

**FINAL
REPORT**

Literature Review:
Public Opinion Research on
Air Quality Issues and Advisories

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EXECUTIVE SUMMARY

Air pollution constitutes one of the major environmental challenges facing Canadians and its institutions today, and accordingly, is a priority issue for the Government of Canada. The Meteorological Service of Canada-Environment Canada and Health Canada are undertaking an initiative to improve how the public is informed about air quality and the associated health risks, to help Canadians take actions to reduce their exposure and also their personal contribution to poor air quality conditions. This initiative is being supported by a measurement program designed to evaluate the effectiveness of Air Quality Forecast Program (AQFP) communications, in terms of reaching the target population(s) and promoting appropriate actions.

The measurement program will rely in large part on well-designed public opinion research, and build upon previous research conducted on this topic. An important first step is to review the existing body of research on public awareness and response to air quality issues and advisories, to determine what is currently known (and not known) about public views on air quality. The review covers 15 separate quantitative surveys conducted in Canada over the past 12 years, most of which were commissioned by Environment Canada and/or Health Canada. Some studies were conducted in specific communities immediately following a poor air quality episode, while others were national or local studies focusing more broadly on public awareness, perceptions and behaviours. The following paragraphs summarize the key findings from this literature review:

How Canadians define air pollution

The public opinion research conducted to date reveals that Canadians widely identify air pollution as a significant environmental problem in their communities today, and one that evokes concern comparable to that for water quality and toxic chemicals in the environment. Most Canadians think of air pollution in

relatively narrow terms, as being largely localized and coming from vehicle and factory/industry emissions. This conception of air pollution as being localized around specific sources leads to assumptions about air quality (e.g. that it is invariably better in the suburbs than in the downtown core, and in smaller cities than in larger ones).

Canadians rely primarily on their own senses rather than on media advisories to detect air pollution (most say they can identify poor air quality as soon as they step outdoors), and this reliance appears to be a notable barrier to paying closer attention to the local Air Quality Index (AQI) and advisories. When people cannot see pollution for themselves or feel any noticeable health symptoms they can tie directly to air quality, the strong tendency is to conclude conditions are safe; air quality advisories become of secondary importance as something that applies to other types of people who they believe are more at risk.

Air pollution and health

Most Canadians acknowledge that air pollution has a significant impact on human health, primarily in terms of asthma and other forms of respiratory illness. People tend to think that the health effects are long-term rather than acute, partly because this is how respiratory illness is viewed, and also in the absence of having knowledge of direct evidence of significant acute impacts (e.g. deaths, heart attacks).

The public is divided on whether air pollution affects health at any level or only when it reaches a certain threshold level. At the same time, most Canadians appear to be incorporating the concept of thresholds, as the research shows that most believe that air pollution starts to affect health once their local AQI drops below the most positive point on the scale (e.g. from “good” to “fair”).

Despite acknowledging the health risks of air pollution, there is a strong tendency for individuals to “dissociate” these risks from themselves. In a national survey conducted in 2004, almost three in ten Canadians report that they or someone in their household experienced some type of health impact from air pollution in the previous two years, yet few in this group considered local air pollution to represent a serious hazard. Few Canadians believe that healthy people (like themselves) are at notable risk from air pollution, and instead assume that such risks apply primarily to other people who are more vulnerable to health effects (e.g. children, the elderly, and people with pre-existing health problems).

A further challenge to getting Canadians to take protective actions in response to poor air quality episodes is that many do not believe there is much they can easily do to reduce such risks. Canadians demonstrate a limited understanding of the appropriate protective actions to be taken when poor air quality occurs. Perceptions about the localized nature of air pollution lead many to believe the best (or only) strategy is to move away from the source (e.g. urban centres or high-traffic areas), with fewer placing faith in such steps as staying indoors or avoiding strenuous exercise.

Air quality advisories and the AQI

Six public opinion surveys have been conducted in communities immediately following poor air quality episodes. Recall of the air quality advisories has varied dramatically, from a low of six percent in the Mauricie Bois-Francs regions of Quebec (Environics, 2007b) to a high of 72 percent in Southern New Brunswick (CRA, 1994a). The variation may be due in part to the infrequency of local advisories (and hence their novelty), although other factors are also likely at play (e.g. characteristics of the local population, extent of media coverage).

Awareness of an advisory is an essential first step in informing the public about poor air quality conditions, but just as important is absorbing and retaining the content. The research suggests that most residents absorb little more from advisories than the fact that air quality in their area is not good. Few could recall specific messages about potential health impacts, the

types of people most at risk, ways to reduce exposure, or the specific AQI reading for the day.

The available research shows that Canadians express a willingness, in principle, to change their behaviour or lifestyle in response to an air quality advisory, particularly for actions that would involve little inconvenience or disruption. However, the range and extent of concrete actions in response to actual advisories appears to be limited. The post-event surveys revealed that well below half of residents aware of a recent advisory in their community said they or someone in their household did anything differently because of it. Moreover, such efforts were largely limited to one type of action, most commonly to spend less time outdoors.

People give two principal reasons for not taking action in response to local air quality advisories. Some did not believe that it was necessary to act since they did not believe that they themselves were at risk, either because they did not notice any health-related symptoms or because they did not believe the current air quality level constituted any hazard. Other people expressed a more fatalistic opinion that it was not possible for them to have done anything about the poor air quality episode, either because they were not able to alter their routine at the time, or because they felt there was simply no way to avoid breathing bad air.

The research indicates that most Canadians know there is a local AQI in their community, but only a minority seem to be making use of this information on any kind of regular basis. At the same time, the public indicates they believe there is a great deal of value in AQIs and advisories, as an effective way to help people (i.e. others who are more at risk) reduce their exposure to air pollution.

Such clear expressions of value appear to be at odds with the limited impact such advisories have had to date in prompting action to reduce personal exposure. This may simply reflect the tendency for people to identify as priorities those things they feel they should pay more attention to than they are currently motivated or able to do. It also reflects people’s limited understanding of what can and should be done, coupled with the absence of immediate and visible effects, resulting in limited citizen action.

While Canadians currently pay limited attention to AQIs and advisories, they also would like to receive more information about local air quality and pollution, and for this information to be regularly available (rather than only when air quality is a problem). This appears to be a somewhat unfocused type of interest, however, as no specific type of information emerges as a clear priority. Most people may simply not have had enough experience with AQIs and advisories, nor given sufficient thought to what might be of greatest value to them, to have a clear idea of what information they need and how they would make use of it.

Research gaps

The public opinion research conducted to date provides a valuable picture of Canadians' awareness, perceptions and behaviors related to air quality and health, but the body of evidence is far from complete. The following represent the most significant gaps in the research:

- **Coverage across forecast regions and weather conditions.** The research covers only a handful of Canadian communities, and does not cover the full range of factors likely to influence public awareness and response to advisories. This limits the ability to draw stronger conclusions about Canadian public opinion and behaviour with respect to air quality and health, and to predict responses to future episodes.
- **Measurement of media broadcast coverage.** The research has not yet incorporated measurement of how advisories were broadcast across local communities (type of media, extensiveness of coverage), which may prove to be a critical factor influencing public awareness and response.
- **Deeper insight into public cognition and behaviour.** Qualitative research techniques could add further insight into the dynamics of why people think, believe, and do what they do in response to air pollution advisories.
- **Focus on target groups.** Additional research is needed to better understand how audiences at greater risk from the hazards of air quality differ from the general population in their attitudes and perceptions on air quality and health issues, and in their responses to advisories.

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INTRODUCTION

Background. Air pollution constitutes one of the major environmental challenges facing Canadians and their institutions today. Air pollutants such as ozone, particulate matter, nitrogen dioxide, sulphur dioxide and carbon monoxide have been clearly linked to a variety of health effects, including premature mortality, asthma, bronchitis, increased respiratory distress symptoms and other adverse endpoints. Policies and programs are underway to improve ambient air quality (most recently the new Clear Air Act tabled in Parliament), but this represents a long-term process. In the meantime, a key priority is to effectively inform Canadians (especially those at greatest risk) about air quality conditions on an ongoing basis and in particular leading up to and during advisories when conditions are poor. The purpose of such communication is to help Canadians to take actions to reduce their exposure and also their personal contribution to poor air quality conditions.

The Government of Canada's current Air Quality Forecast Program (AQFP) provides air quality forecasts to approximately 75 percent of the Canadian population on a daily basis. This program plays an important role in helping to protect Canadians health and well-being, but it also has several notable limitations. First, the current Air Quality Index (AQI) measures are not based on the latest scientific knowledge, in terms of what pollutants are measured and how the index is formulated. Moreover, none of the AQIs currently used in Canada incorporate any measure of the health risk associated with different levels of pollution. Second, there is no common AQI used across the country, and versions developed and implemented by provinces and some municipalities lack consistency in the way in which air quality is calculated and reported. Third, while presenting air quality information to the public is an essential first step, getting Canadians to pay attention to this information and act upon it represents a difficult challenge in terms of public education/social marketing.

In 2001, the Government of Canada initiated a process to improve the Canadian AQIs, with the goal of establishing a national standard that is: a) based on the most current scientific data; b) more reflective of human health risk; and c) designed to more effectively communicate to Canadians in a way that elicits attention and action. This initiative is a joint effort of the Meteorological Service of Canada-Environment Canada and Health Canada, in collaboration with provinces and other stakeholders. The primary outcome of this process has been the development of a new Air Quality Health Index (AQHI), which is now being piloted in Nova Scotia and British Columbia.

To support this initiative, MSC has identified the need to establish and implement a credible measurement program and tool to evaluate the effectiveness of AQFP communications in terms of reaching the target population(s) and promoting appropriate actions. The measurement program is intended to:

- Build on the previous public opinion research already conducted on this topic;
- Work well over the long-term (e.g. up to 20 years);
- Be sufficiently generic and flexible to be equally applicable in any Canadian forecast region and accommodate program changes over its lifetime (e.g. transition from AQI to AQHI); and
- Be methodologically rigorous to ensure maximum credibility among scientific, policy and political stakeholders.

Literature review. The first step in building such a measurement program is to review the existing body of public opinion research on public awareness and response to air quality issues and advisories. The primary objective of this literature review is to determine what is currently known (and not known) about public views on this topic. It will provide a foundation for the new

work to be done in terms of utilizing measures already developed and validated, and identifying any key gaps that need to be addressed.

The focus of this review is on Canadian research conducted over the past 12 years, totalling 15 separate quantitative surveys, most of which have been commissioned by Environment Canada and Health Canada. Some of the studies are “post event” surveys, conducted in specific communities immediately following a poor air quality episode, with the overall objective of measuring the public’s awareness of and response to such events. Other national or local studies have focused more broadly on the public’s awareness, perceptions and behaviors as they relate to air quality, air pollution and the AQI, with a particular focus on the relationship between air quality and health. One of the most recent studies, conducted in Kamloops, British Columbia for Environment Canada, evaluated a pilot project to dis-

seminate the new Air Quality Health Index (AQHI) using Internet and community radio. There appears to be little public opinion research on air quality done by governments in other jurisdictions, or by non-government organizations, at least which is available in the public domain. References for the source data are listed at the back of this report.

The report begins with an executive summary highlighting key findings and conclusions, followed by a detailed analysis organized by the major issue areas that have been addressed by public opinion research to date. Within each key area is identified what research has been done, what has been learned or concluded, and what gaps in understanding remain. While this is not an exhaustive report on every aspect of air quality and air quality advisories, it provides a solid overview of recent public opinion in these key areas.

HOW CANADIANS DEFINE AIR POLLUTION

One broad area addressed by public opinion research on air quality is how Canadians think about this issue, in terms of their degree of concern, what they consider to be the causes of air pollution, their assessment of local air quality, and how they go about identifying poor air quality. These topics are covered primarily by the more comprehensive national and local surveys, rather than by the post-event surveys. The exceptions are questions evaluating local air quality, which have been included in almost all surveys included in this literature review.

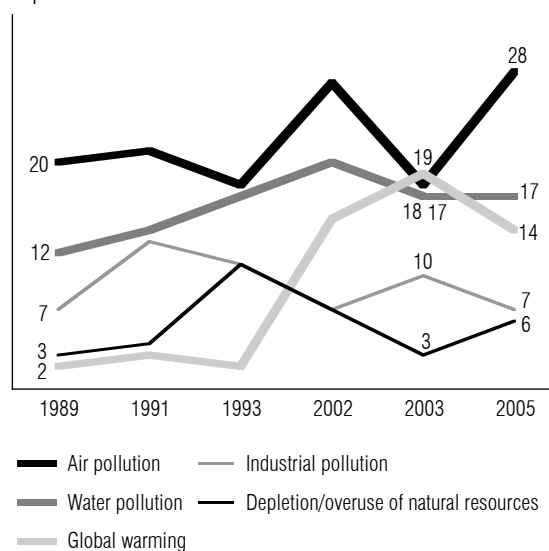
Concern about air quality

Two national public opinion surveys on air quality initially approached the issue by assessing where air quality fits within the broader context of environmental concerns. The public was asked (without prompting) to identify the most important environmental problem facing Canadians (Enviroics, 2002), as well as about their degree of concern about a number of environmental issues, including air quality (Enviroics, 2002 and 2005a). These questions mirror similar ones regularly asked on Enviroics' syndicated FOCUS CANADA survey.

The findings indicate that Canadians recognize air pollution as a major environmental hazard, and one that evokes concern. Although its perceived importance has fluctuated, air pollution has traditionally been cited as one of the country's top environmental issues, going as far back as 1989. Moreover, two-thirds of Canadians say they are very concerned about the quality of the air, comparable to the level of concern about water quality and toxic chemicals in the environment, and this proportion has remained remarkably stable over the past several years (Enviroics; 2002, 2005a and 2005b).

Most important environmental issue

Top five mentions National 1989 - 2005



Source: Enviroics, 2005b

In your view, what is the most important environmental issue we face in Canada today?

Causes of air pollution

Sources of air pollution

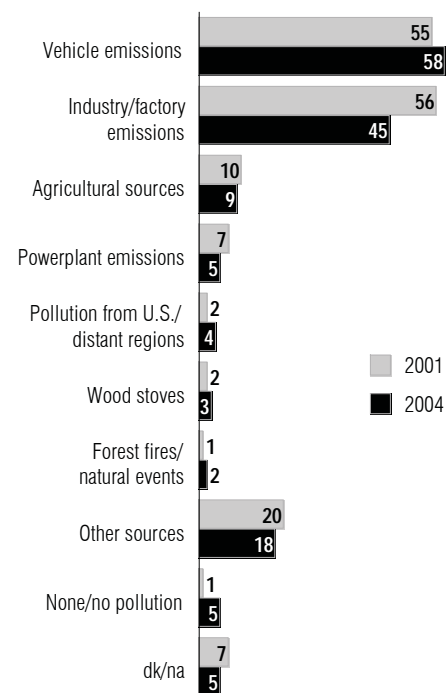
Several surveys have asked the public about their knowledge of the major sources of air pollution, and the results have been generally consistent. The two principal sources identified are vehicle and industrial emissions, and few Canadians identify any other causes beyond these (such as agricultural or U.S. sources). The findings are similar when the public is asked separately about summer and winter causes of air pollution (EKOS, 2000).

There are some differences in the relative contributions attributed to vehicle versus industrial sources which are related to geographical area. The emphasis on vehicle emissions is greater in urban areas, such as Vancouver (CRA, 1994c), Toronto (CRA, 1994b) and Montreal (CRA, 1997), and in urban areas on national surveys (Environics, 2005a). There is a greater focus on industrial emissions in New Brunswick, for example (CRA, 1994a and EKOS, 2000), due to its proximity to local and U.S. factories.

At a national level, the trend between 2001 and 2004 was toward a greater emphasis on vehicle emissions (up 3 points) over industry sources (down 11 points) (Environics, 2002 and 2005a). This may be the result of growing public awareness of urban smog and how emissions from vehicle tail-pipes contribute to this problem.

Primary sources of local air pollution

National 2001-2004



Source: Environics, 2005a

As far as you know, what are the major sources of air pollution in your area? Any others?

Local versus distant sources

Given that Canadians identify vehicle and factory emissions as the primary sources of local air pollution, it is perhaps not surprising that most also perceive air pollution as localized in nature. When specifically asked, over half of Canadians believe that air pollution in their community comes from mostly local sources, compared with one in three who look to distant sources and one in ten who believe that both types of sources have an equal effect upon the air quality in their area (Environics, 2005a).

Once again, these perceptions appear to be largely defined by region, consistent with the actual pattern of long range pollutants across North America. For example, residents of Western Canada are more likely to say local air pollution is generated in the immediate vicinity, while Atlantic Canadians and people in Nunavut are more apt to attribute it to distant sources (EKOS, 2001 and Environics, 2005a). The perception that air pollution is highly localized is also evident by the fact that Canadians tend to think that air quality is better in the suburbs and city parks than in denser downtown areas, and that smaller cities invariably have better air quality than larger ones (Environics, 2005a).

Where local air pollution is generated

By region 2004

	IN OR NEAR LOCAL COMMUNITY	FROM DISTANT REGIONS	EQUALLY FROM LOCAL AND DISTANT REGIONS
Canada	54	33	10
Atlantic	42	47	9
Quebec	53	28	15
Ontario	47	39	11
Saskatchewan/Manitoba	70	20	7
Alberta	67	27	5
B.C.	67	26	5

Source: Environics, 2005a

Would you say the air pollution in your area comes mostly from sources ...?

Subsample: Those who are aware of major sources of air pollution in their area (n=1,353)

Other determinants of air pollution

There has been limited exploration of the public's perceptions (and misperceptions) about the factors that determine or influence air quality, such as season and weather conditions. Canadians do appear to make a distinction between air quality in the different seasons, with summer the season most likely to be associated with poor air quality. The public is more likely to rate local air quality as only fair to poor during the summer months than during the other three seasons (Environics, 2005a), and to perceive higher air pollution levels in the summer (EKOS, 2000). A strong majority of Canadians also believe that air quality in their area is influenced to some degree by humidity and temperature, and to a lesser extent by cloud cover (Environics, 2005a).

Assessment of local air quality

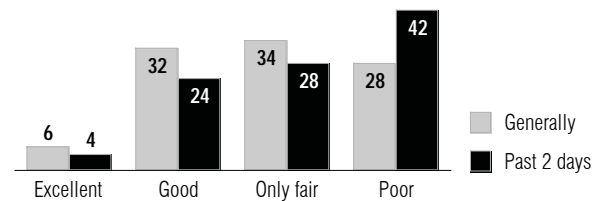
Almost all of the public opinion surveys on this topic ask residents to rate the general air quality conditions in their community. In surveys conducted immediately following a poor air quality episode, residents are also asked to rate the air quality over the previous couple of days.

At a national level, Canadians give a mixed assessment of their local air quality. Consistent with actual conditions, these surveys found that public perceptions of air quality are noticeably worse in urban areas, in particular Toronto and Montreal (EKOS, 2000 and Environics, 2005a). However, these urban-rural differences do not play out consistently in community-specific surveys. For example, one of the most positive assessments of local air quality was in fact recorded in Montreal in 1997 (70% excellent or good) (CRA, 1997), while in 2004, Fraser Valley residents gave one of the most negative assessments (38% excellent or good) (Environics, 2005a). The reasons for this discrepancy are unclear (both surveys took place following an air quality advisory), and further data points in different communities and under varied circumstances are likely required to fully understand the pattern of public perceptions regarding local air quality.

At the same time, many Canadians notice a difference in local air quality during an air quality episode. Residents are more apt to rate their local air quality as poor (ranging between 10 and 20 points higher) during such an episode than under normal conditions (CRA, 1994a-c, 1997; Environics, 2005a). An exception is the most recent post-event survey conducted in the Mauricie/Bois-Francs areas of Quebec, which found perceptions of local air quality to be better than normal during the episode (72% excellent or good vs. 65% normally), and ratings of “poor” to be unchanged (5% and 4%, respectively) (Environics, 2007b).

In addition to an evaluation of current conditions, a few surveys have addressed the perceived trend in terms of whether air quality in their community is seen to be getting better or worse. In fact, most people believe that the quality of their local air has remained largely stable. In 2004, six in ten (60%) Canadians said local conditions have not changed over the past five years, and this view has strengthened since 2001 (up 10 points). However, a substantial minority said conditions have become worse (29%) (Environics, 2002 and 2005a), with deteriorating conditions most apt to be reported by Vancouver and Toronto residents. In 2006, Torontonians remained almost equally likely to say that air quality in the city had stayed the same (49%) or become worse (42%) (Environics, 2006a).

Perception of local air quality Fraser Valley 2004



Source: Environics, 2005a

How would you rate the quality of the air in your community, that is, the presence or absence of pollution? Is it generally ...?

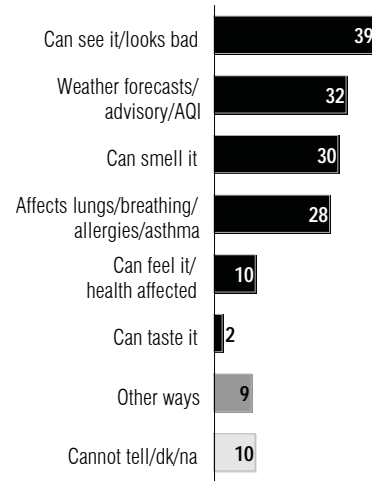
And how would you rate the air quality in your community over the past couple of days? Has it been ...?

Basis for identifying poor air quality

Two surveys assessed *how* Canadians determine for themselves whether the air quality in their area is poor (EnviroNics, 2005a and 2007a). The results indicate that the public relies primarily on their own sensory cues, rather than on published sources or media advisories, to detect air pollution conditions. When asked how they can tell when the air is bad, a large majority say they know from what they see or smell or from their own health symptoms, and considerably fewer rely on weather or advisory forecasts. Furthermore, a clear majority of Canadians say they can identify poor air quality as soon as they step outdoors (EnviroNics, 2005a and 2007a). These findings are notable in revealing an important reason why Canadians are not more attentive to the AQI and air quality advisories. The public may require a better understanding of poor air quality before they will shift their reliance from visual or other cues to scientifically-based indicators.

How you know when the air is bad

National 2004



Source: EnviroNics, 2005a

*How would you know when the air quality in your area is poor?
Anything else?*

AIR POLLUTION AND HEALTH

One of the goals of the process to improve Canadians AQIs is to make them more reflective of human health concerns. As a result, assessing public knowledge and perceptions of the relationship between human health and air pollution has been a priority topic for public opinion surveys. The issue has been examined from a number of different angles, including general perceptions of the impact of air pollution on health and which groups are most at risk, as well as the extent to which Canadians believe they are personally affected by air pollution.

General effect on human health

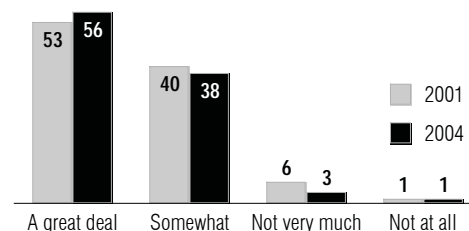
Most Canadians recognize and acknowledge that air pollution has a significant impact on human health. Regardless of whether surveys use numeric or word measurement scales, a majority of respondents say that air pollution has a major effect on the health of Canadians (EKOS, 2000 and 2001; Environics, 2002 and 2005a). National survey results suggest this perception has strengthened marginally (up 3 points) between 2001 and 2004 (Environics, 2002 and 2005a). Among the various studies, opinions are notably consistent across regions of the country.

Several surveys have probed more deeply into the specific types of health problems people think are related to air pollution, typically using an unprompted question. Health impacts are largely seen in terms of respiratory illness and breathing-related problems (e.g., CRA, 1994a-c), and this remained consistent between 2001 and 2004 (Environics, 2002 and 2005a). However, a significant percentage also agreed, when prompted, that air pollution might also contribute to cancer, heart disease and even skin rashes (Environics, 2005a).

A couple of surveys have explored whether Canadians think of the health effects of air pollution as more immediate or longer term (Environics, 2005a and 2007a). The public tends to think about air pollution as having chronic (longer term) rather than acute impacts on health, partly because this is how respiratory illness tends to be viewed. However, even among those who initially say long term effects are most likely, a majority acknowledges that Canadians may also experience immediate health effects as a result of air pollution (Environics, 2005a).

Perceived effect of air pollution on Canadians' health

National 2001-2004



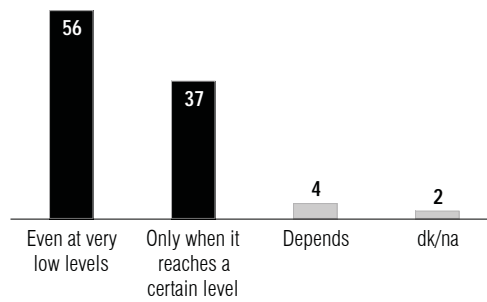
Source: Environics, 2005a

In your view, to what extent does air pollution affect the health of Canadians? Does it affect them ...?

Another important question is whether the public thinks that air pollution affects health at any level or only when it reaches a certain threshold level. The concept of thresholds is implicitly conveyed through the current air quality advisory system now in place (in which public announcements are made when air quality readings reach a pre-established level), but current scientific evidence indicates that health effects can be detected at any level. When asked which opinion is closer to their own, Canadians express no consensus on the question, although the balance of opinion is towards the view that air pollution at any level can affect health (Environics, 2005a).

However, prior research also provides clear evidence that Canadians are incorporating the concept of thresholds in interpreting the AQI. In several surveys, the public tendency is to say that air pollution starts to affect health once the level drops below the most positive point on the scale (e.g. when it declines from “good” to “fair”) (Environics, 2005a). This finding suggests that the public may either be drawing a threshold for health impacts, or assuming that the “cleanest” level on the AQI scale indicates the absence of any pollutants.

Point at which air pollution affects health
National 2004



Source: Environics, 2005a

Do you think that air pollution affects people's health at any level; that is, even when there are only very low levels of pollutants in the air? Or do you think the impact on health is only when air pollution reaches a certain level?

Subsample: Those who think that air pollution affects the health of Canadians a great deal, somewhat or not very much (n=1,470)

People most at risk from air pollution

Two surveys explored public perceptions of the types of people they believe are most at risk from the health effects of air pollution (Environics, 2005a and 2007). When considering who is most at risk, Canadians are most likely to think of the elderly, followed by children or infants, and people with pre-existing health problems (mostly related to respiratory illness). Beyond these segments, very few tend to think about otherwise healthy people (like themselves) who simply face greater exposure to air pollution by nature of where they live or work, or who engage in strenuous activity. These data suggest that Canadians tend to view the health effects of poor air quality as not affecting everyone, but primarily those who are most vulnerable with respect to health. This perspective is supported by the absence of acute symptoms that can be tied unmistakably to air quality.

Types of people most at risk from air pollution

National 2004

Elderly/seniors	71
Children/infants	58
People with health problems	49
Pre-existing problems	22
Respiratory problems	16
Asthma	14
Weak immune systems	10
Heart conditions	3
Allergies	2
Other problems	1
People exposed to pollutants	4
People working/exercising outdoors	3
Smokers	2
People living in urban areas	2
Other	7
Everyone	9
dk/na	4

Source: Environics, 2005a

What types of people do you believe are most likely to experience health effects from air pollution?

Subsample: Those who think that air pollution affects the health of Canadians a great deal, somewhat or not very much (n = 1,470)

Personal health effects

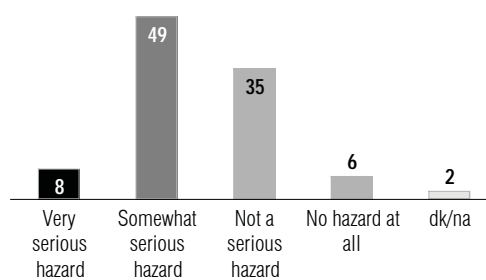
Health hazards to local population

While Canadians say that air pollution clearly affects the health of Canadians generally, they are noticeably less likely to acknowledge this to be the case in their own community. Very few (8%) believe that air pollution presents a serious hazard to the health of people living in their area, with the most common view being that it is a “somewhat serious” (49%) or “not serious” (35%) hazard (Environics, 2005a). These data are revealing as they point to the tendency for many to dissociate the acknowledged hazard of poor air quality from themselves, which is a potential barrier to Canadians’ use of the AQI.

These results are consistent with other public opinion research conducted by Environics (FOCUS CANADA) showing that Canadians’ assessment of general pollution levels increases linearly from one’s own neighbourhood, to one’s province, the country, and the world overall (Environics, 2005b).

Is air pollution a hazard to people in your area?

National 2004



Source: Environics, 2005a

How much of a hazard do you believe air pollution presents to the health of people living in your area? Does it present ...?

Subsample: Those who think that air pollution affects the health of Canadians a great deal, somewhat or not very much (n = 1,470)

There is some evidence of urban-rural differences in perceptions of the hazards posed by local air quality conditions (CRA, 1994a-c and 1997; Environics, 2005a, 2006a, 2007a-b). However, these results are not conclusive since the available data are complicated by the fact that some surveys were conducted immediately following an air quality advisory, which may have impacted how seriously residents viewed potential health hazards.

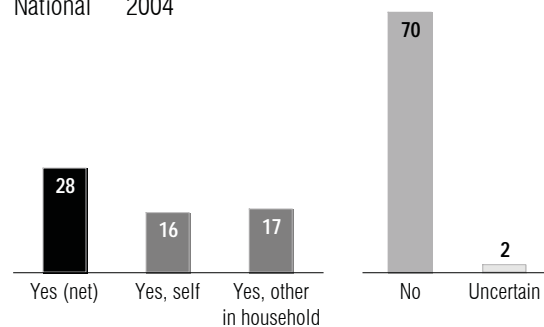
Household health effects

While there is a clear tendency to focus on the air quality impacts on vulnerable populations, a noticeable proportion of Canadians believe their health, or that of someone in their household, is affected by air pollution. The 2004 national survey found that almost three in ten households reported experiencing some type of health effects from air pollution at some point in the past two years, primarily in the form of asthma and other respiratory problems (Environics, 2005a). A slightly different question asked in 2001 found that almost one in four Canadians said they currently suffer or have suffered (personally) from health problems they feel are due to air pollution (Environics, 2002). In addition, one in ten Canadians say they have received advice from a doctor regarding the effect of air pollution on their health, mostly involving instructions to stop smoking or to stay indoors and curtail their activities (Environics, 2002).

Canadians who report their household health has been affected by air pollution demonstrate a greater sensitivity to air quality issues in a number of ways. They are more apt to express concern about air quality, to hold worse perceptions of their local air quality, to believe that air pollution has substantial health impacts, and to link air pollution with specific health problems. However, even among this group only 17 percent consider local air pollution to represent a serious hazard (Environics, 2005a). This suggests that people view air pollution more as an aggravating factor to pre-existing problems than a major cause of illness.

Surveys conducted after an advisory recorded notable levels of reported household health effects in Fraser Valley (27%), Toronto (22%) and Montreal (17%) that residents believed could be linked to the recent air quality episode (Environics, 2005a). At first glance, these findings suggest a surprisingly high proportion of residents are experiencing a physical response to air pollution, or at least are sensitized to this possibility. While these results merit further investigation, they do not in themselves warrant a firm conclusion, since the health effects reported may have been very minor in scope, and the link to air pollution highly speculative, possibly prompted by the question being posed during the survey.

Personally experienced health effects from air pollution in past two years
National 2004



Source: Environics, 2005a

Have you or someone else in your household experienced any type of physical or health problems over the past two years that might be attributed to air pollution at the time?

Knowledge of protective actions

Despite recognizing the health risks posed by air pollution, Canadians do not believe there is much they can easily do to reduce such risks, demonstrating a somewhat limited understanding of the appropriate protective actions to be taken when poor air quality occurs.

At a national level, in response to an unprompted question, people are most likely to say they could reduce their exposure to poor air quality during episodes by staying indoors (20%), getting out of polluted areas (14%) or wearing a mask (12%). Very few identify such strategies as avoiding strenuous activity or exposure at certain times of day, and one in four Canadians could not identify any way to limit exposure (Environics, 2005a). These are consistent with the findings of surveys conducted in specific communities (CRA, 1994a-c and 1997; Environics, 2005a and 2007b).

Perceptions about the localized nature of air pollution lead people to assume that they can avoid its effects by moving away from the sources. Thus, in response to a follow-up, prompted question, most Canadians believe that getting away from urban areas (89%) or avoiding high traffic areas (91%) will be effective in reducing personal exposure. Many also agree that avoiding strenuous activity (48%) or staying indoors (57%) will make a difference, although these steps are not as widely seen to be effective in comparison to getting away from polluted areas (Environics, 2005a).

How to limit personal exposure to air pollution health effects

National 2004

Stay indoors	20
Get out of city/polluted areas	14
Wear a mask	12
Change driving habits	8
Use air purifier/filtration	7
Move to country/rural area	7
Avoid high traffic areas	6
Avoid second-hand smoke	5
Reduce smoking	4
Exercise/live healthy	4
Lobby government	4
Avoid exposure at certain time of day	4
Use public transit	3
Limit activities during advisories	3
Avoid strenuous activity	3
Stay informed/increase awareness	2
Other	20
No way to limit exposure	12
dk/na	15

Source: Environics, 2005a

Research has shown that air pollution can cause health problems among both healthy people and those with heart or lung illnesses. What, if anything, do you believe people can do to limit their exposure to air pollution and its harmful health effects? Anything else?

AIR QUALITY ADVISORIES AND THE AQI

The Air Quality Index (AQI) and episode advisories represent the principal means for alerting communities about the need to take actions to reduce exposure to adverse health effects. Public opinion surveys have explored Canadians' awareness of air quality announcements, both generally and immediately following an event, as well as their behaviour (both projected and actual) when confronted with an air quality message, and the value that they place on such advisories. In addition, a few surveys have specifically explored the public's knowledge and experience with the AQI in their community, and one survey has evaluated the pilot of the new AQHI in British Columbia.

Recall of air quality advisories

A series of public opinion surveys have focused on public awareness of announcements or information about air quality or air pollution, and have found reasonably broad, but far from universal, awareness of such information. When the survey is not focused on a specific air quality event, a plurality of Canadians (ranging between 40% and 60%) say they recall seeing or hearing air quality information, no matter the timeframe involved (e.g., past summer, past year, previous two years) (EKOS, 2000 and 2001; Environics, 2002 and 2005a). As might be expected, recall of advisories is highest in those areas where they are most commonly issued, notably the country's major urban centres (Environics, 2005a).

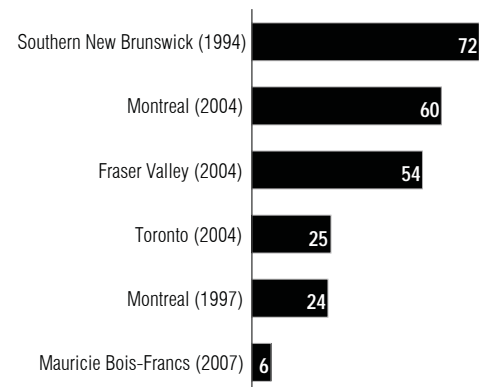
In contrast to the general consistency of these responses are the varied levels of recall of air quality announcements reported following a poor air quality episode. These have ranged from a low of six percent in the Mauricie Bois-Francs area of Quebec (Environics, 2007b), to a high of 72 percent recall in Southern New Brunswick (CRA, 1994a). The variation between

communities appears to be due in part to how common advisories typically are, and thus how noticeable they are when issued. For example, in 2004, Montreal had its worst ever air quality episode recorded during winter (levels of over 100 on the Air Quality Index), which generated significant media coverage and resulted in 60 percent awareness of the advisory among the general population.

Why more residents did not notice these advisories may be due in part to the fact that most people do not make a habit of looking for air quality information on a consistent basis. In the three post-event surveys conducted in 2004, fewer than one in five residents in each community who noticed the advisory said they were specifically looking for such information at the time (Environics, 2005a).

Recall of air quality advisories

Post-event By community



Source: CRA, 1994a and 1997; Environics, 2005a and 2007b

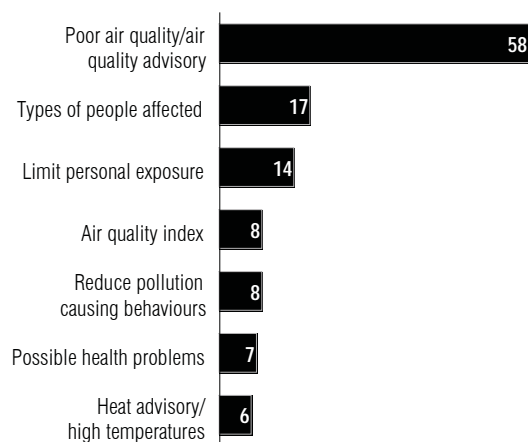
Do you recall seeing or hearing any announcements or information about poor air quality in your area over the past couple of days?

Content recall

Awareness of an advisory is an essential first step in informing the public about poor air quality conditions, but just as important is absorbing and retaining the content. The research to date suggests that most residents absorb little more from an air quality advisory than the fact that air quality in their area was not good. Across five surveys conducted following an air quality event, few could recall specific messages about potential health impacts, the types of people most at risk, ways to reduce exposure, or the specific AQI reading for the day (CRA, 1994a and 1997; Environics, 2005a). Even when specifically asked, few residents aware of an advisory could accurately recall the specific AQI level reported, ranging from a low of four percent in Montreal to a high of 23 percent in the Fraser Valley (Environics, 2005a).

Specific recall from advisory

Fraser Valley 2004 Top mentions



Source: Environics, 2005a

*Can you tell me what it was that you recall hearing or seeing?
Anything else?*

Subsample: Those aware of recent advisory (N=217)

Source of recall

Residents who recall an air quality announcement or advisory are most likely to say they saw it on television, followed by radio and then newspaper (CRA, 1997; Environics 2005a). One exception was following an air quality event in Southern New Brunswick, when residents were most likely to recall hearing a recent advisory on the radio (CRA, 1994a). Very few individuals (less than 10%) mention other sources such as the Internet, billboards or their family and friends. When a smog advisory was issued in Montreal in 2004, nine percent mentioned seeing something about it on electronic billboards on major roadways (Environics, 2005a).

The prominence of television as a source of recall is a typical pattern for most advertising and public service campaigns, even when multiple media are used (and sometimes even when TV is not part of the media mix). Therefore, while secondary media such as newspaper and radio may be less well recalled, their usefulness should not be discounted since different media have different strengths (above and beyond building awareness).

Response to advisories

Public opinion surveys on air quality have examined both Canadians' projected and actual behaviour when confronted with air quality announcements. The available data show that Canadians express a willingness to change their behaviour of lifestyle in response to an advisory, but that most do not actually do so.

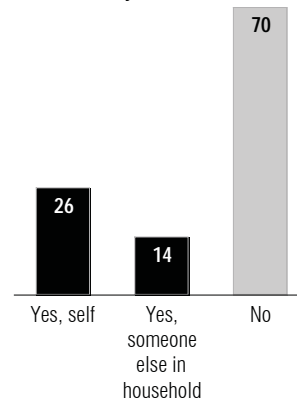
Three separate surveys found that close to eight in ten Canadians say they would be likely to do something differently as a result of an advisory (a hypothetical situation), although no more than 55% indicated a "high likelihood" or said it was "very likely" (EKOS, 2000 and 2001; Environics, 2001).

In the case of an actual episode, typically about one-quarter of Canadians aware of an advisory say they or someone in their household did anything differently because of it. Nor does the severity of the air quality episode appear to encourage greater public response. The highest level of household action reported was in Toronto (42%), followed by the Fraser Valley (30%) (Environics, 2005a). By comparison, action levels were lower in Montreal in 2004 (23%), following the worst ever winter episode recorded in the city, and in Southern New Brunswick in 1994 (26%), despite being the best recalled of the advisories measured to date (Environics, 2005a; CRA, 1994a).

That people's response to a hypothetical situation is considerably greater than the actual response by those hearing an advisory is consistent with numerous studies indicating that intentions typically overstate behaviour, especially when the behaviours relate to an acknowledged health hazard such as air quality. Moreover, it confirms that reported willingness to take action is not an accurate indicator of future behaviour.

Nonetheless, roughly half of those aware of the advisory did take sufficient notice to discuss it with someone else (e.g. friends, family, co-workers) (Environics, 2005a). This indicates that the information surpassed a minimum threshold of relevance, even if few changes were made in terms of concrete actions.

Behaviour change as result of advisory
Fraser Valley 2004



Source: Environics, 2005a

Did you, or someone else in your household, do anything differently as a result of this advisory?

Subsample: Those aware of recent advisory (N=217)

Specific actions taken

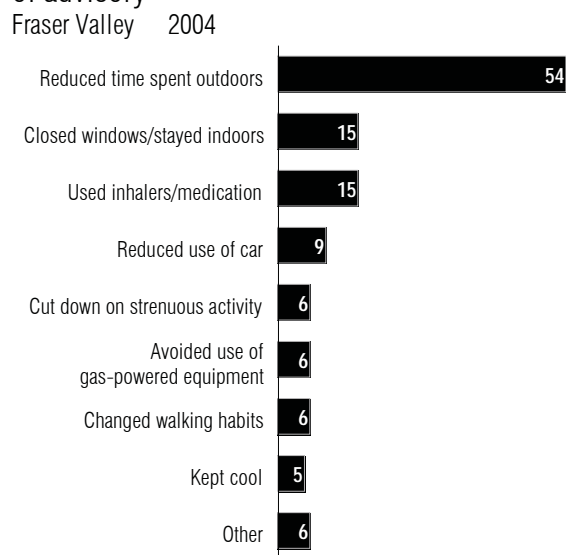
Even among those who report making changes in response to a poor air quality event, such efforts were largely limited to one type of action, most commonly spending less time outdoors (CRA, 1994a-c and 1997; Environics, 2005a). Beyond an unprompted question about what actions had been taken, the post-event surveys did not more precisely measure the extensiveness of such actions nor incorporate any objective measures of validation; nonetheless, it is likely that many of the efforts reported were token and/or over-stated.

Some surveys explored people's perceptions about the actions they *would likely* take in the case of an advisory. Respondents were provided with a list of potential lifestyle changes or behaviours, and asked how likely they would be to adopt each in the event of a poor air quality rating. Overall, the degree of expressed intent

varies across the types of actions, depending on the amount of inconvenience or disruption involved. For example, among the changes the public is most likely to say they will make is avoiding the use of oil-based paints, solvents or aerosols (which relatively few people use on a regular basis), and limiting or avoiding strenuous activity (CRA, 1994a-c and 1997; EKOS, 2000 and 2001). In response to this question, people are least likely to say they will cut down on the use of their car during an air quality episode.

Regardless of whether the questions refer to actual or hypothetical air quality episodes, the focus of change has generally been on actions intended to reduce personal exposure to poor air quality, rather than on efforts to lower an individual's contribution to air pollution (CRA, 1994a-c and 1997; Environics, 2005a). While there is recognition that individuals are contributors to air pollution, Canadians tend to feel that the federal government (35%) or industry (22%) needs to play the lead role in addressing these problems (Environics, 2002).

What people did differently because of advisory



Source: Environics, 2005a

What did you or the other person do in this case? Anything else?
Subsample: Those who did something differently as a result of advisory (n=65)

A few surveys have specifically explored Canadians' perceptions of ways they can help reduce smog in their area. In general, the public has a reasonably strong belief that individuals can make a difference in reducing air pollution (55% agree strongly and 35% agree somewhat), primarily by reducing personal vehicle use and using alternate methods of transportation (CRA, 1994a-c, 1997; Environics, 2002). When provided with a list of possible measures to reduce air pollution, Canadians were in fact most willing to make changes involving considerable inconvenience or expense but at some undefined, future point (e.g. choosing a more fuel efficient vehicle). They were least supportive of changes that would require less personal effort but would have immediate financial implications (e.g. paying more for gasoline). Such perceptions clearly differ from people's actual behaviour, and therefore this type of question should not be used to predict future action.

Obstacles to taking action

All post-event surveys asked those who did not do anything differently in response to an air quality advisory the reasons for this (on an unprompted basis). The data reveal a consistent pattern of two main types of obstacles. First, many say it was *not necessary* to act since they themselves were not affected by, or at risk from, the ambient air quality at the time, either because it was not affecting their health or because they did not believe the current air quality level constituted any risk. Second, other residents adopted a more fatalistic perspective, expressing the view that it was not possible for them to do anything about the poor air quality episode, either because they were not able to alter their routine at the time, or because they felt there was simply no way to avoid breathing bad air (CRA, 1994a-c and 1997; Environics, 2005a).

AQI familiarity and use

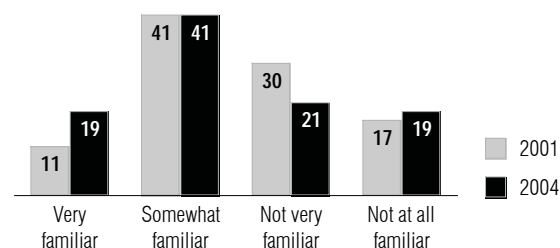
A few surveys explored Canadians' knowledge of and experience with the Air Quality Index (AQI) in their community. The data suggest that while Canadians are reasonably familiar with the AQI, only a minority appear to be making use of this information on any kind of regular basis.

In 2004, six in ten Canadians said they were at least somewhat familiar with their local AQI, which represents a noticeable increase from 2001 (52%) (Environics, 2002 and 2005a). For the 2004 data, familiarity with the AQI was highest in Ontario and particularly in Toronto. This pattern was also evident in the post-event surveys conducted the same year, which found Toronto residents were most familiar with their AQI, while Montrealers were least so (Environics, 2005a).

Among those familiar with the AQI, one in five (20%) say they make frequent use of it, while another 37 percent report doing so occasionally (Environics, 2005a). This represents a marginal increase since 2001, when 17 percent said they frequently used the AQI (Environics, 2002). Even in an air pollution "centre" like the Greater Toronto Area, only one-quarter of residents familiar with the AQI say they regularly look for current information about it.

Familiarity with local air quality index

National 2001-2004



Source: Environics, 2005a

Would you say you are very, somewhat, not very, or not at all familiar with something called the air quality index for your area currently distributed through the media?

A couple of surveys have attempted to put the potential use of an air quality index in context of how Canadians currently use weather, weather warning and UV information (EKOS, 2000 and 2001). It appears air quality forecasts have some way to go before they are monitored with the same degree of attention as these other types of forecasts. The research found that three-quarters of Canadians say they frequently use weather information, and half frequently use weather warnings (for potentially dangerous events such as severe thunderstorms, heavy rain, strong winds or blizzards). Current use of the AQI appears to be closer to the level of use reported for the UV index in 2001 (15% frequently).

A pilot study conducted in Kamloops B.C. to disseminate the new Air Quality Health Index (AQHI) through community radio and Internet found that one in three residents recalled something about Airplay (the campaign) or the AQHI (EnviroNics, 2007a). This was judged a noteworthy level of awareness, since it was achieved exclusively through radio, which typically does not reach large audiences compared to television.

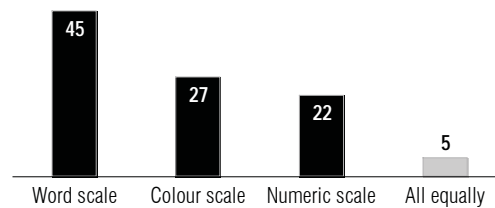
Preference for AQI format

AQIs are usually presented in three different formats (words, colours, numbers), and all three are not all equally recognized by Canadians. The public is most familiar with the word scale, in comparison to the colour and numeric scales, and this is also the format considered to be the most useful of the three. This is the case both at a national level and within three communities (Fraser Valley, Toronto and Montreal) surveyed following an air quality episode (EnviroNics, 2002 and 2005a). While the research has not probed further into the reasons behind this preference, it may be that word descriptions are the most intuitively obvious way for most people to make sense of differing levels of air quality. That is, terms like “good” or “poor” fit more easily into people’s current “mental model” of air quality, than a colour or number.

One survey found that Canadians would like to see air quality information provided in both a numerical and a descriptive format, rather than solely in one or the other format (EKOS, 2000). It is understandable that people might desire more information (i.e. both numeric & descriptive) about something for which they are not particularly familiar.

Most useful AQI format

National 2004



Source: EnviroNics, 2005a

And which of these formats do you personally find to be the most useful?

Subsample: Those who are familiar with more than one AQI format (n=669)

Perceived value of advisories

Public opinion surveys conducted following an air quality event examined the value that the public places in such advisories in a few different ways, by asking how useful they found the advisory to be, how important they say it is for them to receive the information contained in an advisory, and how effective they believe advisories to be in helping people reduce exposure to air pollution. Even if they did nothing with the information they learned from an advisory, Canadians do perceive a great deal of value in this type of information.

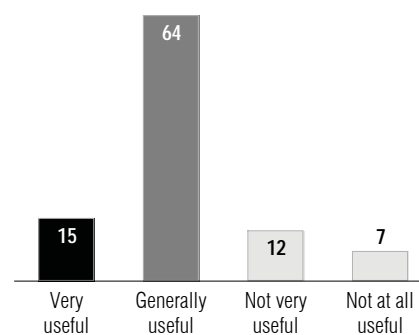
In the three post-event surveys conducted in 2004, more than three-quarters of residents in each community (Fraser Valley, Toronto and Montreal) who recalled the recent advisory rated this information to be at least somewhat useful (Environics, 2005a). Similar surveys conducted in New Brunswick and Montreal in the previous decade found that slightly fewer, but still a majority, of residents found the information provided in the advisory to be useful (74% and 59%, respectively) (CRA, 1994a and 1997). More generally, strong majorities say they consider it important that they hear about smog advisories when they are issued, and that they receive advisory information pertaining to the AQI level, forecast episode length, and how to limit both personal exposure and contribution to this problem (CRA, 1994a-c and 1997; Environics, 2005a).

Public support for air quality advisories is also reflected in the fact that residents are generally positive about their perceived effectiveness in helping people reduce exposure to air pollution. In most communities surveyed following an air quality advisory, approximately three-quarters of residents believe such advisories are at least somewhat effective in helping people limit their exposure (CRA, 1994a-c and 1997, Environics, 2005a and 2007b). By comparison, Quebec residents are divided in their views (Montreal: 47% in 1997 and 53% in 2004 / Mauricie Bois-Francs: 51% in 2007). In general, residents are less likely to believe an advisory will encourage people to reduce activities that *contribute to* smog (CRA, 1994a-c and 1997).

Such clear expressions of the value of air quality advisories certainly appears to be at odds with the limited impact that such advisories have had to date in prompting action to reduce personal exposure. This may simply reflect the tendency for people to express a priority on something they feel they should pay more attention to but may not be sufficiently motivated or able to do so themselves. It also reflects people's tendency to dissociate from the health risks of air quality and to see it as something affecting people other than themselves.

Usefulness of information in advisory

Fraser Valley 2004



Source: Environics, 2005a

Overall, how useful did you find the information provided in the air quality advisory announcement you saw or heard? Was it very, generally, not very or not at all useful?

Subsample: Those aware of recent advisory (N=217)

AIR QUALITY INFORMATION NEEDS AND PREFERENCES

Beyond air quality advisories, a number of public opinion surveys have examined public interest in air quality information more generally, and preferences in terms of when and through which sources this information should be delivered.

Interest in air quality information

Canadians say they are interested in receiving, or having access to, more information about local air quality and pollution. Several surveys have found that the public places clear value in receiving specific types of information, such as the health effects of air pollution, what individuals can do to limit exposure, and the types of pollutants causing poor air quality (EKOS, 2000 and 2001; Environics, 2002 and 2005a). The overall strength of interest (the proportion who rate each type of information as very useful) declined noticeably between 2001 and 2004 (Environics, 2002 and 2005a). This may reflect a lack of perceived relevance to their needs, since a growing number of Canadians believe local air quality conditions have not worsened over the past few years.

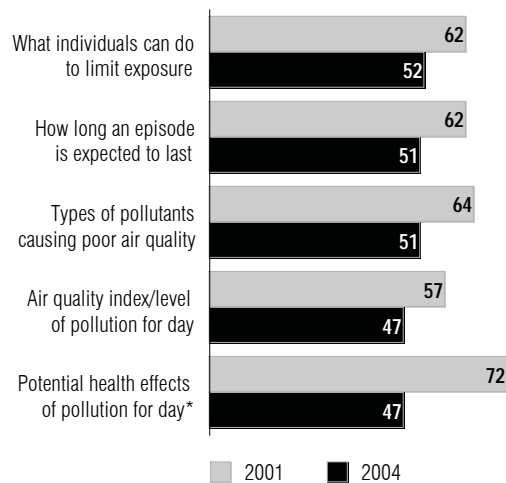
This interest does appear to be somewhat unfocused, as no specific type of information emerges as a clear priority when the public was asked which type would be most useful (Environics, 2005a). Among those rating more than one of the information types as very useful, roughly one in five each assign their strongest preference to the AQI/level of pollution for the day (23%), what individuals can do to limit personal exposure (21%) and potential health effects of pollution (20%), while fewer pick the types of pollutants (15%) or forecasts of how long an episode will last (13%). This lack of differentiation suggests that most people may simply have not had enough experience with such information, nor given sufficient thought to what

might be of greatest value to them, to be in a position to articulate their needs in a meaningful way.

While the level of interest in information on air pollution is relatively high, this is another area where attitudes do not correspond with actual behavior. Canadians are not particularly active in their pursuit of information on air pollution, with only about one in five saying they frequently look for such information for their area (EKOS, 2000; Environics, 2002).

Usefulness of specific types of air quality information

Very useful National 2001-2004



* Wording different in 2001

Source: Environics, 2005a

Please tell me if the following information about air quality would be very, somewhat, not very, or not at all useful for you to know ... The potential health effects of the pollution level for the day ... What individuals can do to limit their exposure to air pollution ... The types of pollutants causing poor air quality ... A forecast for how long an air pollution episode is expected to last ... The air quality index or level of pollution for the day.

Availability of air quality information

While Canadians may make limited use of air quality information, at the same time they would like to have this information readily available to them. This is clear in their strong preference for having such information provided on a regular basis rather than only during bad air days (EKOS, 2000 and 2001; Environics, 2001 and 2005a). In 2004, seven in ten Canadians said air pollution information should be provided to the public all the time, although this preference is not quite as strong as it was in 2001 (83%) (Environics, 2002). Moreover, an overwhelming majority (92%) believe this information should be provided to Canadians year-round, rather than in the summer or winter months only (EKOS, 2000).

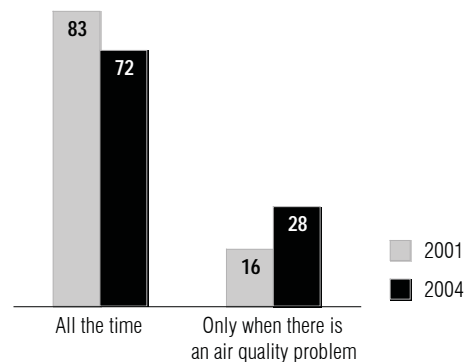
Canadians express a preference for mainstream media sources for receiving air quality information, reflecting the fact that these are the media they use most frequently in general. When asked which of several methods is the best way to deliver information on air quality (using a paired choice methodology), television and radio emerged as the preferred sources, followed by newspapers (EKOS, 2000 and 2001). Television is also the main source for Canadians *looking for* air quality information (EKOS, 2000; Environics, 2002).

While interest in receiving information over the Internet lags behind other media sources, six in ten Canadians expressed high or moderate interest in a website that contains air quality information (EKOS, 2000 and 2001). Consistent with typical patterns of Internet use, interest in an air quality website was higher among younger, better educated Canadians. The increase in the penetration and use of the Internet across the population since this research was conducted suggests that the web may be an increasingly popular source of information for air quality information. A recent qualitative study conducted on a pilot test of the AQHI in Nova Scotia found the web-based information was both well-used and well-received (Environics, 2006b).

One survey further examined Canadians' preferences for information sources on air pollution by assessing the perceived credibility of the various sources (Environics, 2002). Environment Canada and Health Canada received the highest ratings for credibility (69% and 65% very credible, respectively), while municipal governments (26%) and the Internet (28%) were seen as least credible.

When should air pollution information be provided to Canadians?

National 2001-2004



Source: Environics, 2005a

Do you think that air pollution information should be provided to Canadians ...?

HOW RESULTS VARY ACROSS THE POPULATION

At a general level, the broad conclusions from these studies are applicable to Canadians across the country, as defined by region, demographic characteristics and health status. However, there are some patterns across studies in how the results vary by segment, in many cases in a predictable fashion (e.g. urban residents are less positive than their rural neighbours about local air quality conditions).

The most notable distinction can be found among a minority of the population who appear to be “sensitized” to poor air quality. This group is defined as individuals who are likely to rate local air quality to be fair or poor (both generally and during a recent episode), consider air pollution to be a serious hazard and have household health problems linked to air pollution. This group is

most apt to be familiar with the local AQI, to recall recent advisories and to have responded in some way (CRA, 1994a-c and 1997; Environics, 2005a). At a national level, this group is more likely to be made up of residents of major urban centres, women and Canadians in the middle age brackets.

More surprisingly, reported health status and diagnosed respiratory illness appear to have only a minor influence on Canadians’ awareness and opinions about the AQI, air quality and its impact on health, and awareness of recent advisories. Household composition, in terms of the presence of children and/or seniors in the household, has not emerged as a factor that heightens public attention toward or concern about air pollution generally or in the local community (Environics, 2005a).

RESEARCH GAPS

Considered in its entirety, the public opinion research that has been conducted over the past decade or so on air quality and health provides a valuable picture of how Canadians view air quality and pollution, the impact of poor air quality on health, and citizens' response to the type of advisories issued by Environment Canada. However, given the scope of the issue, the complex dynamics of human cognition and behaviour, and the broad geographical and meteorological conditions at play, this picture is by no means complete.

The following represent the principal gaps in the current research conducted to date.

1. Coverage across regions, conditions and seasons. The research conducted to date reveals some consistent patterns of public opinion, awareness and behavioral response. At the same time, it is clear that there is important variability depending on forecast region (e.g. urban versus rural), the season, and both the level and source of air pollution. The available data provide valuable insight into some of these differences (e.g. public response in Toronto versus Southern New Brunswick), but by no means cover the full range of the different factors likely to influence public awareness and response to advisories. This limits the ability to draw stronger conclusions about Canadian public opinion and behaviour with respect to air quality and health, and limits the precision with which such opinion and behaviour can be predicted in specific situations.

This gap cannot easily be addressed in full, given that it is not feasible to collect comparable public opinion data from all forecast regions covering all of the likely combinations of season, weather conditions and air quality levels. At a more practical level, Environment Canada can fill in some of the more critical gaps in coverage, where little or no data have been collected to date (e.g. rural Quebec, winter advisories). This

strategy is now part of the department's AQFP measurement program.

2. Measurement of media broadcast coverage. Because public communication of air quality advisories relies almost entirely on broadcast media, the type and extensiveness of such coverage is likely a critical factor in public awareness and response to advisories. Yet none of the studies conducted to date have in any way incorporated any measurement of this coverage, by which to assess its impact. This represents a critical gap because media coverage may explain some of the variability in response (as well as lack of response) to advisories that otherwise cannot be clearly interpreted. It is difficult to firmly conclude with precision the extent to which residents in a given forecast region respond to a published advisory without a clear measure of how this advisory is actually made available in that community.

The methodology exists to monitor and measure media coverage of such information (through established media monitoring services and measurements). By pairing such coverage to survey data, it is possible to a) better understand and interpret public response to advisories; b) more accurately predict public response based on a certain level of broadcast coverage; and c) more effectively design communications and outreach.

3. Deeper insight into public cognition and behaviour. The methodology used in the studies conducted to date is appropriate for providing an accurate understanding of public opinion and behaviour that can be extrapolated to populations with statistical confidence. At the same time, such quantitative methods are limited in their ability to dig deeper into the dynamics of why people think, believe and do what they do in response to such external stimuli as air pollution and advisories. The research reveals consistent patterns of what on the surface appear to be contradictory facets (e.g. acknowledging

poor air quality conditions that pose a risk to personal health but not taking protective actions). Apart from the challenge of getting advisories out to citizens through media channels, the greater hurdle lies in finding ways to get Canadians to pay more attention to these advisories and not tune out the message.

The valuable understanding being gained through population surveys could be complemented by also exploring the cognitive and behavioral dynamics driving public attention and response to air quality and advisories. The insight gained through this focus would help guide the development of more effective communications, educational material and outreach. This work is best approached through qualitative research techniques, that might involve focus groups and “Everyday Living” (or EDL) research techniques.

4. **Focus on target groups.** The mandate of the government’s AQFP is to communicate relevant air quality information to all Canadians, but such communication is of particular importance to specific groups in the population that are at greater risk from the hazards of poor air quality. Such groups would include the elderly, children, people with pre-existing health problems, parents with asthmatic children, and otherwise healthy adults who regularly engage in aerobic activities outdoors. Because of the special importance in reaching these target groups, additional research (quantitative and qualitative) is needed to better understand how they may differ from the general population in their attitudes towards, and perceptions of air quality and health issues, and in their responses to advisories. The results of such research may lead to communications or outreach initiatives tailored to these at-risk groups.

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