Deciding on complex knowledge; biomonitoring data and policy interpretation in Belgium

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Abstract

When science does not have all answers, how can policy makers make up their minds about complex data on health and environment? An interdisciplinary and transdisciplinary working group developed an action-plan to deal with a large amount of biomonitoring data: the measurements of pollutants and health effects in more than 4000 inhabitants of Flanders (the Dutch part of Belgium). Part of the development process was the growing awareness of the limits of scientific interpretation. Social scientists helped introducing a decision making procedure in which the use of scientific interpretation and 'other' insights complement one another. Both the scientists and the policy makers accorded the action plan. Parts of the procedure are an expert round and a jury that both will give advice to the government. One of the methods used for the jury deliberations is a multi criteria analysis. We will discuss this procedure, and the development process. We will especially focus on the contribution of the social scientists.

1. Introduction

At the international level experts more and more come to the conclusion that environmental problems have serious consequences for public health (McCally 2002, Harremoës et al. 2002). The number of environmentally related cancers is rising, an increasing number of people suffer from respiratory problems, fertility problems are on the rise, and so on. The (causal) relation between environment and health is very complex though and to a large extent unknown. For a number of individual toxic substances the health effects from high doses are well known. Unknown are the effects of small doses of different substances over a longer period. Also unknown are the combined effects of different substances. There are clues though about DNA-damage, hormone disruptions and loss of sperm quality.
It is not always possible to prove unambiguously that a relation exists between environmental pollution and specific health effects (Ravetz 2002, McCally 2002, Harremoës et al. 2002). Furthermore scientists can and do differ in opinion about these issues. The question how to organise research and policy on these topics is difficult to answer because of complexities. This does not only relate to the complex relationship between environment and health, but also to societal aspects. Next to toxic substances, different societal perspectives and interests play an important role.
The Flemish government picked up the challenge of further investigating the relation health – environment and to generate policy relevant knowledge in order to formulate adequate policy measures. The road from research to policy making appeared to be strewn with unforeseen complexities. The ambition though remained on the political agenda and practical solutions were developed. We are now in the phase of implementing a conceptual action-plan. We will not present

results from this practice, it is too early for that, but will introduce the process in which the action-plan was developed.

First we will introduce the background of this project: the Centre for Health and Environment, the setting in which the process started. We will introduce the biomonitoring project, the main research activity of this Centre, and shortly illustrate the type of results that come out of this research. Second we will introduce the action-plan: three evaluation phases, a practice cycle, a jury and multi criteria analysis. Third we describe the process mainly from the perspective of action research and social science. Finally some conclusions are drawn.

1.1 Centre for Health and Environment

The Centre for Health and Environment in Flanders (Dutch speaking part of Belgium), a project funded by and working directly for the Flemish government, investigates the complex relationship between Health and Environment. This is one of twelve centres for policy relevant research that started end of 2001, beginning of 2002, for a five year period. Their main task is scientific research on priority issues for government policy. A steering group, in which representatives of governmental institutions are seated, is attached to each Centre. In the steering group policymakers discuss the knowledge production and valorisation with the researchers.
In the Centre for Health and Environment mainly environmental health experts from all Flemish universities and the Dutch University of Maastricht are cooperating. In addition a social scientific expert unit is part of this Centre. The main research activity of the Centre for Health and Environment is biomonitoring.

1.2 Biomonitoring

In Flanders a biomonitoring campaign was started end of 2001. Main purpose of the biomonitoring project is to investigate the very complex relation between environmental pollution and human health. This is done by measuring pollutants and health effects in human beings. The focus lies on three different target groups (in total over 4000 participants): newborn babies, adolescents and adults. Each campaign is carried out in eight areas within Flanders. These areas represent different kinds of environmental conditions, such as industry, the countryside (rural areas), urbanized areas, waste incinerators, and fruit orchards. The results from the first biomonitoring campaign (newborn babies; presented in 2005) showed some interesting outcomes. First though we will shortly introduce the way these data were interpreted.
The limits of knowledge on health and environment clearly showed when the first biomonitoring results had to be interpreted: no reference values for interpreting the data really exist. Only with regard to lead (international) norms are available. One of the aims of the study was to compare different environmental conditions by comparing results from different areas. An average reference value per pollutant or health effect was used to decide which monitoring results from which study areas are relatively high. Also a comparison was done with research outcomes from other studies e.g. from abroad.
The interpretation of first biomonitoring results presented some unexpected outcomes. First, the differences between study areas with different kinds of environmental conditions overall were not as clear or (statistically) significant as was expected. The differences between individual results of participants within one study area were more explicit than the differences between different study areas. Second, it was expected that the countryside results would correspond to the image of being relatively less problematic with regard to the environment. When we

compare this with the outcome of the biomonitoring, we notice a strikingly different picture. The biomonitoring indicated that, in several rural areas, levels of persistent chlorinated compounds such as dioxin-like compounds and PCBs, were relatively high compared to the industrial zones of Olen and Albertkanaal, near ports, and the urban agglomeration of Ghent.

2. Action-plan

The biomonitoring results in data on several pollutants and health effects in eight different study areas, and for three different age-groups. The big question is: what should be done with this vast amount of information? Together with medical and environmental scientific experts and policymakers, social scientists worked on the preparation of an action-plan (Koppen et al. 2005) for further interpretation and policy measures. Both the biomonitoring as well as the development of an action-plan for policy uptake of the biomonitoring results is a new phenomenon in Flanders. The first discussion concerning interpretation of data was done within the framework of the Centre for Health and Environment.
At first the question of policy interpretation was approached as a merely scientific quest: with the right group of experts the interpretation with regard to policy priorities will follow automatically. While trying to build bridges between scientific and policy interpretation though the limitations of an exclusively scientific endeavour clearly showed: no scientist or group of scientists dared claiming to possess the necessary and overarching knowledge for answering difficult questions, questions e.g. on policy priorities when also other than (medical and environmental) scientific factors had to be taken into account (economics, social preferences, feasibility of policy measures). The social scientists therefore introduced the formation of a jury that will also judge relevant data and knowledge in order to give advice to the government.

2.1 Phased evaluation

In the beginning the discussions in the working group (consisting of scientists from the Centre for Health and Environment, policy representatives and experts from government institutions) mainly focussed on environmental and medical scientific interpretation of the monitoring data. This is not surprising, since most of the policy representatives and policy experts involved from the start were medical, technical or environmental specialists by training, as are most of the scientists involved in the Centre for Health and Environment. Consultation of scientific experts as well as desk research was considered to provide the necessary knowledge and answers. The social scientific contribution at first was considered to be limited to issues of (risk) communication.
The biomonitoring results are assessed in three successive phases, each focussing on different aspects. The first phase focuses on the question: how severe are specific results with regard to public health risks? To a large extend in this phase the discussion focuses on reference values for interpreting the data (see under paragraph 1.2). The second phase focuses on possible causes for a specific monitoring result. For example causes may be environment related or life style related. In the third and final phase the focus is on the question whether we can identify a (local) source for the pollution?

2.2 Practice cycle

Because in the early stages of the development process no clear ideas were formulated about the process aspects of the scientific interpretation and translation

into policy action, the social scientists proposed to develop a practice cycle with the different procedural steps, actors and roles for each phase: from assessment to decision making. The main questions we wanted to answer with this practice cycle were:

- Who is responsible for the research based on the results from the biomonitoring?
- Who is responsible for steering the process?
- Whose knowledge or opinion is relevant?
- Who decides on policy options?
- Who should be informed about the developments and outcomes during the process?
- What are important points of interest during the process?

The social scientists investigated the preferences for this by means of a short questionnaire among the participants of the working group. On the basis of the outcomes, proposals were designed for organizing the process and for involving different kinds of actors. Also a more precise definition of the main questions resulted, especially with regard to the first phase. The central question of the first phase became: what relative priority do different biomonitoring results have for policy? The outcome will be a priority ranking of biomonitoring results for policy (see paragraph 2.4).

The practice cycle is made up of cyclical steps, to be taken during each phase of the action-plan:

- Step 1: Deciding how to operate and which actors to involve during the process
- Step 2: Desk research on the biomonitoring results and expert consultation
- Step 3: Bringing a synthesis of the desk research and expert consultation before a jury; main focus on recommendation of priorities for further steps
- Step 4: Synthesis of desk research, expert consultation and jury advice for the administration
- Step 5: The administration translates a synthesis of the above into policy options
- Step 6: The government decides on next steps
- Step 0-7: External communication

Another outcome of the questionnaire was a reservoir of potentially relevant actors for different steps during the practice cycle. This varied from scientific experts to be consulted for scientific interpretations, to stakeholders for input on societal issues, to the broader public for communication purposes. Furthermore the relevance of taking into account social, economical and policy issues was stressed.

2.3 Jury

The fact that no scientist or group of scientists dared claiming to possess the necessary and overarching knowledge for answering all difficult questions of interpretation and policy action, formed the occasion for the social scientists to propose to work with a jury. The jury will potentially be made up of experts, stakeholders and (other) citizens. The reservoir of potentially relevant actors will form the basis for selecting candidates.
For good understanding, we did not choose for the formal method of a citizens jury as described in literature (e.g. Slocum 2003). We did not limit the potential candidacy of a jury to merely ‘citizens’, but used a broader perspective, potentially including both stakeholders and experts. We mainly used the word *jury* to distinguish the procedure of prioritising options or selection of ‘next steps’ from the

expert consultation. We wanted to highlight the aspect of inviting a diversity of social actors to the interpretation effort, and as such being more inclusive than merely stick to experts from both scientific and governmental institutions. As such we wanted to broaden the knowledge base for the decision making process as well as learn from a diversity of opinions with regard to the issues under discussion. Main guideline for the selection of jury members was not striving to be statistically representative, but invite a diversity of relevant societal perspectives. The main challenges for this approach were enrichment of the quality of the process of assessment and decision making, and gaining support for the process of policy making (e.g. Fisher 2000).
Furthermore it is important to stress the advisory status of the jury, as opposed to e.g. the status of a jury in some legal systems where the jury takes final decisions. In the case of the biomonitoring action-plan, the jury is a kind of advisory committee. The jury will formulate a policy advice for the government on the basis of the input from desk research, the expert consultations and its own deliberations. Of course the government may decide otherwise. But part of the process is the commitment of transparency: once the government decides, it will communicate not only the decisions, but also the arguments for it. Also the government will respond to the suggestions, arguments and concerns raised during the process that led to the jury advice.

2.4 Multi criteria analysis

For the jury in phase one (prioritization of biomonitoring results for policy action) we developed a multi criteria analysis. The three main criteria are: seriousness of environmental & health risks, feasibility of policy measures and societal aspects. The content of these three criteria will be gathered during the second step of the practice cycle: desk research and consultation of experts. In the multi criteria analysis the jury for each biomonitoring result discusses the relative importance (weight) of each criterion. The outcome will be more than merely a numeric ranking of policy priorities though. The jury process will be a group discussion in which participants can learn from each other and where views, arguments and concerns will be exchanged and monitored. The multi criteria analysis functions not as a black box - miracle tool, but as a method for structuring discussions and for supporting reflection during the deliberations (Belton and Stewart 2002, Dodgson et al. 2000). Transparency and practical employability therefore are essential features.

3. Development process

3.1 Action research

From the perspective of the social scientist this development process is an example of action research or interactive research: action-oriented, researcher and research subject work together, and do not stand in any hierarchical relation (Boog et al 2001). In the case of the Flemish Centre for Health and Environment it concerns two-layered interactive research. Firstly, the cooperation of the social scientists with other actors in the Centre can be noticed. Secondly, one of the goals of the Centre is to involve external actors. The social scientists support this process.
Two kinds of lessons may be learned from action research. On the one hand context specific lessons, related specifically to the research context. On the other hand lessons that go beyond the specific context, that are exemplary for other situations or contexts, or even society in general. It is a constant process of research, practice and learning: new knowledge is introduced directly into the research context, and on the basis of this practical experience the knowledge may

be improved. Together with the participants the social scientist reflects on this process. This reflection leads to an action strategy that will be tested in practice, and evaluated afterwards which leads again to reflection. This context- and interaction-specificity means that no best practices are available. Fruitful lessons from social science and other contexts may be helpful, but researchers and research subjects are free to choose, negotiate, the approach they think is best suitable for the research context.

3.2 Social science

The social scientists in the framework of the Centre for Health and Environment focus on the scientific, societal and political meaning of knowledge, and on processes of deliberation and cooperation between different disciplines and actors. At the beginning of the development process of the action-plan under discussion here, these social scientific perspectives were not addressed by the working group. Step by step though, the fruit of interdisciplinary and transdisciplinary discussions and cooperation resulted in emancipation of social science in this mainly technical environment. In order to bridge the gap in issue framing between experts and policymakers the contribution of the social scientists proved to be helpful. A reflective contribution paved the way for the involvement of a diversity of actors, enriching the assessment with other than technical medical and environmental criteria, and procedures for cooperation, deliberation and decision making were introduced.

The effort sketched in this paper turned out to be a rather labour intensive exercise. The time available for reflection on the work in progress is rather limited. Moreover do most actors involved in the process have overloaded agendas. Discussing complex issues takes time and energy, and often goes hand in hand with a lot of 'paperwork'. Part of the work also goes to unforeseen complexities. Daily practice of the Centre for Health and Environment clearly differs from a laboratory situation. In laboratory research conditions are controlled to a large extend (or controllable) and complexities are limited to a certain degree. The research practice of a social scientist in a setting such as the Centre is something completely different. In the laboratory atoms and molecules more or less do what they are expected to do. In social practice research subjects will go into discussion with the researcher, they talk back (Bal et al. 2002). We can therefore speak of a 'stubborn' practice.

Quite some time is spend on actors getting used to working together. Trust building takes time and effort and is an important part of the work. Actors also have to find new roles for themselves to some extend. In the case of the Centre for Health and Environment scientists suddenly have to discuss work with (sometimes totally) different disciplines. They also have to talk (to) politics. Government representatives suddenly have to discuss science and different fields of policy expertise (the Ministries of Health and Environment) also have to come to terms. Apart from role seeking, this also demands (new) procedures. Furthermore common vocabularies need to be developed: different scientific disciplines, policy makers and other actors use different (technical) language, have different cultural backgrounds and a different knowledge base.

4. Conclusions

Designing a process for assessing complex data and deciding on policy steps has shown to be ambitious and in need of a joint effort of relevant actors. The appreciation of and openness towards other views, other disciplines, and transdisciplinary knowledge seems to have increased with regard to this project. More or less this runs parallel with the development of the work of the social

scientists. Fisher (2000) uses the concept of coordination when describing the role of social scientists. He speaks of the necessity of developing innovative methods for coordinating between different discursive processes and institutions. This role of the social scientists within the framework of the Centre for Health and Environment can be characterized as 'emancipating'. This process of emancipation clearly takes a lot of time and effort.

The experience in the framework of the Centre for Health and Environment shows that the social scientific contribution is not so much a matter of transferring concepts or tools and once they are agreed upon by other actors, job finished for social science. Next to 'different disciplinary concepts' also 'different disciplinary hand & eyes' are needed. Of course certain 'foreign' concepts and reflexes may to some extend become routine after a while, but this takes quite some time and effort of these 'other' disciplines. Most actors involved complain about their work load: their own disciplinary task is very demanding and leaves little room for other perspectives. For example we notice the effect compositions of the working group during meetings have on the work in progress: absence of specific experts to some extend is equal to absence of specific expertise. Another example is that even once certain social scientific phenomena such as a jury are agreed upon by the other actors, they tend to question these activities over and over again, as if they have to keep ruminating, or sometimes almost seem to have never tasted it before. Apart from complexity of (also) the social scientific expertise, this clearly is a matter intrinsic to difference in perspectives.

Another important lesson is context specificity, a matter addressed several times during the PATH-conference (see e.g. the contribution of Lars Klüver). It is relatively easy to develop concepts and methods in the 'ivory tower', at a 'ten commandments level' or to apply them in laboratory-like circumstances. Applying them in the stubborn and complex daily social practice, negotiating their application with actors with totally different backgrounds is quite demanding. At the same time though, the results can be very rewarding and fruitful, the development of the action-plan in the context of the Centre for Health and Environment discussed in this paper being a promising example of this.

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