A brief study on IAQ in Pljevlja’s households heated with different fuels and health impacts

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Introduction

In Montenegro, 7.22% (6.08%-8.44%) of all deaths are attributable to air pollution, where 2.61% (1.74%-3.68%) of all death cases are from indoor air pollution

The mortality rate due to air pollution in Montenegro is one of the highest in Europe, 78.6 deaths at each 100,000 citizens

Only Bosnia & Herzegovina and Northern Macedonia have higher mortality rates

IAQI assessment performed in 2020

Objective to improve awareness of Pljevlja’s citizens on health impacts of the heating based on fossil fuels
Methodology

IAQ is measured in 3 households that use different fuels: 1) pellet, 2) electricity and 3) combination of coal and wood

Measurement period: 17 February -20 April 2020 (74 days)

Households selected according to the following criteria:

1. non smoking
2. situated away of the large crossroads
3. measurements are conducted in the living room (surface area not exceeding 40m2)
4. households dwell in houses/not apartments
Instruments

- AirVisual Pro, PM10 and PM2.5, ambient AQ based on information from nearest station
- A light scattering laser sensor for PM2.5 (0.3 to 2.5μm) and air flow through the chamber
- Quantitative health impact estimate AirQ + software version 2.0
- Functions ‘pollution concentration->health outcome’ (in accordance with WHO Guidelines)
- Population and health – MONSTAT and Pljevlja Municipality
- Data regarding the % of households that use different type of fuels for heating - Municipality of Pljevlja
Results of indoor air quality measurement

- The household with combustion of coal for heating had the poorest indoor air quality - 3 times larger value for PM2.5 than the recommended health level

- The households that used pellet and electricity for heating had excessive indoor air pollution, with the unhealthy pollution level, 26.0 and 26.1 µg/m³ of PM2.5

- Ambient air quality (PM2.5) in Pljevlja was very bad, and 6 times exceeded the limits set for health preservation (10 µg/m³), while in Pljevlja that value was 57.9 µg/m³, causing less ventilation of the households

- Number of days exceeding MDL for PM:
  - Coal based 21% days PM10 and 49% PM2.5
  - Pellet: 14% PM10 and 42% PM2.5
  - Electricity: 14% PM10 and 30% PM2.5
Indicative health impacts of indoor air pollution

- Indoor air pollution causes more than a half of all respiratory diseases in Pljevlja - 51.9%
- 1264 persons had trachea inflammation and other obstructive lung diseases (woman 52%, men 43%)
- Indoor air pollution caused 93 cases of lung cancer (women 51 cases and 42 in men)
- 217 cases of ischemic heart disease is caused by indoor air pollution (women 43% in men 37%)
- Indoor air pollution caused 36 cases of stroke, 43%

To set acceptable levels of pollutants for indoor air quality within the Montenegrin legislation

Indicative number of annual cases of disease in Pljevlja due to the indoor air pollution caused by combustion of coal and wood

Percentage of households that use coal and wood for heating is 83% (5000 households) used for calculation the Burden of Disease (annual number of cases of disease)

Important note: not appropriate to use these results of burden calculation to show how the burden is distributed among specific individuals in the population
Recommendations for improving the AQ and heating systems

- Start shifting towards clean heating solutions (individual furnaces, microgrids, district heating)
- Municipalities to take a lead in process of decarbonisation of the district heating system
- Need to map the possible clean heat sources and start action planning now
- Build a consensus of all stakeholders
- Complete the research missing in order to better quantify potentials (geothermal, seasonal storage capacities, energy saving and waste heat potential etc.)
- Start negotiations for ongoing funding opportunities and conduct financing plan combined with subventions (WBIF, ReDEWeb, WeBSEFF, GEFF, CARI, EBRD, EIB...)

Summary of the study 'Identification and analysis of potential sustainable heating solutions in Pljevlja, Montenegro' - Bankwatch

Summary of the study 'Analysis of Sustainable Heating Options for the City of Tuzla, Federation of Bosnia and Herzegovina' - Bankwatch
Thank you!

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