Reducing the risk of tick-borne diseases in Sweden

– a valuation study

PROJECT CONCEPT NOTE,
Daniel Slunge, December, 2011
1. Background
Lyme borreliosis (LB) and tick-borne encephalities (TBE) are two tick-borne diseases with severe health impacts that are increasingly common in the northern hemisphere. The symptoms are however often diffuse which partly explain the lack of good epidemiological data on tick-borne diseases. LB is the most common vector-borne disease in temperate zones of the northern hemisphere and about 85,000 cases of LB are reported annually in Europe. However, this number is probably largely underestimated since case reporting is highly inconsistent in Europe and many LB infections go undiagnosed. In the United States between 15,000 and 20,000 cases are registered each year and the disease is currently endemic in 15 states (Lindgren and Jaenson 2006). TBE is typically a more severe disease than LB, but less common with around 6,000 reported cases annually in Europe (Lindquist and Vapalahti 2008). Lately, a third serious tick-borne disease, Candidatus Neoehrlichia mikurensis (Neo), has been discovered. Neo is however extremely uncommon and there are only 8 documented cases in the world (whereof three in Sweden) (SMI, 2001).

Tick activity is temperature dependent and typically starts in the spring when temperature approaches 6 degrees Celsius and usually persists until temperatures fall in November. Global warming may hence prolong the active period of ticks and lead to an increase in cases of tick-borne diseases (Lindgren and Gustafsson 2001).

TBE and LB in Sweden
The number of ticks, as well as the prevalence of LB and TBE, has increased rapidly in Sweden during the last decades. Figure 1 shows how the prevalence of ticks in central and northern Sweden has changed from before 1980 (left map) and after the mid-1990s (right map).

Figure 1: Differences in tick prevalence in central and northern Sweden (southern parts not included).
The spread of TBE in Sweden began in the Stockholm region and has later spread also to the West coast. Figure 2 displays the geographical distribution of reported cases of TBE in Sweden during 2010. Despite the increase in TBE cases it should be noted that the number of TBE cases is still limited to around 200 cases per year.

Figure 2. Geographical distribution of reported cases of TBE in Sweden during 2010.

Source: Swedish Institute for Communicable Disease Control

There are no reliable statistics on the prevalence of LB in Sweden, partly because LB, in contrast to TBE, is not a notifiable disease in Sweden and that the distribution of LB is very heterogeneous. A study that includes seven counties in southern Sweden estimates that there are about 70 cases per 100,000 inhabitants (Berglund et al 1995). Another study found more than 460 cases per 100,000 inhabitants in the Southeastern county of Blekinge (Bennet et al, 2006). North of Dalälven it is assumed that the risk of contracting Lyme disease can be much lower. Recent studies indicate that even if you get bitten by a tick that carries LB, the risk of infection is low (Fryland et al, 2011).

Despite the difficulties involved in estimating the risk of getting infected by LB and TBE in Sweden, it is reasonable to conclude that the average risk is small but increasing. The actual risk of getting infected is highly dependent on factors such as place of residence and summer vacation, leisure habits and precautionary measures taken by different individuals (e.g. vaccination against TBE, wearing protective clothing while walking in woodlands or areas with high grass and checking for ticks on your body after being in woodlands or areas with high grass.

Individuals can hence undertake a variety of measures to reduce the risk of tick-borne diseases. There is also a variety of public programs that have been undertaken with the objective of reducing the risk of tick-borne diseases. These include vaccination programs against TBE (notably in Austria), information disclosure, chemical spraying, removal of vegetation to reduce tick density, exclusion or removal of deer (which is a host animal for ticks) (Hayes and Piesman, 2003).

2. Purpose of the study
The study has the following purposes:
- to study individuals’ risk-perceptions of getting tick-borne diseases and their related behavioral responses to these risk perceptions;
- to estimate willingness to pay for reducing the risk of tick-borne diseases through individual measures (e.g. Vaccines) and public programs;
- to identify the determinants of differences in willingness to pay among different individuals.

3. Relevance of the study
While there has been a lot of research on medical effects of tick-borne diseases and the epidemiology of LB and TBE, research on risk perceptions and behavioral responses is more scant. There are some studies on the cost effectiveness of vaccination schemes against TBE (Lindquist and Vapalahti 2008; Kunz, 2003) and LB (e.g. Poland and Jacobson, 2001), but, as far as we can tell, there are no stated preference studies on risks and measures to reduce the risk of tick-borne diseases. Studying risk perceptions, related behavioral responses and the willingness to pay for reducing or eliminating the risk of tick-borne diseases can thus add to the existing literature.

The study can also be relevant for the design of public policies related to tick-borne diseases. The study can for example provide a background for analyses of the effectiveness of different policy options to reduce the risk of tick-borne diseases, such as information campaigns and vaccination policies.

4. Research Methodology and Scope
The research methodology consists of a contingent valuation study conducted via a web based survey involving approximately 2000 randomly selected individuals in two Swedish regions with different risk levels related to tick-borne diseases. The geographical differences in the prevalence of tick-borne diseases in Sweden allows for a comparative study involving a low risk and a high risk region. This could resemble a natural experiment where the welfare impact from the spread of tick-borne diseases may be studied.

The survey will be preceded by a literature review, semi-structured interviews with medical experts and researchers, focus group meetings and a pilot survey. Further delimitations of the study are expected based on the research phases preceding the survey.

5. Time plan

| Oct - 11 – Feb - 12: | Literature review  
|                    | Scoping interviews  
|                    | Drafting of survey questions  
| March - 12 | Testing of draft survey questions  
| April - 12 | Pilot survey  
| June - 12 | Full survey  
| Sept. – Nov. 12 | Analysis of results  
| Dec 12 – Feb. - 13 | Writing of research paper and policy briefs  
| March – April - 13 | Dissemination of results  

6. Organization of the research project
The study forms part of a PhD- dissertation in Environmental Management and Economics at the Department of Economics, University of Gothenburg. Supervisor for the dissertation is Professor Thomas Sterner.

The study is funded by the Graduate School on Environment and Health coordinated by the Centre for Environment and Sustainability (GMV) in Gothenburg, which is jointly financed by the University of Gothenburg, Chalmers University of Technology and the Västra Götaland Region.

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