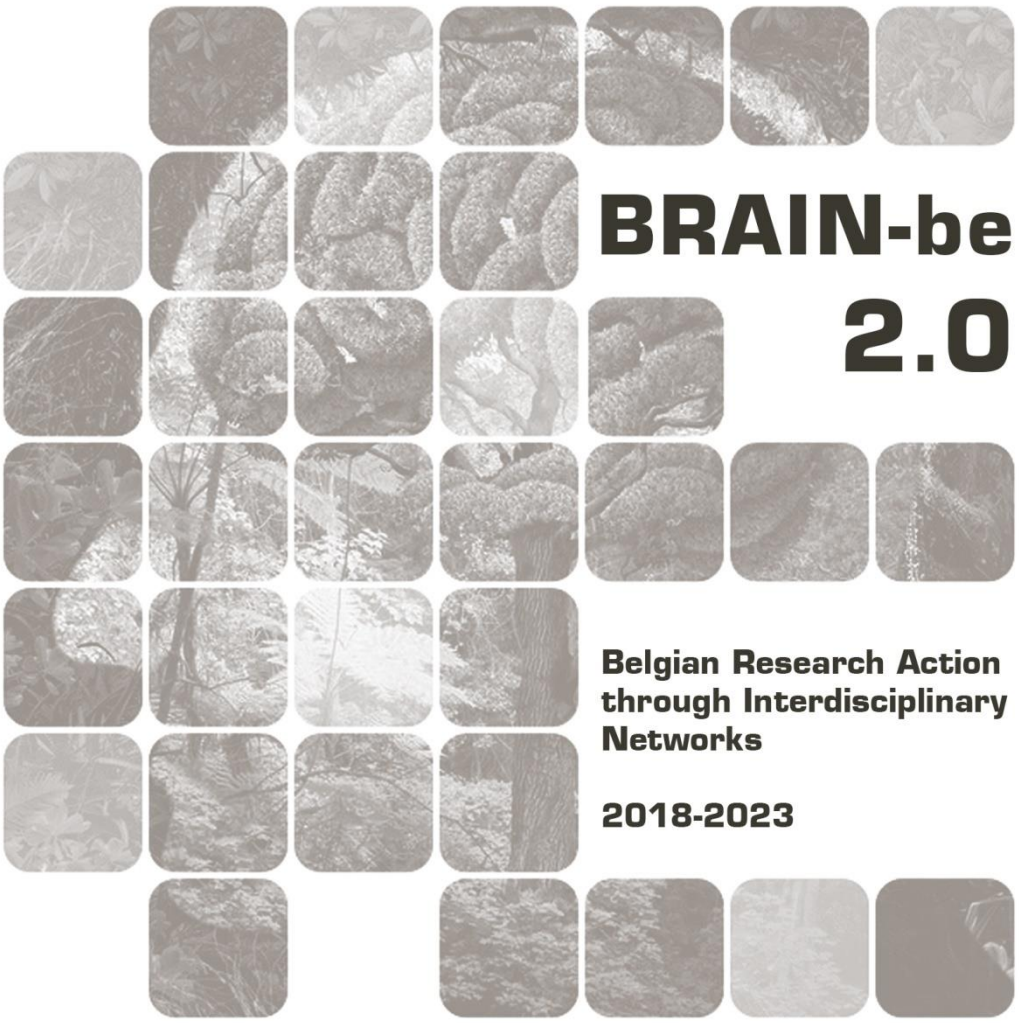

ELLIS

Monitoring and mitigating environmental health inequalities

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Pillar 3: Federal societal challenges

SUMMARY

CONTEXT

Environmental factors significantly impact public health, influencing disease risk and well-being. Pollution increases risks like lung cancer and cardiovascular disease, while green spaces promote physical and mental health. However, environmental exposures are unevenly distributed, often worsening socioeconomic health disparities. Lower-income and less-educated populations face greater exposure to pollutants and have less access to health-protective environments, contributing to lower life expectancy and poorer health outcomes.

Health inequalities arise from disparities in socioeconomic status, environmental exposure, and resulting health impacts. While these factors have been studied individually, their combined effect is less understood. Socioeconomic deprivation, reflected in education, employment, and housing conditions, is a key driver of health disparities. In some regions, such as Belgium, despite strong social systems, the gap in life expectancy between education levels is widening, exacerbated by geographic variations in environmental burdens.

The Environmental Burden of Disease (EBD) framework quantifies health impacts of environmental stressors using Disability-Adjusted Life Years (DALYs). However, most models fail to incorporate social inequalities, limiting their effectiveness in addressing health disparities. Understanding environmental health inequalities requires integrating individual and area-based data to capture both personal exposure histories and broader policy-driven influences.

Effective policy solutions depend on tools that assess environmental health impacts while accounting for social inequalities. Health Impact Assessment (HIA) methods exist but often lack integration of equity considerations. Developing localized, inequality-sensitive models is crucial for guiding interventions that reduce environmental health disparities and promote equitable health outcomes.

OBJECTIVES

In Belgium, there is no system for monitoring environmental health inequalities, and the country lacks tailored tools to evaluate the impact of policies on the distribution and extent of environmental health issues. This gap arises from significant data needs and methodological challenges. The primary aim of the ELLIS project was therefore to create tools to both monitor socioeconomic disparities in the environmental burden of disease and assess the impact of policy measures on these inequalities. ELLIS integrated three key dimensions: socioeconomic deprivation, environmental exposures, and health outcomes. This approach was implemented at the statistical sector level (the smallest administrative division in Belgium) to enhance flexibility and sustainability. The tools developed by ELLIS also enable the simulation of potential policy scenarios to assess their impact on environmental health inequalities.

CONCLUSIONS

Within the context of ELLIS, we developed the Belgian Indices of Multiple Deprivation (BIMD), marking a shift from simple measures of deprivation to a multidimensional approach, combining income, employment, education, housing, crime, and health domains to assess small administrative units. Our studies revealed significant geographical disparities, with the most deprived areas concentrated in Wallonia. Poor housing conditions contributed to 18.5% of deaths between 1991 and 2020, while

socioeconomic inequality accounted for nearly 30% of premature deaths from 1998 to 2019. Despite overall improvements in life expectancy, gaps persist between the most and least deprived areas. Furthermore, deprivation is linked to higher risks of premature mortality, especially for alcohol-related deaths, COPD, and diabetes, with notable spatial inequalities, particularly in Wallonia.

The ELLIS project specifically explored the health impacts of environmental stressors in Belgium, focusing on air pollution, noise, and industrial land-use. The study found that areas with high air pollution and industrial presence saw an increase in all-cause mortality rates, with cumulative exposure to multiple stressors significantly raising the mortality rate by 26.9%. Seasonal air pollution patterns were also observed, with higher pollution levels in winter, particularly from traffic and heating sources. A study on urban and transport planning highlighted the health burden of air pollution and lack of green space in cities like Brussels, Mechelen, and Liège, estimating that addressing these issues could prevent up to 22% of total mortality. Additionally, a separate study in Flanders linked higher exposure to pollutants like NO_2 and $PM_{2.5}$ to more deprived areas, revealing that social inequality exacerbates the health impacts of air pollution. Finally, traffic interventions like car-free days in Brussels and Paris were found to significantly reduce NO_2 exposure and could lower paediatric asthma rates by up to 29%.

Belgium must continue updating and promoting the Belgian Indices of Multiple Deprivation (BIMD) to ensure it reflects current patterns and guides policy and funding decisions. Integrating the BIMD into strategies across policymakers, regional authorities, and academics will help target interventions effectively. To reduce environmental health risks, stricter air quality regulations are needed, particularly in urban areas, along with better urban planning and expanded green spaces to limit pollution exposure. Focusing on pollution reduction in low-income areas and enhancing cross-sector collaboration will foster integrated solutions. Addressing poverty, education, and employment is however required to tackle the root causes of health inequalities.

KEYWORDS

Environmental burden of disease, Environmental health inequalities, Environmental inequalities, Health impact assessment, Health inequalities, Monitoring, Pollution, Social deprivation