

Frequency and risk factors related to smoking in cars with children present

Annie Montreuil, PhD,^{1,2} Michèle Tremblay, MD,^{1,3} Michael Cantinotti, PhD,⁴ Bernard-Simon Leclerc, PhD,^{3,5} Benoit Lasnier, MSc,¹ Joanna Cohen, PhD,^{6,7} Jennifer McGrath, PhD,⁸ Jennifer O'Loughlin, PhD^{3,9}

ABSTRACT

OBJECTIVES: Second-hand smoke (SHS) can attain high concentrations in cars. To protect children's health, nine Canadian provinces have enacted legislation prohibiting smoking in privately owned vehicles when children are present; Quebec is the only province with no such legislation. The objective of this study was to estimate the proportion of smokers in Quebec who smoke while travelling in a private vehicle in which children are present, and to compare the characteristics of smokers who do and do not smoke in cars.

METHODS: In 2011–12, 754 daily smokers who recently travelled in a car with children completed a telephone survey in which they reported how frequently they smoked in a car, if there were smoking restrictions, and perceptions about the effectiveness of legislation prohibiting smoking in cars when children are present.

RESULTS: Twenty-three percent of daily smokers smoked at least occasionally in their car when children were present. This proportion was higher among smokers who knew that there was no legislation in Quebec prohibiting smoking in cars, compared to smokers who believed that such legislation was already in effect (32% vs. 12%). Smokers with a university degree and those who reported that smoking was prohibited at home were less likely to expose children to SHS in cars. Most daily smokers (75%) believed that legislation would be effective.

DISCUSSION: The results of this study suggest that legislation prohibiting smoking in cars is necessary to protect children from SHS, that such legislation would be effective, and that it may be relatively easy to implement.

KEY WORDS: Canada; child; smoke-free policy; tobacco smoke pollution

La traduction du résumé se trouve à la fin de l'article.

Can J Public Health 2015;106(6):e369–e374
doi: 10.17269/CJPH.106.5070

Tobacco control legislation has been pivotal in reducing exposure to second-hand smoke (SHS) as well as in changing the social norm that smoking is an acceptable behaviour in public.¹ While legislation has been effective in controlling SHS exposure in public places, adoption of voluntary smoking restrictions in homes has lagged,² especially in homes with smokers – 87% of households of non-smokers in Quebec had a complete smoking ban in 2013, compared to only 53% of households with at least one smoker.³ Voluntary smoking restrictions in privately owned vehicles has also lagged. Seven percent of adults and 14% of adolescents age 12–17 years in Quebec travel every day or almost every day in cars in which someone is smoking.⁴ SHS exposure is higher in disadvantaged populations. In 2007–08, 27% of non-smoking adolescents (age 12–17 years) living in deprived neighbourhoods in Quebec reported frequent SHS exposure in a car, compared to only 16% of those living in more advantaged neighbourhoods.⁵

SHS exposure in cars can be particularly problematic among children.⁶ The concentration of fine particulate matter (i.e., <2.5 micrometres in diameter, referred to as PM_{2.5}) in tobacco smoke can quickly attain high levels in confined spaces.^{7,8} WHO guidelines state that to prevent illness, the average daily concentration of PM_{2.5} in the air should not exceed 25 µg/m³, and annual mean concentration should remain below

10 µg/m³.⁹ Yet Ott et al.⁷ reported that smoke from only two cigarettes smoked inside a car with the air conditioning on and the windows closed would generate PM_{2.5} concentrations of 42 µg/m³ in a 24-hour period, and others have reported similar findings.^{6,10,11} Even with the windows open and the

Author Affiliations

1. Institut national de santé publique du Québec, Montréal, QC
2. Département de psychologie, Université du Québec à Montréal, Montréal, QC
3. Département de médecine sociale et préventive, Université de Montréal, Montréal, QC
4. Département de psychologie, Université du Québec à Trois-Rivières, Trois-Rivières, QC
5. CSSS de Bordeaux-Cartierville-St-Laurent, Montréal, QC
6. Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
7. Dalla Lana School of Public Health, University of Toronto, Toronto, ON
8. Department of Psychology, Concordia University, Montréal, QC
9. Centre de recherche du Centre Hospitalier de l'Université de Montréal, Montréal, QC

Correspondence: Annie Montreuil, PhD, Institut national de santé publique du Québec, 190 Crémazie Est, Montréal, QC H2P 1E2, Tel: 514-864-1600, ext. 3529, E-mail: annie.montreuil@inspq.qc.ca

Sources of support: This project was funded by the Canadian Institutes of Health Research (CIHR) and the Institut national de santé publique du Québec through a financial contribution from the Québec Ministry of Health and Social Services. J. McGrath holds a CIHR New Investigator Award and Operating Grant (MOP97879). J. O'Loughlin holds a Canada Research Chair in the Early Determinants of Adult Chronic Disease.

Acknowledgements: The authors thank Erika Dugas for assistance with preparation of the manuscript and Yan Kestens for his contribution to the research protocol submitted for funding.

Conflict of Interest: None to declare.

ventilation turned on, average $PM_{2.5}$ concentrations during a car ride in which someone is smoking can exceed recommended levels of fine particulate matter.¹⁰ In Quebec, ambient temperatures during the fall and winter months are not conducive to window-lowering.

On inhalation, $PM_{2.5}$ penetrates deep into the lungs.¹² Even if the time spent in a vehicle is relatively short, $PM_{2.5}$ increases the risk of asthma symptoms in children.¹³ Among the 18% of Quebec adolescents aged 12–17 years with asthma, 27% report that their asthma attacks were caused by tobacco smoke.¹⁴ However, parents often underestimate the effects of SHS exposure in cars on their children's health, even if their child suffers from asthma.¹⁵

To date, nine of ten provinces in Canada and one territory (Yukon) have enacted legislation prohibiting smoking in privately-owned vehicles transporting children.¹⁶ Quebec is the only province in Canada with no such legislation.

The objective of this study was to estimate the proportion of daily smokers in Quebec who smoke while travelling in a car in which children are present, and to compare the characteristics of smokers who do and do not smoke in cars. Secondary objectives were to describe voluntary restrictions on smoking in cars, and beliefs about the existence and potential effectiveness of legislation prohibiting smoking in cars with children present.

METHODS

In 2011–12, we conducted a cross-sectional survey among daily smokers age ≥ 18 years in Quebec who travelled by car as a driver or passenger in the presence of children age < 16 years, at least once in the previous month. The sample included smokers of low, moderate and high socio-economic status (SES) in each of three geographic regions in Quebec (Montreal metropolitan area, other metropolitan regions, rural regions). Participant SES was proxied by the material deprivation level (quintile 1 (least disadvantaged) to quintile 5 (most disadvantaged)) of the neighbourhood in which the smokers surveyed lived¹⁷ as indicated by their home postal code. To ensure representation of all deprivation quintiles across the three geographic regions, an equal number of participants was targeted in each deprivation quintile in each geographic region. The survey was conducted by an independent polling firm. To increase the potential for an acceptable response proportion and high-quality data, the research team consulted survey experts to shorten the questionnaire and to improve the wording of the items; they offered survey-specific training to the interviewers hired by the polling firm; and they listened unobtrusively to interviews during data collection to ensure that the survey protocol was respected. The project received approval from the Comité d'éthique à la recherche du CHUM.

In a randomly selected sample of 37,489 valid telephone numbers, 34,042 households were considered eligible to participate in the study. Of these, 23,296 households were successfully contacted and a member of the household accepted to respond to three screening questions to determine if there was an eligible participant in the household (i.e., age ≥ 18 years, daily smoker, had travelled in a vehicle with a person < 16 years in the past 30 days), for a household response proportion of 68%.

If more than one person in a household was eligible, the individual with the next birthday was selected.¹⁸ Eligible participants were identified in 1,229 of the 23,296 households (5%). Two thirds (66%) of persons eligible agreed to participate, but 56 were excluded because after further verification of the inclusion criteria, they were in fact ineligible. The final sample size was 754 and the response proportion was 45%. Public Works and Government Services Canada have issued guidelines for response targets in telephone surveys (<http://www.tpsgc-pwgsc.gc.ca/rop-por/rapports-reports/comitephone-panelphone/page-06-eng.html>). For surveys of high importance in terms of key policy decisions, response proportion targets range between 40% and 60%.

One third (31%) of participants lived in metropolitan Montreal, 29% lived in other metropolitan regions and 30% lived in rural regions (region of residence was missing for 9% of the sample). Ten percent of participants were in the first quintile of the material deprivation indicator; 19%, 18%, 20% and 24% respectively were in the second, third, fourth and fifth quintiles. Quintile could not be determined for 10% of the sample due to missing or erroneous postal code data.

Study variables

Number of cigarettes smoked per day was assessed by: "Currently, how many cigarettes do you smoke each day?"

Smoking in cars was measured by: i) "When you are in a privately owned vehicle, how often do you smoke?"; ii) "When you are in a privately owned vehicle in the presence of a person < 16 years, how often do you smoke?"; iii) "In general, when you are in a privately owned vehicle in the presence of a non-smoker age ≥ 16 years, how often do you smoke?" (Response choices for items i), ii) and iii) were: always; more than half the time; half the time; less than half the time; never; don't know (DK). Participants who answered "always", "more than half the time", "half the time" or "less than half the time" were coded 'smoking in cars', while participants who answered "never" were coded 'not smoking in cars'. Participants who smoked in cars were asked: "Think about the last time you smoked in a privately owned vehicle in the presence of a person < 16 years. How long was the ride? (< 15 minutes; 15–30 minutes; 30–60 minutes; > 1 hour; DK)."

Data on smoking rules inside the car used most often were collected by: "The next question concerns your own vehicle. If you do not own a vehicle, think about the one in which you travel most often. Do you or the owner of the vehicle allow smoking in the vehicle? (yes; no; DK). Do you or the owner of the vehicle have any rules about smoking inside the vehicle?" Response choices included yes, no, and DK. Participants who responded "yes" were asked if any of the following rules applied (response choices for each item were yes, no, or DK): "Smoking is not allowed: i) when children < 16 years are in the vehicle; ii) when non-smokers 16 years or older are in the vehicle; iii) unless the driver is alone; iv) unless the fan, air conditioning or heating is on; v) unless the windows are open; vi) unless non-smokers agree; vii) are there other rules on the use of tobacco inside the car than those just mentioned?" If the participant answered "yes" to vii), he/she was asked to specify the rule.

Participants were asked if smoking is allowed in their home and if there are specific rules about smoking in the home. Response choices for both items were: yes, no, DK.

Knowledge about legislation prohibiting smoking in cars with children present was measured by: “To the best of your knowledge, in the province of Quebec, is smoking allowed in a privately owned vehicle transporting a person <16 years? (yes; yes, but only with the windows open; no; I don’t know).” Participants who responded “yes” were coded as ‘knowledgeable about the (absence of) legislation’.

Perception of the effectiveness of legislation prohibiting smoking in privately owned vehicles transporting children <16 years was measured by: “Do you think that legislation prohibiting smoking in privately owned vehicles in the presence of people <16 years would be: very effective, quite effective, moderately effective, not very or not at all effective in preventing young people from being exposed to tobacco smoke?”

Socio-demographic data included age, sex, highest level of education completed (elementary; high school; CEGEP; university), annual household income (ten categories from CAD <\$10,000 to ≥\$200,000; DK), employment status (coded ‘currently employed’ if self-employed or employed; ‘not currently employed’ if student, on parental leave, sick or on strike, unemployed, retired, homemaker, other, DK), number of persons age <18 years living in the household, and any adult non-smokers living in household (yes, no).

Data analysis

The data were analyzed in simple frequency distributions and cross-tabulations. We used multivariable logistic regression to identify independent socio-demographic correlates of: i) whether participants smoke in cars; ii) whether they smoke in cars when children age <16 years are present; and iii) knowledgeable about legislation prohibiting smoking in cars when children are present. All data analysis was conducted using SPSS 19.

RESULTS

Over half of participants were female, most were between age 18 and 44 years, 19% had a university degree, and 74% were currently employed (Table 1). Compared to a representative sample of adults who smoked daily in the province of Quebec, our sample of daily smokers who recently travelled in a car with a child <16 years had higher proportions of females, participants age 35–44 years, participants whose highest level of education

Table 1. Comparison of selected characteristics of the current sample of smokers age ≥18 years with those of a same-aged provincially representative sample of smokers. Québec, 2011-12

	Study sample (N = 754) % [†]	Provincial sample of adult daily smokers (CCHS 2011–12) %
Male	42	55*
Age, years		
≤34	33	32
35–44	35	16*
45–54	19	23*
≥55	13	29*
Highest level of education completed		
Elementary	7	23*
High school	47	26*
CEGEP	27	47 [‡]
University	19	
Missing	1	4*
Annual household income		
<\$20,000	11	16*
\$20–\$39,999	18	23*
\$40–\$59,999	19	23*
\$60–\$79,999	14	16
≥\$80,000	20	22
Missing	18	–
Currently employed	74	66*

Notes: CEGEP (*Collège d’enseignement général et professionnel*; General and vocational college): In Quebec, students graduate from high school after completing grade 11 and attend CEGEP for a 2-year pre-university program or a 3-year technical program. CEGEP is equivalent to grade 12 and the first year of a university undergraduate program in other Canadian provinces.

CCHS = Canadian Community Health Survey.

[†] Totals may not add to 100% because of rounding.

[‡] Combines CEGEP and University.

* Significantly different from the study sample (p < 0.05).

was high school and participants currently employed (Table 1). Proportionately fewer were age ≥55 years, reported that their highest level of education was elementary school and had an annual household income <\$60,000. Three quarters (75%) lived with one or more persons <18 years; 54% lived alone or with other smokers; and 46% lived with at least one non-smoker. Participants smoked 14–15 cigarettes per day on average. Half (48%) indicated that smoking was completely prohibited at home, 28% indicated that smoking was permitted at home but only under certain conditions, and 24% indicated that there were no smoking restrictions at home.

One third of participants (36%) never smoked when travelling by car and 64% smoked at least occasionally (Table 2). However, 76% reported that they never smoked when travelling in a car in the presence of children age <16 years, while 23% did smoke on

Table 2. Frequency of smoking in privately owned vehicles in general, when children age <16 years are present, and when non-smokers age 16 years or older are present, among daily smokers who travel regularly [at least once in past 30 days] by car in the presence of children age <16 (N = 754), Québec, 2011–12

Smoke	In general (N = 754) %	When children age <16 years are present (N = 754) %	When non-smokers age ≥16 years are present (N = 754) %
Never	36	76	66
Less than half the time	24	13	18
Half the time	18	6	7
More than half the time	8	1	4
Always	14	3	4
Missing	0.3	0.1	1.5

Table 3. Smoking restrictions inside car used most often among daily smokers who travel regularly in cars with children age <16 years (N = 754), Québec, 2011–12

Smoking permitted	%
Never	34
Always	30
Not permitted in certain circumstances*	36
When people age <16 years are in the vehicle	27
Unless the windows are open	23
Unless non-smokers agree	21
When non-smokers age ≥16 years are in the vehicle	18
Unless driver is alone	12
Unless the fan, air conditioning, or heating is turned on	8
Other	7

* Participants could check all that apply.

occasion. Sixty-six percent reported that they never smoked in a car in the presence of non-smokers ≥16 years.

Among those who smoked at least occasionally in the presence of children, 40% indicated that the last time this happened, the trip was <15 minutes; 23% reported that the trip was 15–30 minutes, 21% reported that it was 30–60 minutes and 16% reported that the trip was more than one hour.

One third of participants (34%) reported that smoking was prohibited in their car or in the car in which they travelled most frequently; 30% reported that smoking was always permitted, and 36% reported that smoking was permitted but only in certain circumstances (Table 3). The most frequently reported

restrictions were: in the presence of children, only if a window was open, only if non-smokers agreed and only with non-smokers ≥16 years.

Half of participants thought that it was illegal to smoke in cars in the presence of children, even though there is currently no such legislation in Quebec. Thirty-seven percent knew that it was not illegal; 8% thought that smoking was permitted, but only with the windows open; and 5% did not know or did not respond to the question.

Knowledge about legislation prohibiting smoking in cars with children present was linked to smoking behaviour in cars. Twelve percent of smokers who thought there was such legislation in effect reported smoking in a car with children present, compared to 32% of smokers who knew that there was no such legislation.

Among participants who travelled in cars with children, 42% thought that legislation prohibiting smoking in cars would be very effective in protecting children from SHS; 19% thought it would be quite effective; 14%, somewhat effective; 11%, not very effective and 12% thought it would be not at all effective.

Multivariable logistic regression analyses suggested that females were less likely than males to smoke in cars (OR 0.57, 95% CI 0.41–0.80), but there was no difference by sex in the likelihood of smoking in cars when travelling with children (Table 4). Smokers aged ≥55 years were less likely than younger participants to smoke in cars (OR 0.23, CI 0.13–0.39) and to smoke in cars when children were present (OR 0.26, CI 0.12–0.54). Participants who

Table 4. Odds ratios (OR) and 95% confidence intervals (CI) for smoked in privately owned vehicles, smoked in privately owned vehicles transporting children age <16 years, and knowledge about legislation prohibiting smoking in cars with children present according to potential socio-demographic correlates (N = 754), Québec, 2011–12

	Smoked in privately owned vehicle (n = 746)			Smoked in privately owned vehicle with children age <16 years (n = 747)			Knowledge about legislation prohibiting smoking in cars with children present (n = 748)		
	%	OR	(95% CI)	%	OR	(95% CI)	%	OR	(95% CI)
Sex									
Male	70.0	Ref.		20.5	Ref.		41.6	Ref.	
Female	60.1	0.57**	0.41–0.80	25.6	1.32	0.89–1.96	33.6	0.74	0.54–1.02
Age, years									
≤34	68.5	Ref.		19.8	Ref.		37.9	Ref.	
35–44	66.8	0.69	0.46–1.03	27.2	1.39	0.87–2.22	37.5	0.82	0.56–1.19
45–54	64.1	0.52**	0.32–0.84	31.2	1.35	0.79–2.31	40.8	0.99	0.63–1.55
≥55	47.4	0.23***	0.13–0.39	11.3	0.26***	0.12–0.54	27.8	0.58*	0.34–0.98
Highest completed level of education									
Elementary or high school	65.7	Ref.		28.5	Ref.		35.3	Ref.	
CEGEP	66.5	1.04	0.71–1.54	22.2	0.64	0.41–1.00	37.3	1.01	0.70–1.45
University	57.6	0.83	0.53–1.29	11.1	0.31***	0.16–0.57	41.7	1.19	0.78–1.82
Annual household income									
<\$20,000	66.3	Ref.		35.0	Ref.		31.3	Ref.	
\$20–\$39,999	66.7	1.30	0.69–2.44	28.6	0.93	0.49–1.79	37.6	1.41	0.77–2.58
\$40–\$59,999	66.7	1.31	0.69–2.48	23.1	0.81	0.41–1.58	35.4	1.25	0.68–2.28
\$60–\$79,999	62.7	1.05	0.53–2.07	17.5	0.65	0.30–1.39	42.7	1.62	0.85–3.08
≥\$80,000	63.4	1.38	0.71–2.72	17.0	0.99	0.47–2.09	47.1	1.98*	1.0–3.74
Missing	60.7	1.04	0.55–1.96	23.7	0.80	0.41–1.58	25.9	0.78	0.41–1.46
Adult non-smoker lives in household									
No	64.7	Ref.		26.7	Ref.		35.2	Ref.	
Yes	63.9	1.10	0.78–1.55	19.6	0.89	0.59–1.33	39.2	1.10	0.80–1.53
Smoking prohibited at home									
No	75.0	Ref.		36.8	Ref.		38.7	Ref.	
Yes	52.8	0.24***	0.17–0.35	8.9	0.16***	0.10–0.25	35.2	0.68*	0.48–0.94
Nagelkerke's Pseudo R ²	0.153			0.245			0.053		

Notes: Participants with missing data were not included in the multivariable analysis. The model included all variables in the table concurrently.

*p < 0.05; ** p < 0.01; *** p < 0.001.

reported that smoking was prohibited at home were less likely than those who permitted smoking at home, to smoke in cars (OR 0.24, CI 0.17–0.35) and in the presence of children (OR 0.16, CI 0.10–0.25). Education was not related to smoking in cars in general, but university graduates were less likely than less educated smokers to expose children to smoke in cars (OR 0.31, CI 0.16–0.57). Annual household income and living with a non-smoker were not related to smoking in cars or to smoking in cars in the presence of children.

Older participants age ≥ 55 years were less likely than younger participants to know that there was no legislation prohibiting smoking in cars in Quebec (OR 0.58, CI 0.34–0.98), whereas participants whose annual household income was $\geq \$80,000$ were more likely to know that such legislation is not in effect in Quebec (OR 1.98, CI 1.05–3.74). Sex, education and living with a non-smoker at home were not related to knowledge about legislation prohibiting smoking in cars with children present.

DISCUSSION

Quebec is the only province in Canada where legislation prohibiting smoking in cars in the presence of children has not been enacted. In 2012–13, 34% of students in grade 6 to 12 in Quebec were exposed to tobacco smoke in a car in the previous week compared to 17% of students in the other provinces.¹⁹ To date, there are no publications describing barriers and facilitators to the implementation and enforcement of this kind of legislation in other provinces. In Ontario, 300 notifications of violation were issued during the first nine months after implementation in 2009 (personal communication, Ontario Campaign for Action on Tobacco). Media coverage of these first notifications did not report any problematic incidents or negative reactions among smokers. In Ontario, Newfoundland and Prince Edward Island, police officers are responsible for enforcing this law, which specifies that the officer's estimate of the age of a child is sufficient proof of his/her age.^{20–22} Police officers are more likely to issue a notification if they are permitted to stop a vehicle to verify compliance with the law, compared to when they stop a car for another reason (i.e., driving above the speed limit). Police being allowed to stop a car to verify compliance apparently increases respect for the law.²³

In Quebec, population support for legislation prohibiting smoking in cars with children present is high, even among smokers – 84% of smokers and recent former smokers agree that smoking should be prohibited in cars when children are present.²⁴ Although the reasons for the lack of legislation in Quebec are not clear, it may be that decision makers perceive that targeting privately owned vehicles is an intrusion on individual rights and/or they may anticipate difficulties with enforcement of the legislation.^{25–27}

The proportion of smokers who smoke in cars is similar to the proportion reported in 2007 shortly after introduction of legislation in Quebec that prohibited smoking in public places.²⁴ While it is possible that participants in this current study did not report accurately, these data would suggest many smokers are aware of the impact of smoking in cars on the health of children and choose to reduce this risk by not smoking in these circumstances. On the other hand, fully 32% of smokers who knew that it was not illegal, did smoke in cars when children

were present, and our data on time in cars with smoking suggest that many children may have had a biologically important dose of exposure. That any smoker continues to smoke in cars when children are present suggests that preventive intervention including legislation is warranted.

Legislation that obliges people to behave in a certain way may seem coercive or draconian (at least when first implemented) to persons who are not aware of, or who minimize the dangers of their own behaviour. If such legislation is implemented in Quebec, it will be important to accompany it with education about the dangers of SHS in cars.

Half of smokers thought that legislation to prohibit smoking in cars with children present was already enacted, perhaps because of confusion with adoption of similar legislation in other provinces. This suggests that such legislation may be relatively easy to implement in Quebec, as well as effective. Indeed, Nguyen²⁸ reported that legislation in Canada reduced exposure to SHS among children travelling in cars, with no notable increase in smoking at home.

Limitations

Limitations of this study include that the data were based on self-report, which could have resulted in misclassification. In particular, the proportion of smokers who reported smoking in cars when children were present may be underestimated because of social desirability bias. The sampling frame required an equal number of participants who smoked daily in each deprivation quintile. Therefore, the prevalence of smoking in cars with children present is likely underestimated since smokers in advantaged quintiles (more of whom are university-educated and less likely to smoke) are over-represented. Non-response among persons eligible to participate may also have affected prevalence estimates.

CONCLUSION

The current study, carried out in 2011–12 in the province of Quebec, provides evidence that approximately 23% of smokers smoke in cars when children are present. Many smokers thought that legislation prohibiting smoking in cars with children present was already in effect, and most thought that such legislation would be effective. Overall these data provide evidence that legislation prohibiting smoking in cars with children present is needed in Quebec and that it would be effective. In particular, if smokers are unable or unwilling to provide a smoke-free environment in cars for children, it may be that this kind of legislation is essential to assure that Quebec children are protected from the health effects of exposure to SHS.

REFERENCES

- Orbell S, Lidiere P, Henderson CJ, Geeraert N, Uller C, Uskul AK, et al. Social-cognitive beliefs, alcohol, and tobacco use: A prospective community study of change following a ban on smoking in public places. *Health Psychol* 2009;28(6):753–61. PMID: 19916644. doi: 10.1037/a0016943.
- Zhang X, Martinez-Donate AP, Kuo D, Jones NR, Palmersheim KA. Trends in home smoking bans in the U.S.A., 1995–2007: Prevalence, discrepancies and disparities. *Tob Control* 2012;21(3):330–36. PMID: 21813487. doi: 10.1136/tc.2011.043802.
- Statistics Canada. *Canadian Tobacco, Alcohol and Drugs Survey (CTADS) 2013. Public Use Microdata Files*. Ottawa, ON: Statistics Canada, 2014.
- Statistics Canada. *Canadian Community Health Survey (CCHS) 2011–2012. Public Use Microdata Files*. Ottawa: Statistics Canada, 2013.

5. Lasnier B, Leclerc BS, Hamel D. *Les inégalités sociales de santé en matière de tabagisme et d'exposition à la fumée de tabac dans l'environnement au Québec*. Montréal, QC: Institut national de santé publique du Québec, 2012.
6. Northcross AL, Trinh M, Kim J, Jones IA, Meyers MJ, Dempsey DD, et al. Particulate mass and polycyclic aromatic hydrocarbons exposure from secondhand smoke in the back seat of a vehicle. *Tob Control* 2014;23(1):14-20. PMID: 23172398. doi: 10.1136/tobaccocontrol-2012-050531.
7. Ott W, Klepeis N, Switzer P. Air change rates of motor vehicles and in-vehicle pollutant concentrations from secondhand smoke. *J Expo Sci Environ Epidemiol* 2008;18(3):312-25. PMID: 17637707. doi: 10.1038/sjjes.7500601.
8. Rees VW, Connolly GN. Measuring air quality to protect children from secondhand smoke in cars. *Am J Prev Med* 2006;31(5):363-68. PMID: 17046406. doi: 10.1016/j.amepre.2006.07.021.
9. World Health Organization. *Air Quality Guidelines, Global Update 2005, Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide*. Copenhagen: WHO Regional Office for Europe, 2006.
10. Semple S, Apsley A, Galea KS, Macalman L, Friel B, Snelgrove V. Secondhand smoke in cars: Assessing children's potential exposure during typical journey conditions. *Tob Control* 2012;21(6):578-83. PMID: 22218425. doi: 10.1136/tobaccocontrol-2011-050197.
11. Sendzik T, Fong GT, Travers MJ, Hyland A. An experimental investigation of tobacco smoke pollution in cars. *Nicotine Tob Res* 2009;11(6):627-34. PMID: 19351785. doi: 10.1093/ntr/ntp019.
12. Apelberg BJ, Hepp LM, vila-Tang E, Gundel L, Hammond SK, Hovell MF, et al. Environmental monitoring of secondhand smoke exposure. *Tob Control* 2013;22(3):147-55. PMID: 22949497. doi: 10.1136/tobaccocontrol-2011-050301.
13. Kabir Z, Manning PJ, Holohan J, Keogan S, Goodman PG, Clancy L. Second-hand smoke exposure in cars and respiratory health effects in children. *Eur Respir J* 2009;34(3):629-33. PMID: 19357146. doi: 10.1183/09031936.00167608.
14. Institut de la statistique du Québec. *Enquête québécoise sur la santé des jeunes du secondaire (EQSJS) 2010-2011. Fichier maître*. Montréal, QC: Institut de la statistique du Québec, 2014.
15. Halterman JS, Conn KM, Hernandez T, Tanski SE. Parent knowledge, attitudes, and household practices regarding SHS exposure: A case-control study of urban children with and without asthma. *Clin Pediatr (Phila)* 2010;49(8):782-89. PMID: 20522612. doi: 10.1177/0009922810368290.
16. Non-smokers' Rights Association. *Second-hand Smoke in Cars*. Non-smokers' Rights Association, 2014. Available at: <http://www.nsrna-adn.ca/cms/page1497.cfm> (Accessed March 23, 2015).
17. Pampalon R, Hamel D, Gamache P, Philibert MD, Raymond G, Simpson A. An area-based material and social deprivation index for public health in Quebec and Canada. *Can J Public Health* 2012;103(8 Suppl. 2):S17-22. PMID: 23618066.
18. Binson D, Canchola JA, Catania JA. Random selection in a national telephone survey: A comparison of the Kish, next-birthday, and last-birthday methods. *J Off Stat* 2000;16(1):53-59.
19. Lasnier B. *L'exposition à la fumée de tabac dans les véhicules privés chez les élèves québécois: 2012-2013*. Montréal: Institut national de santé publique du Québec, 2015.
20. Newfoundland and Labrador. *Smoke-free Environment Act, 2005, 2011*. (Bill/Resolution)
21. Ontario. *Smoke-Free Ontario Act, 2008*. (Bill/Resolution)
22. Prince Edward Island. *Smoke-free Places Act, 2009*.
23. Dinh-Zarr TB, Sleet DA, Shults RA, Zaza S, Elder RW, Nichols JL, et al. Reviews of evidence regarding interventions to increase the use of safety belts. *Am J Prev Med* 2001;21(Suppl. 4):48-65. PMID: 11691561.
24. Kairouz S, Montreuil A, Lasnier B. *Habitudes tabagiques des fumeurs québécois après l'interdiction de fumer visant certains lieux publics*. Montréal: Institut national de santé publique du Québec, 2010.
25. Thomson G, Hudson S, Wilson N, Edwards R. A qualitative case study of policy maker views about the protection of children from smoking in cars. *Nicotine Tob Res* 2010;12(9):970-77. PMID: 20696742. doi: 10.1093/ntr/ntq124.
26. Pawson R, Owen L, Wong G. Legislating for health: Locating the evidence. *J Public Health Policy* 2010;31(2):164-77. PMID: 20535099. doi: 10.1057/jphp.2010.5.
27. All Party Parliamentary Group on Smoking and Health Inquiry into Smoking in Private Vehicles, 2011. Available at: <http://www.ash.org.uk/APPGnov2011> (Accessed March 23, 2015).
28. Nguyen HV. Do smoke-free car laws work? Evidence from a quasi-experiment. *J Health Econ* 2013;32(1):138-48. PMID: 23202259. doi: 10.1016/j.jhealeco.2012.10.003.

Received: March 23, 2015

Accepted: June 12, 2015

RÉSUMÉ

OBJECTIF : La concentration de fumée de tabac peut atteindre des niveaux élevés dans une voiture. Afin de protéger la santé des enfants, neuf provinces canadiennes ont adopté une mesure législative interdisant de fumer dans les véhicules privés lorsque des enfants y prennent place. Le Québec est la seule province canadienne à ne pas avoir légiféré en ce sens. L'objectif de cette étude était d'estimer la proportion de fumeurs qui fument en voiture en présence d'enfants au Québec, et de comparer les caractéristiques des fumeurs qui fument à ceux qui ne fument pas en voiture.

MÉTHODE : En 2011-2012, 754 fumeurs quotidiens ayant voyagé récemment en voiture en présence d'enfants ont participé à une entrevue téléphonique. Les participants ont été interrogés sur la fréquence à laquelle ils fumaient dans la voiture, sur la présence de restrictions à l'usage de tabac dans la voiture, et sur leur perception de l'efficacité d'une loi qui interdirait de fumer dans une voiture en présence d'enfants.

RÉSULTATS : Vingt-trois pour cent des fumeurs quotidiens fumaient régulièrement ou à l'occasion en voiture en présence d'enfants. Cette proportion était plus élevée parmi les fumeurs qui savaient qu'aucune loi québécoise n'interdisait de fumer en voiture, comparativement aux fumeurs qui croyaient à tort qu'une telle loi était en vigueur (32 % c. 12 %). Les fumeurs diplômés universitaires et ceux qui rapportaient qu'il était interdit de fumer à l'intérieur de leur domicile étaient moins susceptibles d'exposer des enfants à la fumée de tabac en voiture. La majorité des fumeurs quotidiens interrogés (75 %) croyaient qu'une telle loi serait efficace pour réduire l'exposition des jeunes à la fumée de tabac.

DISCUSSION : Les résultats de cette étude indiquent qu'une loi interdisant de fumer dans les voitures est nécessaire pour protéger la santé des enfants, qu'une telle loi serait efficace et que son implantation au Québec se ferait sans opposition.

MOTS CLÉS : Canada; enfant; interdiction de fumer; fumée de tabac