$PM_{2.5}$ Intake and Burden of Disease - Effect Factors for Europe

ULTRHAS

ULtrafine particles from TRansportation - Health Assessment of Sources

Heli Lehtomäki, Antti Korhonen, Isabell Rumrich & Otto Hänninen

14.09.2023

Finnish Institute for Health and Welfare

UNIVERSITY OF EASTERN FINLAND

What are effect factors?

- Effect factors describe the burden of disease per kg of intake while intake is the amount of PM2.5 inhaled
- Effect factors can be used in life-cycle assessments of products and evaluation of policy measures
- Our aim was to estimate PM2.5 effect factors for 28 European countries by sex and five age groups

Modeling the intake of PM2.5

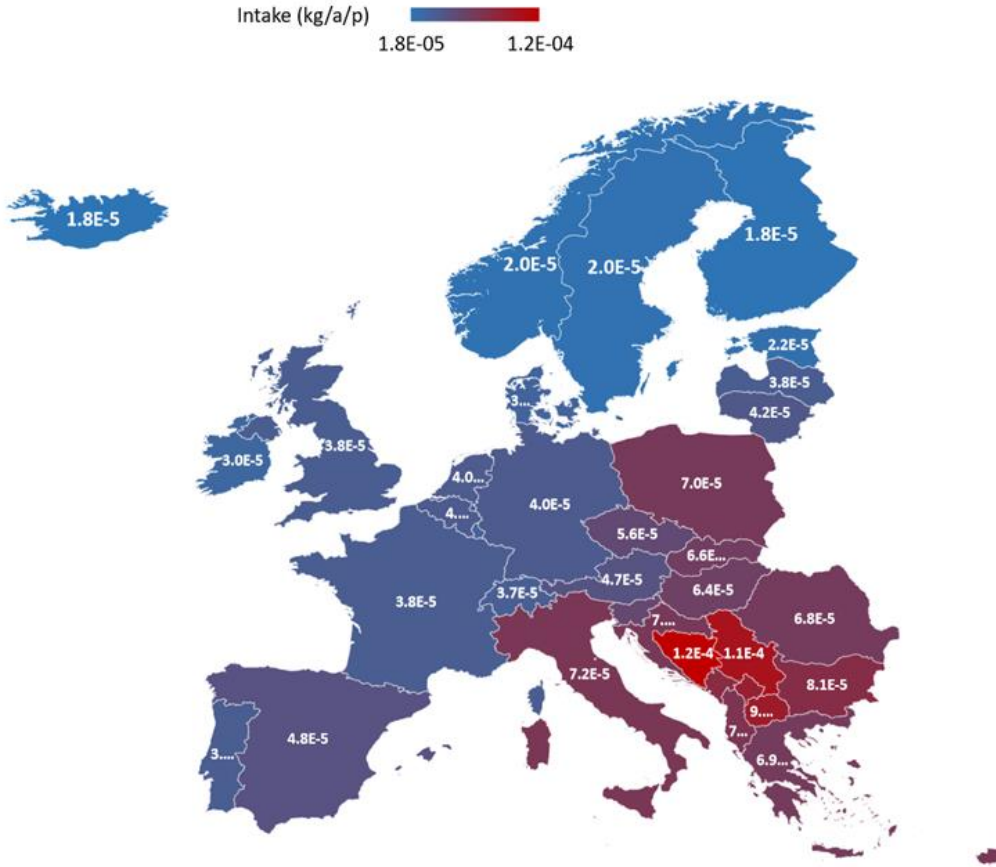
- Intakes by sex and five age groups (15-20, 20-24, 25-44, 45-64 and + 65 years) considering:

Outdoor air quality data by country

Infiltration of outdoor PM2.5 to indoors

Time and physical activity patterns

Breathing rate according to physical activity



The mean $PM_{2.5}$ intakes for adults.

Korhonen, A. et al. 2023. poster:
https://www.researchgate.net/publication/370707296_22_Development_of_an_Integrated_Exposure_Pathway_Model_for_Health_Impact_Assessment_of_Traffic_Ultrafine_Particles_H2020_Ultrhas-Project

https://vizhub.healthdata.org/gbd-results/

PM2.5 burden of disease

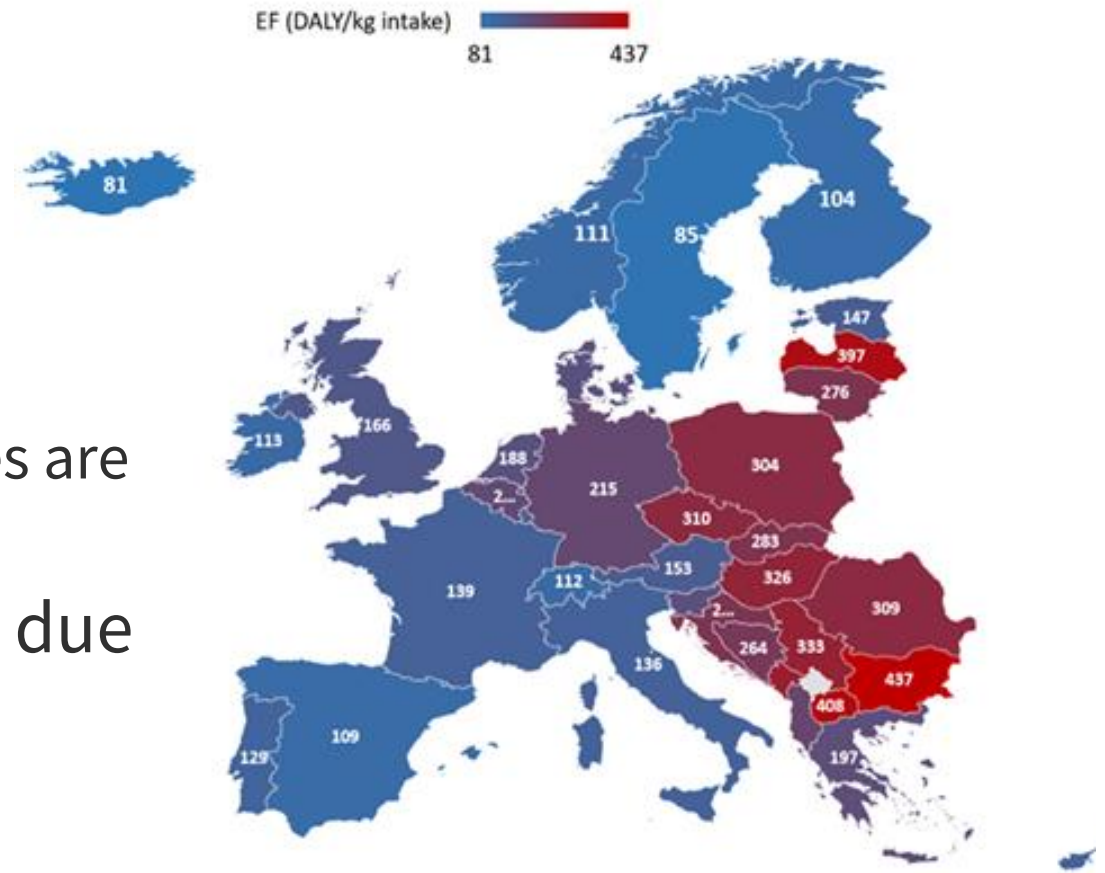
- GBD 2019 burden of disease estimates for PM2.5:
  - CVDs (IHD, stroke)
  - Lung cancer
  - Lower respiratory infections
  - Diabetes (type 2)
  - COPD
  - Birth outcomes (low birthweight and short gestation)

- GBD 2019 uses MR-BRT exposure-response functions
  - Combine relative risks from different studies
  - Cut-off range (TMREL) 2.4 to 5.9 µg/m3

PM2.5 effect factors in Europe

Preliminary results

- The mean effect factor was 205 DALY/kg intake for the EU-26 countries
- Women had on average (19%) lower effect factors than men
- Higher effect factors in Eastern Europe
  - Note: calculations per kg intake -> differences are not impacted by exposure
- In Nordic countries effect factors are low due to the cut-off used

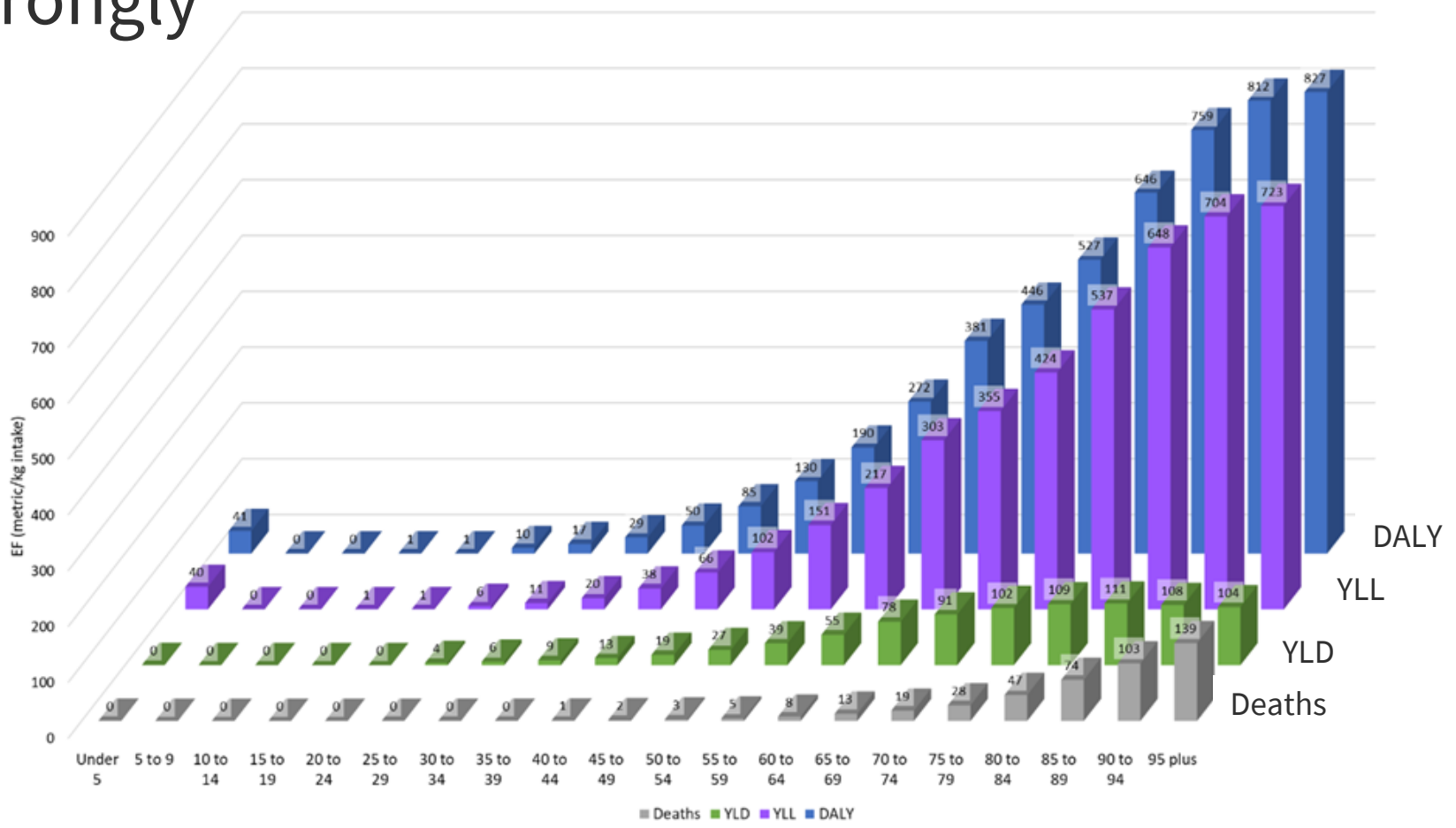


The mean PM2.5 effect factors for adults.

Effect factors by 5-year age groups for EU-26

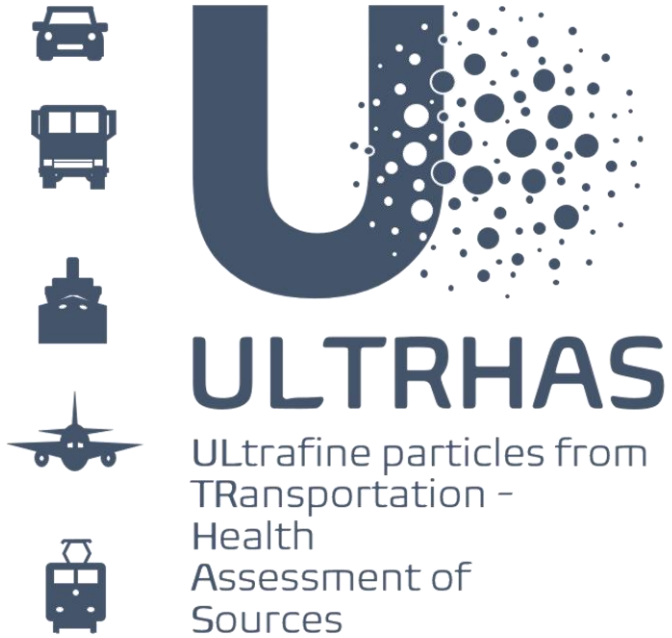
Preliminary results

- Effect factors are strongly age dependent



Summary of the findings

- The $PM_{2.5}$ effect factors had large variation between countries
- The highest effect factors were in Eastern Europe
- The effect factors are strongly age dependent with higher effect factors being associated with older age groups



Thank you all!

heli.lehtomaki@thl.fi

www.ultrhas.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 955390

NIPH Norwegian Institute of Public Health · HelmholtzZentrum münchen German Research Center for Environmental Health · UNI FR Université de Fribourg Universität Freiburg · der Bundeswehr Universität München · University of Eastern Finland · Universität Rostock Traditio et Innovatio · Finnish institute for health and welfare