INTARESE Technical brief

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Integrated Assessment of Health Risks of Environmental Stressors in Europe

Introduction

INTARESE's goal is to develop a framework and toolbox for performing integrated assessments. This toolbox will only be useful if you know what those assessments are likely to be, in order to make sure the right data and tools are available.

For this reason case studies have been the cornerstone of the INTARESE project since its beginning. By performing an integrated assessment on real-life situations, the INTARESE teams can demonstrate and refine their methodology.

The project is focusing on seven policy areas in total, chosen for their relevance to everyday issues and policy makers. Each area is well suited to integrated assessment because of the complexity of the issues involved and the trade offs that have to be made with each policy decision. By applying the four stages of the INTARESE methodology, the teams working on each policy area have the chance to test the assessment framework, as well as identify and fill any gaps in knowledge.

Both the waste and transport case studies featured here are in their 'second pass' stage. They've already been through one assessment, which has allowed the team members to define the issues they want to address and develop the tools and data to do so, with the second phase being a refinement process.

Assessing the impact of transport

Transport is one of the biggest aspects of our lifestyles today that affects our health. And from congestion charges to bans on cars, every community has different ways of responding to the negative effects of transport.

Dr Gerard Hoek

We're all familiar with the negative effects – air pollution, noise pollution, traffic accidents. We can also see the positive effects from transport activities such as cycling. And then there are the other effects that transport policies have - public spaces being knocked down to make way for car parking for example.

The fact that there are so many different aspects to the effects of transport, positive and negative, makes it an ideal area to demonstrate the INTARESE methodology.

The transport team started with open minds about what kinds of exposures and health effects can occur. To avoid excluding issues that might be difficult to quantify, the team conducted a literature search then defined the issues they wanted to explore.

"This stage of issue-framing isn't just a matter of talking with experts and deciding what to look at." says Dr Gerard Hoek from the Institute for Risk Assessment Sciences at Utrecht University. "It's also vital to involve the stakeholders in this process. In an assessment, you can't ignore things that are important to the general public - the results might be scientifically valid but they won't be very useful!"

In this case study, involving the people who have to make the decisions on transport policies gave the team a new perspective on transport assessments.

Whilst scientists typically think of the negative effects of transport, policy officials tend to focus on the positive effects such as the impact on traffic congestion. And while

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scientists are happy talking about the health effects in Disability Adjusted Life Years, or DALYs, the stakeholders preferred the universal language of financial costs.

After consultation with the stakeholders, the team decided to focus on the three most dominant effects in transport – air pollution, road traffic noise and traffic accidents - and express the results in the way the stakeholders preferred, where possible. The three effects also lent themselves well to quantification. In the second stage they also addressed the benefits of physical activity.

Cycling to work must be good for you

In one area of the assessment, they looked at whether the health benefits of cycling to work outweighed any negative effects.

"This assessment was quite difficult to do because of the lack of data." explains Dr Hoek. "We had good evidence of the link between physical activity and the health benefits, but very little on the air pollution."

The majority of the air pollution data was based on levels around where people live, and didn't take into account the short commutes during high exposure levels. By making use of other epidemiological studies and further calculations, the team were able to approximate the information they needed, and concluded that the number of years gained from the benefits of cycling to work can be up to 12 times more than the number of years lost.

Throughout the assessments, Hoek and his team were aware of the need to take uncertainties in account. By carefully defining different scenarios, such as whether the person taking up cycling is unhealthy or healthy, and using statistical uncertainties on the exposure-response functions, they could quantify some of the uncertainties. The qualitative uncertainties, and how the results may have differed because of them, were included in the concluding discussion.

Spatial scale

The team also studied transport policies aimed at reducing congestion in five European cities – London, Rome, Barcelona, Helsinki and the Hague. The effect that those policies had in the cities was substantial when the traffic intensity and speed were assessed – a reduction in car traffic of up to 30-40% was seen. To the stakeholders, this is an important result and must not be ignored in favour of DALYs. As they went along the assessment chain, the effect on emissions was less but still substantial – a 10-20% decrease in emissions. The beneficial effects on health were smaller, but the results did indicate that some policies could contribute towards reducing social inequalities.

> "Integrated assessments can only be a small part of the many factors that influence policy. But they're a really important part, providing objective assessments."

The spatial scale of the evaluation of assessments like these is important – when the team looked at the Rome assessment again but concentrated over the centre of Rome, they found that the impact on the concentration of NO_2 was ten times higher than when averaged over the whole of Rome. Knowledge like this can help explain why some policies have only perceived modest impacts when a lot more was expected, and help the policy makers understand better how to improve them.

"There are so many factors that influence policy - integrated assessments can only be a small part of that," says Dr Hoek. "But it's a really important part, providing objective assessments of policies in a very politicised area."

Reducing waste

On average, one person in an industrialised country produces 500kg of waste each year. Finding ways to safely dispose of this waste in an environmentally friendly manner is increasingly a priority.

Dr Francesco Forastiere

Dr Kees De Hoogh

'Reduce, reuse, recycle' is a common mantra now for waste disposal. With up to 90% of all municipal solid waste (MSW) in European countries going to landfill, governments are developing policies to reduce the amount of waste we generate.

The negative impacts of landfills extend further than just the environment. Emissions from landfill and incinerator sites have been the subject of many scientific studies but there is no conclusion yet on the health impacts of living near one. The subject is a controversial one, with communities protesting against planned incinerators and confusion over the distinction between toxic waste from hospitals and standard MSW.

The members of work package 3.6 are taking the health effects of landfill and incinerator sites as their starting point for the INTARESE case study on waste, assessing the impact of waste management policies since 2001 in Italy, Slovakia and England.

From a comprehensive literature review of the major health effects related to landfill and incinerators, two issues were chosen. The case study focused on the health effects of cancer incidences and reproductive outcomes such as low birth weight and congenital malformation. Effects such as health impacts from transportation, emissions into soil and water, illegal dumping or accidental releases weren't considered in this first phase.

With the scope of the assessment clearly defined, the team studied a wide range of pollutants generated by incinerators and landfill sites, with five found to dominate: particulate matter, volatile organic compounds, hydrogen chloride, nitrogen oxide and sulphur dioxide.

Dispersion modelling was used to calculate the exposures to these pollutants from incinerators. "It allows us to evaluate the dispersion of the pollutants whilst taking into account the weather, geography and characteristics of the incinerator." explains Dr Kees de Hoogh of Imperial College London.

The team also used a geographic information system (GIS) to assess the population sizes and characteristics most affected by the incinerator. With over 2% of Italians living within 3km of an incinerator, and 2.5% within 2km of a landfill site, the data set for the assessment was large. The team found that those living closer to landfill sites and incinerators tend to be in a lower socioeconomic class.

Dr Daniela Porta

Dr Martin Krayer von Krauss

What to assess

As with all the case studies INTARESE has been assessing, not all the data was available to the waste team. "Most of our efforts were concentrated on resolving problems of data collection." says Dr Francesco Forastiere of the Department of Epidemiology in Rome. "We needed methods to calculate emissions, model the exposures and calculate the exposure-response functions."

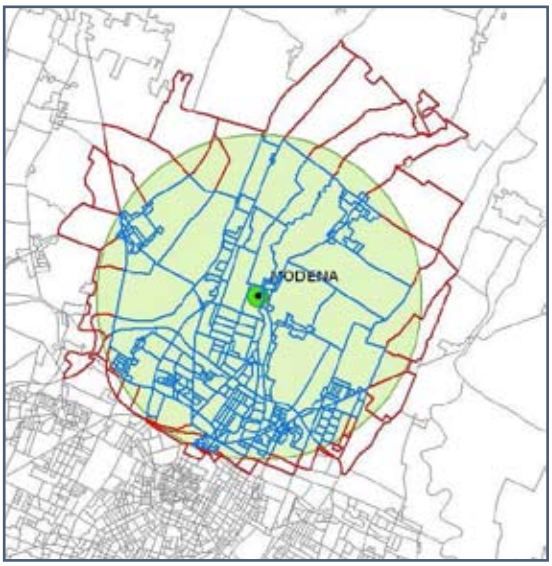
And the team found that it wasn't just missing data they had to deal with. Just linking cancer rates to recent emission levels and assessing the impact of newer policies was difficult. The majority of cancer cases observed are due to exposure levels from before 2001, making the relative impact of recent policy changes weaker.

"Unfortunately our assessments have shown that there's not much we can do now to prevent the negative health effects that have already taken root." says Dr Daniela Porta from the Department of Epidemiology in Rome.

Levels of confidence

Common to all INTARESE case studies, the team also had to consider the uncertainties in their assessment. They adopted the approach of the IPCC in its climate change reports. "By using the 'level of confidence' scale, we could all use the same terminology to describe the validity of the models, assumptions and results. Then if any disagreement occurs, we know it's about the content not the terminology used to describe it." says Dr Martin Krayer von Krauss of the European Centre for Environment and Health at the World Health Organisation.

Completing the first stage case study has prepared the team for a larger, second phase case study. This second assessment will compare scenarios from two possible policy changes in England. It will also broaden the scope of the assessment to include waste transport, mechanical biological treatment (MBT) and other emission sources including recycling and composting.



The population at risk near the Modena Incinerator in Italy based on the latest census data

The scenarios that the team plan to assess are based on figures for England and include an increase in recycling and composting of household waste by 50% with the rest either being incinerated or going to landfill. A more ambitious green policy will also be assessed - 15% reduction in waste production and an increased recycling rate of 70%, with the rest being incinerated only.

Both these scenarios will be compared with the 2006 baseline of 29 million tonnes of waste. Over half of that went to landfill, 30% was recycled and the rest incinerated.

Once complete, the waste team will have produced a lot of the data and tools needed for future waste management policy assessments, contributing to INTARESE's toolbox legacy.