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Socioeconomic inequalities in second-hand smoke exposure before, during, and after implementation of Quebec's 2015 "An Act to Bolster Tobacco Control"

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**DECLARATION OF INTERESTS**

We have no conflicts of interest to declare.

**ABSTRACT**

**Background.** To better understand whether tobacco control policies are associated with changes in second-hand smoke (SHS) exposure across socioeconomic groups, we monitored differences in socioeconomic inequalities in SHS exposure in households and private vehicles among youth and adults before, during, and after adoption of Quebec's 2015 *An Act to Bolster Tobacco Control*.

**Methods.** Using data from the Canadian Community Health Survey, we examined the prevalence of daily exposure to SHS in households and private vehicles among youth (ages 12-17) and adults (ages 18+) across levels of household education and income (separately) in 2013-14, 2015-16, and 2017-18. We tested differences in the magnitude of differences in outcomes over time across education and income categories using logistic models with interaction terms, controlling for age and sex.

**Results.** We detected inequalities in SHS exposure outcomes at each time point, most markedly at home among youth (OR of SHS exposure among youth living in the 20% poorest households *versus* the 20% richest = 4.9, 95%CI 2.7-6.2). There were decreases in SHS exposure in homes and cars in each education/income group over time. The magnitude of inequalities in SHS exposure in homes and cars, however, did not change during this period.

**Conclusions.** The persistence of socioeconomic inequalities in SHS exposure despite implementation of new tobacco control laws represents an increasingly worrisome public health challenge, particularly among youth. Policymakers should prioritise the reduction of socioeconomic inequalities in SHS exposure and consider the specific needs of socioeconomically disadvantaged populations in the design of future legislation.

**WHAT THIS PAPER ADDS**

- Second-hand smoke (SHS) exposure decreased in homes and private vehicles during the period in which Quebec's 2015 law was implemented.
- Socioeconomic inequalities in SHS exposure in homes were larger among youth (<18) than adults (18+).
- SHS exposure remained more prevalent in households with lower education/income in 2017-2018.
- There was no change in relative inequalities in SHS exposure between 2013-14 and 2017-18.

**MAIN TEXT (max 3,500 words)**

## 1. INTRODUCTION

Tobacco control policies are championed as one of the most important public health successes considering marked declines in cigarette smoking prevalence over time. These declines, however, have been experienced inequitably across socioeconomic groups in most high-income countries. Smoking prevalence in Canada, for example, decreased by 79% over the last 60 years among those with a university education, but by only 25% among those who did not complete high school.[1] Today, Canadian adults are 1.6 times more likely to smoke if they are in the bottom quintile of household income (*versus* the top quintile), and 3.9 times more likely to smoke if they have not completed high school (*versus* university completed).[2] In this context, the discovery that some tobacco control interventions designed to reduce smoking prevalence may have contributed to these socioeconomic inequalities is sobering.[3-5]

Socioeconomically disadvantaged groups are also more likely to be exposed to second-hand smoke (SHS).[6-9] Differences in exposure to SHS across socioeconomic groups may relate to gaps in knowledge and awareness of the dangers of SHS, composition of social networks, levels of nicotine dependence, stress from living in deprivation, and lack of consideration of these inequalities in the design of tobacco control policies.[10-16] Smokers in socioeconomically disadvantaged groups are also more likely to be exposed to permissive smoking environments in homes, neighbourhoods, workplaces and leisure environments.[11,12,16-18] These socioeconomic inequalities particularly affect youth as they are more often exposed and vulnerable to the health effects of SHS exposure than other age groups. These effects include elevated risks of lower respiratory tract infections, asthma, wheezing, middle ear infections, sudden unexpected death in infancy, and invasive meningococcal disease.[19-22]

This paper examines the association between socioeconomic inequalities in SHS exposure and a recent smoke-free public health intervention that, due to its population-level nature, did not consider the needs of specific population subgroups. Smoke-free policies are designed to target the population-at-large and are championed as a highly effective intervention with synergetic benefits. These effects include reducing the prevalence of smoking and SHS exposure by: 1) protecting non-smokers, especially children, from SHS exposure, 2) preventing children from modelling the behaviour of other household members, 3) de-normalizing smoking, and 4) reducing the number of places where people can smoke, thereby encouraging smokers to quit.[23-25] Most smoke-free policies regulate smoking in public spaces, with few directly targeting smoking in private spaces such as households. Policies in public spaces, however, are known to have had spillover effects on smoking practices in private spaces. Studies across multiple countries report decreases in SHS exposure in households after implementation of smoke-free legislation in public places.[26-31]

Smoking in private vehicles has also been targeted by tobacco control policymakers over the past decade. Given the higher levels of exposure to SHS in small enclosed spaces, numerous studies suggest that SHS exposure in vehicles could be directly related to a higher risk of nicotine dependence, early smoking initiation, and negative respiratory outcomes.[32-36] Socioeconomically disadvantaged youth and adults are more likely to be exposed to SHS in private vehicles than more privileged groups.[6,37,38] Smoke-free policies that target vehicles directly have been implemented in high-income countries including Canada, some U.S. states (e.g., Maine, California), the UK, and Ireland to protect children from SHS-related harms.[39-42] Results regarding their effects on SHS exposure in vehicles among children and adults are mixed.[41-45] In particular, SHS exposure in vehicles has remained relatively high among children despite smoke-free policy implementation.[21]

Research on the association between smoke-free policies and socioeconomic inequalities in SHS exposure remains underdeveloped. Only three studies have investigated the role of smoke-free policies on socioeconomic inequalities in SHS exposure in private vehicles, showing conflicting results. In Wales, Moore et al. examined differences between 2007-08 and 2014 following a media campaign promoting voluntary smoke-free rules in cars with children and found that children in poorer families reported a larger decrease in SHS exposure in cars compared to their more privileged counterparts.[40] In the U.S., Murphy-Hoefer et al. examined differences in Maine between 2007 and 2008-2010 following the passage of a law prohibiting smoking in cars with children and found significant decreases only among higher education and income groups.[39] Also in the U.S., Kruger et al. compared SHS exposure in vehicles between 2010-11 and 2013-14 when voluntary smoke-free rules in cars increased, and found relatively equal decreases in SHS exposure among adults across education and income groups over time.[46] For SHS exposure in households, Nanninga et al. reviewed nine studies and argued that, whereas there was little evidence to support whether smoke-free policies reduced socioeconomic inequalities in SHS exposure in the household, their capacity to increase inequalities was unlikely.[47]

This paper extends this literature in the context of a recent tobacco control legislation in the Canadian province of Quebec. This province (8.5 million inhabitants) has had among the highest levels of SHS exposure at home across the 10 Canadian provinces (5.7% *versus* the national average of 3.9% in 2014).[48] It also has marked differences in SHS exposure across socioeconomic groups (i.e., in 2015-16, adults in the province were 5.6 times more likely to be exposed to SHS at home if they had not completed high school (*vs.* university completed)).[7,37,38] In November 2015, the Quebec government passed a comprehensive tobacco control legislation, *An Act To Bolster Tobacco Control*, with three objectives: 1) to prevent youth smoking initiation; 2) to protect non-smokers and children from SHS exposure; and 3) to encourage smoking cessation.[49] There was no obvious prioritization given to socioeconomic inequalities in smoking or smoking-related outcomes. This legislation was an

amendment to the Quebec's 2005 *Tobacco Control Act,* which initially prohibited smoking in all non-home workplaces, restaurants and bars, public transportation, and on all primary and secondary school grounds.[49] To achieve its "SHS exposure" objective, the 2015 law amended the *Tobacco Control Act* smoke-free policy in three ways. First, it extended smoking prohibitions to bar and restaurant patios, playgrounds, within 9 meters from building entrances, and in vehicles with youth under the age of 16. Second, it required health and social service establishments and post-secondary education institutions to develop a smoke-free policy plan by the end of 2017. Finally, it permitted landlords to enforce a smoke-free policy in multi-unit apartment buildings.

Despite the number of smoke-free policies implemented worldwide in the last decade, their relationship to socioeconomic inequalities in SHS exposure remains unclear. To inform this knowledge gap, we considered the implementation of the *An Act To Bolster Tobacco Control* law in 2015-16 as a critical opportunity to examine this issue. Specifically, we examined trends in socioeconomic inequalities in the prevalence of SHS exposure in the household and private vehicles among youth (ages 12-17) and adults (ages 18+) across two-year periods corresponding to the periods before (2013-14), during (2015-16), and after (2017-18) the implementation of the law.

## 2. METHODS

### 2.1. Data

We used data from six annual cycles (2013-18) of the Canadian Community Health Survey (CCHS).[50] The CCHS is the largest repeat cross-sectional health survey in Canada. It collects data on health status, health care utilization and health determinants in the Canadian population annually. It incorporates a large sample and is designed to provide reliable estimates at the health region level (i.e., geographical units within provinces) every two years. Between 10,000 and 12,000 people living in Quebec age ≥12 were recruited annually between 2013 and 2018. The response proportion in

Quebec was 68% in 2013-2014, 64% in 2015-16, and 65% in 2017-2018. A detailed description of the sampling methodology is available elsewhere.[50] The Health Research Ethics Committee at the University of Montreal granted ethical approval for this study.

### 2.2. Measures

Our dependent variables were: 1) *exposure to SHS in the household*, measured with: "Including both household members and regular visitors, does anyone smoke inside your home, every day or almost every day?" (Yes / No) and 2) *exposure to SHS in private vehicles*, measured by: "In the past month, were you exposed to second-hand smoke, every day or almost every day, in a car or other private vehicle?" (Yes / No). We note that CCHS only administered these questions to non-smokers in 2013-14, precluding us from exploring how smokers' practices changed during this period.

We defined socioeconomic groups using household education and income. *Household education* was coded by Statistics Canada using information on the highest level of education in the household, into three categories: 1) High school not completed; 2) High school completed; 3) Post-secondary education completed. *Household income* was coded by Statistics Canada using data on income, household size, and community size into a decile rank to represent a relative measure of household income compared to other households at the provincial level. We recoded this variable from deciles into quintiles: 1- living in one of the 20% poorest households in the province to 5- living in one of the 20% richest households in the province. When testing differences in outcomes across socioeconomic groups, we controlled for age (among youth: 12-13, 14-15, 16-17; among adults: 18-24, 25-34, 35-44, 45-54, 55-64, 65+) and sex (Male / Female).

### 2.3. Statistical analyses

We first estimated the prevalence of exposure to SHS in the household and private vehicles among non-smokers ages 12-17 and 18+ across socioeconomic groups in 2013-14, 2015-16, and 2017-18.

We then tested, in three steps, the statistical significance of: 1) associations of SHS exposure outcomes with education and income in each two-year time point, 2) average trends in outcomes over the course of the three time points, and 3) differences in trends across socioeconomic groups over time, using different logistic models adjusted for age and sex. To accomplish the second and third steps, we pooled observations between 2013-18 and modelled: Model 1 - the socioeconomic indicator and time (using dummy terms for 2015-16 and 2017-18 with 2013-14 as the reference category) and; Model 2 - the socioeconomic indicator, time, and its interaction term. A statistically significant interaction term would indicate that the magnitude of inequalities in SHS exposure outcomes differed according to year. The pooled sample sizes for 2013-18 varied among adults from 50,850 to 53,263 and among youth from 4,795 to 5,019 depending on the dependent (SHS exposure at home or in cars) and independent (household education or income) variables. To test the robustness of estimates we reproduced models: 1) controlling for living in a rural area (Yes / No), and 2) using individual-level education instead of household education in the adult sample.[37] Results were consistent in these sensitivity analyses with those of the primary analyses. Analyses were produced with a listwise deletion approach using Stata 15.[51]

## 3. RESULTS

### 3.1. Exposure to SHS across socioeconomic groups

Table 1 presents the prevalence of exposure to SHS in the household and private vehicles among non-smoking youth ages 12-17 and adults ages 18+ between 2013-14 and 2017-18. Table 2 presents the odds ratios (OR) of exposure to SHS in the household and private vehicles amongst education and income groups adjusted for sex and age.

#### *3.1.1. Household education*

In 2013-14, non-smoking youth in households where no one completed high school reported a 453% (95% CI 2.38-12.80) higher odds of being exposed daily to SHS in their household and a 259% (95CI 1.30-9.96) higher odds of being exposed daily to SHS in private vehicles compared to those in households where a household member completed post-secondary education. These differences remained strong in 2017-18 (OR for SHS in the household = 3.19, 95% CI 1.44-7.05; OR for SHS in private vehicles = 3.89, 95CI 1.50-10.11). Similarly, in 2013-14, non-smoking adults in households where no one completed high school reported a 56% (95CI 1.08-2.25) higher odds of being exposed daily to SHS in their household and a 191% (95CI 2.05-4.13) higher odds of being exposed daily to SHS in private vehicles compared to households in which a member had completed post-secondary education. These differences also remained strong in this age group in 2017-18 (OR for SHS in the household = 1.45, 95CI 1.00-2.11; OR for SHS in private vehicles = 1.74, 95CI 1.12-2.70).

*3.1.2. Household income*

In 2013-14, non-smoking youth in households in the lowest income quintile reported a 406% (95CI 2.25-10.45) higher odds of being exposed daily to SHS in their household and a 166% (95CI 1.41-5.04) higher odds of being exposed daily to SHS in private vehicles compared to those in households in the highest income quintile. Differences remained strong in 2017-18 (OR for SHS in the household = 4.45, 95CI 2.07-9.54; OR for SHS in private vehicles = 2.68, 95CI 0.94-7.61). Similarly, in 2013-14, non-smoking adults in households in the lowest income quintile reported a 36% (95CI 0.96-1.93) higher odds of being exposed daily to SHS in their household and a 163% (95CI 2.05-4.13) higher odds of being exposed daily to SHS in private vehicles compared to those in households in the highest income quintile. Differences in adults increased to reach statistical significance for SHS exposure in the household and remained strong for SHS exposure in private vehicles in 2017-18 (OR for SHS in the household = 1.76, 95CI 1.14-2.73; OR for SHS in private vehicles = 2.05, 95CI 1.39-3.03).

*Please insert Tables 1 and 2 somewhere here.*

### 3.2 Trends in SHS exposure across socioeconomic groups

After examining inequalities in SHS exposure outcomes across two-year time points, we tested trends in outcomes between 2013-14 and 2017-18, and differences in trends across socioeconomic groups. Tables 3 and 4 present the pooled odds ratios of exposure to SHS in the household and private vehicles for time, household education (Table 3), and household income (Table 4) over the course of the 2013-18 period, and the results from the "education x time" interaction tests. Overall, we found substantial average decreases in exposure to SHS for each outcome/age pair between 2013-14 and 2017-18 (Model 1). Non-smoking youth had a 45% lower odds (95CI 0.41-0.73) of being exposed to SHS in the household and a 62% lower odds (95CI 0.27-0.53) of being exposed to SHS in private vehicles in 2017-18 compared to 2013-14. Similarly, non-smoking adults had a 25% lower odds (95CI 0.63-0.89) of being exposed to SHS in the household and a 46% lower odds (95CI 0.45-0.65) of being exposed to SHS in private vehicles in 2017-18 compared to 2013-14.

Regarding differences in trends in SHS exposure across levels of education and income (Models 2 in Tables 3 and 4), we found no significant differences for each outcome/age pair between 2013-14 and 2017-18. The statistical significance of interaction tests for household education ranged from $p = .369$ for SHS in private vehicles among adults to $p = .883$ for SHS in private vehicles among youth. Similarly, the statistical significance of interaction tests for household income ranged from $p = .273$ for SHS in the household among adults to $p = .971$ for SHS in private vehicles among youth.

*Please insert Tables 3 and 4 somewhere here.*

## 4. DISCUSSION

The current state of knowledge suggests that there are socioeconomic inequalities in SHS exposure yet the effects of smoke-free policies on SHS exposure across socioeconomic groups remain unclear.

To address this gap, we reported trends in SHS exposure in homes and cars across education and income groups between 2013-14 and 2017-18 following the implementation in 2015 of a new tobacco control law in Quebec. Three main results emerged from our analyses: 1) SHS exposure decreased across education and income groups over the 2013-18 period, 2) relative inequalities in SHS exposure remained substantial and unchanged across this period, 3) relative inequalities in SHS exposure in the household were markedly larger among youth compared to adults.

The considerable decline in population levels of SHS exposure over this relatively short time period is worthy of celebration given the facts that: 1) SHS exposure in Quebec homes had already decreased by 32% over the five years preceding 2013 and; 2) smoke-free policies targeting cars with children have not always succeeded in reducing the prevalence of SHS exposure in other Canadian provinces.[44,52,53] Beyond their influence on smoking prevalence, it is likely that tobacco control policies implemented over the past decade have had a direct impact on population levels of SHS exposure.[54]

That socioeconomic inequalities in SHS exposure were maintained before and after adoption of the law is worrisome and challenges the "one-size-fits-all" nature of most smoke-free policies today. Population-level interventions seek to change the underlying conditions of risk for an entire population, neglecting *ipso facto* the specific needs of vulnerable populations in the context of socioeconomic inequalities.[3,10] As a result, those who could most benefit from these policies are, at times, the ones who least benefit from them.[2] Population-level interventions are also liable to increase socioeconomic inequalities when directly targeting downstream behaviours such as smoking instead of their structural determinants (e.g. inequalities in access to financial security).[55,56] The limitations of population-level interventions are reflected in cases where overall smoking prevalence has declined following the implementation of population-level policies, but remained high or stable in disadvantaged populations.[57-59] This is not the case for all programs and policies - stop smoking

services in the United Kingdom and taxation on tobacco products in multiple countries are cases in point.[4,60,61] To reduce both population prevalence and socioeconomic inequalities in smoking, policy makers should ultimately champion approaches that address the limitations of both targeted and population-based interventions, e.g., universal policies with an added focus on vulnerable groups and/or weighting the intensity of the intervention by different groups' disadvantage.[62,63]

In the context of SHS exposure, interventions will have to better address the needs of people in socioeconomically disadvantaged groups, particularly those with children given the magnitude of inequalities in this age group. Multiple obstacles faced by people to smoke outside their homes and quit smoking have been highlighted in the literature. These include: 1) the presence of permissive smoking norms and smoking-related stigma, 2) the lack of safe outdoor spaces to smoke, and 3) the lack of relevant SHS-related mass media campaigns for disadvantaged smokers.[13,64-66] Future efforts to support disadvantaged smokers in modifying their smoking practices should also include addressing misconceptions about SHS in the household (e.g., smoking in another room, under an oven fan, or near an open window) as well as the lack of smoking cessation resources and support for parents to smoke outside while parenting children. Creating programs to tackle these issues, however, require continued investments in public health that are not guaranteed in jurisdictions such as Quebec, in which the share of governmental spending on public health was second lowest across Canadian provinces in 2019.[67]

### 4.1 Strengths and Limitations

We drew on the methodological strengths of the CCHS to produce representative estimates of socioeconomic inequalities in SHS exposure in the Canadian province of Quebec. We highlight three limitations. First, the CCHS did not collect data on variables such as car ownership, housing type, or the smoking status of other household members, which would have helped us draw a more nuanced portrait of SHS exposure. Second, despite the large sample size in the CCHS, the samples for youth

were relatively small ($n$ = approx. 1,500 every two years), limiting the potential for examining differences in the subset of youth ages 12-15 targeted by the law as well as detecting differences in the associations of interest across time points. Finally, we highlight that our study design precludes inferring a causal relationship between the Act to Bolster Tobacco Control law and trends in SHS exposure across socioeconomic groups between 2013 and 2018. Other studies should examine trends in SHS exposure across provinces using study designs that can provide evidence of a causal effect of tobacco control policies, longer follow-ups, and other regions as counterfactuals.

### 4.2 Conclusion

Tobacco control is a critical public health institution which has done much to improve population health. This includes the prevention of SHS exposure at all ages and across all socioeconomic groups. Whereas smoke-free policies may be associated with strong declines in overall prevalence, they do not appear to yield similar results regarding the reduction of socioeconomic inequalities in SHS exposure. We found that the implementation of Quebec's 2015 *An Act to Bolster Tobacco Control* was unlikely to be associated with changes in the magnitude of socioeconomic inequalities in SHS exposure in the household and private vehicles among youth and adults up to 2018. Alongside reducing socioeconomic inequalities in smoking, tackling the unequal presence of smoking-related outcomes such as SHS exposure among vulnerable groups must also be emphasized as a priority of tobacco control programmes. The latest strategic policy document on tobacco control published by the Quebec government in May 2020, i.e., *Stratégie pour un Québec sans tabac 2020-2025,* is encouraging because of its focus on inequalities and high-risk populations as cross-cutting themes, and taxation and stop smoking services as key interventions. In order to support future tobacco control policy efforts, future studies need to unpack: 1) the reasons why socioeconomically disadvantaged smokers, including those with children, are more likely to smoke inside their home, and 2) which interventions are most likely to promote smoke-free rules in homes and cars across socioeconomic groups.

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TG, JL, and KLF conceptualized the study; TG and AG analyzed the data; TG and JL wrote the first draft; TG, JL, KLF, AG, and JOL contributed to the final draft.

**REFERENCES**

1. Corsi DJ, Boyle MH, Lear SA, Chow CK, Teo KK, Subramanian SV. Trends in smoking in Canada from 1950 to 2011: progression of the tobacco epidemic according to socioeconomic status and geography. *Cancer Causes Control*. 2014; 25(1): 45-57.

2. Public Health Agency of Canada (PHAC). Key Health Inequalities in Canada – A National Portrait. 2018. Accessed online August 2nd 2020. URL: https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/science-research/key-health-inequalities-canada-national-portrait-executive-summary/key_health_inequalities_full_report-eng.pdf

3. Frohlich KL, Potvin L. Transcending the known in public health practice: the inequality paradox: the population approach and vulnerable populations. *Am J Public Health*. 2008; 98(2): 216-221.

4. Thomas S, Fayter D, Misso K, et al. Population tobacco control interventions and their effects on social inequalities in smoking: systematic review. *Tob Control*. 2008;17(4):230-237. doi:10.1136/tc.2007.023911

5. Hill S, Amos A, Clifford D, Platt S. Impact of tobacco control interventions on socioeconomic inequalities in smoking: review of the evidence. *Tob Control*. 2014;23(e2):e89-e97. doi:10.1136/tobaccocontrol-2013-051110

6. Vozoris N, Lougheed MD. Second-hand smoke exposure in Canada: prevalence, risk factors, and association with respiratory and cardiovascular diseases. *Can Respir J*. 2008;15(5):263-269. doi:10.1155/2008/912354

7. 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. Institut National de Santé Publique du Québec. May 2012. Accessed online June 1st 2020. URL: https://www.inspq.qc.ca/pdf/publications/1487_ISSTabagExpoFumeeTabacEnviroQc.pdf

8. 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): 330-336. doi:10.1136/tc.2011.043802

9. Kuntz B, Lampert T. Social disparities in parental smoking and young children's exposure to secondhand smoke at home: a time-trend analysis of repeated cross-sectional data from the German KiGGS study between 2003-2006 and 2009-2012. *BMC Public Health*. 2016; 16: 485.

10. Frohlich KL, Poland B, Mykhalovskiy E, Alexander S, Maule C. Tobacco control and the inequitable socio-economic distribution of smoking: Smokers' discourses and implications for tobacco control. *Crit Public Health*. 2010; 20(1): 35–46.

11. Glenn NM, Lapalme J, McCready G, Frohlich KL. Young adults' experiences of neighbourhood smoking-related norms and practices: A qualitative study exploring place-based social inequalities in smoking. *Soc Sci Med*. 2017; 189: 17-24.

12. Lewis S, Russell A. Young smokers' narratives: public health, disadvantage and structural violence. *Sociol Health Illn*. 2013; 35(5): 746-760.

13. Orton S, Jones LL, Cooper S, Lewis S, Coleman T. Predictors of children's secondhand smoke exposure at home: a systematic review and narrative synthesis of the evidence. *PLoS One*. 2014; 9(11): e112690.

14. Passey ME, Longman JM, Robinson J, Wiggers J, Jones LL. Smoke-free homes: what are the barriers, motivators and enablers? A qualitative systematic review and thematic synthesis. *BMJ Open*. 2016; 6(3): e010260.

15. O'Donnell R, Angus K, McCulloch P, Amos A, Greaves L, Semple S. Fathers' Views and Experiences of Creating a Smoke-Free Home: A Scoping Review. *Int J Environ Res Public Health*. 2019; 16(24): 5164.

16. Pateman K, Ford P, Fizgerald L, et al. Stuck in the catch 22: attitudes towards smoking cessation among populations vulnerable to social disadvantage. *Addiction*. 2016; 111(6): 1048-1056.

17. King BA, Homa DM, Dube SR, Babb SD. Exposure to secondhand smoke and attitudes toward smoke-free workplaces among employed U.S. adults: findings from the National Adult Tobacco Survey. *Nicotine Tob Res*. 2014; 16(10): 1307-1318.

18. Saito J, Shibanuma A, Yasuoka J, Kondo N, Takagi D, Jimba M. Education and indoor smoking among parents who smoke: the mediating role of perceived social norms of smoking. *BMC Public Health*. 2018; 18(1): 211.

19. Action on smoking and health (ASH). Secondhand smoke: the impact on children. March 2014. Accessed online June 1st, 2020. URL: https://ash.org.uk/wp-content/uploads/2018/12/ASH-Report-The-Impact-of-Secondhand-Smoke-and-Children.pdf

20. Cao S, Yang C, Gan Y, Lu Z. The Health Effects of Passive Smoking: An Overview of Systematic Reviews Based on Observational Epidemiological Evidence. *PLoS One*. 2015; 10(10): e0139907.

21. Azagba S, Kennedy RD, Baskerville NB. Smoke-Free School Policy and Exposure to Secondhand Smoke: A Quasi-Experimental Analysis. *Nicotine Tob Res*. 2016; 18(2): 170-176.

22. Azagba S, Latham K, Shan L. Exposure to secondhand smoke in vehicles among Canadian adolescents: Years after the adoption of smoke-free car laws. *Addict Behav Rep*. 2019; 10: 100215.

23. World Health Organization (WHO). WHO Framework Convention on Tobacco Control (FCTC). 2003. Accessed online June 1st, 2020. URL: https://www.who.int/fctc/text_download/en/

24. Canadian Public Health Association (CPHA). The winnable battle: ending tobacco use in Canada. Ottawa, ON: CPHA. 2011. Accessed online June 1st, 2020. URL: https://www.cpha.ca/winnable-battle-ending-tobacco-use-canada.

25. Jacobs M, Alonso AM, Sherin KM, et al. Policies to restrict secondhand smoke exposure: American College of Preventive Medicine Position Statement. *Am J Prev Med*. 2013; 45(3): 360-367.

26. Borland R, Yong HH, Cummings KM, Hyland A, Anderson S, Fong GT. Determinants and consequences of smoke-free homes: findings from the International Tobacco Control (ITC) Four Country Survey. *Tob Control*. 2006; 15 Suppl 3(Suppl 3): iii42-iii50.

27. Akhtar PC, Haw SJ, Currie DB, Zachary R, Currie CE. Smoking restrictions in the home and secondhand smoke exposure among primary schoolchildren before and after introduction of the Scottish smoke-free legislation. *Tob Control*. 2009; 18(5): 409-415.

28. Mons U, Nagelhout GE, Allwright S, et al. Impact of national smoke-free legislation on home smoking bans: findings from the International Tobacco Control Policy Evaluation Project Europe Surveys. *Tob Control*. 2013; 22(e1): e2-e9.

29. Phillips R, Amos A, Ritchie D, Cunningham-Burley S, Martin C. Smoking in the home after the smoke-free legislation in Scotland: qualitative study. *BMJ*. 2007; 335(7619): 553. doi:10.1136/bmj.39301.497593.55

30. Tsai YW, Chang LC, Sung HY, Hu TW, Chiou ST. The impact of smoke-free legislation on reducing exposure to secondhand smoke: differences across gender and socioeconomic groups. *Tob Control*. 2015; 24(1):6 2-69.

31. Monson E, Arsenault N. Effects of Enactment of Legislative (Public) Smoking Bans on Voluntary Home Smoking Restrictions: A Review. *Nicotine Tob Res*. 2017; 19(2): 141-148.

32. Bélanger M, O'Loughlin J, Okoli CT, et al. Nicotine dependence symptoms among young never-smokers exposed to secondhand tobacco smoke. *Addict Behav*. 2008; 33(12): 1557-1563.

33. 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): 629-633.

34. Glover M, Scragg R, Min S, et al. Driving kids to smoke? Children's reported exposure to smoke in cars and early smoking initiation. *Addict Behav*. 2011; 36(11): 1027-1031.

35. Healey B, Hoek J, Wilson N, Thomson G, Taylor S, Edwards R. Youth exposure to in-vehicle second-hand smoke and their smoking behaviours: trends and associations in repeated national surveys (2006-2012). *Tob Control*. 2015; 24(2): 146-152.

36. Nguyen KH, King BA, Dube SR. Association between current asthma and secondhand smoke exposure in vehicles among adults living in four US states. *Tob Control*. 2015; 24(4): 376-381.

37. Lasnier B, Alix C, Lo E, O'Neill S, Blaser C. Portrait et évolution récente des inégalités sociales de santé en matière d'usage de la cigarette et d'exposition à la fumée de tabac dans l'environnement au Québec. Institut national de santé publique du Québec (INSPQ). 2019. Accessed online June 1st 2020. URL: https://www.inspq.qc.ca/sites/default/files/publications/2529_portrait_inegalites_sociales_usage_cigrette_exposition.pdf

38. Montreuil A, Hanusaik N, Cantinotti M, et al. Social disparities in children's exposure to secondhand smoke in privately owned vehicles. *Tob Control*. 2017; 26(6): 663-668.

39. Murphy-Hoefer R, Madden P, Maines D, Coles C. Prevalence of smoke-free car and home rules in Maine before and after passage of a smoke-free vehicle law, 2007-2010. *Prev Chronic Dis*. 2014; 11: 130132.

40. Moore GF, Moore L, Littlecott HJ, et al. Prevalence of smoking restrictions and child exposure to secondhand smoke in cars and homes: a repeated cross-sectional survey of children aged 10-11 years in Wales. *BMJ Open*. 2015; 5(1): e006914.

41. Faber T, Mizani MA, Sheikh A, Mackenbach JP, Reiss IK, Been JV. Investigating the effect of England's smoke-free private vehicle regulation on changes in tobacco smoke exposure and respiratory disease in children: a quasi-experimental study. *Lancet Public Health*. 2019; 4(12): e607-e617.

42. Laverty AA, Hone T, Vamos EP, et al. Impact of banning smoking in cars with children on exposure to second-hand smoke: a natural experiment in England and Scotland. *Thorax*. 2020; 75(4): 345-347.

43. Haw SJ, Gruer L. Changes in exposure of adult non-smokers to secondhand smoke after implementation of smoke-free legislation in Scotland: national cross sectional survey. *BMJ*. 2007; 335(7619): 549.

44. Elton-Marshall T, Leatherdale ST, Driezen P, Azagba S, Burkhalter R. Do provincial policies banning smoking in cars when children are present impact youth exposure to secondhand smoke in cars?. *Prev Med*. 2015; 78: 59-64.

45. Nguyen HV. Do smoke-free car laws work? Evidence from a quasi-experiment. *J Health Econ*. 2013; 32(1): 138-148.

46. Kruger J, Jama A, Kegler M, Baker Holmes C, Hu S, King B. Smoke-Free Rules and Secondhand Smoke Exposure in Vehicles among U.S. Adults-National Adult Tobacco Survey, 2009-2010 and 2013-2014. *Int J Environ Res Public Health*. 2016; 13(11): 1048.

47. Nanninga S, Lehne G, Ratz T, Bolte G. Impact of Public Smoking Bans on Social Inequalities in Children's Exposure to Tobacco Smoke at Home: An Equity-Focused Systematic Review. *Nicotine Tob Res*. 2019; 21(11): 1462-1472.

48. Statistics Canada. Exposure to second-hand smoke at home, 2014. 2015. Accessed August 2nd, 2020. URL: https://www150.statcan.gc.ca/n1/pub/82-625-x/2015001/article/14181-eng.htm.

49. Government of Quebec. Tobacco Control Act. 2015. Accessed online June 1st, 2020. URL: https://www.quebec.ca/en/health/advice-and-prevention/healthy-lifestyle-habits/smoke-free-lifestyle/tobacco-control-act/

50. Statistics Canada. Canadian Community Health Survey – Annual Component (CCHS). 2019. Accessed June 1st 2020. URL: https://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3226

51. StataCorp. 2015. *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP.

52. Statistics Canada. Second-hand smoke. 2009. Acccessed online June 1st, 2020. URL: https://www150.statcan.gc.ca/n1/pub/82-229-x/2009001/envir/shs-fra.htm

53. Statistics Canada. Exposure to second-hand smoke at home, 2012. 2013. Acccessed online June 1st, 2020. URL: https://www150.statcan.gc.ca/n1/pub/82-625-x/2013001/article/11836-eng.htm

54. Levy DT, Tam J, Kuo C, Fong GT, Chaloupka F. The Impact of Implementing Tobacco Control Policies: The 2017 Tobacco Control Policy Scorecard. *J Public Health Manag Pract*. 2018; 24(5): 448-457.

55. McLaren L, McIntyre L, Kirkpatrick S. Rose's population strategy of prevention need not increase social inequalities in health. *Int J Epidemiol.* 2010; 39(2): 372-377.

56. Popay J, Whitehead M, Hunter DJ. Injustice is killing people on a large scale – but what is to be done about it?. *J Public Health.* 2010: 32(2): 148–9.

57. Eek F, Ostergren PO, Diderichsen F, et al. Differences in socioeconomic and gender inequalities in tobacco smoking in Denmark and Sweden; a cross sectional comparison of the equity effect of different public health policies. *BMC Public Health*. 2010; 10: 9.

58. Kuipers MA, Nagelhout GE, Willemsen MC, Kunst AE. Widening educational inequalities in adolescent smoking following national tobacco control policies in the Netherlands in 2003: a time-series analysis. *Addiction*. 2014; 109(10): 1750-1759.

59. Sandoval JL, Leão T, Cullati S, et al. Public smoking ban and socioeconomic inequalities in smoking prevalence and cessation: a cross-sectional population-based study in Geneva, Switzerland (1995-2014). *Tob Control*. 2018; 27(6): 663-669.

60. Brown T, Platt S, Amos A. Equity impact of population-level interventions and policies to reduce smoking in adults: a systematic review. *Drug Alcohol Depend*. 2014; 139: 7-16.

61. Smith CE, Hill SE, Amos A. Impact of specialist and primary care stop smoking support on socioeconomic inequalities in cessation in the UK: a systematic review and national equity analysis. *Addiction.* 2020; 115: 34-46.

62. Benach J, Malmusi D, Yasui Y, Martínez JM, Muntaner C. Beyond Rose's strategies: a typology of scenarios of policy impact on population health and health inequalities. *Int J Health Serv*. 2011; 41(1): 1-9.

63. Benach J, Malmusi D, Yasui Y, Martínez JM. A new typology of policies to tackle health inequalities and scenarios of impact based on Rose's population approach. *J Epidemiol Community Health*. 2013; 67(3): 286-291.

64. Rowa-Dewar N., Lumsdaine C., Amos A. The challenges faced by mothers in attempting to protect children from smoking in disadvantaged homes. *Nicotine Tob. Res.* 2015; 17: 496–501.

65. Rowa-Dewar N, Amos A. Disadvantaged Parents' Engagement with a National Secondhand Smoke in the Home Mass Media Campaign: A Qualitative Study. *Int J Environ Res Public Health.* 2016; 13(9): pii: E901.

66. Thomson G, Wilson N, Edwards R. At the frontier of tobacco control: a brief review of public attitudes toward smoke-free outdoor places. *Nicotine Tob Res*. 2009;11(6):584-590.

67. Canadian Institute for Health Information. Health Expenditures in the Provinces and Territories — Provincial and Territorial Chartbook, 2019. Ottawa, ON: CIHI; 2019.

**TABLE 1**
Prevalence of second-hand smoke exposure among Quebec non-smokers, by household education and income. Canadian Community Health Survey, 2013-18.

| | 2013-14 | | 2015-16 | | 2017-18 | |
|---|---|---|---|---|---|---|
| | % | 95%CI | % | 95%CI | % | 95%CI |
| | **SHS exposure in the household among youth ages 12-17** | | | | | |
| **Household education** | | | | | | |
| High school not completed | 46.1 | 27.5-64.8 | 37.2 | 23.1-51.3 | 22.8 | 10.2-35.4 |
| High school completed | 31.7 | 18.1-45.2 | 21.4 | 14.1-35.2 | 24.7 | 14.1-35.2 |
| PS education completed | 14.5 | 11.9-17.1 | 9.9 | 7.8-12.0 | 8.4 | 6.5-10.3 |
| **Household income** | | | | | | |
| First quintile | 22.7 | 16.2-29.2 | 15.1 | 10.1-20.0 | 17.6 | 11.9-23.3 |
| Second quintile | 18.5 | 12.3-24.7 | 10.8 | 7.1-14.4 | 12.1 | 8.0-16.2 |
| Third quintile | 17.6 | 12.5-22.7 | 14.3 | 9.9-18.6 | 9.6 | 6.0-13.1 |
| Fourth quintile | 16.5 | 10.3-22.7 | 11.3 | 6.7-15.6 | 5.1 | 2.0-8.1 |
| Fifth quintile | 5.5 | 2.3-8.6 | 5.9 | 2.6-9.3 | 4.6 | 1.8-7.4 |
| | **SHS exposure in the household among adults ages 18+** | | | | | |
| **Household education** | | | | | | |
| High school not completed | 6.4 | 4.9-7.8 | 6.1 | 4.1-8.2 | 4.6 | 3.3-5.9 |
| High school completed | 7.1 | 4.8-9.4 | 7.2 | 5.5-8.9 | 5.6 | 4.2-7.0 |
| PS education completed | 4.8 | 4.2-5.4 | 3.4 | 2.9-4.0 | 3.6 | 3.1-4.1 |
| **Household income** | | | | | | |
| First quintile | 5.8 | 4.5-7.1 | 4.8 | 3.5-6.0 | 5.2 | 3.8-6.5 |
| Second quintile | 5.9 | 4.6-7.1 | 5.3 | 3.9-6.7 | 4.9 | 3.9-6.0 |
| Third quintile | 4.9 | 3.8-6.1 | 4.3 | 3.2-5.5 | 4.1 | 3.2-5.0 |
| Fourth quintile | 5.5 | 4.2-6.7 | 3.7 | 2.7-4.7 | 3.3 | 2.5-4.2 |
| Fifth quintile | 4.3 | 3.2-5.4 | 3.3 | 2.3-4.3 | 3.0 | 2.1-3.9 |
| | **SHS exposure in private vehicles among youth ages 12-17** | | | | | |
| **Household education** | | | | | | |
| High school not completed | 34.7 | 14.6-54.8 | 15.8 | 4.0-27.6 | 17.0 | 3.8-30.1 |
| High school completed | 29.9 | 17.1-42.6 | 15.7 | 6.8-24.6 | 9.6 | 3.8-15.4 |
| PS education completed | 13.5 | 10.9-16.0 | 7.0 | 5.4-8.6 | 6.0 | 4.3-7.6 |
| **Household income** | | | | | | |
| First quintile | 21.6 | 14.8-28.4 | 9.6 | 5.5-13.7 | 8.4 | 4.6-12.2 |
| Second quintile | 13.8 | 8.6-19.0 | 10.1 | 6.2-14.1 | 6.8 | 3.6-10.1 |
| Third quintile | 16.3 | 10.1-22.4 | 9.2 | 5.9-12.5 | 8.5 | 4.7-12.2 |
| Fourth quintile | 14.3 | 8.6-20.1 | 5.5 | 2.8-8.2 | 5.7 | 1.9-9.5 |
| Fifth quintile | 9.4 | 5.4-13.3 | 5.0 | 2.3-7.6 | 3.5 | 1.0-6.0 |
| | **SHS exposure in private vehicles among adults ages 18+** | | | | | |
| **Household education** | | | | | | |
| High school not completed | 6.5 | 4.9-8.1 | 4.9 | 3.6-6.2 | 3.0 | 2.0-3.9 |
| High school completed | 8.0 | 5.1-10.8 | 5.0 | 3.7-6.3 | 4.6 | 3.1-6.1 |
| PS education completed | 5.0 | 4.3-5.7 | 2.8 | 2.4-3.3 | 2.8 | 2.4-3.2 |
| **Household income** | | | | | | |
| First quintile | 8.0 | 6.1-9.8 | 4.6 | 3.3-5.9 | 4.7 | 3.7-5.7 |
| Second quintile | 6.0 | 4.3-7.7 | 2.8 | 2.0-3.6 | 3.1 | 2.1-4.1 |
| Third quintile | 5.8 | 3.9-7.6 | 3.3 | 2.5-4.1 | 3.6 | 2.6-4.5 |
| Fourth quintile | 5.4 | 4.2-6.5 | 3.3 | 2.4-4.2 | 2.3 | 1.5-3.1 |
| Fifth quintile | 3.5 | 2.5-4.5 | 2.5 | 1.8-3.2 | 2.3 | 1.7-3.0 |

CI = Confidence intervals. SHS = Second-hand smoke. PS = Post-secondary. Estimates are weighted using the survey and bootstrap replicate weights designed by Statistics Canada.

**TABLE 2**
Education and income-based inequalities in second-hand smoke exposure among Quebec non-smokers. Canadian Community Health Survey, 2013-18.

| | 2013-14 | | 2015-16 | | 2017-18 | |
|---|---|---|---|---|---|---|
| | OR | 95%CI | OR | 95%CI | OR | 95%CI |
| | **SHS exposure in the household among youth ages 12-17** | | | | | |
| **Household education** | | | | | | |
| High school not completed | **5.53** | **2.38-12.80** | **5.34** | **2.71-10.55** | **3.19** | **1.44-7.05** |
| High school completed | **2.66** | **1.36-5.20** | **2.50** | **1.36-4.57** | **3.60** | **1.90-6.82** |
| PS educ. completed (ref.) | --- | --- | --- | --- | --- | --- |
| **Household income** | | | | | | |
| First quintile | **5.06** | **2.25-10.45** | **2.82** | **1.28-6.22** | **4.45** | **2.07-9.54** |
| Second quintile | **3.88** | **1.84-8.17** | 1.93 | 0.90-4.13 | **2.84** | **1.33-6.09** |
| Third quintile | **3.58** | **1.66-7.71** | **2.68** | **1.31-5.48** | 2.19 | 0.99-4.82 |
| Fourth quintile | **3.33** | **1.53-7.23** | 2.03 | 0.93-4.44 | 1.12 | 0.43-2.91 |
| Fifth quintile (ref.) | --- | --- | --- | --- | --- | --- |
| | **SHS exposure in the household among adults ages 18+** | | | | | |
| **Household education** | | | | | | |
| High school not completed | **1.56** | **1.08-2.25** | **2.78** | **1.71-4.52** | **1.45** | **1.00-2.11** |
| High school completed | **1.54** | **1.02-2.32** | **2.41** | **1.76-3.29** | **1.55** | **1.14-2.10** |
| PS educ. completed (ref.) | --- | --- | --- | --- | --- | --- |
| **Household income** | | | | | | |
| First quintile | 1.36 | 0.96-1.93 | **1.60** | **1.04-2.45** | **1.76** | **1.13-2.73** |
| Second quintile | 1.41 | 0.98-2.02 | **1.75** | **1.15-2.66** | **1.77** | **1.16-2.69** |
| Third quintile | 1.17 | 0.81-1.70 | 1.43 | 0.93-2.21 | 1.48 | 0.99-2.19 |
| Fourth quintile | 1.32 | 0.91-1.92 | 1.15 | 0.75-1.76 | 1.14 | 0.77-1.69 |
| Fifth quintile (ref.) | --- | --- | --- | --- | --- | --- |
| | **SHS exposure in private vehicles among youth ages 12-17** | | | | | |
| **Household education** | | | | | | |
| High school not completed | **3.59** | **1.30-9.96** | 2.52 | 0.96-6.61 | **3.89** | **1.50-10.11** |
| High school completed | **2.66** | **1.36-5.21** | **2.44** | **1.18-5.04** | 1.71 | 0.79-3.67 |
| PS educ. completed (ref.) | --- | --- | --- | --- | --- | --- |
| **Household income** | | | | | | |
| First quintile | **2.66** | **1.41-5.04** | 1.97 | 0.96-4.05 | 2.68 | 0.94-7.61 |
| Second quintile | 1.54 | 0.79-3.00 | 2.18 | 0.99-4.74 | 2.18 | 0.73-6.54 |
| Third quintile | 1.83 | 0.90-3.74 | 1.87 | 0.91-3.82 | 2.64 | 0.87-7.96 |
| Fourth quintile | 1.58 | 0.78-3.21 | 1.11 | 0.48-2.53 | 1.70 | 0.51-5.59 |
| Fifth quintile (ref.) | --- | --- | --- | --- | --- | --- |
| | **SHS exposure in private vehicles among adults ages 18+** | | | | | |
| **Household education** | | | | | | |
| High school not completed | **2.91** | **2.05-4.13** | **3.02** | **2.01-4.54** | **1.74** | **1.12-2.70** |
| High school completed | **2.27** | **1.49-3.44** | **2.10** | **1.48-2.98** | **1.94** | **1.30-2.89** |
| PS educ. completed (ref.) | --- | --- | --- | --- | --- | --- |
| **Household income** | | | | | | |
| First quintile | **2.63** | **1.74-3.99** | **1.91** | **1.20-3.05** | **2.05** | **1.39-3.03** |
| Second quintile | **2.10** | **1.33-3.31** | 1.12 | 0.72-1.75 | 1.40 | 0.88-2.24 |
| Third quintile | **1.77** | **1.12-2.80** | 1.36 | 0.90-2.05 | **1.62** | **1.07-2.46** |
| Fourth quintile | **1.56** | **1.07-2.26** | 1.31 | 0.88-1.95 | 0.96 | 0.63-1.48 |
| Fifth quintile (ref.) | --- | --- | --- | --- | --- | --- |

Estimates are odds ratios (OR) adjusted for age and sex. Education and income were modelled separately. Estimates are bolded when the 95%CI excludes the null value. CI = Confidence intervals. SHS = Second-hand smoke. PS = Post-secondary. Estimates are weighted using the survey and bootstrap replicate weights designed by Statistics Canada.

**TABLE 3**

Trends in second-hand smoke exposure, on average and by education group, among Quebec non-smokers between 2013-14 and 2017-18. Canadian Community Health Survey, 2013-18.

| | **SHS in the household Ages 12-17** | | | | **SHS in the household Ages 18+** | | | | **SHS in private vehicles Ages 12-17** | | | | **SHS in private vehicles Ages 18+** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Model 1 | | Model 2 | | Model 1 | | Model 2 | | Model 1 | | Model 2 | | Model 1 | | Model 2 | |
| | OR | 95%CI | OR | 95%CI | OR | 95%CI | OR | 95%CI | OR | 95%CI | OR | 95%CI | OR | 95%CI | OR | 95%CI |
| **Household education** | | | | | | | | | | | | | | | | |
| High school not completed | **4.49** | **2.96-6.80** | **5.19** | **2.32-11.62** | **1.84** | **1.45-2.32** | **1.70** | **1.21-2.30** | **3.23** | **1.91-5.48** | **3.68** | **1.34-10.06** | **2.56** | **2.05-3.19** | **2.45** | **1.76-3.40** |
| High school completed | **2.91** | **2.01-4.23** | **2.71** | **1.38-5.34** | **1.81** | **1.47-2.22** | **1.60** | **1.06-2.41** | **2.31** | **1.54-3.48** | **2.68** | **1.36-5.28** | **2.10** | **1.66-2.65** | **2.14** | **1.42-3.23** |
| PS educ. completed (ref.) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | | | | | | | | | | | | | | | | |
| 2013-14 (ref.) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2015-16 | **0.64** | **0.49-0.85** | **0.65** | **0.47-0.88** | **0.77** | **0.65-0.93** | **0.71** | **0.56-0.89** | **0.46** | **0.34-0.63** | **0.48** | **0.35-0.66** | **0.57** | **0.47-0.69** | **0.55** | **0.43-0.69** |
| 2017-18 | **0.55** | **0.41-0.73** | **0.54** | **0.40-0.74** | **0.75** | **0.63-0.89** | **0.76** | **0.62-0.93** | **0.38** | **0.27-0.53** | **0.41** | **0.28-0.58** | **0.54** | **0.45-0.65** | **0.56** | **0.45-0.69** |
| **Interaction terms** | | | --- | --- | | | --- | --- | | | --- | --- | | | --- | --- |
| HS not completed x 2015-16 | | | 1.05 | 0.38-2.88 | | | 1.39 | 0.82-2.33 | | | 0.71 | 0.18-2.79 | | | 1.39 | 0.87-2.20 |
| HS not completed x 2017-18 | | | 0.63 | 0.21-1.89 | | | 0.95 | 0.60-1.50 | | | 0.90 | 0.22-3.61 | | | 0.80 | 0.48-1.31 |
| HS completed x 2015-16 | | | 0.91 | 0.37-2.28 | | | 1.41 | 0.85-2.34 | | | 0.91 | 0.33-2.53 | | | 1.02 | 0.61-1.70 |
| HS completed x 2017-18 | | | 1.32 | 0.51-3.41 | | | 1.00 | 0.61-1.65 | | | 0.62 | 0.23-1.69 | | | 0.93 | 0.53-1.61 |

Estimates are odds ratios (OR) adjusted for age and sex. Model 1 included household education and time and Model 2 included the two variables and their interaction. Estimates are bolded when the 95%CI excludes the null value. CI = Confidence intervals. SHS = Second-hand smoke. HS = High school. PS = Post-secondary. Estimates are weighted using the survey weight and bootstrap replicate weights designed by Statistics Canada.

**TABLE 4**

Trends in second-hand smoke exposure, on average and by income group, among Quebec non-smokers between 2013-14 and 2017-18. Canadian Community Health Survey, 2013-18.

| | **SHS in the household Ages 12-17** | | | | **SHS in the household Ages 18+** | | | | **SHS in private vehicles Ages 12-17** | | | | **SHS in private vehicles Ages 18+** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Model 1 | | Model 2 | | Model 1 | | Model 2 | | Model 1 | | Model 2 | | Model 1 | | Model 2 | |
| | OR | 95CI | OR | 95CI | OR | 95CI | OR | 95CI | OR | 95CI | OR | 95CI | OR | 95CI | OR | 95CI |
| **Household income** | | | | | | | | | | | | | | | | |
| First quintile | **4.94** | **2.66-6.16** | **5.06** | **2.47-10.40** | **1.55** | **1.22-1.97** | 1.33 | 0.93-1.90 | **2.43** | **1.63-3.65** | **2.64** | **1.39-5.01** | **2.48** | **1.64-3.74** | **2.66** | **1.75-4.05** |
| Second quintile | **2.83** | **1.87-4.29** | **3.91** | **1.85-8.23** | **1.62** | **1.29-2.05** | 1.40 | 0.98-2.00 | **1.87** | **1.21-2.88** | 1.55 | 0.80-3.03 | **1.97** | **1.26-3.07** | **2.07** | **1.32-3.26** |
| Third quintile | **2.84** | **1.86-4.36** | **3.65** | **1.71-7.81** | **1.34** | **1.06-1.71** | 1.16 | 0.80-1.69 | **2.01** | **1.31-3.08** | 1.82 | 0.89-3.70 | **1.73** | **1.09-2.74** | **1.79** | **1.13-2.84** |
| Fourth quintile | **2.19** | **1.39-3.43** | **3.39** | **1.57-7.33** | 1.21 | 0.96-1.52 | 1.29 | 0.89-1.88 | 1.49 | 0.93-2.39 | 1.59 | 0.78-3.21 | **1.53** | **1.05-2.22** | **1.56** | **1.07-2.26** |
| Fifth quintile (ref.) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | | | | | | | | | | | | | | | | |
| 2013-14 (ref.) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2015-16 | **0.66** | **0.50-0.86** | 1.07 | 0.43-2.67 | **0.80** | **0.68-0.95** | 0.73 | 0.48-1.09 | **0.47** | **0.35-0.64** | 0.49 | 0.22-1.09 | 0.69 | 0.45-1.05 | 0.70 | 0.46-1.07 |
| 2017-18 | **0.57** | **0.43-0.75** | 0.83 | 0.34-2.04 | **0.78** | **0.66-0.92** | 0.67 | 0.45-1.00 | **0.39** | **0.29-0.54** | **0.34** | **0.12-0.98** | **0.65** | **0.43-0.99** | **0.66** | **0.43-0.99** |
| **Interaction terms** | | | --- | --- | | | --- | --- | | | --- | --- | | | --- | --- |
| First quintile x 2015-16 | | | 0.56 | 0.19-1.63 | | | 1.19 | 0.69-2.06 | | | 0.77 | 0.28-2.16 | | | 0.81 | 0.45-1.48 |
| Second quintile x 2015-16 | | | 0.88 | 0.31-2.46 | | | 1.36 | 0.78-2.38 | | | 0.98 | 0.30-3.22 | | | 0.85 | 0.48-1.47 |
| Third quintile x 2015-16 | | | 0.49 | 0.17-1.43 | | | 1.24 | 0.71-2.16 | | | 1.43 | 0.53-3.90 | | | 0.60 | 0.33-1.10 |
| Fourth quintile x 2015-16 | | | 0.73 | 0.25-2.13 | | | 1.30 | 0.77-2.18 | | | 1.35 | 0.37-4.88 | | | 0.74 | 0.40-1.36 |
| First quintile x 2017-18 | | | 0.73 | 0.26-2.05 | | | 1.22 | 0.71-2.10 | | | 1.10 | 0.37-3.23 | | | 0.81 | 0.44-1.50 |
| Second quintile x 2017-18 | | | 0.60 | 0.20-1.78 | | | 1.30 | 0.77-2.21 | | | 1.44 | 0.39-5.39 | | | 0.97 | 0.52-1.80 |
| Third quintile x 2017-18 | | | 0.60 | 0.20-1.82 | | | 0.89 | 0.51-1.56 | | | 0.72 | 0.24-2.15 | | | 0.86 | 0.49-1.50 |
| Fourth quintile x 2017-18 | | | 0.32 | 0.10-1.11 | | | 0.89 | 0.53-1.51 | | | 1.06 | 0.26-4.27 | | | 0.65 | 0.38-1.13 |

Estimates are odds ratios (OR) adjusted for age and sex. Model 1 included household income and time and Model 2 included the two variables and their interaction. Estimates are bolded when the 95%CI excludes the null value. CI = Confidence intervals. SHS = Second-hand smoke. PS = Post-secondary. Estimates are weighted using the survey weight and bootstrap replicate weights designed by Statistics Canada.