Environmental impacts in cost-benefits analyses:
Does the cause of a health impacts influence its disutility's value?

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1 Context

Environmental quality, and especially air quality, are now increasingly considered by local stakeholders when assessing the opportunity to launch a project or choosing between various options of one project. Cost-benefit analyses are used to weight as many dimensions of a project as possible for all the actors affected, and especially to include externalities in the decision process. Indeed, the quality of air majorly affects population's health. However, the multiple dimensions of the assessment have to be considered in a consistent way.

The present study examines the possible differences in disutility's values determined by contingent valuation depending on the causes of the assessed health impact, and especially if pain and suffering due to an illness caused by air pollution have to be assessed with an adapted monetary value.

2 Method

After a review of the literature about the influence of information, and especially causes of the illness, on monetary values determined by stated preferences methods, a contingent valuation was designed and conducted on chronic obstructive pulmonary disease (COPD). This illness, which consists of an irreversible deterioration of lungs function, is mainly caused by active or passive smoking and by air pollution (1). These two causes are quite different in nature: whereas smoking is a choice, breathing is mandatory with little to no control over the quality of the breathed air.

The contingent valuation, a follow-up of the project European HEIMTSA (2, 3), valued the four stages of COPD (one day of cough, chronic bronchitis, COPDmild, COPDsevere). The payment vehicle was a pill to immediately cure this illness, paid by all at once for cough and as monthly contributions over ten years for the three more serious illnesses.

Four variants of the questionnaire were designed:

✓ "Baseline": the respondent gets no information about the causes of the illness, as in the HEIMTSA project.

✓ Variant 1 provides full context by indicating the illnesses are usually caused by air pollution and mainly by smoking.

✓ Variant 2 indicates that the illnesses are caused by air pollution.

✓ Variant 3 provides information on the fact that the illnesses are usually caused by smoking.

Among other aspects, smoking habits as well as the connection to health and environment of the respondents were specifically monitored.

The questionnaire was administrated per internet (CAWI) to a 2000 persons' sample representative of the French population.

The results were analyzed with IBM SPSS Advanced Statistics 25.0, with the SPSS plug-in STATS HECKMAN REGR; version 1.1.6 by Jon Peck (JKP. IBM SPSS; 2015).

3   Results

The main driver of the questionnaire's acceptability, assessed by the share of protest answers, is the illness itself: respondents are globally more ready to pay the more serious the illness is. Providing the causes of the illness seems to have some influence: less protest answers are observed when air pollution and smoking are said to cause the illness, so when a realistic context is settled. Smoking status also affects respondents' acceptance of the questionnaire: smokers accept the questionnaire more non-smokers, who accept it more than former smokers. It seems that smokers either take responsibility for their actions or completely ignore their consequences; whereas former smokers think they already took their share of responsibility.

The respondents who agreed to buy the treatment are globally willing to pay more to avoid the more serious illnesses. The causes of the illness provided in the questionnaire do not influence the willingness to pay. The smoking status of the respondents affect their willingness to pay (with different levels of statistical significance): smokers are ready to pay less than non-smokers, and than former smokers. Lastly, the characteristics of the respondent also impact their willingness to pay, and especially being "healthy conscious" (balanced diet, exercising, exposure to pollution of the living area).

It should be noted that air pollution and smoking are well known by general population as bad for health. Moreover, the importance of smoking status and being "healthy conscious" may let suppose that other characteristics such as culture, predisposition or education (4) may influence respondents' attitude towards risk, as smokers are more bound to take risks than non-smokers do (5).

These results highlight that, while providing context improves the reliability of monetary valuation of the health impacts due to environmental exposure by contingent valuation; it does not affect the willingness to pay itself, this value being more affected by personal characteristics of the respondents. It is consistent with the literature's recommendations stating that some information should be given but without influencing the respondents (6-8).

When conducting a cost-benefit analysis, it would consequently not be necessary to use a disutility's value determined specifically for environmental causes. However, controlling the characteristics of the populations, and specifically their "health and social behaviors", could improve the relevance of the recommended decisions.

4   Acknowledgment

5   References

1.   Andreas S, Hering T, Mühling S, Nowak D, Raupach T, Worth H. Tabakentwöhnung bei chronisch obstruktiver Lungenerktrankung. Deutsches Ärzteblatt. 2009;106(16):7.

2.   Maca V, Payre C, Scasny M. Valuation of chronic respiratory illnesses: 6-country study. European Association of Environmental and Resource Economists 19th Annual Conference; 27 - 30 June; Prague2012.

3.   Maca V, Scasny M, Hunt A, Anneboina L, Navrud S. Presentation of the unit values for health endpoints: country specific and pooled. GOCE-CT-2006-036913-2, HEIMTSA (Health and Environment Integrated Methodology and Toolbox for Scenario Development), sixth Framework Programme, Thematic Priority 6.3; 2011. Contract No.: D 4.1.3.

4.   Finkel AM. Perceiving Others' Perceptions of Risk. Annals of the New York Academy of Sciences. 2008;1128(Strategies for Risk Communication Evolution, Evidence, Experience):121-37.

5.   Viscusi WK, Aldy JE. The Value of a Statistical Life: A Critical Review of Market Estimates Throughout the World. Journal of Risk and Uncertainty. 2003;27(1):5-76.

6.   Mitchell RC, Carson RT. Using Surveys to Value Public Goods: The Contingent Valuation Method. 4eme ed. Press JHU, editor1989. 488 p.

7.   Ajzen I, Brown TC, Rosenthal LH. Information Bias in Contingent Valuation: Effects of Personal Relevance, Quality of Information, and Motivational Orientation Journal of Environmental Economics and Management. 1996;30(1):43-57.

8.   Boyle KJ. Contingent Valuation in Practice (Chapter 5 in Champ, P.A., K.J. Boyle and Th.C. Brown, *A Primer on Nonmarket Valuation*). Dordrecht:; 2003.