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Measuring social inequalities in the burden of environmental stressors

4th Working Group Meeting – European Burden of Disease COST Action

Carl Michael Baravelli, PhD
Department / Centre – for Disease Burden
Norwegian Institute of Public Health (NIPH)

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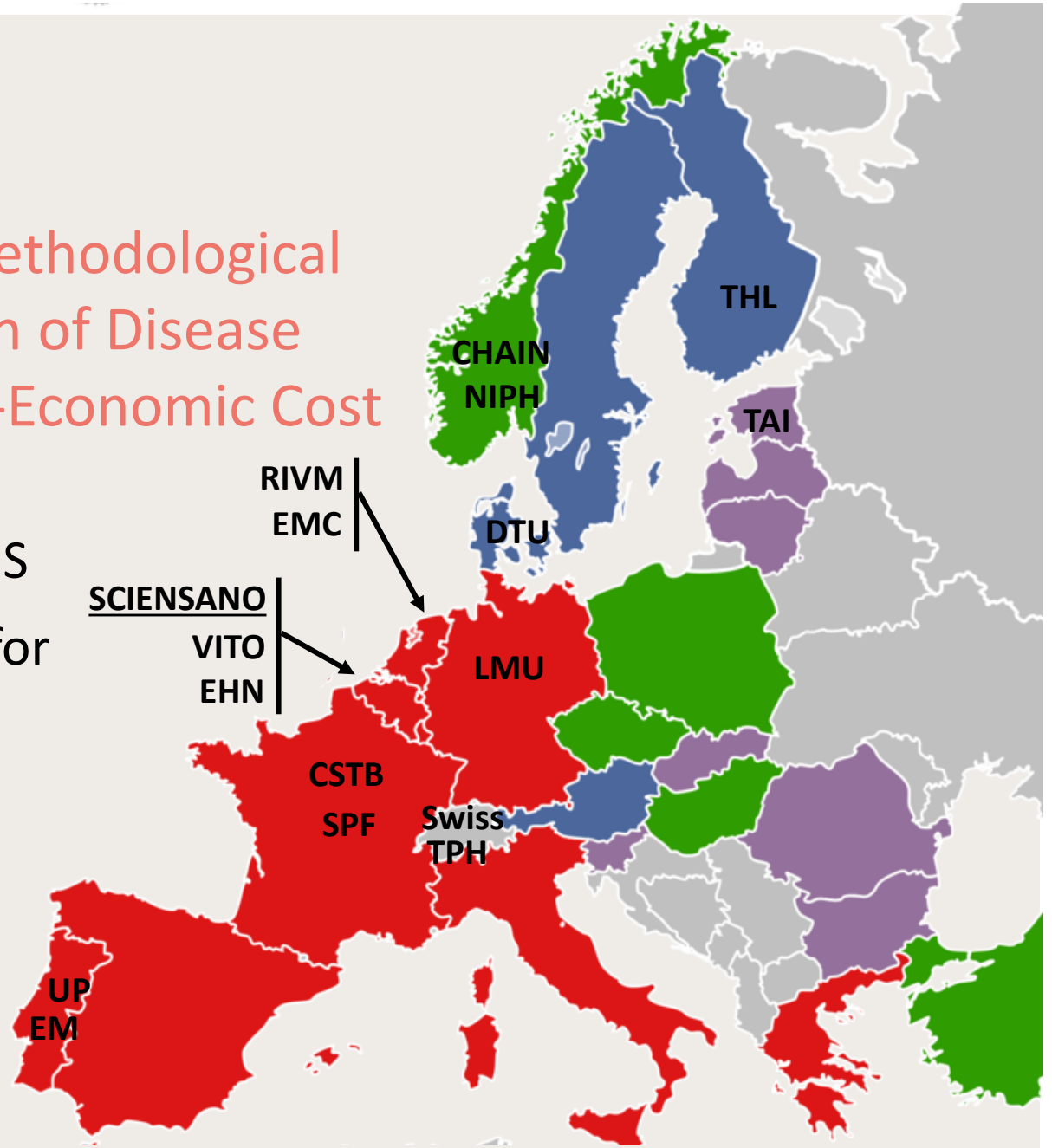
BEST-COST

BEST COST aims to develop a new methodological framework to understand the Burden of Disease Based Tools for Estimating the Socio-Economic Cost of Environmental Stressors

- 17 partners from 10 EU-countires and US
- Led by Sciensano (the Belgian institute for health)
- Project period: 4 years
- Start date: January 1st 2023



USA: IHME

Project structure

Work Packages

WP1: Assess and strengthen BoD methodology for air pollution and noise

WP2: Develop a novel & harmonised methodology for monetising and discounting health loss estimates in BoD

WP3: Develop a coherent framework for assessing the extent of social inequalities caused by air pollution and noise

WP4: Programming Resources (open access)

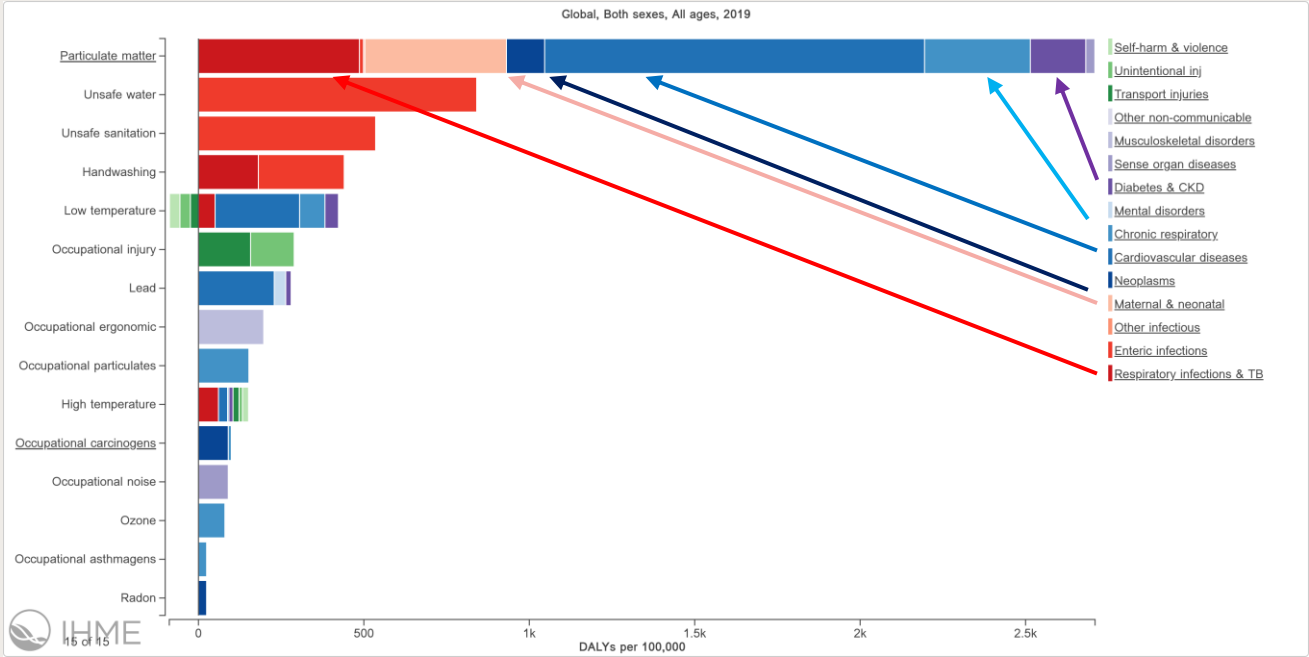
WP5: Case studies in 5 European countries

WP6: Transferability to other stressors/ countries

Background

Environmental Risk Factors

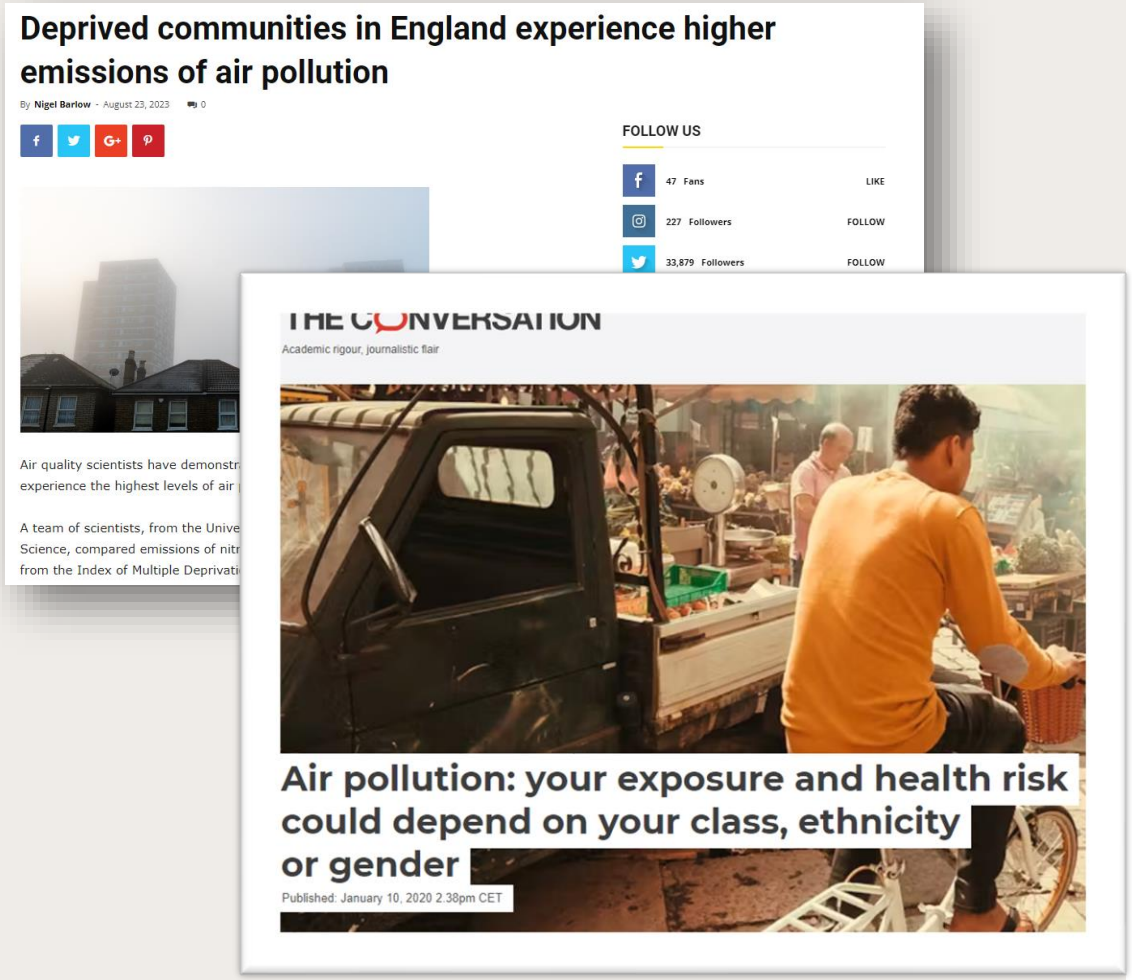
- Air pollution remains the **greatest environmental risk** to human health, including the EU



Background

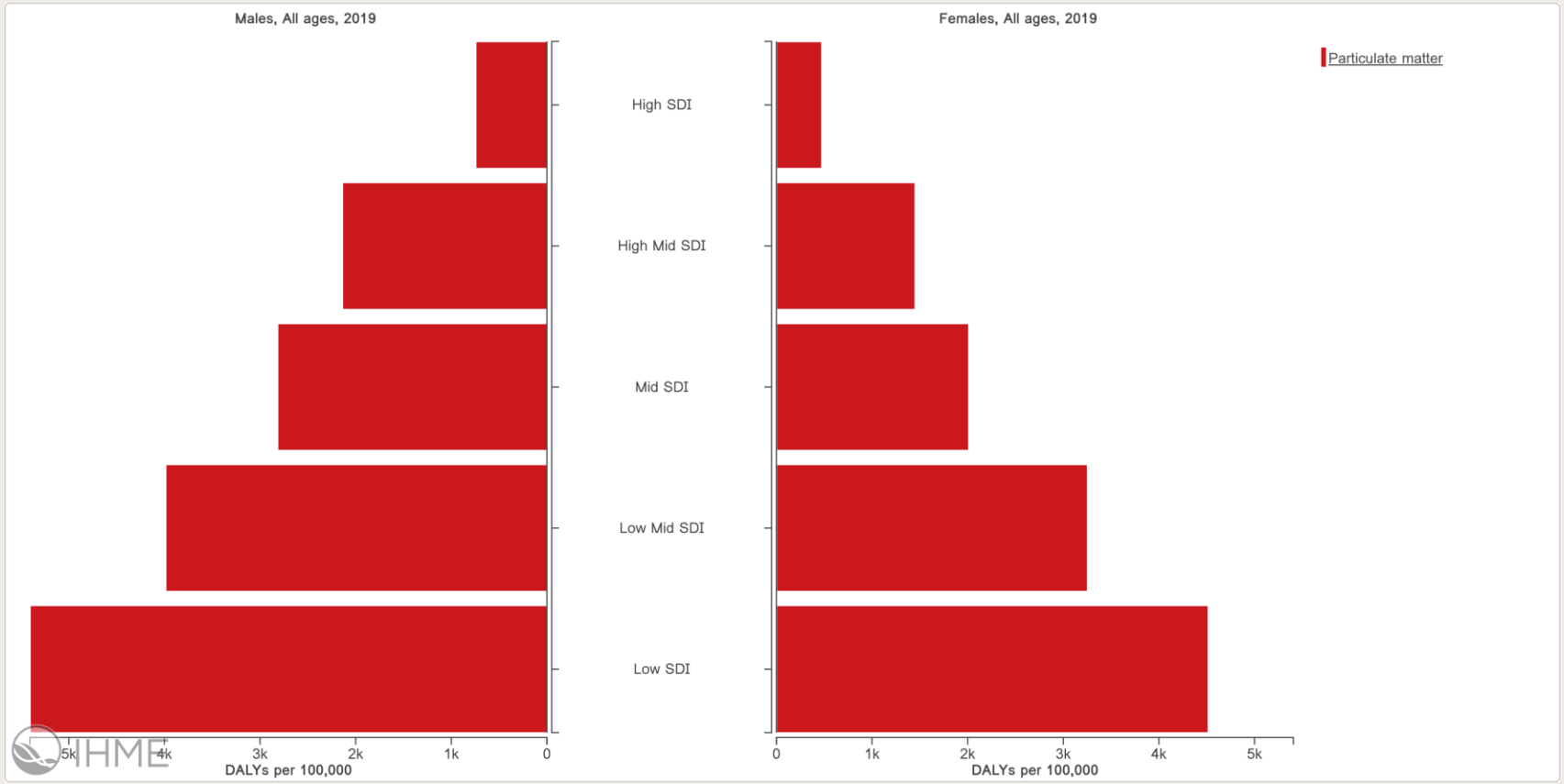
Poor Air Quality: A Socially Stratified Environmental Risk Factor

- The proximity of where individuals **live, study, and work** closely influences their exposure level
- Individuals residing in areas of high deprivation often living near **major roadways** and in **densely populated neighborhoods**



Background

Air Pollution By GBDs SDI Categories



Work Package 3

Develop a coherent framework for assessing the extent of social inequalities caused by air pollution and noise

- Task 3.1 has the objective of developing a common index of multiple deprivation for European countries
  - (1) Conducting a scoping literature review to document existing multiple deprivation indices (MDI) that have been previously used in Europe – independent of environmental stressors
  - (2) Selecting relevant socioeconomic indicators to be included in the index and determining the weights based on the chosen method
  - (3) Mapping the data sources available at the smallest geographical level
  - (4) Computing the suggested index
  - Led by NIPH

Task 3.1

Belgium example

Based on Belgian Census data for years 1991, 2001, and 2011.

The index includes different domains:

Education level

Occupational position

Housing conditions

In Belgium Census data is available at statistical sector. In Belgium there are almost 20,000 statistical sectors

Work Package 3

Develop a coherent framework for assessing the extent of social inequalities caused by air pollution and noise

- Task 3.2 Has the objective of developing a methodology for estimating the health burden of environmental stressors at the smallest geographical level, by:
  - (1) Mapping data sources for environmental stressors and health outcomes at the smallest geographical level
  - (2) Integrating health outcomes and environmental stressors in Geographical Information Systems (GIS) analysis
  - Led by Sciensano (Vanessa Gorasso)

Multiple Deprivation Index (MDI)

Concept Definition

- When measuring social factors at larger-area aggregations, such as neibourhoods, we refer to deprivation rather than socioeconomic position
- Deprivation encompasses **unmet needs** due to a lack of various material or social resources
- Developed in the 1970s in England based on available census data
- Constructed using a combination of various simple indicators **(Multidimentional)**
  - Can be aggregates of **individual-level / household data**
  - Or at the **neibourhood-level**
- Individual elements are often weighted and summed to create a composite measure
  - Weighting by expert opinion, or in recent years by multivariate statistical techniques (Principal Components Analysis/ Factors Analysis)

Multiple Deprivation Index (MDI)

Scale Matters

- Deprivation indexes can be created at **different scales** based on analysis needs and context
- The key distinction between large and small-scale deprivation indexes lies in data granularity

Scoping Review

Abstract Screening

We developed a search string with the following search elements:

1. Deprivation index/socioeconomic deprivation/social inequality/ social-economic, etc..
2. European countries
3. 2013 to 2023 (last 10 years)

Database searched	Platform	Years of coverage	Records	Records after duplicates removed
Medline ALL	Ovid	1946 - Present	586	578
Embase	Embase.com	1971 - Present	535	101
Web of Science Core Collection*	Web of Knowledge	1975 - Present	480	181
Total			1601	860

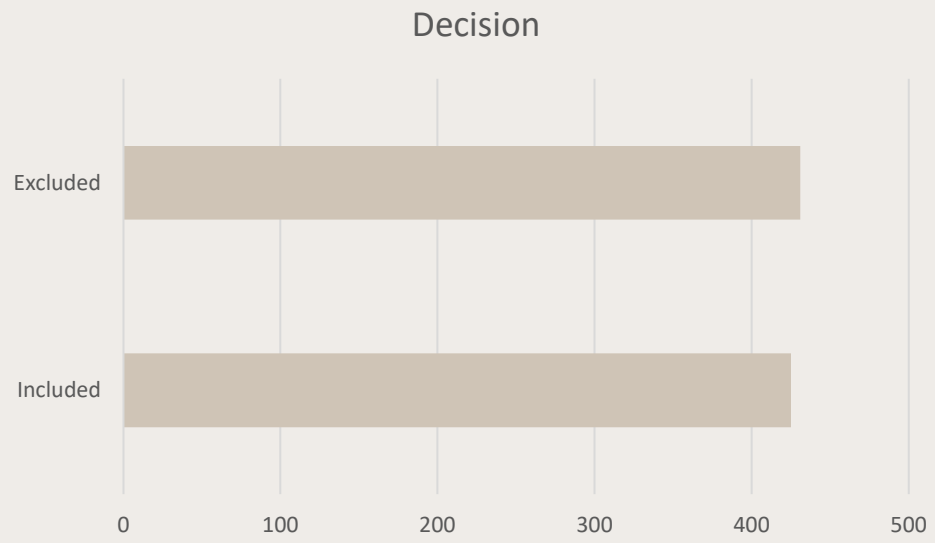
Scoping Review

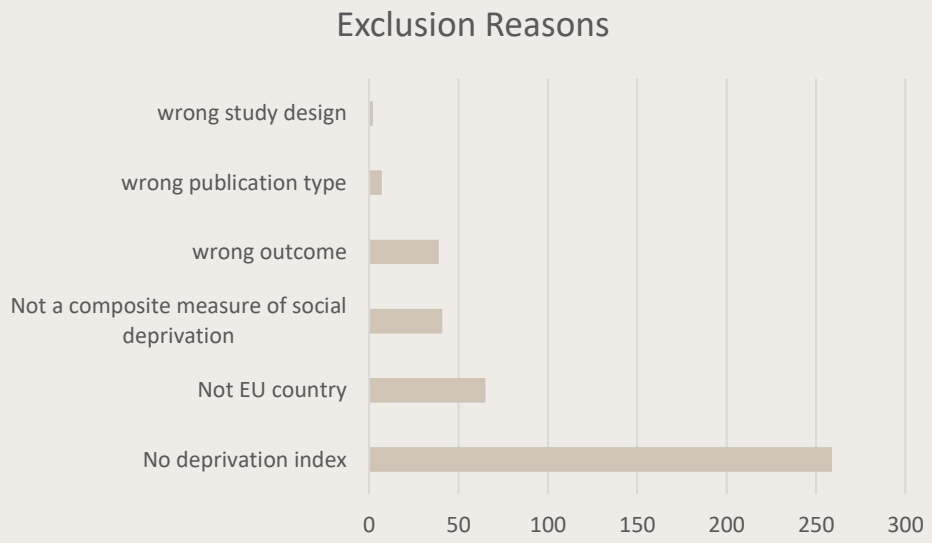
Exclusion Criteria

1. **No Deprivation Index**: Studies that lack an index of social deprivation or socioeconomic status
2. **Single Measurement**: Studies relying on a single observable measurement of deprivation/socioeconomic status (such as education, income, or occupation), rather than an aggregated index
3. **Non-European Study**: Studies conducted outside of Europe
4. **Non-European Language**: Studies not written in a European language
5. **Excludes a social dimension**: Studies with a deprivation index that excludes a social dimension
6. **Excludes health outcomes**: Studies that do not investigate or include a health outcome

Scoping Review

Results



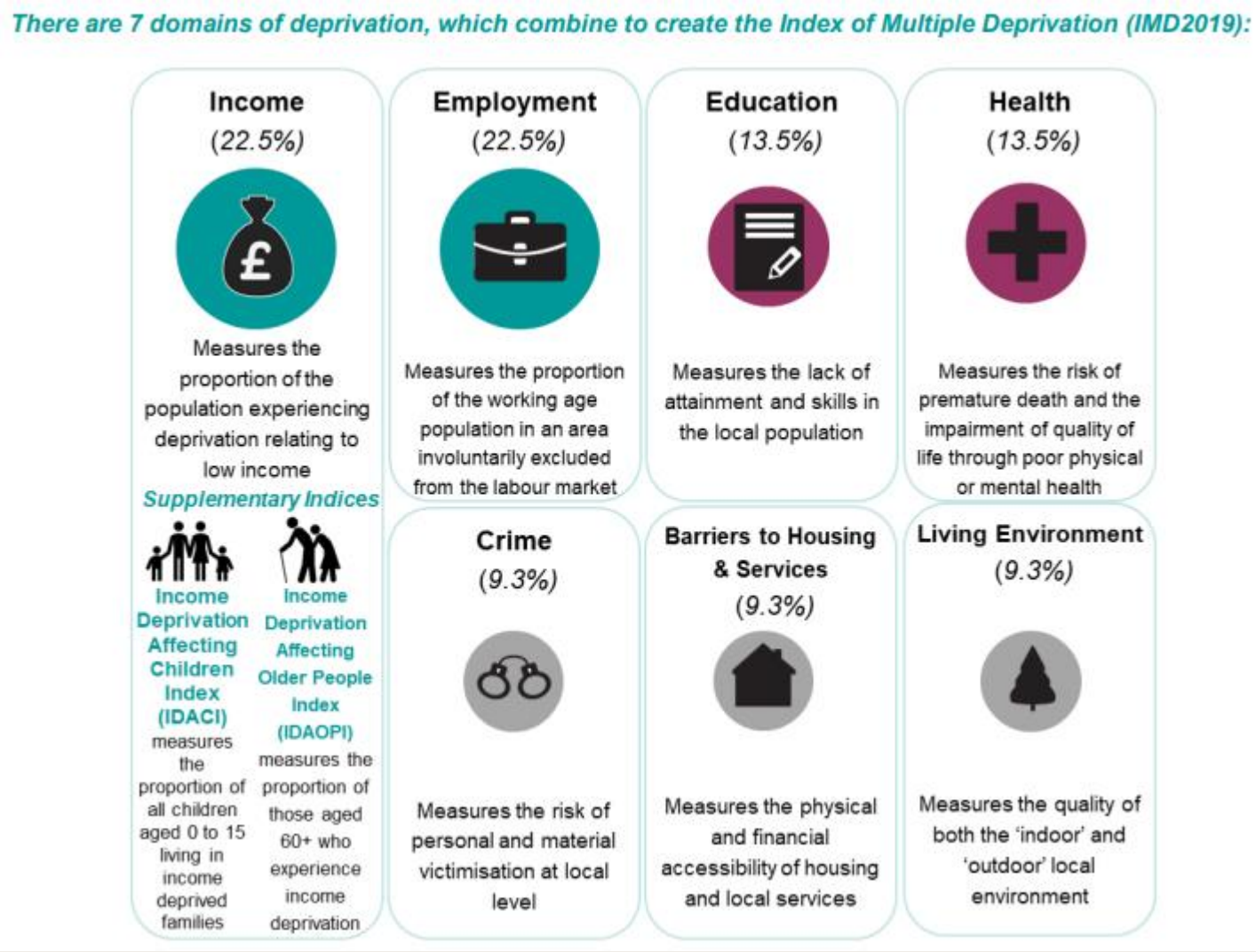


Scoping review

Some examples

- Scottish Index of Multiple Deprivation (SIMD)
- Italian Deprivation Index (IDI)
- Umbria Region Socio-Health Index (USHI) and Italian National Deprivation Index at the Umbria regional level (NDI-U)
- English Index of Multiple Deprivation (EIMD)
- French-European Deprivation Index (FEDI)
- French-Deprivation-Index (FDep)
- Welsh Index of Multiple Deprivation (WIMD)
- MEDEA Deprivation Index - Spain
- German Index of Multiple Deprivation (GIMD)
- German Index of Socioeconomic Deprivation (GISD)
- Bavarian Index of Multiple Deprivation (BIMD)
- English Index of Multiple Deprivation (IMD)
- European Deprivation Index for Portuguese small-areas (EDI-PT)
- SI-EDI, a newly derived European Deprivation Index for Slovenia
- Rural Deprivation Index (RDI) – England
- HP Pobal Deprivation Index (Ireland)
- Northern Ireland Multiple Deprivation Measure (NIMDM)
- Irish National Deprivation Index
- French Individual Child Deprivation Index (FrenChILD-Index)
- Spanish Deprivation Index (SDI)
- Belgian Indices of Multiple Deprivation (BIMDs)
- Danish Deprivation Index (DANDEX)

Example: Index of Multiple Deprivation



https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/835115/IoD2019_Statistical_Release.pdf

Scoping review

Current and Future Tasks

- Full text reading & Data extraction

- Assess the validity of the MDI
- Assess data availability for our case countries / European countries
- Assess what index can be applied to capture the smallest possible geographical unit

Author list

Vanessa Gorasso[1,2], Martina Otavova [1,3,4], **Carl Michael Baravelli**[5], Anette Kocbach Bølling[6], Jurgen Buekers[7], Susanne Breitner[8], Jane Idavain[9], Brigit Staatsen[10], Terje Andrea Eikemo[11], Alberto Castro[12], Brecht Devleesschauwer[1,13]

Author[1], Author[1,2], Author[3]

[1] *Department of Epidemiology and Public Health, Sciensano, Brussels, Belgium*

[2] *Department of Public Health and Primary Care, Ghent University, Ghent, Belgium*

[3] *Center for Demographic Research, UCLouvain, Louvain-La-Neuve, Belgium*

[4] *Data Science Institute, I-BioStat, Hasselt University, Hasselt, Belgium*

[5] *Department of Disease Burden, Norwegian Institute of Public Health, Bergen, Norway*

[6] *Department of Air Quality and Noise, Norwegian Institute of Public Health, Oslo, Norway*

[7] *VITO Health, Flemish Institute for Technological Research, Mol, Belgium*

[8] *Institute for Medical Information Processing, Biometry, and Epidemiology, Faculty of Medicine, LMU Munich, and Institute of Epidemiology, Helmholtz Zentrum München - German Research Center for Environmental Health, Munich, Germany*

[9] *Department of Health Statistics, National Institute for Health Development, Tallinn, Estonia*

[10] *National Institute for Public Health and the Environment, Bilthoven, The Netherlands*

[11] *Centre for Global Health Inequalities Research (CHAIN), Norwegian University of Science and Technology (NTNU), Dragvoll, Trondheim, Norway*

[12] *Swiss Tropical and Public Health Institute (Swiss TPH), Basel, Switzerland*[2]

[13] *Department of Veterinary Public Health and Food Safety, Ghent University, Merelbeke, Belgium*

Thank you ☺