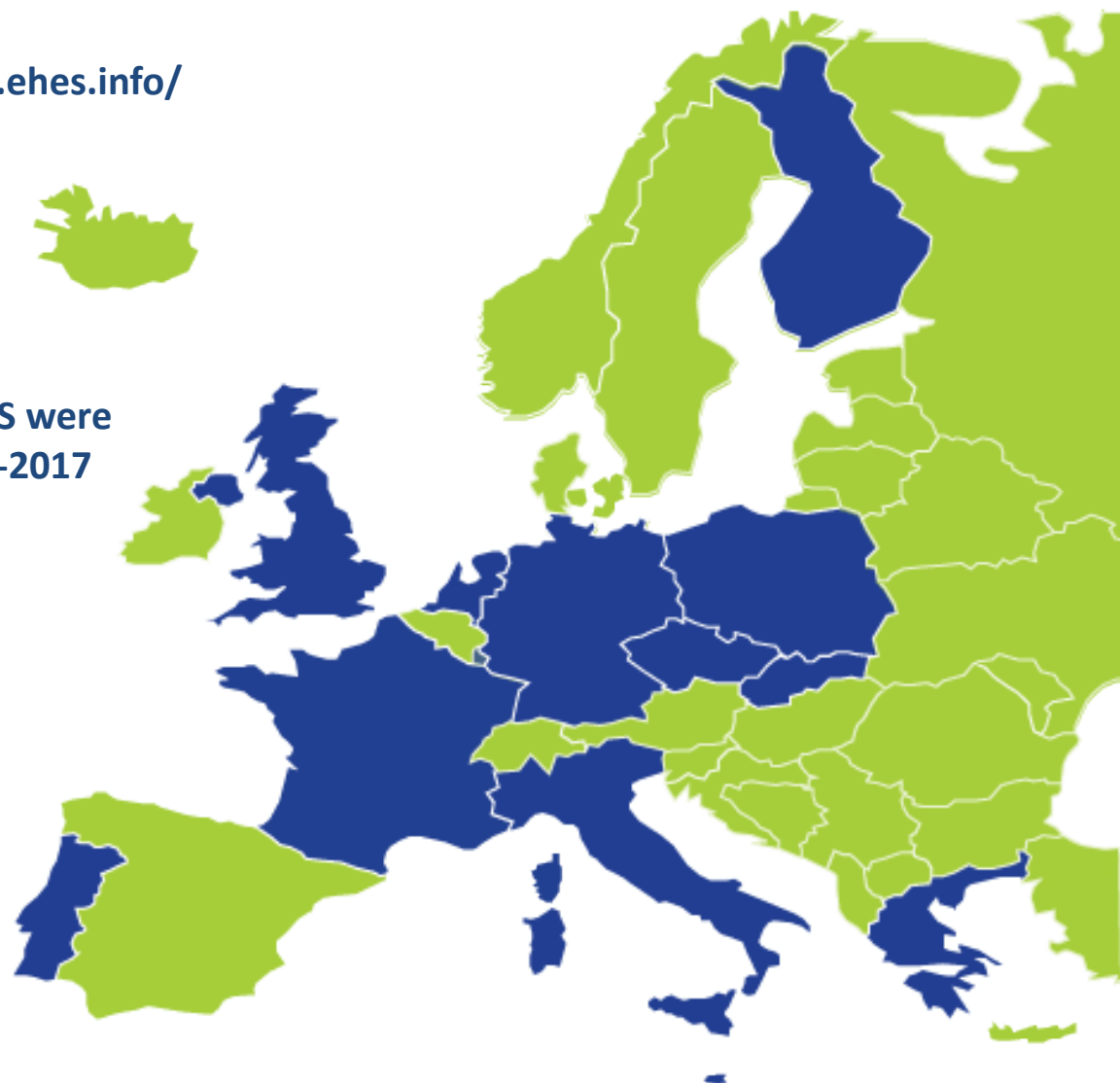


Source: <http://www.ehes.info/>

# HES in Europe

Source: <http://www.ehes.info/>

 Countries where HES were developed in 2010-2017



# HES in Portugal - INSEF

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- **First National Health Examination Survey (INSEF)**

- observational epidemiological, cross-sectional, population-based study designed to be representative at the regional and national level;
- target population consisted of individuals aged between 25 and 74 years old, living in Portugal for more than 12 months, not institutionalized and able to follow the interview in Portuguese;
- included a set of physical and biochemical measurements, in addition to an interview;
- collected data on 4911 individuals in 2015.



Inquérito Nacional de Saúde com  
Exame Físico 2013-2016

Source: [www.insef.pt](http://www.insef.pt)

# Similarities between HES & HBM surveys

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- **Ethics and data protection issues**
- **Sampling**
- **Training**
- **Recruitment**
- **Questionnaires**
- **Collection of biological samples**
- **Quality control**
- **Data management/storage**
- **Data analysis**
- **Interpretation of results**
- **Communication**

# Potential synergies

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- **Sampling frame**
- **Sampling scheme**
- **Ethics and data protection**
- **Team members**
- **Training**
- **Fieldwork logistics (coordination; recruitment; data and sample collection, handling, processing and storage; sample transport)**
- **Quality control**
- **Reporting**

# Combined HBM & HES surveys

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- **U.S. National Health and Nutrition Examination Survey (NHANES)** (HES since 1960; NHANES since 1971; continuous since 1999).
- **German Environment Surveys (GerES I – VI) & German Health Interview and Examination Survey** (since 1985).
- **Korea National Health and Nutrition Examination Survey (KNHANES)** (since 1998).
- **French Nutrition and Health Survey (ENNS)** (2006-2007) and **French Health Study on Environment, Biomonitoring, Physical Activity and Nutrition (ESTEBAN)** (2014-2016).
- **Canadian Health Measures Survey (CHMS)** (since 2007).

# HBM4EU

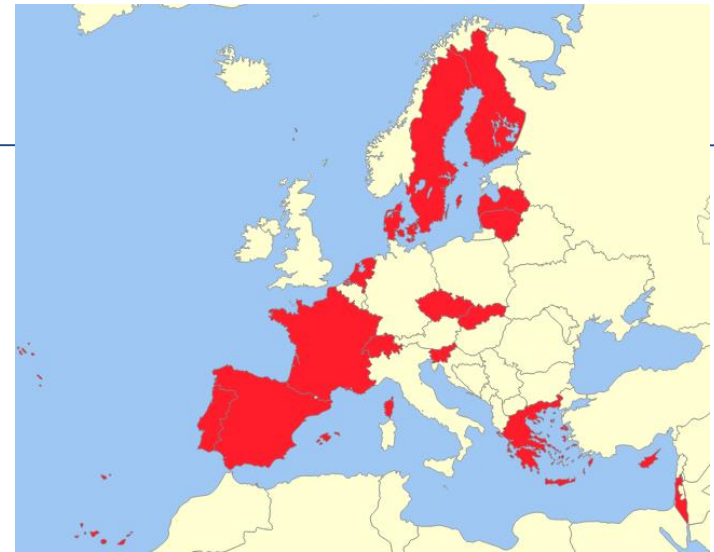
## WP11 - Linking HBM, health studies and registers

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- Evaluate opportunities and obstacles related to linking HBM, health surveys and administrative data sources.
- Evaluate existing biological samples from health studies which could be used to analyse HBM biomarkers.
- Provide tools for linking HBM and health studies for improved cost-benefit and knowledge on human exposure-health outcome correlations.
- Provide broader HBM and health data on the same individuals.

# WP11 inventory

- 52 different surveys;
- 30 researchers;
- 16 European countries;
- Most of the studies include the collection of biological samples and storage for future use;
- Most frequently stored samples: blood, plasma, serum and DNA;
- Ethical approval for the measurements of chemicals would be possible to obtain;
- Half of the studies are longitudinal;
- Register data was only retrieved for half the studies.



# Advantages

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- **Increased sampling size**
- **Use of common logistical infrastructure**
- **Reduced cost**
- **Access to detailed health and exposure data**
- **Possibility to study links between exposure and health related outcomes**
- **Reinforce public awareness and interest in HBM through health**

# Obstacles

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- **Financial**
- **Logistic**
  - recruitment
  - higher data complexity, more samples and more results
- **Combined questionnaire**
- **Coordination between HBM/HES modules**

# Recomendations

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- Adequate and integrated planning including both components from the beginning;
- National prioritization;
- Pluri-annual planning.

# Acknowledgements

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