

Environmental Effect on Health Care and Wellbeing and Active Interventions

LINKING ENVIRONMENT AND HEALTH DATA FOR SMARTER DECISIONS



ENACT is a European research project focused on understanding how pollution affects our health—so we can prevent diseases before they start. Using cutting-edge science, the project will develop a risk score that shows how exposure to air, noise, and light pollution may lead to chronic conditions like heart disease. This tool will help citizens, healthcare professionals, and policymakers make smarter decisions to protect health, reduce financial burden, and improve quality of life in our communities.



KEY OBJECTIVES

1

Develop a comprehensive model to assess the interaction between environmental factors and non-communicable diseases (NCDs)

- Create an exposomic risk score based on multiple environmental exposures (air, noise, light, etc.) linked to hospitalization for acute vascular and non-vascular NCDs.

- Translate this population-level risk model to the individual level, enabling prediction of preclinical stages of disease.

2

Build a secure, federated platform for exposomic risk analysis

- Implement a privacy-preserving platform using Federated and Distributed Ledger Technologies (DLT) to enable secure data sharing and AI model training across countries.

- Provide a suite of services—including risk scores and visualization tools—for use by citizens, healthcare professionals, and policymakers at local, national, and EU levels.

METHODOLOGY

RETROSPECTIVE PHASE

Model development

Using retrospective health data from ~400,000 patients in Belgium, ENACT will construct an exposomic risk prediction model focused on hospitalizations related to acute NCDs.

Model validation and calibration

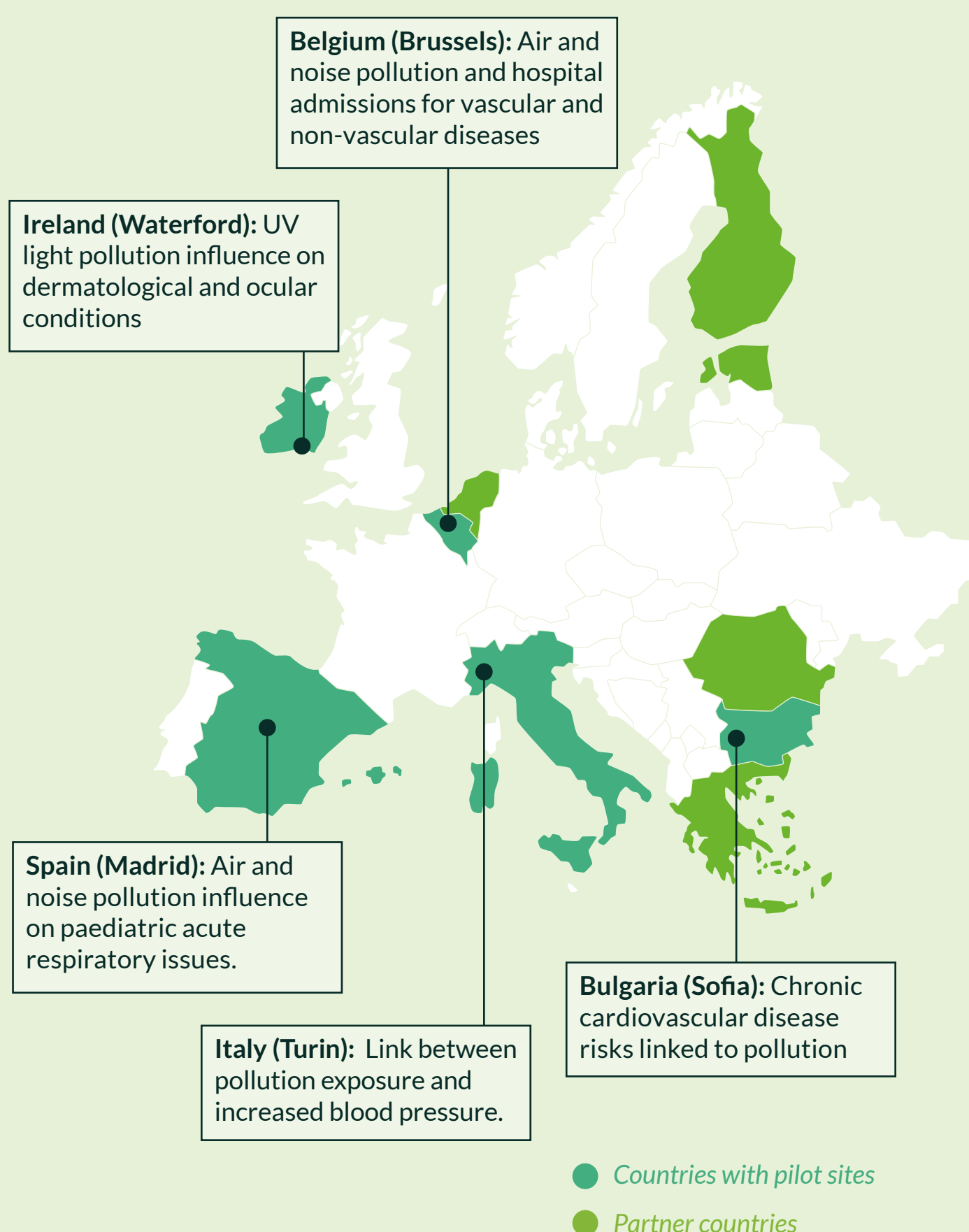
The predictive model will be validated and calibrated using retrospective data from five national cohorts (~600,000 patients).

PROSPECTIVE PHASE

Individual-level application

The population-level model is adapted into a personalised risk assessment tool. This will be achieved by integrating data from ~2,000 healthy volunteers across the five participating countries.

FIVE PILOT SITES





Turin, Italy

CLINICAL FOCUS

Link between pollution exposure and increased blood pressure. This ENACT use case examines the impact of air pollution on cardiovascular and respiratory health in the Turin area through a two-phase study.



DURATION

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2020												2021											

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2025												2026											

The **retrospective phase** analyzes anonymized data from more than 900 hypertensive patients collected between winter 2020 and spring 2021 in the Turin area. These mostly single-measurement clinical records are linked with pollution data from the same period to identify exposure–health associations and form the basis of an exposomic risk model.

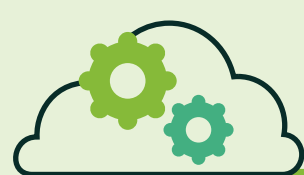
The **prospective phase** will follow around 100 volunteers who consent to have their blood pressure measured twice (once in winter 2025 and once in spring 2026) via cuffed devices, allowing comparison of the same individuals under different seasonal pollution levels.

Together, the two phases provide complementary evidence on pollution-related health impacts and the potential of targeted indoor air quality interventions to support preventive healthcare strategies.

TARGET GROUP

900 patients (retrospective phase)

100 volunteers* (prospective phase)



PROSPECTIVE DATA

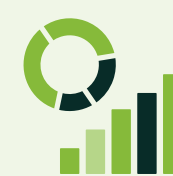
ENVIRONMENTAL

Air pollution (PM2.5, PM10, NO₂, O₃), (Indoor) Air quality (PM2.5, PM1, AQI), Temperature

CLINICAL

Renin-angiotensin-aldosterone system (RAAS), Clinical history & demographics

TECHNOLOGY



Environmental monitoring system



Clinician PoC

*Excluding subjects who suffer from pre-existing cardiovascular diseases, kidney or liver impairment, are pregnant, or use medications like lithium or non-steroidal anti-inflammatory drugs (NSAIDs).

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