Summary and Conclusions from the Study:

Cold Spells in Southern Quebec: Current Adaptation and Suggestions for Future Adaptation

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EXECUTIVE SUMMARY

In the context of Canada's obligations under the Kyoto Protocol, Natural Resources Canada is coordinating a national-scale scientific assessment of climate change impacts, which is expected to be finalized shortly. In order to contribute to the health component of this assessment and to set the first milestones for adapting to future climate conditions, as described in the Quebec action plan on climate change, the Direction des risques biologiques, environnementaux et occupationnels of the Institut national de santé publique du Québec has proposed conducting further research on the ways in which the population of Southern Quebec is vulnerable to climate change, and assessing the capacity of this population and certain institutions to mitigate the associated health risks.[1]

In this context, the present report examines ways of adapting to cold spells. Indeed, global warming does not necessarily occur in a linear fashion, even though an increase in minimum and maximum temperatures in Canada has been observed over the past decades, particularly in the winter, and a rise in average temperatures in Southern Quebec was recorded between 1960 and 2003. Consequently, there will still be periods of intense cold, and it will be essential for people to become adequately acclimatized to these conditions, in particular because of the worrisome health effects attributable to the cold.[2]

In concrete terms, this document summarizes findings from a telephone survey (n= 2,545), conducted in the fall of 2005, among the general population living in Southern Quebec, and seeks to answer the following questions:

- What type of home heating is used?
- Who heats with wood and how often?
- In the winter, who puts weather stripping on the windows and doors of their residence, as a preventive measure?
- When people are at home during a cold spell, what methods do they use to keep themselves warm (e.g., taking showers or baths) or to warm up their dwelling (e.g., using the oven of their kitchen stove)?
- Who goes out to run errands or to engage in intense physical activity, in spite of unusually cold temperatures?
- When people go out, how do they dress to prevent the adverse effects of the cold?
- And, who uses a remote car starter in the winter?

In addition, this document suggests various strategies for future adaptation, a number of which are already being recommended nationally and internationally.

1 Various literature reviews and studies have been produced in this way by the *Institut national de santé publique du Québec*. For further information, please consult the website <www.inspq.qc.ca/>.

2 The literature review conducted by Beaudreau *et al* [Beaudreau, P., Besancenot, JP., Caserio-Schönemann, C., Cohen, JC., Dejour-Salamanca, D., Empereur-Bissonnet, P. et al. (2004) Froid et santé : éléments de synthèse bibliographique et perspectives. En ligne le 15 mai 2006 :http://www.invs.sante.fr/publications/2004/froid_et_sante/rapport_froid_et_sante.pdf] summarizes in particular the health impact of cold spells. The report by Doyon *et al* [Doyon, B., Bélanger, D., Gosselin, P. (2006). Effets du climat sur la mortalité au Québec méridional de 1981 à 1999 et simulations pour des scénarios climatiques futurs. Institut national de santé publique du Québec, Québec. Sous presse.] also refers to various articles on this subject.

Current Adaptation

More than three-quarters of respondents had access to a single energy source at home for heating their dwelling in the winter, primarily using electricity. The other participants combined more than one source, especially electricity and wood.

In fact, 18.5% of participants heated their homes with wood, at least some of the time. Almost all of them lived in a house, rather than an apartment. They were also more affluent than the other respondents. It is interesting to note that the use of wood heating, which is more common the further one goes from Montreal and Laval, was not influenced by the perception of living in an area that is prone to winter smog, or by the smog warnings broadcast by the media.

In the winter, 12.4% of the participants put weather stripping on all of the windows and doors of their home, and 19.3% did so for some of them. This adaptation strategy was used more often by residents of dwellings built before 1983 and by respondents who perceived that their home insulation was not effective for protecting against the cold or humidity.

During a cold spell, 27.7% of respondents used draft stoppers, at least occasionally, on the windows (e.g., rags) and doors (e.g., rugs) of their home. This strategy seems to be used by people when their home insulation does not provide effective protection against the cold or humidity, and when the weather is unusually cold, particularly in the case of respondents who have not previously placed weather stripping on their windows and doors.

Among all of the participants, 57.5% turned up the heat during the day at least occasionally, if they were at home during a cold spell. Women of all ages and men between 18 and 34 years of age were more likely to turn up the heat.

Nearly one-third of respondents turned up the heat at night during an intense cold spell. This group was made up primarily of people 18-34 years of age, allophones, and people who turn up the heat both during the day and at night in extremely cold weather.

Twelve percent of respondents used the oven in the kitchen stove to heat up their homes during periods of unusually low temperatures. These participants, who were less well-to-do than those who did not use this type of supplementary heating, also resorted to various other strategies for coping with cold spells, especially portable space heaters.

More than one respondent out of ten used a portable space heater during a cold spell. These participants more often considered the insulation of their home to be more or less effective, if not ineffective, for protecting against the cold. They were also more likely to reside in a dwelling built before 1983.

The great majority of participants opened the curtains if it was sunny during a cold spell; one-third closed them if it was windy. Closing the drapes and blinds was an adaptation strategy used mainly by allophones.

During unusually cold spells, the participants, especially women of all ages and men between 18 and 34 years of age, resorted to a variety of methods to keep warm at home, especially wearing warmer clothes than usual and using blankets, for example when reading or watching television, and taking showers or baths.

More than one-third of respondents reported that they used at least six adaptation strategies in order to keep warm at home (e.g., using a blanket when reading or watching television) or to heat up the house (e.g., using the oven in the kitchen stove) during a cold spell; more than one-third mentioned three to five

strategies; and approximately 10% named one or two. Five groups of participants resorted to a greater number of solutions, i.e., women and people between 18 and 34 years of age; respondents who considered their home insulation to be inadequate for protecting against humidity; participants who did not put weather stripping on the windows and doors of their homes in the winter; and residents of the administrative health regions covering Montreal, Laval, and the Montérégie and Outaouais Regions.

One out of two participants often or always went out to run errands (e.g., grocery shopping) in spite of unusually cold temperatures; one-quarter of the participants occasionally ventured out, while the others rarely or never did. Similarly, one-third of respondents often or always engaged in brisk physical activities outdoors (e.g., snow shovelling, sports); about one-quarter sometimes participated in these physical activities, and two out of five rarely or never did. The participants who went out to run errands or engage in intense physical activities outdoors were more often men than women, as well as people who tended to perceive that they were in good, or very good health. In addition, workers and students went out more often to do errands than did unemployed or retired people, while people who lived in houses engaged in intense physical activities outdoors more often than the participants who lived in apartments.

Three-quarters of the participants always wore warmer clothes than usual (nearly 60.0% of them also wore several layers) when they went out to do errands (e.g., grocery shopping) or to participate in intense physical activities outdoors (e.g., snow shovelling) during a cold spell. Less than one respondent out of two always wore warmer footwear than usual. Gloves were the most popular accessory and were always worn by three out of four participants; the next most popular items were scarves or neck warmers, and hats or head coverings, always worn by three out of five participants; and balaclavas, the least popular accessory, were worn all the time by one out of four respondents. Generally speaking, people in the 18-34 age group, as well as the 35-64 age group (but to a lesser extent) used these coping strategies more frequently than did people older than them, apart from warmer footwear than usual, which was worn by a similar proportion of respondents, regardless of their age. Note that the use of a car seems to encourage people to put on gloves and wear warmer clothes than usual.

Four out of five respondents owned a car, and approximately one-third of them used a remote car starter in the winter. The use of a starter was more common among women than men, and was also more prevalent in the colder regions of Southern Quebec. It should be noted that neither the smog warnings broadcast by the media, nor the perception of living in an area that was prone to winter smog, affected the use of a remote car starter in the winter.

Suggestions for Future Adaptation

Wood Heating

It appears to be essential to monitor more closely the increase in wood heating and, at the same time, to put into place educational and legislative measures and incentives (e.g., financial assistance) aimed at encouraging people to purchase combustion appliances that do not cause much pollution in order to replace conventional appliances. This approach is further justified given the increase in frequency and intensity of extreme climate events, which could prompt more Quebecers to heat with wood. In addition, Quebec's recent and future population growth in the outskirts of Montreal, where the prevalence of wood heating is already relatively high, should not be underestimated.

Winter Adaptation Strategies for Keeping Warm at Home During Intense Cold Spells

The combination of particular housing characteristics along with the income of the occupants provides a reasonable basis for identifying certain sub-groups of people who are at high risk during extreme cold spells. From the standpoint of public health and energy conservation, it would be judicious to develop assistance programs for home insulation improvements that are more in line with the financial realities of

economically disadvantaged people, whether they are owners or tenants. This measure would be all the more important in a context of climate change, because poor housing insulation against humidity also affects the capacity to adapt to heat waves.

Preventive weather stripping of windows and doors in the winter – a concrete and cost-effective measure for conserving energy at home – could be used more. A study identifying the reasons for following this practice would help to reinforce the energy conservation messages broadcast on this matter.

The specifications of this research did not allow for identifying the physiological and psychosocial factors that determine which adaptation strategies are used to keep warm at home during extreme cold spells, such as wearing warmer clothes than usual. From the point of view of sustainable development, it would nevertheless be pertinent to pursue this line of research further, since even if in the future there is likely to be a significant decrease in the total number of heating degree-days (compared to the period from 1961 to 1990), this will probably also be accompanied by a diminished physiological capacity on the part of young people to adapt to the cold, which could significantly reduce the potential energy conservation.

Certain immigrants, especially those from tropical regions, are the most vulnerable in the winter, especially first-generation immigrants who have difficulty communicating (e.g., language) and who have no support resources (e.g., family), especially when there is a massive power blackout. If it has not already been done, it would be considerably important for the managers of emergency response services to work together with Hydro-Quebec. In partnership with reception and integration agencies, Hydro-Quebec has initiated programs targeting cultural communities and has developed means of communication tailored to the unilingual allophone clientele. This aspect is all the more important in a context where extreme climate events (e.g., ice storms, cold spells) will increase in frequency and intensity.

Wind Chill Index and Clothing Recommendations Broadcast Simultaneously

It seems that consulting the wind chill temperature, as well as Environment Canada's recommendations broadcast at the same time as intense cold warnings, have little or no impact on the choice of clothing worn for going outside in the winter. In fact, whether or not people adopt preventive behaviours depends on numerous factors, in addition to knowledge. Furthermore, it is also possible that the wind chill index is not as well understood as would be desired, or is difficult to relate to individual temperature sensation, or is of questionable validity, at least among the general population. From a public health perspective, it would be desirable to assess these various aspects.

Use of Remote Car Starters

In terms of public health and protection of the environment, it would be useful to conduct research specifically on factors influencing the use of remote car starters, especially since the difference observed according to gender in this study was not very high, which indicates that other types of factors may potentially play a role, such as the habit of idling.

Smog Warnings

Smog warnings do not seem to affect the use of wood heating, nor do they prevent people from using cars and, in the winter, remote car starters, according to the assessment done in this study. Also, it appears that reporting this weather information has not yet had the expected impact on the implementation of recommendations broadcast by the media. Identifying the factors that influence compliance with these recommendations would only help to improve the Info-Smog Program.

CONCLUSION

In recent years, much has been written about heat waves, due to rising temperatures and the increase in hot spells occurring in certain industrialized countries. While this is important, it is most important to recall that in Quebec, there will still be winters and periods of intense cold.

It is true that Quebecers are fortunate to have access to hydroelectric resources that cause relatively little pollution. As well, it cannot be denied that they have been very ingenious over the centuries in protecting themselves from the cold; this is especially true for the most disadvantaged people. However, in light of the findings of this study and the literature on climate change, we must acknowledge that much remains to be done, collectively, in order to preserve public health and the environment. We humbly hope that the suggestions for future adaptation strategies presented in this report will help to move forward in this direction.