



Summary of Focus Group Discussions and Other Preparatory Work for the VERHI Project

by Pascale Scapecchi and Nick Johnstone

OECD
Environment Directorate

Paper prepared for the OECD Project on the “Valuation of Environment-Related Health Impacts, with a Particular Focus on Children” (VERHI).

Valuation of Environment-Related Health Impacts with a Particular Focus on Children

Background

The lack of empirical surveys and associated lack of data in this area is a barrier to the provision of sound policy advice. Indeed, existing values used for monetisation of environment-related health impacts focus on adult populations and use scenarios that often do not match well with environmental scenarios. As such, there is concern that the continued use of existing estimates from unrelated contexts that do not take these factors into account may result in a misguided benefit-cost analyses, and in a possible misallocation of resources, especially when environmental policies with significant implications for children are under consideration.

In this context, the OECD Environment Directorate implemented in 2006 a project on the valuation of environmental health impacts, with a particular focus on children: the VERHI Project.

Objectives

This three-year project (2006-2008) funded by the European Commission under the 6th Framework Programme of Research (contract number SSPE-CT-2005-006529) seeks to improve the incorporation of environment-related health impacts in policy-making. An original survey instrument will be applied in three OECD countries (United Kingdom, Italy and the Czech Republic) that have disparities in terms of important factors, such as social insurance systems, health care systems, social concern about the environment, etc.

This survey will be developed so as to obtain methodologically comparable values for adults and children for similar risks, and will also seek to cast light on the context of the risk reduction, and on latency issues. Finally, the project will explore the potential for benefits transfer across countries with different socioeconomic characteristics.

Contact

Project Co-ordinator: Nick Johnstone, Email: nick.johnstone@oecd.org

For more information on the VERHI Project and to download documents, visit the website: <http://www.oecd.org/env/social/envhealth/verhi>

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Pascale Scapecchi and Nick Johnstone¹

OECD Environment Directorate

1. Introduction

There is a lack of empirical surveys and associated data in the area of valuation of environmental health risks to children. This limited evidence is a barrier to the provision of sound policy advice. Indeed, existing values used for monetisation of environment-related health impacts focus on adult populations and use scenarios that often do not match well with environmental scenarios. As such, there is concern that the continued use of existing estimates from unrelated contexts that do not take these factors into account may result in a misguided benefit-cost analyses, and in a possible misallocation of resources, especially when environmental policies with significant implications for children are under consideration.

The Valuation of Environment-Related Health Impacts (VERHI) project was therefore undertaken to address some of these issues. It seeks to improve the incorporation of environment-related health impacts in policy-making. To this end, a survey instrument will be applied in three OECD countries (United Kingdom, Italy and the Czech Republic) presenting social, economic and environmental differences. This survey will be developed so as to obtain methodologically comparable willingness to pay (WTP) values for adults and children for similar risks, as recommended in the-state-of-the-art. It will also seek to cast light on the context of the risk reduction, and on latency issues.

The valuation of children's health poses many challenges, and may have significant methodological implications that should be taken into account to obtain reliable estimates of benefits (see Table 1). More specifically, three challenges may be particularly important. The first one is related to the elicitation of children's preferences. Three distinct perspectives can be used to elicit children's preferences. The first approach is referred to as the "societal perspective", and consists in asking a representative sample of the population, including all adults, *i.e.* both parents and non-parents. An alternative is the "children perspective" where the children are directly asked about the value they place in reducing a risk affecting them directly. Finally, the "parental perspective" can be used: parents (or caregivers) are asked about the value they place on their children's health.

The first perspective may be substantially affected by altruism and the difficulty in distinguishing between altruism towards one's own children and altruism towards children in general. The second perspective is rendered inappropriate by the lack of well-defined preferences and budget constraints for children. The third perspective would seem to be the most appropriate approach: various theoretical economic models suggest that parents' choices

¹ Information given in this report reflects the authors' views only. The Community is not liable for any use that may be made of the information contained therein.

are the appropriate proxy for children’s preferences and constitute a reliable source of information (Viscusi *et al.*, 1987). Even though altruism is likely to remain a concern, this approach has the advantage of asking those who are directly affected by the risk reduction and who can be considered to have the interests of the child at heart.

Table 1 – Challenges associated with the VERHI project

Preferences elicitation	The lack of well-defined preferences and budget constraint precludes asking children directly about their preferences. Third party elicitation (relying on parents) is therefore recommended, but it may be affected by altruism.
Latency	Environmental impacts affecting children are generally latent. As such, it is important to ensure that the issue of latency is well understood. Previous work by Hammitt and Liu (2004), and Alberini and Chiabai (2006 and 2007) has shown that with appropriate survey design, latency issues can be adequately addressed
Environmental context	There is relatively weak evidence of a causal link between exposure to environmental pollution and mortality or morbidity impacts, except in the context of air pollution. As such, respondents may reject the scenario. An abstract-environmental scenario might work better.
Health impacts for children and adults	For an ideal comparison, the health impact valued in the survey should be environment-related and affect both adults and children. It is not straightforward to identify an environment-related cause of death with reasonable baseline risk for both populations.
Low probabilities	Mortality risks for children are generally associated with very low probabilities. Given that the average respondent may not be familiar with the concept of probability, careful communication of risk and probabilities is necessary to ensure the reliability of estimates.
Preferences for risk reduction for adults and children	Empirical evidence suggests that a programme protecting young adults is generally preferred over a programme that protects older people, because it delivers greater benefits due to the difference in time/age existing between these two populations (larger benefits for young adults given their larger expected lifespan). Differences in preferences may be even greater when the programme in question reduces risks to children. This has implications for deriving a marginal rate of substitution between adults and children.
Good to be valued	Two “goods” can be valued: mortality risk reductions or extensions in life expectancy. Most of the literature has previously focused on reducing mortality risks to adults. Some authors have argued that in certain environmental contexts it is preferable to value extensions in life expectancy.
Familiarity with the task	Unfamiliarity with this sort of decision-making, the cognitively demanding nature of the task, and uncertainty associated with future health events make it difficult to elicit preferences from parents.

Risk perception	Involuntariness of risk may have substantial impacts on the WTP for a risk reduction. This makes context particularly important.
Measure estimated	Two types of measures can be estimated: the value of a statistical life (VSL) or the value of a life year (VOLY). The choice between the two possible outcomes will depend on the health outcome.
Valuation approach	There is limited empirical evidence to inform the determination of the most appropriate valuation method when considering children.

Given the focus of this project, special attention should be paid to risk preferences, latency and risk perception. These factors affect the valuation of adults' health and may be of even greater concern when considering the case of children.

Some empirical studies have indeed shown that people believe that, *ceteris paribus*, a programme that protects young people is better than one that protects old people, because it delivers greater benefits related to the difference in remaining lifespan between these two populations (larger benefits for young adults given their greater expected remaining lifespan). Examples include Lewis and Charny (1989) where people stated they preferred saving the life of a 35-year-old than the life of a 60-year-old. Cropper *et al.* (1994) applied a person trade-off approach to compare saving lives at different ages². They found that saving one 30-year-old is perceived to be equivalent to saving eleven 60-year-olds. This could mean that people attach greater value to saving young persons. Johannesson and Johannesson (1997) asked a sample of individuals about their choice between saving their lives now and in the future³. They found that saving five 50-year-olds or 34 70-year-olds is judged equivalent to saving one 30-year-old. In addition, this study revealed that the age of the respondent has no effect on his/her choice, which means that both young and old adults give priority to saving the life of the youngest.

Latency is a major concern for the valuation of environmental health risks for children, because of their particular vulnerability to environmental pollutants and given their longer lifespan. Latency, which is characteristic of many environmental health risks, refers to a time lag between exposure and the onset of illness or death. For example, exposure to some heavy metals and chemicals (especially in childhood) has been linked with health impairments later in life. A reduction in exposure today, therefore, would result in risk reductions to be experienced later in life. It is thus necessary to know the present WTP of people for a risk reduction to be experienced in the future. In addition, trade-off decisions that involve latent health effects may be influenced by perceptions of future health states and preferences. This increases the complexity associated with the valuation of children's health.

Issues associated with risk perception also have to be considered. For instance, involuntariness of risk may significantly affect the valuation of children's health. Research in psychology and economics has shown that individuals generally prefer voluntary risks to involuntary ones and that the degree of risk voluntariness could have impacts on the WTP (Fischhoff *et al.*, 1978; Slovic, 1987). In the context of valuation of children's health, this may have a greater influence on the estimates obtained because children may be less aware of some of the risks surrounding them. Moreover, those risks which are voluntary for adults might be considered involuntary for children since at least some risk exposure decisions are made on their behalf by their parents. Therefore, parental WTP to protect their children's

² In this study, respondents were asked to think as social planners and the cost of the programme is not mentioned to them.

³ The objective of this study was to reveal individual preferences for longevity and income.

health may be significantly affected by the perceived degree of voluntariness of risks faced by the children.

2. Preparatory work⁴

This section presents the preparatory work undertaken to identify the best way to address these issues, and thus to provide guidance for the development of an appropriate and relevant survey design.

Three methodological reports were prepared by consultants (James Hammitt and Alistair Hunt) in order to assist the Research Consortium in identifying the most appropriate way to achieve the purpose of the project. A meeting gathering the Research Consortium and members of the Advisory Group was organised to present findings from the methodological reports as well as preliminary results of focus group discussions (see next section).

The findings from this preparatory work result from a collaborative effort and consensus amongst consultants, research teams and members of the Advisory Group. They are reported here according to their contribution to the main themes of survey design: context, health impact, benefit measure, and valuation method.

2.1 Context

The proposal specifies that the project will focus on the value of reducing environmental risks to children and adults populations. However, as only a few studies have been undertaken in this specific area, different contexts were tested in focus group discussions and one-on-one interviews in order to compare the different contexts and draw conclusions concerning the appropriate survey design.

Some arguments favour the use of a context-free survey. This puts less cognitive burden on the respondents; the scenario is less subject to rejection from the respondents; it may be perceived to be more credible as it could be understood to represent a variety of risks by respondents; values obtained are more easily transferable, etc. However, one important disadvantage in using an abstract context is from the policymaking perspective. As we suspect that context is important, context-specific values would be useful contributions to policy design.

2.2 Health impact

An important element which needed to be addressed was the identification of the health impact that the project will seek to evaluate (assuming that the scenario is not context-free). In many respects, the choice of the health impact can influence the other components of survey design, such as the valuation approach, the type of benefit measure, etc. Therefore it was of particular relevance to determine the choice of health impact before focus groups and other pre-tests were undertaken.

One important aspect is that we have to estimate adult and child WTP for reduction in similar risks. Although the literature on adults is quite extensive, there are at least two reasons for valuing WTP for adults in this project:

⁴ All survey development work was undertaken by the teams involved in the project: Milan Scasny and Marketa Braun Kohlova for the Czech Republic; Anna Alberini and Aline Chiabai for Italy; and, Ian Bateman, Brett Day and Graham Loomes for the UK. The Czech Republic will also benefit from the inputs of Stale Navrud.

- This would ensure the credibility of our results: if we find adult WTP values close to values obtained in previous studies, this would suggest that these estimates are reliable; and,
- This allows comparison of WTP for adults with values for children. Although the ultimate objective is not to derive a marginal rate of substitution between adult's and children's health.

In conclusion, allowing for comparison of children and adult values would appear to be essential, although problematic.

A list of criteria to select the health impact was proposed during the first team meeting (in April 2006), including: the relevance for children, a minimum baseline risk, the presence of latency issues, public vs. private risk reduction, and contribution to the literature. The discussions suggested that it was rather difficult (if not impossible) to identify a health outcome that satisfies all these criteria.

A non-exhaustive list of health impacts considered in the first team meeting included: leukaemia, respiratory diseases (in particular asthma), waterborne diseases (*e.g.* cryptosporidiosis), food-borne disease (*e.g.* listeria), radon-related diseases, diabetes type 2 and endocrine disruptors. These health outcomes are a mix of mortality and morbidity issues that are of particular relevance for children. However, not all of them are environment-related and the proposal specifically targets health outcomes in which “environmental” factors are potentially causal. Therefore, food-borne diseases and diabetes were excluded as potential health impacts to be considered in the project.

The question whether to consider either mortality risk reductions or extensions in lifetime was also discussed. The valuation of mortality risk reduction may be particularly problematic for children as it may imply extremely low-probability risks. Cancers and non-trauma deaths are very rare in children and the link with environmental exposure tenuous at best. This has implications for the valuation approach. In this case, contingent valuation questions would deal with extremely small risks or extremely short extensions in lifetime. These questions would be difficult to convey using the standard risk communication devices (grids, etc.) and may be dismissed by the respondents.

However, as most mortality risks associated with children's environmental exposures are latent, it may be possible to ask parents to report their WTP now for a risk reduction that would be incurred by their child later (or much later as adults), at age X, when baseline risks are larger than they are now. But in this case, parents would have to indicate their WTP to reduce health risks to adults, since their children would be adults when impacted.

Given the problems associated with valuing mortality, morbidity was then considered. Morbidity has the advantage of being familiar, even though problems associated with risk communication remain. Moreover, considering morbidity would allow for inclusion in the survey questions related to preventive expenditures, which can not readily be asked within a mortality setting for an environmental context. However, the proposal specifically states that VSL for a child and for an adult will be estimated. The main reason for focusing on the VSL for a child is that, until now, no stated preference surveys have been implemented to estimate such a value. Estimating the VSL for a child is highly valuable in policy terms, and would an important contribution to scarce academic literature in this area.

Concerns have also been expressed regarding the reliability of WTP values for latent risks. Acute risks would of course be preferred for the ease of interpretation and implementation in the survey. However, it is difficult to identify an environment-related acute cause of death with a reasonable baseline risk.

A review of epidemiological literature on children's environmental health risks prepared by Alistair Hunt (Bath University) was commissioned in order to identify answers to at least some of these questions. The main findings (<http://www.oecd.org/dataoecd/21/39/37945375.pdf>) regarding the identification of an environmental risk factor which is likely to lead to credible estimates for both adults and children are the following:

- Recent epidemiological studies tend to focus more on the morbidity impacts to children than on the mortality impacts.
- Air pollution (mainly associated with transport and energy sources) is the environmental hazard most studied, especially when it deals with mortality risks. One possible explanation is that epidemiological relationships between air pollutants and health end-points may be easier to identify and therefore to study than for other types of environmental pollution. In addition, air pollution has occupied an important place in political agendas in recent years.
- Very few studies focus on cancers, and the epidemiological evidence on the relationship between exposure to environmental pollution and this health outcome is still limited at the moment. However, recent evidence indicates that cancer could be a promising candidate.

2.3 Benefit measure

A report was prepared by James Hammitt (Harvard University) on the appropriateness of using either WTP or QALY frameworks in order to value benefits of reducing environmental health risks to children. His report (<http://www.oecd.org/dataoecd/20/55/37945233.pdf>) suggests that WTP is a more flexible approach than QALY. In addition, WTP measures reflect individual preferences better than QALYs, and as such, WTP are more likely to be used for policy evaluation. However, respondents to SP surveys may be over-sensitive to some risk attributes (*e.g.* qualitative attributes) while being under-sensitive to other risk attributes (*e.g.* probability or duration of the effect). As a consequence, responses may be misleading.

Other current projects are trying to build a bridge between WTP and QALY values. The empirical evidence is mixed on the feasibility of such an exercise. For instance, preliminary findings from the work undertaken in the UK on the value for society of a QALY (based upon stated-preference and revealed-preference surveys) suggest that trying to relate QALY and WTP empirically (for adults) did not work very well. Perhaps one reason why this is so is QALY and WTP can be mapped to one another only under extremely restrictive assumptions about preferences, as reported by Hammitt. Another study, undertaken by Haninger and Hammitt (2006) tried to estimate the WTP for a QALY. They found that the WTP is not proportional to changes in expected QALY, mainly because people do not have a constant rate of WTP for changes in QALY.

These findings suggest that the task could be even more complicated when dealing with children. As a consequence, it was decided to adopt a WTP-based approach.

Although it was decided that WTP values will be estimated (perhaps complemented by equivalents expressed in physical health terms – from risk-risk trade offs), another important issue needed to be clarified subsequent to the first team meeting. As the survey would focus on reducing mortality risks, the question of how to express these reductions was raised: in terms of VSL (*i.e.* valuation of a risk reduction) or in terms of VOLY (*i.e.* valuation of changes in life expectancy)?

The choice between deriving VSL or VOLY values will depend upon the health impact to be valued (the way the risk is considered in one approach could be easier to communicate than through the use of the other approach). A possibility would be to split the samples in three sub-samples in order to test the relationship between VSL and VOLY. Although it would be an important contribution to the literature, it should be noted that it was not included in the proposal, and it may complicate the design and implementation of the survey (as we consider children). As such this idea was abandoned and it was decided to focus on eliciting VSL values for both children and adults.

2.4 Valuation method

Existing empirical studies

Only a few studies have focused on the valuation of benefits to children's health (see OECD, 2006). As such, there is a need to explore the best way to value risk reductions for children. There are at least two challenges associated with the valuation exercise:

1) We have to rely on parents' elicitation since children cannot be directly asked about the value they place in reducing health risks. Although deriving WTP for children through parents and caregivers may imply biases associated with third-party elicitation, no solution was found to tackle this specific issue beyond those adopted in existing studies. As the parental perspective seems to be the most appropriate in this context, this approach is adopted in this project.

2) The lack of familiarity with the good to be valued. Valuing a reduction of the respondent's own health risk is not straightforward and a misconceived questionnaire can lead to unreliable estimates. But valuing a reduction of a health risk affecting another member of the household (more specifically a child) and a risk which may occur only several years after the exposure (latency) is even more difficult, leaving aside the potential influence of altruism on the values.

Drawing upon Hammitt's work, it was decided that a WTP-based approach was most appropriate. There was also a general agreement on the use of stated preference (SP) techniques. It was also considered to complement the SP survey with a revealed preference (RP) survey, and Hunt also provided a review of revealed preference studies focusing on children (<http://www.oecd.org/dataoecd/20/55/37945233.pdf>). His review brought significant insights, and concluded that the implementation of a RP survey (as a complement of the SP survey) in the present project was not feasible. Reasons included methodological limitations, high data requirements, and resource demands. As a consequence, the idea of complementing the SP survey with a RP survey was abandoned.

It was further necessary to determine whether to use a direct WTP elicitation approach (through the implementation of a standard contingent valuation (CV) exercise or a conjoint choice experiment) or an indirect elicitation approach (through risk-risk trade-offs), and to combine these with person trade-offs to derive the marginal rate of substitution between adults' lives and children's lives (discussed below).

Scope tests and corroboration

Internal (scope test) validity would ensure credibility of our results. A distinction can be made between "weak" (same sign) and "strong" (proportional) scope tests, and there was some discussion during the first team meeting about the desirability to meet the strong proportionality requirement, recognising however that it is rarely met in practice.

Given the complexity of the tasks that have been set, the credibility of the results is of primary importance. As such, there was first an idea of corroborating the VERHI results with data and results from previous studies. The results will therefore be compared with those obtained in other SP studies to the extent possible. In particular, the credibility of the results for children will be strengthened if the results for adults are comparable to those obtained in other studies with similar contexts. However, and as noted above, identifying studies on mortality from environment-related health impacts which are also relevant for children is not straightforward. It is even more difficult if the project focuses on cancer for reasons explained above.

3. Survey development

This section provides an overview of survey elements that needed to be further tested in order to determine the final survey instrument. Focus group discussions, one-on-one interviews and pilot studies were therefore conducted from early 2006 to spring 2007 by the three teams to better comprehend people perceptions about environmental pollution, about exposure to health impacts and to test different valuation approaches as well. Table 2 presents chronologically the work undertaken in order to provide answers to some of these questions.

The findings from these tests are reported in this section according to the main themes (and challenges) of survey development: context, health impact, valuation method, scenario design, survey administration, survey sampling, and comparability of the results between countries.

Table 2 – Chronology of focus group discussions, one-on-one interviews and pilot studies

Date	Location	Sample	Type	Purpose	Main outcomes
January 2006	Norwich (UK)	99 UEA students	Experiment design	Look at the impact of risk and familiarity on scope sensitivity of WTP estimates.	Unfamiliar risks or large risk denominator impose a large cognitive burden, resulting in scope insensitivity of WTP estimates
July 2006	Cambridge (UK)	25 parents	Pilot study	Obtain WTP and VSL estimates for both adults and children using the chained method.	Premium on WTP to avoid morbidity to children; aversion to mortality risks to children; child premium for mortality risks: VSL for a child greater than VSL for an adult
August-September 2006	Cambridge (UK)	300 parents with at least a child aged 13 or under	Pilot study	Obtain WTP and VSL estimates for both adults and children using a contingent valuation survey.	Premium on reducing mortality risks to children; VSL for a child between 2 to 10 times greater than VSL for an adult
September 2006	Milan and Mestre (Italy)	16 parents in each city with at least one child aged 0-12 (8 respondents each)	Focus group discussions	Explore parents' concerns and perceptions about environmental pollution, children's health and test some methodological aspects as well.	Risks associated with the environment and its health impacts are salient to people. They focus on air pollution. People found the tools used to display risks really clear and helpful. People understood the notion of latency while extensions in life expectancy (tested in Mestre's focus groups) were difficult to convey.
October 2006	Roma (Italy)	14 parents with at least one child aged 0-12	Focus group discussions	Test the materials related to mortality rates, survival curves, life expectancy, risk reductions at different ages and conjoint choice experiment.	Mortality rates expressed as relative frequencies worked well. The bar charts and survival curves used were well understood. The grid used to display risk probabilities was found to be useful. Evidence that people trade-off the size of risk reduction with the timing of the risk reduction. People understood the concept of life expectancy and extensions in life expectancy.

Date	Location	Sample	Type	Purpose	Main outcomes
October 2006	Prague (Czech Republic)	15 parents of children aged 0-14	Focus group discussions and individual interviews.	Know people perceptions about risks, environmental health risks, dread effects and test some methodological aspects as well.	People are aware of environmental health risks. No evidence of dread effect. People understood the concept of latency. Extensions in life expectancy were found easier to value than reductions in mortality risks.
December 2006	Venice (Italy)	15 parents	Focus group discussions	Test for possible conjoint choice experiments. Special focus on the presentation of mortality risks, the breaking down of a risk into its possible attributes and on the conjoint choice exercises.	The approach and materials were understood by the respondents. They used all attributes to make their decisions. Person trade-off questions were well understood although people tend to always choose to save children's lives.
January 2007	Venice, Vittorio Veneto and Garda (Italy)	13 parents with children aged 0-14	One-on-one interviews	To test the concept and materials for a conjoint choice experiment (CCE) (using different ill-health causes, latency periods and modes of delivery) and person trade-offs (followed by a CV question).	Concerning the person trade-offs, respondents always chose to save children, whatever the age of the adult and the number of adult lives saved. As such, respondents are more likely to pay more to reduce risks to children than to reduce similar risks to adults. Concerning the CCE, respondents considered all the attributes when making their decisions, including context and cause of death. Dread effects seem to be associated with cancers.

Date	Location	Sample	Type	Purpose	Main outcomes
January 2007	Prague (Czech Republic)	18 parents with child aged 0-14	One-on-one interviews	To test PTO questions, the workability of the conjoint choice experiment (using different ill-health causes, latency periods, as well as different modes of delivery, and changing the order of the attributes) and the feasibility of the chaining method.	Concerning the conjoint choice experiment (CCE), the order of attributes does not affect the importance of the attributes. Respondents considered all attributes when answering, including cause of death and context. The number of attributes included increased the difficulty of respondents to make a choice. In general, cause/context, beneficiary and duration of the effects were considered the most important. The chained approach was well understood and was perceived as easier (than the CCE) by the respondents. Concerning PTO the choice set which reduces risks for the respondent's own child did not dominate the choice set that reduces risks for adults.
May 2007	Prague (Czech Republic)	14 parents with child aged 0-14	One-on-one interviews	Test the perception of the true size of annual risk of dying for children, the usability of CCE, the second PTO alternative (to derive indifference point), and the "City A v. City B" scenario.	Three approaches = very long questionnaire (74 minutes to be completed in average). The most important attributes of the CCE are the cause of death and the beneficiary. The PTO question was found difficult to answer mainly because people had to choose between saving children and saving adults, but in the end all respondents were able to make a choice. Trade-off point between adults and children estimated at 52 (<i>i.e.</i> people are indifferent between saving 52 children and 100 adults). The "City A v. City B" led to a mean WTP of approximately 1,000 EUR (32,500 CZK) which is significantly higher than the cost figures used and accepted by individuals in the CCE.

3.1 Context

The project focuses on the value of reducing environmental risks to children and adult populations. However, as only a few studies have been undertaken in this specific area, other contexts were tested in focus group discussions and one-on-one interviews in order to compare between the different contexts and draw conclusions for appropriate survey design.

A number of focus groups discussions and one-on-one interviews were therefore implemented in each country where several contexts were tested simultaneously. As an example, Italy tested a conjoint choice experiment questionnaire⁵ that presented risks in three different contexts: road accidents, cancers and respiratory diseases (associated with air pollution). The impression resulting from these preliminary discussions is that the questionnaire Italy tested worked well for these three contexts. These risks were salient to people who provided plausible answers and values.

The UK tested the chained approach questionnaire in an accident context. They also implemented a pilot CV study in order to elicit direct WTP for both adults and children in an abstract context but whose characteristics (especially latency) could correspond to those of an environmental context.

The Czech Republic tested the conjoint choice experiment questionnaire with three contexts, *i.e.* cancer, car accident, and respiratory illness. They also tested the chained approach in an accident context. However, most of the questions targeted adults (only the risk-risk trade-off question addresses children). Both questionnaires were well accepted by the individuals, suggesting that these contexts were appropriate for the purposes of the project.

One important finding from focus group discussions is that an environmental context is feasible and credible. The first round of focus group discussions and experiments undertaken in the three countries were designed to better understand people's perceptions about the environment, environmental health risks, exposure of their children and of themselves to these risks, etc before implementing more targeted focus groups. Findings from Italy and the Czech Republic suggest that the risks associated with the environment and its health impacts are salient to people. They are familiar with most of the impacts presented, especially those related to air pollution. Indeed, the first thing that comes to their mind when they hear about "environmental pollution" is air pollution. They are also aware of latency issues. As such, it seems that an environmental context would not cause problems of scenario/survey understanding.

In addition, while the project focuses on general environmental health concerns, it is not thought to be necessary to provide a detailed environmental context which would potentially distract respondents. Given this, it was decided to consider an "abstract" environmental context, where the specific hazard will not be specified per se but whose characteristics (for example in terms of health impacts) could be associated with those of an environmental risk.

One option would consist in splitting samples in order to compare values between two different contexts such as road accidents and environment. It is particularly interesting to consider these two contexts as they are the two fields where economic valuation is most often done in OECD member countries. Each team has already tested the (road) accident context and as it worked very well for the two valuation approaches, this option would not be costly and would greatly contribute to the literature as well as policy-making.

⁵ For more details on the valuation approaches used in focus group discussions, one-on-one interviews and pilot studies, please refer to the section "Valuation Method".

Despite the potential benefits of comparing two contexts within a single survey, this option raises concerns about survey implementation. As discussed below, the Czech Republic will have to split its sample in order to apply the two valuation methods proposed to estimate WTP for adults and for children. If they also have to split their sample to test for two different contexts, given the resources available the final sample would be significantly reduced. Further discussions are necessary to decide whether or not two contexts will be tested.

3.2 Health impact

Two specific aspects associated with the health impact needed to be further tested: whether to value a reduction in mortality risk or an extension in life expectancy; and, assessment of the most appropriate health outcome to be valued.

The choice between valuing mortality risk reductions and valuing extensions of life expectancy was tested in the first round of focus group discussions carried out in the Czech Republic and in Italy. The results were mixed. In the Czech Republic, people had greater facility with the valuation of a variation in life extension over the valuation of a variation in mortality risks, while the opposite result occurred in Italy. In Italy, in one focus group carried out in Mestre, it was difficult for people to place a value on life expectancy extensions and they were not able to trade-off life expectancy extensions with money. However, people participating in a focus group in Rome one month later, clearly understood the concept of extensions in life expectancy. Given that this exercise is nevertheless more burdensome and more difficult than valuing mortality risk reductions, it was decided to focus on mortality.

Concerning the health outcome to be valued, the focus group discussions tested different health impacts associated with environmental degradation, as empirical evidence is limited in this area. Given the specific context of the project, cardiovascular diseases are not plausible, as they are more likely to affect the elderly. Respiratory diseases worked well in the conjoint choice experiments tested in Italy and the Czech Republic. This may be explained by the fact that people tend to focus on air pollution and its health effects when they hear about environmental pollution. However, respiratory ailments do not work as well in the chained approach tested in the UK as many people may feel that the hospital admission scenario is unlikely to apply to them. They think that it can only happen to people with existing respiratory problems (such as asthmatics), and they do not believe they can be affected. A good alternative seems then to be cancer as it also worked quite well in the conjoint choice experiments led in Italy and the Czech Republic.

There are pros and cons regarding the use of cancer as the health impact in the project. On the one hand, using cancer may be problematic as external validity checks presuppose the comparison of the WTP estimates obtained for adults in VERHI with similar estimates from previous studies. The problem is that the empirical literature on cancer is limited, even for adults. As such, there would be few values to which to compare the VERHI WTP estimates. In addition, using the label “cancer” in the survey may significantly affect the WTP estimates (*e.g.* dread effect). On the other hand, there is an urgent need of cancer-specific values as highlighted in Hunt’s report, which means that using cancer in VERHI will contribute a great deal to the existing literature on both adults and children (double contribution).

A further problem associated with using cancer is that cancer probabilities for children are really low, which may then have consequences for the reliability of the responses, and possibly on the acceptability/plausibility of the scenario. In addition, although cancer seems to work well for the conjoint choice experiment, it has not been tested yet for the chained approach. Overall, findings from focus group discussions and one-on-one interviews conducted in the Czech Republic and in Italy provide mixed evidence on perceptions of cancer risks. In the Czech Republic, respondents seem to perceive cancer as “destiny”, and thus less amenable to risk reductions.

In order to ensure reliable WTP estimates of reducing cancer risks, one solution would be to describe the health impacts similar to those associated with cancers, without explicitly labelling them as “cancer”.

3.3 Familiarity with the health state

The UK team carried out an experiment to look at the impacts of risk and familiarity on WTP estimates elicited in a standard CV study. They found evidence of weak scope sensitivity for most WTP estimates but not proportionality. In addition, familiarity and risk reduction had an impact on some WTP values, suggesting that for unfamiliar risks (such as those affecting children) and large risk denominator, WTP values would be less scope sensitive. Because of a large cognitive burden, people are unable to fully assess all the attributes of the good, which then results in scope insensitivity. They therefore recommend the use of alternative approaches in such contexts.

Given that mortality risk probabilities for children are generally extremely low, and that we will ask people to value something they are not used to value, the results from the UK experiments are particularly worrying but useful at the same time. As a consequence, the recommendation drawn in this report was considered as relevant and it was decided to implement two valuation approaches: one based on a SP approach (conjoint choice experiment) and the other one based on a risk-risk trade-off approach (the chained method).

3.4 Latency issues

As latency was an important element of the VERHI project proposal, it was included in the list of attributes of the conjoint choice experiment tested in Italy and the Czech Republic, as presented in Table 3.

Table 3 – Example of how latency was introduced in a conjoint choice experiment.

Attributes	Situation A	Situation B
Cause of death	Respiratory Illness	Cancer
Who receives mortality risk reduction	Your child	Your child
Mortality risk reduction per year	3 in 10,000 per year	1 in 10,000 per year
When does the risk reduction begin	Immediately	In 10 years
Duration of the risk reduction	1 year	10 years
Cost for your household (one-time payment to be paid this year only)	20 euros	60 euros

Findings from several focus group discussions and one-on-one interviews carried out in Italy and the Czech Republic suggest that people understood well the notion of immediate versus latent risks. The latency concept was well accepted, which offers then the possibility to vary the latency across respondents in the final instrument. However, the latency period should not be too large when dealing with valuation of children’s health effects. This point was also made by Advisory Group member Mark Dickie during the meeting with the Advisory Group (6-7 November 2006). It is therefore suggested to keep the latency period to a reasonable interval (between 5 to 20 years). In addition, it should be noted that people in the Czech Republic or in Italy preferred the policy which proposed immediate risk reduction (instead of latent risk reductions). This finding highlights the relevance of including latency among the attributes in the final conjoint choice instrument as well as in the chained approach.

Table 4 presents a summary of the different risks that could be considered in the final survey, according to the different valuation approaches and the associated mode of delivery (private or public treatment) as well.

Table 4 – Risks to be valued

Approach	Risks that could be valued using this approach	Mode of delivery of the risk reduction
Chaining approach	Accidental injuries Cancer?	Private treatment
Conjoint choice approach	Road traffic accident Cancer	Public program Private action
Contingent valuation	Road traffic accident Cancer	Public program Private action
Person trade-off questions	Context-free	Public program (by definition)

As mentioned previously, there is always the possibility to compare accidental injuries with cancers in splitting the samples in each country (see above).

3.5 Alternative valuation approaches

Given the above considerations and constraints, two valuation approaches seem to be of particular relevance to the VERHI context: direct elicitation of WTP to reduce mortality risks or indirect elicitation through risk-risk trade-offs.

The first approach seeks to elicit directly parents' WTP to reduce health risks to themselves and to their children. To this end, two alternative methods can be applied. The first one consists in implementing a standard contingent valuation survey in order to estimate a WTP for reducing mortality risks to a child and one of his/her parents, directly from parents. It would then allow for deriving corresponding VSL and therefore computing the MRS between adults and children.

The second alternative is to propose to the interviewed people a hypothetical policy programme within a conjoint choice experiment framework. Respondents could, for example, be asked to choose between policy A and policy B, where the two policies differ for the number of lives saved, the number of life-years gained holding the lives saved the same (which depends on the ages of the persons affected, and on whether you have a small risk reduction for a large population, as with air pollution, or a large risk reduction for a small population). Conjoint choice experiments could also propose choices between programmes involving private actions. Examples of the attributes could include: the size of the risk reduction, the age when it is experienced (*i.e.* latency period), who is experiencing the risk (parent or child), the type of effects (cancer or cardiovascular diseases), the baseline risk and the type of payment vehicle. This would allow estimating risk-money trade-offs (*e.g.* the WTP to avoid cancer).

Indirect elicitation (the second approach) would involve risk-risk trade-offs (*e.g.* equivalence between a case of asthma and x days of bad flu – x to be determined), as a means to obtain values for other impacts indirectly. This is what is referred to as the “chained approach” or “chaining method” (as in Carthy *et al.*, 1998). Earlier research suggests that people are capable to report WTP to avoid cases of acute respiratory illness, asthma attacks, the flu, and other acute ailments. To some extent, they have also been capable of valuing chronic respiratory illnesses (*e.g.* onset of asthma, COPD, etc.). It could, then, be possible to obtain their WTP to avoid a case of one of these illnesses, and then scale up this value to a more severe illness or even death by asking them how many cases of the former illness are equivalent to a case of the latter (or to death, or to a given risk of death).

This approach was first designed to overcome some of the difficulties associated with traditional SP techniques. The chained approach is composed of three steps:

1. Elicitation of the WTP to avoid a non-fatal injury
2. Risk-risk trade-off in a modified standard gamble
3. Chain responses to steps 1 and 2 to estimate the VSL.

The three approaches presented above (contingent valuation, conjoint choice experiment and the chaining method) seemed to be appropriate to overcome the main challenges and problems associated with the valuation of environmental health risks to children. However, one concern is that it will not be possible to pool the datasets from the three countries as they use different valuation methodologies (because of reasons set out in the section below “Survey Administration”). For this reason, it was also proposed to include a simpler valuation question using a person trade-off approach for all countries.

Person trade-off

Two different types of PTO were proposed to be tested:

- Alternative a: the PTO question starts with a discrete choice question where people are asked to choose between two programmes. The programmes vary across respondents. Several pairs of programmes are proposed to the respondents, which then allows for the estimation of the trade-off point. This PTO approach was tested by Italy and the Czech Republic, as follows:

8. Suppose now that one has to choose between other public health interventions. Intervention A saves 10 lives in 10.000 children aged 0-4 this year, whereas this year intervention B saves 30 lives in 10.000 adults older than 30.

As before, there is funding for only one of these two intervention. Which would you choose?

(Please check the appropriate answer.)

- Intervention A: saves 10 lives in 10.000 children aged 0-4**
- Intervention B: saves 30 lives in 10.000 adults aged 30 and older**
- A and B are equally attractive**

However, focus groups discussions and one-on-one interviews carried out in Italy and the Czech Republic highlighted that, when presented with this PTO, people always chose the programme reducing risks to children, unless the number of adults’ lives saved was extremely large.

- Alternative b: the PTO question starts with a discrete choice question proposing two programmes, one saving adults and one saving children. Then, the number of lives saved in the programme chosen varies. The question is iterated until the trade-off point is reached (*i.e.* the respondent chooses the other programme). The exercise is introduced as follows:

“The next few questions ask how you feel priorities should be set in treating illnesses. In an ideal world all illnesses would be treated. However, there are not enough resources to do that, so in the real world decisions have to be made regarding which cases to prioritise. I want to find out which cases YOU feel should get priority.

To begin with, imagine that we have two groups each of 100 people. Let’s call them Group A and Group B. Both groups are broadly representative of their generation. Both groups are suffering from an illness which, if untreated, will kill them within the next year.

The difference between the groups is that Group A is composed of 40-year-old people, while those in Group B are 10-year-olds.

If someone is treated, suppose the treatment will cure the illness completely and give them a normal life expectancy – that means, they could, on average, expect to live on to about 80.

It would cost exactly the same to treat each Group, but suppose there are only enough resources to treat one of these groups, not both.

The following picture summarises this information. (Nothing else is known about either group.)”

This alternative PTO question has been tested in the UK and in the Czech Republic and it worked well in both countries. Although it was difficult to get a minority of Czech respondents to determine their final open-ended trade-off level, only one person (admittedly out of 16) had difficulty with the closed ended questions. The results from one-on-one interviews carried out in the Czech Republic allowed for the determination of the average indifference point between saving adults and children. Indeed, the study showed that people were indifferent between saving the life of 52 children and the life of 100 adults. This finding suggests that this PTO approach could allow for the determination of a MRS between adults and children.

The inclusion of a stylised CV question after the PTO would allow for the estimation of the VSL of a child. This value could be compared across the three countries as the question and the information provided to respondents would be exactly the same in the three countries (see the last section on comparability of results for more results). Such CV questions were tested in the Czech Republic and Italy. People understood the exercise and were willing to pay large amounts of money to save children’s lives – much more than to save adult lives. Moreover, findings from Italy suggest that people were not sensitive to the bid in the WTP for a risk reduction, in particular when the programme was referring to children.

In addition, due to concerns about questionnaire length it has been proposed to remove the PTO and stylised CV questions from this questionnaire, and to include them in a shorter questionnaire that would be asked by telephone. As a consequence, people completing the survey would be more focused on and engaged in the conjoint choice experiment or the chained approach task.

City A v. City B

This approach refers to previous work from Jones-Lee, then Viscusi, Magat and Huber (1991) and more recently applied by Chanel *et al.* (2004). This scenario proposes to the person interviewed to move from his/her actual city to two hypothetical cities whose attributes vary according what we want to value. This is the “City A-City B” scenario. This option necessarily requires the evaluation of a private risk reduction. If cast properly it can be used to derive WTP for a risk reduction for both adults and children, and thus a MRS.

The “City A v. City B” scenario can be described as follows:

“Imagine that there are two cities that are identical to each other and to the city where you actually live in all respects, except for the mortality rates and cost of living.

In city A, X in 10,000 children aged 5-9 (same age group as one of the respondent's children) die every year. The cost of living is the same as where you live now. In city B, Y (Y<X) in 10,000 children aged 5-9 die every year. In city B, the cost of living is €1000 a year higher than in city A (and than where you live now).

Where would you prefer to live, in city A or city B?"

With appropriate follow-up questions, the "City A v. City B" alternative can also be implemented to get an exact indifference point between cities A and B, determining precisely the value of the risk reduction.

While in the PTO questions the respondent is asked to think as if he/she was the social planner, "City A v. city B" questions elicit information about the WTP and VSL for any desired age group.

This approach was therefore proposed as a substitute to a full CV exercise. Given the time required to adapt a questionnaire to cancer and children, and the low probabilities associated with mortality risk for children, it might be appropriate to consider this option. In addition, it would avoid the potential bias associated with the marginal rate of substitution between children and adult lives as for many people this marginal rate of substitution is infinity. However, it is planned to use it as a complement to conjoint choice experiments, to supplement the findings from the latter.

This approach was tested in one-on-one interviews in Italy and in the Czech Republic. In the latter, the exercise focused only on children, meaning that in one city, the risk of dying for children was lower than in the other one. The scenario can be described as follows:

Table 5 – City A vs. city B scenario proposed in the Czech Republic

City A	City B
Mortality: 15 in 100,000	Mortality: 10 in 100,000
Costs of living: same as now	Costs of living: by 15,000 CZK higher***

*** 15,000 CZK equals 500 Euro (1,000 Euro in PPP)

This question was followed by an open-ended question in order to determine the maximum monetary amount people would be willing to pay to live in City B, where the mortality risks for children are lower. The mean WTP was estimated at 1,083 EUR and the median WTP at 667 EUR. These figures are significantly larger than the costs used in the CCE).

WTP approaches

It was then decided to further test the three WTP-based approaches in order to determine whether they correctly fit the VERHI project context (environmental health risks to children and adults).The tasks were divided between the three countries as follows:

1) Italy tested the conjoint choice experiment for adults and children and for different types of risks (environmental and non-environmental) as follows:

Exercise 1.

Consider now two different situations, A and B, described below, which reduce the risk of dying. Please read and then answer the question.

	Situation A	Situation B
Cause of death	Respiratory illness	Cancer
Context	Individual preventive action	Individual preventive action
Who receives the mortality risk reduction? (Beneficiary)	Your child	Your child
Other beneficiaries of the risk reduction	No	No
Mortality risk reduction per year	3 in 10.000 a year	1 in 10.000 a year
When does the risk reduction begin?	Immediately	In 10 years
Duration of the risk reduction	1 year	10 years
Cost for your household (one-time payment to be paid this year only)	20 euro	60 euro

Which would you choose, situation A or B?

- Situation A
- Situation B
- neither (I prefer to pay no money and to receive no risk reduction)

The findings from the four rounds of focus groups implemented in Italy were quite promising; the questionnaire and scenario of the conjoint choice experiment were rather well accepted by the respondents. The results also suggest that people were looking at all the attributes when making their decisions, including context and cause of death, which would allow for variation with respect to the respondents in the final survey instrument. In Italy, all else the same, some respondents were more likely to choose a private risk-reducing action over a public programme as they did not feel they trusted the Government and its actions. Others did not report this problem and indeed preferred the public programme, all else the same. Further work is necessary to determine the impact of specifying the policy attribute on the choices (and therefore values).

2) The UK conducted two experiments to estimate VSL for parents and children: they applied the chaining method (in an accident context) and a classic contingent valuation study (in an abstract context). In both surveys, the WTP for a child was greater than the WTP for an adult. They also found evidence of a child premium to avoid morbidity and mortality to children. Parents expressed a high aversion to risks affecting children.

These two experiments also allowed for a comparison between the two approaches in terms of estimates and in terms of methodology. Concerning the estimates, VSL values were slightly higher for the parent when using the CV rather than the chained approach, while child estimates were higher with the chaining method than with the CV. However, in the CV there were fewer outliers than in the chained approach. The authors also noted a potential double counting issue in the WTP for children in the chained approach (see last section). Concerning the methodology, respondents seemed more engaged in their task with the chained approach, resulting in a low number of zero responses (for WTP) and of non responses. The CV study was subject to a very large number of zero values and respondents were less likely to fully engage in the experiment. All in all, the chained approach seems to work quite well and is therefore recommended to be included in the final survey instrument.

3) The Czech Republic also conducted focus group discussions proposing both the conjoint choice exercise and the chained approach. Results from the conjoint choice experiments are quite similar to those carried out in Italy. The questionnaire was well accepted (both countries used the same questionnaire). The ordering of attributes did not

affect their importance, and most respondents considered all attributes when choosing between the two programmes proposed. Discussions with the respondents indicated that they attached particular importance to the beneficiary (child/adult), latency, and context (*i.e.* cancer, car accident, respiratory diseases). In general, people tended to favour public measures (as they involve a larger population) or measures targeting all children of the country (not only those of the respondent), such as Programme S described in Table 6.

Table 6 – Conjoint choice experiment carried out in the Czech Republic

	S	T
Reduction of mortality risk by...	1 : 10 000 per year	2 : 10 000 per year
Cause of dying	Car accident	cardiovascular and respiratory diseases
Type of measure	public measure	private action
Person whose risk will be reduced	Your own child	Your own child
Other beneficiaries	all children in the CZ	none
Costs (one-payment)	1 000 CZK	1 300 CZK

These results are quite promising as they show that people understood the different questionnaires, they were engaged in the task proposed, in general they provided reliable answers, and the scenarios were well accepted.

3.6 Scenario

As we will probably ask parents about the value they place in the reduction of a risk to their children’s health, we can consider either a unitary or a collective approach. If we consider the collective approach (which seems not to have been applied to a CV survey), we would have to ask both parents’ WTP for their child; the question then being “which parent are we going to interview?”. Given previous experience in this area and strong reservations, it is likely that only one parent would be asked about his/her WTP, maybe according his/her role within the household (*e.g.* the one who is mainly responsible for children’s matters). This role could be derived from questions asked in the beginning of the questionnaire (at least before the valuation questions). However, in order to determine the influence of household characteristics on the WTP estimates, it would be recommended to ask both single and married parents.

3.7 Survey administration

Various modes of administration of the survey (in person with computer, centralized facility, etc.) were discussed. For instance, internet surveys were considered at the beginning but as they may be limited to very non-representative segments of the population, and also because of low internet penetration rates in the Czech Republic and Italy, this idea was abandoned.

However, as the valuation approaches were better identified, so were the modes of survey administration. As two valuation methods (the conjoint choice experiment and the chained approach) will be applied with very different features, two different modes of survey which are appropriate to each valuation method have to be used.

For example, the chaining method has to be implemented in a face-to-face setting and it cannot be done differently. Indeed, respondents are presented with different cards (some present the injuries; some propose different money amounts; and, other display probabilities). The approach relies on people sorting the payment cards and placing them in three different piles (would pay for sure, definitely would not pay, unsure). Cards are also shuffled between

each question to avoid biases. It is therefore highly unfeasible to apply this approach using another administration mode.

Similarly, conjoint choice experiments have to be undertaken in a computer setting. Otherwise, it would be impossible to handle the numerous variants of the questionnaire with the different conjoint choice sets, plus the “personalized” baseline risk information, which typically varies with age and gender.

As such, it has been agreed that the different approaches be used in separate questionnaires. The only exception is the PTO (plus the stylised CV question), which could be incorporated in a simpler questionnaire that could be done separately, in a telephone survey (for example) in which respondents are requested to think as social planners. Table 7 summarises the survey approach and mode used in the three countries.

Table 7 – Survey approaches and modes

Methods	UK	Czech Republic		Italy
PTO	Face-to-face	Face-to-face	Computer	Computer
CCE			Computer	Computer
CHA	Face-to-face	Face-to-face		

In order to be able to compare results between the three countries, it was decided that the Czech Republic will apply the two valuation methods, and therefore they will implement two different surveys.

3.8 Survey sampling

Regarding the sampling strategy, as results across countries should be comparable, it is recommended to apply the same sampling strategy in the three countries. Concerning the sampling technique, as random sampling is difficult and quite expensive (and it may not be applicable at all in Italy), and based upon team recent experience, it was concluded that the proportional quotas approach (*e.g.* in terms of age, gender, socio-professional categories, educational level, etc.) should be adopted in this project.

Further discussions amongst the teams highlighted other potential sampling problems in each country. For instance, it is very difficult (if not impossible) to implement a national survey in Italy. Given the time constraints, it was decided to focus on 1 or 2 big cities in each country. In addition to being dictated by the mode of administration of the survey, focusing on cities makes sense because this is where the beneficiaries of environmental policies are concentrated.

For instance, it has been proposed that in the case of Italy, the questionnaire would be administered to residents of the city of Milan. The respondents would have to be either the mother or father of at least one child aged 0-18. We would want 50% mothers and 50% fathers, of ages comprised between 30 and 55, as well as good representation of income and education.

4. Concluding remarks

4.1 Summary of findings

Table 8 summarises the findings from the focus group discussions, one-on-one interviews and pilot studies undertaken to address the main challenges associated with the VERHI project.

Table 8 – Main findings

Issues to be addressed	Empirical evidence	Suggestions
Third party elicitation	The parental perspective was adopted in the CCE and the chained approach as empirical evidence suggests it is the most appropriate manner to reveal children’s preferences. Although it may be affected by altruism and risk perception, it worked well in both cases. Parents did state higher WTP to reduce risks to their children than to themselves.	The parental perspective will be adopted in the final instrument. Although a collective approach seems preferable, it has never been used in an empirical context, probably because of modelling complexity. As such, a unitary approach will be assumed.
Latency issues	People understood very well the difference between immediate and latent risks. People tend to favour reducing immediate risks when the programme deals with adults.	Latency attributes can be included in the final survey instrument
Environmental context	Respondents declare being aware of environmental health issues and their exposure to those hazards. In the CCE, context plays an important role in decision-making. The chained method has not been tested in an environmental context, and pre-tests suggest that a context-free scenario would work well.	For policy-making purposes, the final survey instrument should use an environmental context, as far as possible. An “abstract” environmental context could be one possibility.
Health impact	Respiratory diseases worked well in the CCE but not as well in the chained method. Road accidents worked well in both approaches but they are not environment-related hazards. Cancers (tested in the CCE) worked well	Cancer appears as an interesting candidate.
Low probabilities	Expressions such as “10 in 10,000” or “10 for every 10,000” were used in the CCE and were clearly understood by respondents. Different risk reductions were used in the chained approach, such as 20/1,000, 100/1,000 and they were well understood by respondents. Good comprehension of probabilities is associated with communication in the first part of the questionnaire on risk and probabilities using visual tools (grids).	The use of grids to display risk and probabilities clearly helps respondents understand the probability figures presented in the scenarios. Such tools should be used in the final instrument as well.
Comparison of values for adults and children	Depending upon the precise approach chosen for the PTO questions, people may have a tendency to choose programmes which save children, irrespective of the number of adults saved.	Alternative B of the PTO questions needs to be further tested to ensure reliability.

Good to be valued	People are not always able to understand correctly extensions in life expectancy.	Mortality risk reductions will be valued in the final instrument survey.
Familiarity with the health state	Respondents are aware of the health impacts of environmental degradation, in particular cancers and health effects associated with air pollution.	Cancer seems again the best bet.
Risk perception	The first questions of the questionnaire deal with risk comprehension and propose to train people in understanding the concept of mortality risks and of probabilities using grids (such as those used in Krupnick <i>et al.</i> , 2002). These aids were greatly appreciated by the respondents who found them very easy to understand and clear.	The use of such preliminary tools is proposed for use in the final survey instrument.
Measure estimated	People have difficulty correctly understanding, and thus valuing, extensions in life expectancy.	As the project will value reductions in mortality risks, VSL will be estimated.
Valuation approach	Conjoint choice experiments were well accepted in Italy and the Czech Republic. The chaining approach was promising as respondents seem to fully engage in the exercise.	The two approaches could be used in at least two of the three countries to be able to compare results between two countries.
Survey sampling	Only parents have been interviewed in the preparatory work.	As it would be awkward to ask a non-parent to value a risk reduction to a child, it is suggested to interview only parents.

4.2 Comparability of the results across the three countries

In order to facilitate further benefit transfer and comparison of results across countries, it would be preferable to apply a similar questionnaire in the three countries. As far as possible, the survey questionnaire should be identical for all countries in their initial and core parts. Subsequent sections may differ, depending on the research teams' expertise, and in order to diversify risk associated with using just one method.

When comparing WTP across countries and to learn about benefit transfer, two approaches are possible. The first is to apply the same identical questionnaire in all three countries, and to use the same survey administration format in all three countries. Alternatively, if this is not feasible, one may decide to keep core questions in the questionnaire the same across countries, and to restrict comparisons and benefit transfer inquiries to these questions.

Although different surveys using different modes will be implemented in the three countries, we need to guarantee a certain level of comparability.

If PTO questions are integrated in the final survey instrument, PTO answers would have to be comparable across the three countries as respondents should be given the same amount of prior information and would be asked the same question. Although presented under different supports, PTO questions should be close enough to be comparable and to use pooled

datasets for the analysis. The mode of administration does not matter too much in this case because the question will be asked exactly in the same way.

Chained approach results would be comparable between the Czech Republic and the UK given the same mode of implementation is used in these countries. Similarly, conjoint choice results could be compared between Italy and the Czech Republic if all the technical details (size of the screen, etc.) are correctly addressed.

Using two different approaches presents a clear advantage and will bring insight to the literature in this area. First, it allows for the comparison of the values obtained in the three countries according to the valuation approach adopted, *i.e.* compare chained approach estimates between the UK and the Czech Republic and similarly compare the WTP estimates obtained in the CCE in the Czech Republic and Italy. This type of direct comparison is standard when several countries are involved in a project. It helps identify country-specific determinants of WTP. Secondly, using two valuation approaches also enables to compare the WTP estimates between the two approaches, *i.e.* comparing CCE WTP estimates with chained approach WTP estimates. This type of comparison is not commonly undertaken, especially the one comparing direct elicitation of WTP for reducing mortality risk with indirect elicitation of such WTP.

Based upon the considerations presented in this report, Table 9 below proposes a summary of the surveys that will be implemented in each country by early 2008.

Table 9 – Summary

	CR	IT	UK
Approach	PTO City A vs. City B Chained approach and/or Conjoint choice	PTO City A vs. City B Conjoint choice	PTO Chained approach
Survey mode	Face-to-Face and computer, respectively	Computer	Face-to-Face
Context	Environment and Accident	Environment and Accident	Environment and Accident
Risk reduction delivery mode	Private and public	Private and public	Private and public
Comparability	PTO: all results comparable Chained Approach: comparable with UK if face-to-face Conjoint choice: comparable with Italy if computer	PTO: all results comparable Conjoint choice results comparable with Czech Republic if computer in Czech Republic	PTO: all results comparable Chained Approach results comparable with Czech Republic if face-to-face in Czech Republic

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