Human Costs of Chronic Bronchitis in Switzerland

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1. INTRODUCTION

The costs of morbidity or mortality provide useful information when conducting a cost-benefit analysis of a prevention or care programme. In order to assess these costs, we need to know how a specific disease affects people's welfare. However, most of the cost-of-illness studies only value economic costs, that is to say, the value of the resources required by medical treatment as well as the production losses due to short-term and long-term incapacity or premature death (Rice 1999). Few of these studies assess quality of life despite it contributes to individuals' welfare (Collins et al. 1991; Vitale et al. 1998).

Contingent valuation (CV) - a survey-based method used to elicit individuals' willingness to pay - has been applied increasingly to value outcomes of health care programmes or medical treatment (Diener et al. 1998). The CV approach offers a flexible tool to measure all kinds of goods – private or public – particularly changes in state of health.

The aim of this study is to value the human costs of chronic bronchitis. The specificity of the approach lies in the use of a CV survey to assess human costs only. A similar method was applied to value the human costs of road accidents in Switzerland (Schwab Christe 1995).

The next section of this article discusses the background of the study. It contains some epidemiological data on chronic bronchitis and a brief description of the health implications of the disease. Section 3 outlines the methodological framework used to assess changes in quality of life using a CV approach. The major options in the survey design are presented in Section 4. Section 5 deals with the econometric analysis of the data and the estimation of the human costs of chronic bronchitis. The final section contains a comparison with other studies on chronic bronchitis and some comments regarding the reliability of the present estimate.

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2. BACKGROUND

Chronic bronchitis is a lifelong respiratory disease\(^1\) the clinical syndrome of which includes difficulty in breathing, daily coughing, mucous and purulent expectoration, weight loss and weakness. It is defined by the daily presence of mucus-producing cough during three months each year, for at least the last two successive years.\(^2\) Chronic bronchitis was one of the main causes of morbidity in Switzerland in 1995: 135,000 women and 145,000 men suffered from this disease.\(^3\) Every year more than 5,500 women and 7,000 men are diagnosed with it (Frei 1998). It affects individuals of all age, but the prevalence rate is higher amongst people over 45. This disease is chronic and evolutive, i.e., its duration is long – about 24 years for women and 20 years for men – and its adverse effects worsen in the long run. Some people with chronic bronchitis, for instance, need a special oxygen tank so that their body can get enough oxygen.

Smoking is the most common cause of chronic bronchitis. The proportion of smoking-related mortality cases, i.e., the attributable fraction, is about 85% for men and 66% for women (Frei 1998). The other causes of this disease are air pollution, industrial dust and infection-proneness.

<table>
<thead>
<tr>
<th></th>
<th>Prevalence rate</th>
<th>Mean duration</th>
<th>Number of cases</th>
<th>Number of new cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>4.8%</td>
<td>24 years</td>
<td>135,000</td>
<td>5,500</td>
</tr>
<tr>
<td>Men</td>
<td>5.4%</td>
<td>20 years</td>
<td>145,000</td>
<td>7,000</td>
</tr>
<tr>
<td>Total</td>
<td>5.1%</td>
<td></td>
<td>280,000</td>
<td>12,500</td>
</tr>
</tbody>
</table>

Chronic bronchitis has some important adverse effects on the quality of life of patients, such as the physical pain from the suffering caused by this illness and the treatment it requires. Mental suffering arises from distress, emotional problems and mood swings. Every chronic disease modifies life style, social and family relations. For example, patients may have to modify their physical activities, because they have difficulties breathing. All these elements reduce the patients’ quality of life. For their relatives, grief and distress include sadness, bitterness and the feeling of helplessness when faced with the patient’s pain. People who live with someone suffering from chronic bronchitis may have to change their life style in order to adapt to that of the patient. Thus, the quality of life of relatives is also reduced.

1. Its ICD-10 classification – the 10\(^{th}\) international classification of disease by the World Health Organisation – is J44.
2. Definition provided by the American Lung Association.
3. The SOMIPOPS study conducted in 1981–83 obtained prevalence rates of 4.8% for women and 5.4% for men over nineteen (Gutzwiller et al. 1985). The IGIP study estimated that the prevalence rate of chronic bronchitis was 4.5% for women and 4.3% for men (Weiss et al. 1990). By comparison, a 1994 American survey estimated the prevalence rate at 5.4% of the general population (Adams et al. 1995).
3. **METHOD**

3.1. Valuing quality of life

Health is a non-tradable good\(^4\) which contributes to the people welfare. An improvement in the state of health is an intangible benefit which increases the individual's welfare. Different tools can be used to assess the quality of life in relation to a specific state of health, some of which are disease-specific while others are generic - they can be applied regarding any disease (McDowell *et al.* 1996). Among the latter, QALYs and HYEs are two common procedures based on individuals' preferences. In a questionnaire people are asked to express their preferences in terms of a utility index following a defined procedure (Johannesson 1996).

In the last 30 years, CV has been employed extensively to assess use and non-use value of environmental goods (Carson *et al.* 1994) and is now applied increasingly to value outcomes of health care programmes or treatment (Diener *et al.* 1998). Till now, few CV studies have estimated the value people attribute to reducing the risk of contracting a chronic disease (Hill 1988; Viscusi *et al.* 1991; Vitale *et al.* 1998). CV surveys or other WTP methods – e.g. wage-risk studies – seek to assess the total burden of a specific disease borne by individuals. Thus, these estimates include all costs – the economic costs (medical expenses and production losses) as well as human costs – and it is therefore not possible to elucidate the magnitude of the human costs. Some authors have, however, applied the approach discussed in this article, with which human costs can be estimated separately (Schwab Christie 1995). In this case the questionnaire has to be designed in such a way that respondents only value human costs.

3.2. Contingent valuation

The monetary value attributed by the general population to the deterioration in quality of life – the so-called human or non-resource costs – was estimated by applying the CV method. This survey-based approach invites interviewees to state their preferences in monetary terms by expressing their willingness-to-pay (WTP) for an health improvement on a hypothetical market. In the present study, they were asked to reveal their WTP to reduce their risk of contracting chronic bronchitis (Section 4.3.). In order to avoid potential CV biases, some methodological precautions have to be taken when designing the survey, i.e., the questionnaire and the contingent market itself (Mitchell *et al.* 1989). For example, the contingent market has to be realistic to reduce the risk of a hypothetical bias – expressed WTP could differ significantly from real payments – and it should incite respondents to reveal their true preference, thus limiting strategic behaviour. The main methodological choices regarding the design of the questionnaire on chronic bron-

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\(^4\) There is no market which determines the price of health.
chitis were made after an international workshop, two focus groups and a pre-test were conducted (Section 4).

3.3. Survey

The survey was performed in May 1998 in the three main linguistic regions of Switzerland, on a sample of 868 individuals eighteen years old and above. Face-to-face interviews were conducted by trained investigators. In fact, the CV questionnaire involved a complex scenario that required careful explanations and the use of visual aids, so the physical presence of interviewers was imperative. It also contributed to the quality of the survey as interviewers motivated respondents to co-operate fully. The non-probability quota sampling was used and the selection of respondents was based on four criteria: area of residence (urban or rural), age, gender and social stratum.

4. SURVEY DESIGN

4.1. Health as a private or public good

Health has the characteristics of both a private and a public good. Since the objective of the study was to value the human costs incurred by the individuals contracting chronic bronchitis, health was considered as a private good. Thus, the solution offered would enable respondents to reduce their own risk and hence to improve their own welfare. Interviewees had to express their WTP in order to lower the probability of contracting chronic bronchitis, thus reducing the related adverse health effects, including lower life expectancy. Paying for the device – i.e., buying a vaccine – also meant receiving the benefits. Presenting health as a private good offers three main advantages: firstly, it reduces the risk of strategic behaviour – the so-called strategic bias – as there is no incentive of a free ride. Secondly, it allows for the use of a payment vehicle – buying a vaccine – which is familiar to respondents, as everybody has some experience in buying medication. So, the lack of familiarity with the market – a frequent source of bias in CV – is not an issue here. Lastly, the risk of an embedding effect - the fact that people value a good which is different from the one offered in the contingent market – is lower than in other CV surveys. In fact, it is made quite clear that the device used to lower the risk – the vaccine – is effective for chronic bronchitis and not for any other disease.

4.2. Valuing human costs only

The aim of the study is to estimate the human or non-resource costs of chronic bronchitis only. Medical expenditures or loss of income due to morbidity or premature death should therefore not be considered by respondents when expressing their WTP. The re-
spondents were made aware that they would not bear any economic burden if they contracted the disease. They were also asked to concentrate on human costs, i.e., physical and mental suffering, deterioration in their quality of life and reduced life expectancy. After interviewees had revealed their WTP, a debriefing question was put to check whether respondents had valued human costs only. The purpose of another follow-up question was to establish whether the suffering of relatives was included in the utility function of the potential victim. If this was the case, it meant that the reduced welfare of the patient's relatives was taken into account when formulating the bids.

4.3. Contingent market

In the first stage of eliciting WTP in order to reduce the risk of chronic bronchitis respondents were informed about the consequences of the disease. The information given referred to different aspects, which are material in assessing modification in quality of life, i.e., the typical age at which individuals could contract chronic bronchitis, the symptoms of the disease, medical treatment and medication required to relieve patients, the discomfort and undesirable effects of the illness itself and its treatment, the consequences at the workplace, the impact on performing normal activities, the psychological effects, the consequences for the patient's relatives and the remaining life expectancy once the disease is diagnosed.\footnote{This description of the adverse health effects of the disease had been established with the help of the Outpatients Medical Clinic at University of Lausanne.} It was important, on one hand, to provide respondents with the appropriate information in order to make them understand how chronic bronchitis could affect their well-being and, on the other hand, to consider the cognitive limitations of individuals when providing information which had to be remembered.

As respondents had to make a risk-against-money trade-off, we provided data on the risk of contracting chronic bronchitis. A two-stage procedure was applied: firstly, respondents were informed about the average risk per 100,000 individuals of contracting chronic bronchitis during one year in Switzerland: 270 new cases in 100,000 men and 200 in 100,000 women were diagnosed in 1995. Thus, interviewees knew they were dealing with the average risk for a statistical person and not a person-specific risk. To make the concept of risk easier to understand, respondents received a visual support in which the number of new cases was taken out of a hat (Vitale et al. 1998). In a second stage, respondents were informed that smoking, air pollution and infection-proneness are the most important causes of chronic bronchitis. This procedure incited respondents to think about their own subjective risk. In fact, every respondent did not face the same risk. A heavy smoker would realise, for example, everything else being equal, that she or he is at a higher risk of contracting chronic bronchitis than the average population, and therefore she or he might express a higher WTP. With this procedure, a representative sample of the general population must be surveyed in order to obtain a reliable estimation of the marginal rate of substitution between risk and money. With too many smok-
ers in the sample, human costs would be overestimated. The magnitude of the risk reduction which is proposed in the contingent market can influence the valuation of health benefits. Literature tells us that the marginal rate of substitution tends to be higher when people surveyed are offered a small risk reduction instead of a large one (BLOMQVIST 1982). The 95% risk reduction proposed to respondents in this study could result in a conservative estimate of human costs.

4.4. Elicitation format

There are different ways of inciting individuals to state the highest WTP that would leave their welfare unchanged. We adopted a format which combines two usual methods of eliciting WTP: the payment card and the bidding game. After respondents had chosen a first amount on a payment card, an interactive follow-up – the bidding game – started and continued until individuals no longer accepted to change their WTP. The aim of the bidding process was to prevent individuals from indicating a lump sum without comparing it with the change in their welfare. It is the compensating surplus which was measured.

4.5. Biases

As mentioned in Section 4.1., the fact that respondents had to value health as a private good reduced the risk of some significant biases: the strategic bias, the vehicle-of-payment bias, the embedding effect as well as the hypothetical bias.

When people are not familiar with the good traded in the contingent market, the expressed WTP may very well not reflect the price they would have agreed to pay in a real market (BISHOP et al. 1990; ZETHRAEUS 1998). In this study, the risk of a hypothetical bias was probably not significant, as individuals are used to buying medication to reduce pain or being vaccinated against various diseases. Respondents were made aware that the fraction of their income they decided to allocate to the purchase of the vaccine would no longer be available for other purposes and that they would have to reduce other expenses. This also reduced the risk of a divergence between hypothetical and actual values. The third precaution, which was taken to reduce the consequences of a hypothetical bias, was to exclude very high bids. Thus, outliers – extremely high values suspected of being hypothetical rather than real – were excluded from the sample for the model estimation. Zero bids, representing strategic behaviour and not the indifference of the respondents, were also discarded from the sample. Questions in the debriefing section of the questionnaire were used to identify zero bids revealing a strategic behaviour.
5. RESULTS

5.1. Characteristics of the sample

The representativeness of the full sample (n = 757) was good, as the four characteristics retained for quota sampling – area of residence (urban or rural), age, gender and social stratum – were comparable with those of the Swiss population. Table 2 illustrates the frequency of answers to some health-related questions which were used as independent variables to estimate WTP. Among the interviewees, 33.0% were current smokers and 47.0% non-smokers. These percentages are similar to those obtained by the Swiss Survey on Health (OFS, 1994). As mentioned above, the proportion of smokers in the sample must reflect the prevalence rate of smoking in the Swiss population, in order to avoid over- or under-estimation of human costs. Smoking status and the frequency in physical exercise are two factors which induced interviewees to estimate their own risk of contracting chronic bronchitis (Table 4). It is interesting to note that less than 10% of the interviewees indicated that they knew someone suffering from chronic bronchitis. This proportion seems to be quite low when we know that about 300,000 individuals suffered from this disease in 1995 (Table 1).

<table>
<thead>
<tr>
<th>Questions</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interviewees' smoking status</strong></td>
<td></td>
</tr>
<tr>
<td>Current smoker</td>
<td>33.0%</td>
</tr>
<tr>
<td>Occasional smoker</td>
<td>6.1%</td>
</tr>
<tr>
<td>Former smoker</td>
<td>13.9%</td>
</tr>
<tr>
<td>Non-smoker</td>
<td>47.0%</td>
</tr>
<tr>
<td><strong>Frequency of physical exercise</strong></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>19.4%</td>
</tr>
<tr>
<td>From time to time</td>
<td>29.3%</td>
</tr>
<tr>
<td>Once a week</td>
<td>18.5%</td>
</tr>
<tr>
<td>More than once a week</td>
<td>32.8%</td>
</tr>
<tr>
<td><strong>Relative(s) suffering from chronic bronchitis?</strong></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>90.7%</td>
</tr>
<tr>
<td>Yes</td>
<td>9.3%</td>
</tr>
</tbody>
</table>

6. The Swiss Survey on Health held in 1992–93 returned 30.1% of smokers and 49.1% of non-smokers.
5.2. Treatment of zero bids

Respondents do not react in the same way on a hypothetical market. Some adopt a strategic behaviour, since their bids do not reflect their true preferences. Expressed WTP may be higher or lower than the change in welfare. Respondents will behave strategically if they believe that the outcome of the survey will influence certain political decisions. In order to reduce the impact of this bias, we tried to separate «true zero bids» – reflecting the indifference of the respondent – from strategic ones. Only the former were then used in the estimation of the regression model (Section 5.3.).

Debriefing questions addressed to respondents who refused to pay for the vaccine helped to detect strategic behaviour. The close-ended questions in Table 3 provide information on the reasons given for zero stated willingness-to-pay amounts. People with low income, for example, were considered as expressing their true preferences when stating a zero WTP. In contrast, individuals with average or high income, who agreed to get a free vaccine, were considered as not stating their true WTP. Smokers with average or high income, who indicated that they valued staying in good health, were supposed not to express their true preferences.

Table 3: Respondents’ reasons for zero WTP

<table>
<thead>
<tr>
<th>Reasons</th>
<th>% of respondents*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree to get a free vaccine</td>
<td>27.4%</td>
</tr>
<tr>
<td>Too little income</td>
<td>9.5%</td>
</tr>
<tr>
<td>Impossible to be vaccinated against all existing illnesses</td>
<td>63.1%</td>
</tr>
<tr>
<td>Duration of the vaccine’s efficiency too short</td>
<td>34.1%</td>
</tr>
<tr>
<td>Low risk of contracting chronic bronchitis</td>
<td>52.5%</td>
</tr>
<tr>
<td>Consequences of the disease are not serious</td>
<td>12.0%</td>
</tr>
<tr>
<td>Vaccine should be refunded by health insurance</td>
<td>35.2%</td>
</tr>
<tr>
<td>Vaccine’s efficiency is lower than 100%</td>
<td>19.3%</td>
</tr>
</tbody>
</table>

*Respondents could choose multiple items.

5.3. Regression analysis

A regression analysis was conducted to assess the internal validity of the CV survey and to identify the respondents’ characteristics which influenced their WTP. The dependent variable is the marginal willingness-to-pay (MWTP), which is defined as the price each respondent is willing to pay in order to reduce her or his own risk of contracting chronic bronchitis by 1 in 100,000:

\[
MWTP_i = \frac{WTP_i}{\Delta \text{risk}_s},
\]

where the WTP expressed by the respondent \( i \) for a 95% reduction of the risk (\( WTP_i \)) is divided by the risk variation (\( \Delta \text{risk}_s \)) which corresponds to the reduction in the incidence
of chronic bronchitis in 100,000 by gender. We consider WTP as a linear function of the risk reduction. Thus, MWTP does not depend on the magnitude of this risk variation.

In a first step, the semi-logarithmic and the Box-Cox models were applied to estimate the MWTP. These models reduced the influence of large bids and thus reduced the hypothetical bias (McClelland et al. 1991). Two types of independent variables were entered into the model estimation: socio-economic variables and variables related to the respondents’ health. Variables with coefficient significant at 10% only were retained in the final model (Table 4).

The semi-logarithmic model was chosen to estimate the human costs of chronic bronchitis. The Box-Cox estimation is fairly close to the semi-logarithmic model, as shown by the value of the Box-Cox parameter ($\lambda = 0.12$). Furthermore, the same variables were significant at 10% in both models.

The dependent variable in the semi-logarithmic model was expressed this way:

$$\ln (MWTP_i) = \beta'X_i + \epsilon_i,$$

where $\beta'$ is the coefficients vector of independent variables $X_i$ and $\epsilon_i$ is the random components vector.\(^7\)

Some variables which were supposed to influence the MWTP, such as the household’s income or the way people perceived their own health, were not significant at 10%. It is not so surprising that the coefficient of the variable INCOME was not significant; the expense of buying a vaccine is small, and therefore we must not expect a large income effect. It is interesting to note that in Viscusi’s study on chronic bronchitis income was not significant either (Viscusi et al. 1991). Moreover, social scientists consider Switzerland to be a middle-class society in which cultural factors are better predictors than income as far as health expenditure is concerned.

### Table 4: MWTP semi-logarithmic model

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficients</th>
<th>t-test</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-2.568</td>
<td>-9.142</td>
<td>0.000</td>
</tr>
<tr>
<td>AGE</td>
<td>0.570</td>
<td>2.113</td>
<td>0.035</td>
</tr>
<tr>
<td>SPORT</td>
<td>0.569</td>
<td>2.088</td>
<td>0.037</td>
</tr>
<tr>
<td>SMOKER</td>
<td>1.790</td>
<td>7.329</td>
<td>0.000</td>
</tr>
<tr>
<td>RELATIVE</td>
<td>0.387</td>
<td>1.799</td>
<td>0.073</td>
</tr>
<tr>
<td>REGION</td>
<td>-0.844</td>
<td>-3.482</td>
<td>0.001</td>
</tr>
</tbody>
</table>

n = 508
R-squared            | 0.134
Adjusted R-squared   | 0.129
Pearson’s coefficient | 0.428
Coefficient of variation | 1.150

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7. We added a small positive value to WTP in order to have a positive value for all MWTP. The dependant variable (MWTP) becomes $MWTP_i = WTP_i + 1 / \Delta \text{risk}_i$. 
Two variables were significant at 1%: smoker status (SMOKE) and the linguistic region of interviewees (REGION). Smokers were willing to pay a price six times higher than non-smokers ($e^{1.790}$) to reduce their risk of contracting chronic bronchitis. This means that smokers realised they were at a greater risk of contracting chronic bronchitis than the general population. Thus, when revealing their WTP, they considered their own risk. Two other variables, which were significant at 5% – SPORT and AGE –, indicate that respondents thought about their subjective risk as well. In fact, people who never exercise agreed to pay a higher price than other respondents, and individuals over thirty were ready to pay more than younger ones. RELATIVE was significant at 10% and its positive sign shows that interviewees who had a relative suffering from the disease were better informed of its consequences and thus were willing to pay more than if they had not been.

The value of adjusted $R^2$ is low but comparable which that of other contingent valuations conducted in the field of health (Jones-Lee et al. 1992; Tolley et al. 1994). Pearson’s coefficient does not indicate that the MWTP distribution is skewed to the right; the distribution is, in fact, highly bimodal. The coefficient of variation reveals that the distribution is scattered. On the whole, the values of the statistical characteristics are comparable with those of other CV studies (Mitchell et al. 1989).

### 5.4. Human costs

The semi-logarithmic model in Table 4 was applied to the complete sample ($n = 757$) in order to re-estimate the mean and median MWTP. The mean appeared to be a better measure of human costs because of the high proportion of zero WTP and the bimodality of the distribution. The MWTP distribution has two peaks because many non-smokers knew they were at low risk and were therefore not willing to pay for the vaccine ($WTP = 0$). Using the median MWTP could lead to a serious underestimation of the magnitude of human costs.

The human costs of chronic bronchitis (HC) were obtained as follows:

$$HC = MWTP_{\text{mean}} * 100,000$$

Since the mean MWTP is 38.5 centimes, the estimated cost of one statistical case of chronic bronchitis is CHF 38,500 (Table 5). This amount corresponds to the value attributed by the general population to the non-resource outcomes of a programme that would reduce the incidence of chronic bronchitis by one unit. In 1995, the human costs of all the new diagnosed cases were about CHF 481.2 million, which accounts for 0.13% of the Swiss GDP. If we consider tobacco-related cases only – more than 10,000 new cases in 1995 –, the human costs of chronic bronchitis due to smoking amounted to CHF 386.3 million, thus 80% of the costs were attributable to smoking.
Table 5: Estimated MWTP and human costs, 1995

<table>
<thead>
<tr>
<th></th>
<th>Swiss francs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MWTP</strong></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>0.13</td>
</tr>
<tr>
<td>Mean</td>
<td>0.38</td>
</tr>
<tr>
<td><strong>Human costs</strong></td>
<td></td>
</tr>
<tr>
<td>Per case</td>
<td>38,500</td>
</tr>
<tr>
<td>Total (million)</td>
<td>481.25</td>
</tr>
<tr>
<td>Part attributable to smoking (million)</td>
<td>386.30</td>
</tr>
</tbody>
</table>

6. DISCUSSION

When comparing the costs estimates in this article with those in previous studies, one has to do so with care. Firstly, the extent of the benefits of a reduced risk of chronic bronchitis is at times broader – the economic as well as the intangible benefits – and at times narrower – economic benefits only – than the one presented in this study. Secondly, chronic bronchitis takes many forms with more or less severe adverse health effects. Lastly, the socio-economic characteristics of the population surveyed differ.

Using a North Carolina population sample, Viscusi et al. (1991) assessed an extreme type of chronic bronchitis – patients had to carry a small oxygen tank – with the most severe morbidity effects. In our study, a less severe form of the disease was valued. Benefits of a reduced risk of chronic bronchitis in North Carolina were estimated by applying two different approaches: the traditional risk-against-money trade-off, and a risk-risk trade-off, in which morbidity was compared with the probability of an automobile accident. Krupnick et al. (1992) conducted the same survey on individuals with a relative suffering from chronic bronchitis. Respondents, who were more familiar with the disease, expressed a significantly higher WTP. The two U.S. studies resulted in considerably higher estimates than ours. The survey design may explain part of the difference. Firstly, these studies estimated the economic as well as the human costs, and in the current study, we only valued human costs. Secondly, the health implications of chronic bronchitis were less severe in our study than in the other two; thus, respondents considered chronic bronchitis as a chronic but not a life-threatening disease.

Leu et al. (1986) valued the economic costs of chronic bronchitis in Germany using the human capital and replacement cost methods. In 1984, the direct (medical expenses) and indirect (production losses) costs were about DM 8,000 for one statistical case of chronic bronchitis. This estimate cannot be compared with ours, as the object of the assessment is different. Other consequences of the disease – psychological effects and reduced quality of life – were measured with a non-monetary metric: the MIMIC impairment index.

CV is a preference-based approach which can be used for private or public goods. Using a monetary metric to assess health outcome is still controversial. This may explain
why most quality of life assessments use a utility index – e.g. QALYs or HYEs – rather than monetary units.

As CV is a common tool used to value environmental resources and is being applied increasingly in health economics, guidelines have been established to make CV surveys more reliable. Recommendations of the NOAA panel report (Arrow et al. 1993) constitute the standards for CV applications. We followed most of them: in-person interviews, inclusion of a debriefing section in the questionnaire, making respondents aware of their budget constraint. We did not follow the panel’s recommendations regarding two points: we used quota sampling instead of probability sampling, and the referendum format for the elicitation question was not adopted. Personal interviews – a very costly method of collecting data – were not compatible with the binary referendum format which requires a large sample. As mentioned by the NOAA panel, the embedding effect can lead to unreliable estimates. In our study, this bias is less a matter of concern because health is considered as a private good. Moreover, people are used to purchasing preventive devices to reduce their risk of morbidity. Respondents knew that vaccines are disease-specific and that paying for them would only lower their own risk of contracting chronic bronchitis.

Our assessment of the adverse health effects of chronic bronchitis led to a conservative estimate. We took the usual precautions in designing the questionnaire, and in conducting and managing the survey. The MWTP distribution being highly bimodal, the mean was considered a better estimate than the median. As mentioned above, the high number of zero bids arose from the fact that many non-smokers considered themselves to be at a low risk of contracting chronic bronchitis.

The study’s outcome – the human costs of chronic bronchitis – can be used to value the consequences of a reduced incidence of the disease. These values could be highly useful in public health policy, as possessing this information can make it much easier to assess the benefits of a prevention programme. Some additional work is needed to estimate the global burden generated by the disease. The human capital approach and the replacement cost method would make it possible to assess the economic burden of chronic bronchitis, and thus to obtain an estimate of its social cost by summing up the economic and the human costs.

8. The U.S. National Oceanic and Atmospheric Administration had commissioned a group of experts to assess the reliability of the CV method.

9. This is a binary question: a price is proposed to respondents. They have to accept or to reject it.
REFERENCES


JONES-Lee, M.W., G. LOOMES and P. PHILIPS (1992), The Value of Preventing Non-fatal Road Injuries: Findings of the Willingness-to-pay Feasibility and Main Studies, Final report on a research project conducted under contract to the Transport and Road Research Laboratory, Berkshire.


**SUMMARY**

The contingent valuation method was applied to assess the reduction in quality of life due to chronic bronchitis within an incidence framework. Interviewees – a sample of the general population – expressed their willingness-to-pay to reduce their risk of contracting the disease. Health was presented as a private good and respondents were made aware of the health implications, the average risk and the main causes of chronic bronchitis. The internal validity of the survey was assessed by the semi-logarithmic and Box-
Cox models. Human costs amounted to CHF 38,500 per case and to a total of CHF 481 million, or 0.13% of the GDP.

ZUSAMMENFASSUNG

Mittels der kontingenten Bewertungsmethode wurde die Reduktion der Lebensqualität im Falle chronischer Bronchitis eingeschätzt. Die Inzidenzmethode wurde angewandt. Die Befragten – eine Stichprobe der Bevölkerung – gaben an, was ihre maximale Zahlungsbereitschaft wäre, um ihr Erkrankungsrisiko zu senken. Die Gesundheit wurde als privates Gut dargestellt, und die befragten Personen wurden über die Auswirkungen der Krankheit auf die Gesundheit, über das durchschnittliche Erkrankungsrisiko sowie über die Hauptursachen der chronischen Bronchitis aufgeklärt. Die interne Validität der Daten erfolgte gemäß dem halb-logarithmischen und dem Box-Cox Modell. Die intangiblen Kosten beziffern sich pro Fall auf CHF 38,500.– oder auf total 481 Millionen Franken. Diese entsprechen 0.13% des Bruttoinlandproduktes.

RESUME

La méthode de l'évaluation contingente est appliquée pour estimer la réduction de la qualité de vie en cas de bronchite chronique. Une approche d’incidence est adoptée. Les enquêtés – un échantillon de la population générale – expriment leur disposition à payer pour réduire leur risque d’être atteint de la maladie. La santé est présentée comme un bien privé et les personnes interrogées sont informées des conséquences de la maladie sur la santé, du risque moyen d’être atteint et des causes principales de la bronchite chronique. La validité interne des données est estimée par les modèles semi-logarithmique et Box-Cox. Les coûts humains s’élèvent à 38,500.– francs suisses par cas et à un total de 481 millions de francs, soit 0.13% du PIB.