NEOS

NEoplasm Open-Source Environmental Risk Factors Standardization

Pascal Deschaseaux[1], MD, MBA; Sébastien de Longeaux[1], MBA; Edouard Debonneuil[2], PhD; Rachel Aronoff[3], PhD

EPIDEMIUM SEASON 3 — September 2021 to January 2022

Challenge 2

Air & water carcinogens

CHALLENGE: accelerating research on cancer risk factors by structuring open data sources, and completing the OSIRIS clinical and -omics databases, in order to standardize variables related to the environment (terminology, interoperability,..)

SCOPE:

YES	Cancer	Risk factors	Environmental	Air & water	IARC Group 1	Open sources	France	Epidemiology
NO	Other diseases	Prognostic factors	Behavioral & occupational	Other agents	IARC groups 2A, 2B, 3	Private sources	Rest of world	Care

OBJECTIVE: easing analyses of environmental cancer risk factor data by structuring and harmonizing open source epidemiological data sets, in a FAIR approach

WORK PACKAGES:
WP1: ontology
WP2: data & metadata
WP3: data sources

TARGET OUTCOME:
Standardized cancer epidemiology dataset framework & examples

RISK FACTOR SELECTION:

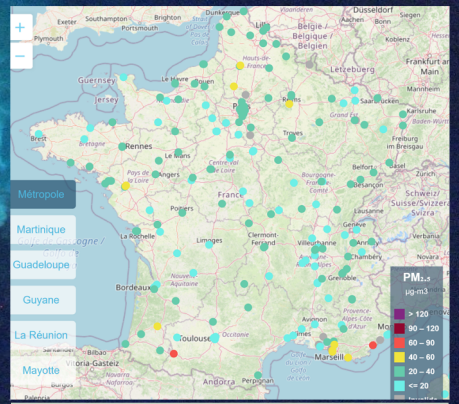
- Easily measurable → **air & water agents, France**
- International reference → **IARC** (International Agency for Research on Cancer) **monographs**
- Scientifically validated → **Group 1 carcinogens** (substances known to have carcinogenic potential for humans)

EXAMPLES:
From a list of 37 IARC Group I air & water biological, chemical and physical agents with open source data, we selected two carcinogens:

- An air pollutant: **PM 2.5** (fine particle matter), associated with lung cancer risk
- A water pollutant: **arsenic**, associated with lung, urinary bladder and skin cancer risk

NEOS FRAMEWORK (SELECTED FIELDS):

- Current address ● For how long ● Past addresses (starting with most recent, as detailed as possible) ● For how long (years) for each past address ● Main occupation ● Usual place of main occupation ● For how long (years) ● Main mode of transportation ● How many days a month ● How many hours a week
- Consent (if needed)
- Item group ● Objectives ● Item N° ● Collection status ● Item ● Item definition ● Expected value
- Geographic location of measure ● Geographic granularity of measure ● Date of measure ● Temporal granularity of measure ● Data source ● Geographic and temporal relevance
- Main cancer sites associated with agent ● Reference value ● Guidelines ● Monograph/backup paper ● Main sources of exposure
- Exposure to carcinogen (concentration in medium)



Mean life expectancy gain at 30 years with the « no PM 2.5 atmospheric pollution » scenario (source : InVS, Santé Publique France). Map shows data measurement coverage

CONCLUSIONS:

- Open source environmental data are very heterogeneous
- Two types of data are crucial for the NEOS Framework: place of residence/occupation, total duration of exposure.
- Definition of variables must be in context and precise to avoid bias
- Data collection and analyses at the patient level require a precise address and geocoding.
- This work will be expanded to other IARC Group I environmental cancer risk factors with open sources, using the NEOS Framework

Possible limitations, particularly for rural areas, include the place where measurements are obtained, and agents' geographical coverage.

https://github.com/Epidemium/EPIDEMIUM-Season-3/NEOS

1 NewClin, 2 International Longevity Alliance 3 AGiR! & Hackuarium

Acknowledgements: we thank the organizers of the Epidemium challenge (Roche, the operational team, JOGL) and also the project mentors (Mehdi Benchoufi, Julien Guérin, Bastien Rance, Hector Countouris) and reviewers