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FACT SHEET INDUSTRIAL POLLUTION AND CANCER
WP9 "Innovation in health information for public health policy development"

Case study: Use of information from non-health related UE databases for health surveillance: the inclusion of E-PRTR data into spatial mortality and morbidity analyses

Key outputs

1. The integration of non-health related UE databases is a feasible strategy to enrich and develop health surveillance. The design of ad-hoc instruments for this purpose can facilitate the use of these data as well as the comparability of the results among EU countries.

2. This case-study presents a practical example, focused on the use of the data included in the European Pollutant Release and Transfer Register (E-PRTR), which allows estimating industrial pollution exposure, for cancer surveillance.

3. "***En-risk***", an easy-to-use java/web application tool, allows merging, at country level, a) the information of the location of industrial facilities included in the European Pollutant Release and Transfer Register (E-PRTR); and b) the municipal mortality or morbidity data. Afterwards, it performs an exploratory spatial analysis of association between them by type of exposure

Background and Rationale

Being able to combine health information with environmental health determinants is very important, both for surveillance or epidemiological monitoring and for risk studies in health. Within the European Union, there are many non-health data that can be used in this context. However, due to the heterogeneity in the availability and in the formats of this data, its integration with health data is difficult and represents an important challenge, which, in many cases, is complex and require specific expertise.

A good example of a potentially useful source of significant environmental data that might be relevant for health is the European Pollutant Release and Transfer Register (E-PRTR), which allows estimating exposure to industrial pollution, a very relevant environmental risk factor from a public health point of view (1). The register, maintained by the European Environmental Agency, contains annual data on more than 30,000 industrial facilities that reported emissions over a determined threshold of any of the selected 91 pollutants. The list of industries comprises 65 economic activities within 9 industrial sectors. For each facility, E-PRTR provides information on type of activity, geographical location and emissions of polluting substances. These data can be freely downloaded from the website of the registry. E-PRTR was established through Regulation (EC) No 166/2006, and covers 28 EU Member States as well as Iceland, Liechtenstein, Norway, Serbia and Switzerland

Proposal

In this case study, we are piloting "***En-risk***", an easy-to-use java/web interactive application tool that merges, at country level, the information of The European Pollutant Release and Transfer

Register (E-PRTR) and the municipal mortality or morbidity data to perform an exploratory spatial analysis of association between them by type of industrial facility. The application works in the user computer. It downloads the geographic coordinates for each facility from the official web of the E-PRTR, while health data can be directly loaded into "*En-risk*" by the user. This way, health information is always stored and managed in the computer of the user in order to guarantee data protection.

The application needs web connection (but could be optional) as well as the following minimum data:

- **Shapefile** (cartography) of the country (spatial unit = municipality)
- Annual **observed deaths** (for mortality) or **cases** (for morbidity) and **population figures broken down by age groups (18) and by sex** per municipality
- Optional information that could also be loaded by the users: social and economic environment information at municipal level.

With this information the application directly calculates

a) The expected number of deaths or of cases of the selected disease, using as reference the rates by age group and sex for the whole country.

b) The distance from the municipal centroids (information obtained from the shapefile) to the location of all the industrial facilities included in the E-PRTR. These distances allow classifying municipalities as exposed or not exposed to industrial pollution, according with the definitions included in the methodological annex.

With these elements, and thanks to the extended expertise of the research team in this field, ***En-risk*** performs a complex spatial association screening analysis that allows to evaluate whether there is any excess mortality/morbidity in those municipalities exposed to industrial pollution compared to those not exposed, globally and by industrial sectors. If the user has loaded additional information (social and economic environment information at municipal level), the analysis could be also performed considering them as possible confounding factors.

The final output of the application will include: 1) a table or forest plot of Relative Risk of mortality due to exposure to industrial pollution by industrial sector and disease analyzed; 2) a standard database adding the environmental exposure to the health data provided, that might be used for further analyses or allow looking to the spatial distribution of the exposure. However, other types of outputs can be developed. For example, ranking of municipalities with excess of risk, spatial cluster analysis, etc.

The use of the application does not require statistical knowledge, although the interpretation of the results clearly needs public health expertise. In addition, if this initial screening indicates the presence of any health problem linked to residential proximity to industrial pollution in any country, it should be followed by ad-hoc studies to deepen into it.

Recommendations for sustainability

The formulation of the European Directive on Integrated Pollution Prevention and Control (IPPC) and the creation of the EPRTR enable Member States to incorporate information of industrial pollution sources from E-PRTR into health information system, which is homogeneous and comparable among European countries. ***En-risk*** facilitates the study of the relationship between pollutant groups, type of industrial sector and health effects such as cancer all around all Europe. It can be used by public health services to identify health problems and to point to key policy interventions to reduce the impact of industrial pollution on health. In addition, the same approach, handy and cheap, can be applied to other geographically-based European environmental databases. Finally, its sustainability is clear because is a normative tool that might improve interoperability of health information systems with non-health data, which would be included in machine learning algorithms in the future.

References

(1) Fernández-Navarro, P.; García-Pérez, J.; Ramis, R.; Boldo, E.; López-Abente, G. Industrial pollution and cancer in Spain: An important public health issue. Environ. Res. 2017, 159, 555–563.