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GENDER AND THE SOCIAL CONTEXT OF SMOKING BEHAVIOUR

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This paper examines the effect of societal factors that impinge directly on smoking behaviour of women and men such as cigarettes price, tobacco control legislation, newspaper coverage of tobacco issues, overall economic factors, such as unemployment, and social milieu characteristics in which smoking behaviour occurs. Individual and interpersonal factors are taken into account. Three Canadian provinces are studied, from 1978 to 1995. A repeated cross-section design is used. Data are derived from national surveys and official documents. Individual and interpersonal factors were associated with men and women’s cigarette smoking. However, smoking occurs in social contexts within which the price of cigarettes appears to have an effect on men’s smoking prevalence and quantity of cigarettes smoked but no effect on either the decision to smoke or the amount smoked in women. More comprehensive and restrictive no-smoking legislation influence negatively both men’s decision to smoke and quantity of cigarettes smoked but only women’s decision to smoke. Further, more comprehensive and restrictive legislation on youth access to tobacco did only influence men’s decision to smoke. Newspaper articles influenced women and men’s smoking prevalence but not the amount of cigarettes smoked. As differences were observed in the responsiveness of men and women to tobacco control policies, policymakers and practitioners need to keep in mind that tobacco control policies have to be tailored to the broader context of women and men’s lives. Future work needs also to be done to clarify the interrelationships between social drivers of smoking such as price, laws and media, and the relationships between these and interpersonal, interpersonal factors as well as other social and cultural factors.

Keywords: gender, smoking, legislation, price, media, evaluation
INTRODUCTION

The health toll taken by cigarettes has stimulated the development and implementation of a wide variety of programs and policies to control smoking in industrialised countries such as Canada. These range from educational programs to legislation that increase cigarette excise taxes, restrict smoking in public places, ban cigarette advertising and tobacco sales to young people under the age of 18, and require cigarette warnings on cigarette packages. The impact of the mix of these interventions on the adult population smoking behaviour has never been fully examined. Analyses of the impact of anti-tobacco policies often used approaches that did not fully account for individual differences, and particularly for differences between men and women. Moreover, they usually lacked the larger perspective of the ecological approach which takes into account the multitude of factors influencing smoking behaviour, and particularly the social context in which it takes place (McQueen, 1988; Chapman Walsh et al., 1995).

Our intent in this study was to examine the relative effect of both individual and societal factors on women and men’s smoking behaviours in Canada. In particular, it was our intention to examine the effect of societal factors that impinge directly on smoking (prevalence) and the behaviour of smokers (amount smoked) such as the price of cigarettes, tobacco control legislation, newspaper coverage of tobacco issues, overall economic factors, such as unemployment, and social milieu characteristics in which smoking behaviour occurs. Our study concentrated on three Canadian provinces (Ontario, British Columbia and Quebec), from 1978 to 1995, as we were interested in
comparing the effects of price changes (which were notably different in Quebec, and Ontario vs. British Columbia) as well as other socio-cultural factors (including the effect of English and French language groups).

To build a Society and Health model on men and women smoking behaviour in Canada, we used as a guide a conceptual framework inspired by Thompson and Kinner's (1990) synthesis of social change theories, Van Reek and Adriaanse's model on the social dynamics on smoking (1987), and the ecological perspective (Green et al., 1996; Richard et al., 1996; Stoikols, 1992; Brebenenner, 1979; McLeroy et al., 1988; Altman, 1990) (Figure 1). The model includes elements identified in the literature review. In this model, smoking behaviour is seen as a function of the surrounding context. The central component (intra-personal factors) is nested within several subsystems (e.g. family, confidants, friends, work groups), the community and the external environment.

At the first level, the intra-personal factors are sociodemographic characteristics, alcohol consumption, exercise, obesity, and recent life changes (e.g. pregnancy, child birth, divorce, death of someone dear, job loss), stress, and self efficacy. Sociodemographic characteristics (i.e. sex, age, education, language) were examined in this study.

At a second level, the model takes into account the interactions women and men have with their immediate environment. Their interpersonal relationships with family members, friends, neighbours, contacts at work are important sources of influence in the health-related behaviours of individuals (McLeroy et al. 1988; Berkman et al., 2000).

Limited by the availability of data, we only examined the impact of economic family size (proxy of social pressures) on smoking behaviour.

At the third level, the focus is on the complex relationships women and men have with their community, the organizations or groups that are in favour or against smoking control. These forces have been crucial in shaping the gender distribution of cigarette use. The industry has monitored, promoted and capitalized on evolving social norms, defining women's smoking as a badge of autonomy and social power. It spends billions of dollars on local advertising and promotion. The industry's local lobbying against the increase of excise taxes on cigarettes and support to cigarette contraband maintains old customers and gets new ones. Business associations such as the "Movement against cigarettes taxation" (Mouvement anti-taxes réservées aux cigarettes, MATRAC) in Quebec which forced the Quebec Government to decrease excise taxes, had the same objective. To overcome this, a variety of public health strategies are used by local governments and public health organizations to decrease smoking. They range from information-based educational campaigns, to counter advertising, and to local formal rules, laws, ordinances, and policies restricting smoking or the latitude of the tobacco industry. Grass-roots anti-smoking organizations such as "La Coalition pour le contrôle du tabagisme" in Quebec use mass media and lobbying for the same purpose. Due to the lack of availability of data on most of these factors, we only examined municipal no-smoking bylaws.
The fourth level refers to the relationship of women and men with forces present in the larger social environment, such as the economy, federal and provincial smoking control activities (i.e., educational programs, excise taxes on cigarettes, mandatory warning labels, television or radio ad bans, vending machine restrictions, spot-zoning and use of restrictions directed at individuals and businesses, legal age, smuggling and media. Recession particularly affects women and increase women’s smoking behaviour (Chapman Walsh et al., 1995). Contraband contributes to the reduction of the average price of cigarettes and thus increases tobacco sales and smoking. In this paper, impacts on tobacco use of factors from the third and four levels were considered jointly.

Associations of smoking behaviors with community characteristics, such as municipal restriction rules on smoking, and with structural social forces, such as unemployment rates, federal and provincial tobacco control laws, and provincial newspaper coverage of tobacco issues were respectively studied by taking into account intra- and interpersonal levels factors.

METHODS
DESIGN
We used a repeated cross-section design (Kahn, 1960) which is considered a not-quite-longitudinal design (Menard, 1991). A secondary analysis of a set of comparable survey data, collected between 1978 to 1995, on Quebec, Ontario and British Columbia women and men was performed. Data on cigarette prices, federal, provincial and municipal by-laws, newspaper coverage, and unemployment rates were collected over the same period and merged with the individual and interpersonal-level survey data.

DATA SOURCES AND POPULATION

The data sources for the federal and provincial legislation were the database of the National Tobacco Law Compendium (University of Ottawa) available on a website (http://www.tobaccoLaw.org) and those of The University of Quebec in Montreal (UQUAM) Law Library. The data source for municipal by-laws in Quebec, Ontario and British Columbia was a report on smoking by-laws in Canada produced by Optima Consultants (1995) for Health Canada. In this report, all Canadian municipalities with a population over 10,000 were contacted by mail.

We sampled all the articles containing the words tobacco, cigarettes and nicotine in five newspapers published in the metropolitan areas of the three provinces and having a large readership: La Presse, Le Soleil, Montreal Gazette, Vancouver Sun, Globe and Mail and Toronto Star. Articles were identified in paper index listings ("L'Index de l'Actualité" was used for French newspapers and the "Canadian News Index" for English newspapers) as well as in the computerized database produced by MicroMedia Ltd, the

MEASURES

Dependent variables

The dependent variables have been measured in the nine surveys. Current smoker includes the daily smoker and the occasional smoker. Never smoked and former smoker were considered into the same category (never/former) in the variable “typfum” (1=current smoker, 0=former or never smoked). Depending on the survey, one or two questions were used to identify a current smoker.

Quantity of cigarettes smoked has generally been measured by an open-ended question but no question was asked on the number of cigarettes smoked in the Health Promotion Survey 1985. Data have been grouped into four categories 1) 1-12 cigarettes per day, 2) 13-22 cigarettes per day, 3) 23-32 cigarettes per day and 4) 33 cigarettes per day and over. A proxy had to be used in two surveys (Canada Fitness Survey 1981 and 1988) as the number of cigarettes was categorized in terms of packages smoked and types of tobacco products used. Packages of cigarettes were transformed into number of cigarettes. Mean number of cigarettes were also used in the analyses.

Independent variables

The independent variables chosen for analysis in the surveys are those measured through questions with similar wording in the nine selected surveys and those not having a high percentage of missing data. The other independent variables have been created from data collected in official documents. They are presented here according to the four levels of the model.

Intrapersonal variables

Sex was coded 0 for males and 1 for females.

Age was a derived variable measured by fixed-alternative categories. Age was reclassified in four groups: 1) 15-19 years, 2) 20-24 years, 3) 25-64 years, 4) 65 years and over.

Language used all or most of the time has been measured by closed-ended questions. Three almost similarly formulated questions were used: “What language do you use all or most of the time?” or “What language do you speak most often at home” or “In which language can you conduct a conversation?”. In the Campbell’s Survey on Well Being (1988), the question on the first language learned at home was used and considered as a proxy for the language used all or most of the time. The data were grouped in three categories: 1) English, 2) French and 3) others. In multivariate analyses, language was categorized with two variable indicators. The first contrast French with other languages, with French coded as (1) and English and other languages coded as (0). The second contrast the French and English speakers—coded (0), with those of other languages—coded (1).
Level of Education was measured by the same question ("What is the highest level of education you have reached or completed?") in all the surveys except one, the General Social Survey 1985 where several questions were asked to obtain the information by level of education. All the possible answers were grouped into five categories: 1) elementary or less, 2) partial/completed secondary school, 3) some post-secondary education, 4) completed post-secondary education, college or certificate, 5) some or completed university.

Relative Education Index is based on education, age group and sex. The educational gap between generations is eliminated in this index developed by Santé Québec (1986). The distribution is divided into quintiles ranging from low educational level (1) to high (5). An individual considered in the lower quintile was an individual with the lowest level of education for his/her age group and sex category.

**Economic family size** was measured by open-ended questions. The most common one was "How many persons live or stay at this address and use this number as a home phone number?". In seven surveys, the question was related to the people living in the household. In two surveys (Canada Health Survey 78-79, General Fitness Survey 1988), it was related to people living together and related by blood, marriage or adoption. Three categories were retained in this study: (1) one person, (2) two or three persons and (3) four and over.

**Community variables**

The variable "type of city" had to be discarded from the analyses because of its unavailability in three surveys and the diversity of its classification in other surveys. As data on municipalities could not be related to individuals in each municipality, all policy data were aggregated to the provincial level.

**External environment variables**

Province is the province of residence at the time of survey. In the Canada Fitness 1988, two questions were used as a proxy to identify British Columbia residents: Where were you born? How many years have you lived in this province? Two indicators variables were introduced in the analysis: Residency in Quebec (coded 1) or in the other two provinces (coded 0); and residency in Ontario (coded 1) or in the other two other provinces (coded 0).

**Price of cigarettes**: Statistics Canada provided provincial data on prices for 200 cigarettes corresponding to months of the years the surveys were conducted. These were prices charged in the three provinces' main cities. We computed an average cigarette price per province and assigned to individuals the average cigarette prices corresponding to the months the individuals were interviewed. No prices were made available to us by Statistics Canada for 1978 and 1981.

**Unemployment rates** for 15 years old and over for Ontario, British-Columbia and Quebec were provided by Statistics Canada per months of the years the surveys were conducted. We assigned to individuals the annual average unemployment rate for the province they lived in when they were interviewed in the selected surveys.

**Population coverage by municipal no-smoking bylaws** (Stephens et al., 1997) was calculated by dividing the population living in municipalities regulating public smoking in Quebec, Ontario and British Columbia by the population of each province at the dates...

Comprehensiveness of municipal no-smoking bylaws was captured by rating the content of each municipal regulation according to the types and number of places in which smoking was restricted or banned. We used the 22 potential public places presented in the Optima Consultants Report (1995) as the items to which ratings were to be assigned. The ratings were determined after examining Emont et al. (1992), Rigotti and Pashos (1991) and Asbridge et al. (1997) comprehensiveness measures of no-smoking laws. They ranged from 0 to 1: 0 for no regulation; 0.25 for 1-3 public places excluding restaurants and private workplaces; 0.35 for 4 or more public places, excluding restaurants and private workplaces; 0.50 for restaurants (whatever the number of other public places, except private workplaces); 0.75 for private workplaces (whatever the number of other public places, except restaurants); 0.85 for private workplaces and restaurants (whatever the number of public places except the maximum); 1 for private workplaces, restaurants and the maximum of places. A mean score was computed for each province at the dates the surveys were conducted by summing the scores assigned to the municipalities (according to the rating scale ranging from 0 to 1) and dividing this sum by the number of municipalities in each province. This mean score was expressed in terms of percentage.

Restrictiveness of municipal no-smoking bylaws was measured by rating the level of restriction within each of the places smoking was restricted or banned. We used the 22 potential public places presented in the Optima Consultants Report (1995) as the items to which ratings were to be assigned. Ratings ranging from 0 to 1 (Deobbeleer et al., 2001) were developed after examination of previous restrictiveness measures (e.g. Asbridge and O'Grady, 1997; Yurekli and Zhang 2000). A score was calculated for each municipality by summing the ratings assigned to the places where smoking was restricted or banned and dividing this sum by the number of public places covered by the regulation. As a high percentage of people may be exposed to smoking regulation in restaurants and workplaces, a weight of 2 was given to restaurants and a weight of 3 to private workplaces in the number of public places.

Population coverage with comprehensive and restrictive municipal no-smoking bylaws was captured by multiplying the comprehensiveness and restrictiveness of municipal no-smoking bylaws by the population coverage with municipal no-smoking bylaws in order to gain a more complete measure of the potential impact of anti-tobacco municipal bylaws by province. It was expressed in terms of percentage.

Comprehensiveness of provincial and federal no-smoking legislation was measured the same way as the comprehensiveness of municipal no-smoking bylaws. Provincial and federal scores were thus assigned according to the types and number of places where smoking was restricted or banned. They were expressed in terms of percentage.

Restrictiveness of provincial and federal no-smoking legislation was measured by rating the level of restriction within each of the places smoking was restricted or banned. The 22 public places presented in the Optima Consultants Report (1995) were used as items to which ratings were assigned. The strength of the legislation in these places was measured by ratings similar to those of Asbridge et al. (1997). They ranged from 0 to 1: 1 for total ban, 0.75 for designated area, 0.50 for partial ban, 0.25 for decision of the proprietor, 0 for no regulation. Provincial and federal mean scores were calculated by
summing the scores assigned to the places where smoking was restricted or banned and dividing by the number of places covered by the legislation. The scores were expressed in terms of percentages.

Coverage with comprehensive and restrictive federal and provincial no-smoking laws measures combined comprehensiveness and restrictiveness measures, by multiplying them in order to gain a more complete measure of the potential impact of provincial (i.e., percentage of comprehensive and restrictive provincial no-smoking laws) and federal (i.e., percentage of comprehensive and restrictive federal no-smoking laws) legislation on protection of non-smokers.

Comprehensiveness and restrictiveness of provincial and federal legislation on youth access was measured by using Alciati et al. (1998) measurement of the extensiveness of state laws restricting youth access to tobacco ratings. Nine items are identified (e.g., minimum age, packaging, clerk intervention, photographic identification). For each of the nine items, a target reflecting public health objectives for controlling youth access to tobacco is specified. Achieving the target on any given provision results in a rating of +4 points. If the item meets about 75% of the target, a rating of +3 is given. If the item meets about 50% of target a rating of +2 is assigned and if the item meets about 25% of target a rating of +1 is given. A rating of 0 is assigned when there is no provision. Certain items may exceed the target and receive a rating of +5. For each item, criteria for assigning ratings at specific levels are established. We adapted this rating system to the Canadian provincial and federal legislation on youth access to tobacco. Each score was also divided by 5, the maximum score, to keep the scores between 0 and 1. At the years the surveys were conducted, comprehensiveness scores for provincial and federal legislation on youth access to tobacco are represented by mean scores, calculated by the number of applicable items in the legislation divided by nine (i.e., the total number of items in the scale). At the years the surveys were conducted, restrictiveness scores for provincial and federal legislation on youth access to tobacco are represented by mean scores, calculated by summing the scores assigned to applicable items and dividing by the number of applicable items. The scores were expressed in terms of percentages.

Comprehensiveness and restrictiveness of federal and provincial youth access to tobacco laws were captured by multiplying the measures of comprehensiveness and restrictiveness in order to gain a more complete measure of the potential impact of provincial (i.e., percentage of comprehensive and restrictive provincial laws on youth access to tobacco) and federal (i.e., percentage of comprehensive and restrictive federal laws on youth access to tobacco) legislation on youth access to tobacco.

Comprehensiveness and restrictiveness of provincial and federal legislation on advertising/promotion and public education (health warnings) were not considered as there was no such legislation in Quebec and Ontario and very little variation in the federal legislation from 1978 to 1995.

Newspaper coverage of smoking issues in Ontario, British-Columbia and Quebec was measured by the number of articles published in the main newspapers of the three provinces on tobacco issues. The variable used in the multivariate analyses is the mean number of newspapers articles published per month during the year antecedent to the end of each survey.
ANALYSES

Considering that the survey data banks are from different sources and that they have been collected over many years, we worked on each data bank separately for testing and evaluating the variables, then we aggregated, merged or created variables in each file to ensure that we are working with the same information across the files and across time. In each survey, each person selected and interviewed represents not only himself/herself but several other persons not in the sample. The response of each person was weighted according to weights attributed in each survey.

We analysed the main newspapers coverage of tobacco issues and computed coverage, comprehensiveness and restrictiveness scores for each type of tobacco control legislation. This provided the large social environment variables (with unemployment rates) common to all individuals per province.

Data were analysed by multiple regression techniques, using logistic regression for decision to smoke and multiple linear regression for quantity smoked by smokers. The first equation was a logistic equation which estimates the probability that women and men smoked. In the second equation, multiple linear regression was used to estimate the amount smoked for the sub population which does smoke. Since the quantity smoked is skewed, its logarithmic transformation was used as the dependent variable (Hu et al., 1995).

RESULTS

SMOKING BEHAVIOR FROM 1978-1995

Smoking prevalence

Smoking prevalence has been declining in all three provinces from 1978 to 1995 (Figure 2). The highest prevalence of smoking was found among Quebec men, and the lowest prevalence was observed among British Columbia women. Quebec women had the highest prevalence compared to Ontario and British Columbia women.

Results show that men usually smoke more than women. In British Columbia, however, smoking prevalence did not significantly vary according to sex except in 1978-1979.

Amount smoked

Survey data also showed a general decrease in the level of tobacco consumption of current smokers, aged 15 and over, from 1978 to 1994-1995. However, important variations in the average number of cigarettes smoked per day in each province during that time period showed up (Figure 3).

The average daily consumption of cigarettes is generally higher among men than among women. From 1978 to 1996-1997, the largest decrease in the average number of cigarettes smoked by men was in British Columbia (20%) compared to 12.3% in Ontario and 5.6% in Quebec. Among women, the largest decrease is found in Ontario and British Columbia (11.6% and 11.9%) compared to 5.4% in Quebec.
EVOLUTION OF CIGARETTES PRICES

As part of the federal government’s comprehensive strategy to reduce tobacco smoking in Canada and to raise additional revenues, Parliament has approved several significant tax increases since 1985. Figure 4 shows the constant increase of cigarette prices in Quebec, Ontario and British Columbia from 1985 to 1991. It also illustrates the decrease in cigarette prices from 1991 to 1994 in Quebec and Ontario but the constant increase in British Columbia during the same period. These decreases and increases correspond to the match of deep federal taxes cuts by some provinces such as Ontario and Quebec to curb smuggling and the opposition to match the federal cuts by other provinces such as British Columbia. The federal tax on a carton of 200 cigarettes was reduced by $5.00, and the federal government was matching, on a province-to-province basis, provincial tax decreases up to a maximum of $5.00 for a total possible federal reduction of $10.00 per carton (Cunningham, 1996).

The largest reduction was observed in Quebec (75%) followed by Ontario (69%). Quebec reduced its taxes by $11.00 per carton, bringing the total federal-provincial tobacco-tax reduction in the province to $21 (Cunningham, 1996). Quebec and Ontario raised again their taxes in 1995 as showed in Figure 3, respectively by 13% and 16%.

EVOLUTION OF TOBACCO CONTROL LEGISLATION

Most of the action in the protection of non-smokers has been at the municipal level, from 1978 to 1995. British Columbia was the province with the highest population coverage with comprehensive and restrictive no-smoking bylaws and Quebec had the lowest population coverage (Dedobbeleer et al., 2001).

Smoking was restricted to designated areas in federal public service workplaces beginning October 1987. Results suggest that by 1988 there was a good coverage with comprehensive and restrictive federal no-smoking laws (Dedobbeleer et al., 2001).

If Quebec and Ontario had provincial laws restricting smoking in public places from 1978 to 1994-1995, British Columbia did not. Results suggest that the coverage with a comprehensive and restrictive law stayed minimal in Quebec and changed from minimal to fair in Ontario (Dedobbeleer et al., 2001).

In 1908, the Tobacco Restraint Act prohibited in Canada the sale of tobacco to persons under 16, and prohibited such persons from purchasing or possessing tobacco. The Act was rarely enforced, even though it was the sole federal law on tobacco for over 80 years (National Clearinghouse on Tobacco and Health, 1995). Bill C-111, the Tobacco Sales to Young Persons Act came into force in 1994, raised the minimum age for purchasing tobacco products to 18 and furnished minimum national standards. From 1978 to 1994, results indicate that the coverage with comprehensive and restrictive federal youth access to tobacco laws raised from 18% to 29% (Dedobbeleer et al., 2001).

In Quebec, no legislation existed to control tobacco sales to minors from 1978 to 1994-1995. In 1970, the Minors Protection Act took effect in Ontario. It prohibited a person from selling or supplying tobacco in any form to a person who is under eighteen years of age.
age. The Ontario Tobacco Control Act took effect in 1994. It raised the legal age for purchasing tobacco products to 19, banned the sale of so-called kiddie-packs (packs containing fewer than 20 cigarettes), banned the sale of tobacco products in pharmacies or through vending machines, and complemented other aspects of the Ontario Government's tobacco strategy. From 1978 to 1994, results indicate that the coverage with comprehensive and restrictive youth access to tobacco laws raised from 13% to 53% (Dedobbeleer et al., 2001).

The British Columbia Tobacco Sales Act passed in 1992. The Tobacco Sales Regulation was introduced in 1994 and an amendment to the Tobacco Sales Act came into force in 1995. It prohibits a person to sell, offer for sale, distribute, advertise or promote the use of tobacco to a person under the age of 19. The coverage with comprehensive and restrictive youth access to tobacco laws in British Columbia increased from 36% in 1978 to 47% in 1995 (Dedobbeleer et al., 2001).

EVOLUTION OF NEWSPAPERS ARTICLES
From 1995 articles retrieved on tobacco, cigarettes and nicotine for the years the surveys were conducted, we sampled 1494 articles corresponding to the year preceding the end of each survey. The number of articles increased substantially in the three provinces but more strikingly in Quebec and Ontario (Figure 5), from 1990 to 1995 (Dedobbeleer et al., 2001).

MULTIVARIATE ANALYSES
Independent variables were introduced in two steps. First, the intrapersonal and interpersonal variables were examined. All the variables were simultaneously considered and were found statistically significant at the 0.05 level. Second, contextual variables were considered, and intrapersonal and interpersonal variables were entered as controls in the regression equations for contextual variables. However, collinearity proved to be a problem in the multivariate analysis when regulatory variables at the federal, provincial and municipal levels, newspaper coverage, and prices were simultaneously introduced in the regression equations. In consequence, contextual variables were considered on a one-by-one basis in different regression equations. We ran separate regressions for men and women. The SPSS package (SPSS 10.5) was used. The results reported in the tables represent the best-fit models.

Relative influence of intrapersonal, interpersonal and social factors
Decision to smoke
As regards the decision to smoke measured by smoking prevalence, we first considered the effect of intrapersonal, interpersonal and social factors such as provincial unemployment rates and the province of residence (Table 1). Results showed that increasing age, increasing education and speaking another language than English and French decreased significantly smoking prevalence among women and men. Increasing number of people in the household also significantly decreased smoking prevalence among women and men. Increasing provincial unemployment rates significantly decreased smoking prevalence among men and women's smoking prevalence. Within this model, the Quebec provincial dummy variable was significant in increasing smoking
prevalence among women and men whereas the Ontario provincial dummy significantly increased men smoking prevalence.

**Amount smoked**

As regards the amount of cigarettes smoked (Table 1), increasing age significantly increased consumption of tobacco among women and men. On the other hand, increasing education and speaking another language than French or English had an impact by decreasing the amount of cigarettes smoked by women and men. Increasing number of people in the household and provincial unemployment rates also significantly decreased the amount smoked but only among women. The Quebec provincial dummy variable led to a significant increase in the amount smoked by women and men. The Ontario provincial dummy variable decreased significantly the number of cigarettes smoked by men but not women’s amount smoked. The variables entered into the model only explained 3% of the variance in men’s cigarettes smoking ($R^2 = .031, F=19.3, p< .0001$) and 2% in women’s cigarettes smoking ($R^2 = .022, F=20.5, p< .0001$).

**Relative influence of cigarettes prices**

**Decision to smoke**

Table 1 indicates that women were price insensitive in terms of their smoking prevalence as the price variable did not achieve statistical significance at the 0.05 level after controlling for intrapersonal, interpersonal and social factors. On the other hand, the smoking prevalence in men was sensitive to price.
Federal no-smoking laws

Decision to smoke

After controlling for intrapersonal, interpersonal and social factors, men and women's smoking prevalence were decreased significantly by federal no-smoking laws (Table 1).

Quantity of cigarettes smoked

Results of the linear multiple regression (Table 1) show that increased coverage with comprehensive and restrictive federal no-smoking laws decreased significantly men's amount of cigarettes smoked but not women's amount of cigarettes smoked after controlling for personal, interpersonal and social factors. The variables in the model explained again a very small percentage of the variance in cigarette consumption (i.e. $R^2=0.028, F=33.3, p<.0001$ for women and $R^2=0.023, F=25, p<.0001$ for men).

Municipal no-smoking bylaws

Decision to smoke

Men and women's smoking prevalence were both significantly influenced by no-smoking municipal bylaws (Table 1). Results showed that, after controlling for personal, interpersonal and social factors, increasing population coverage with comprehensive and restrictive no-smoking municipal bylaws decreased the likelihood of smoking among women and men.

Quantity of cigarettes smoked

After controlling for personal, interpersonal and social factors, no-smoking municipal bylaws decreased significantly men's cigarette consumption (Table 1) but had no impact on women's cigarette consumption. The retained variables in the model explained only 2% of the variance in men's cigarette consumption ($R^2=0.028, F=33.7, p<.0001$).

Relative influence of legislation on youth access to tobacco

Provincial legislation on youth access to tobacco

Only men's smoking prevalence was significantly influenced by provincial legislation on youth access to tobacco after controlling for personal, interpersonal and social factors.

Federal legislation on youth access to tobacco

Federal legislation on youth access to tobacco was significantly associated with a lower probability of being a smoker and a higher amount of cigarettes smoked among men (Table 1). Women's smoking prevalence and tobacco consumption were not sensitive to coverage with comprehensive and restrictive federal legislation on youth access to tobacco. The retained variables in the model explained only 3% of the variance in men's cigarette consumption ($R^2=0.028, F=32.9, p<.0001$).

Relative influence of newspaper coverage of tobacco issues

Increasing newspaper coverage of tobacco issues was associated with a lower smoking prevalence among women and men (Table 1). Men and women cigarette consumption were, however, not significantly influenced by newspaper coverage.
DISCUSSION

The results of this study indicate that the price of cigarettes appears to have no effect on either the decision to smoke or the amount smoked in women in three Canadian provinces. However, prices have an effect on men’s use of tobacco. The dynamics of smoking in men and women would thus appear to differ with regards to the price effect.

Other studies have reported differences in men and women in response to the price effect. Other studies have reported differences in men and women in response to the price effect. A number of American studies (Chaloupka and Pacula 1999; Lewis and Coates 1982; Mullahy 1985) have reported that men are more responsive to price than women among young adults, whereas other studies carried out in the UK. (Boren and Sutton 1992; Townsend et al, 1994) have reported that women are more responsive to price than men.

Graham (in Ettore, 1992) earlier found that smoking for women functions as a necessity and a luxury when material and human resources are limited. As a necessity, smoking is seen as a way of coping with stress, motherhood and women’s experience of poverty. As a luxury, it becomes a woman’s real taking of space for herself. Because of women’s preoccupations with weight (Chapman Walsh et al., 1995), stress and anxiety (Waldron, 1991), women might thus continue to smoke even in the face of the highest tax increases (Health Canada, 1995).

When the impact of tobacco control legislation was examined, coverage with more comprehensive and restrictive federal, provincial and municipal no-smoking legislation appeared to influence negatively both men’s decision to smoke and quantity of cigarettes smoked but only women’s decision to smoke. Quantity smoked by women was not found to be significantly affected by no-smoking legislation. Further, more comprehensive and restrictive provincial and federal youth access to tobacco legislation did decrease significantly men’s decision to smoke even if adults were not the main target of this legislation. Decision to smoke and quantity of cigarettes smoked by women were not influenced by youth access to tobacco legislation.

Results obtained in previous studies showed the influence of no-smoking legislation on smoking in adults. Stephens et al (1997) found that Canadian smoking status in the general population was significantly related to the coverage of no-smoking bylaws in 1991, and was even a more important determinant of smoking status than price in 1990. Our study went further by taking into account the strength of the municipal no-smoking bylaws, by studying their influence over a longer period of time and by examining the provincial and federal no-smoking laws as well as the municipal bylaws in Canada.

Several other studies showed that more restrictive clean indoor air laws had an impact on smoking measured by cigarettes sales or prevalence (Emont et al., 1992; Evans et al., 1996; Oehfildt et al., 1998 in U.S. Department of Health and Human Services, 2000; Yurekli and Zhang, 2000). There is, however, to our knowledge no information concerning the different responses of various social groups in the adult population to specific legislative measures.

A measure of the synergy between all these laws at all levels of government jurisdiction seems important as it would better capture the effect of legislative anti-smoking action. It may well be that laws, whether federal, provincial or municipal which were each
considered separately in this study, in fact are not experienced as separate by those whom they are intended to affect. Thus for the ordinary person, who is considering smoking, a law is a law without regard to whether it is a federal, provincial or municipal law that tells him or her that they cannot smoke in a restaurant, a hospital, or an office.

The influence of newspapers articles on tobacco issues influenced women and men’s smoking prevalence but not the amount of cigarettes smoked. Chapman (1999) noted the importance of quantifying and accounting for unpaid media coverage of tobacco issues as it is a largely “unresearched” area in tobacco control. There is already some evidence that news media can be effective in promoting smoking cessation (Hu et al, 1995).

Laugesen and Meads (1991) showed that weekly purchases of tobacco were significantly related to the weekly number of news stories about tobacco in New Zealand but the effect was short-lived. Reid et al. (1992 in Chapman, 1999) indicated that coverage of smoking in the news media was the main cause of the 30% decline in smoking prevalence among British males in the 20 years after the publication of the first report on smoking and health by the Royal College of Physicians of London in 1962.

Other predictors of women and men’s smoking behaviour further indicate that smoking behaviour varies according to a specific social context: cultural and economical. Speaking a language other than French or English was a predictor of decision not to smoke and of a low amount of cigarettes smoked. This confirms results found by the National Clearinghouse on Tobacco and Health (1993) which found that 70% of foreign-born women have never smoked, compared to 46% of Canadian-born women. The lowest smoking rates were found among residents of Asian origin (10%) and the highest among residents of French and Ukrainian origin (26%).

Provincial unemployment rates were influential. Among women, it was influential on the quantity of cigarettes smoked but among men only on the decision to smoke. Unemployment rates decreased smoking prevalence and amount of cigarettes smoked. A decrease in income might have led women to decrease the amount of cigarettes smoked as men, might have stopped or not initiated smoking because of loss of income. Chapman Walsh (1995) reported, on the contrary, that recession affected women and increased women’s smoking behaviour. Marsh and McKay (1994) argued, on the other hand, that women in low income families have the most intractably high prevalence of smoking. Results suggest that women might reduce the number of their cigarettes and get the most out of those they smoke (Health Canada, 1995).

The total social environment where people live affects smoking behaviour. Living in Quebec was associated with an increase of smoking prevalence and amount smoked in women and men whereas living in Ontario (compared to British Columbia) had a mixed effect. It was related to an increase in smoking prevalence and decrease in amount smoked among men and had no effect on women. The more global social context is thus an important predictor of smoking behaviour. It influences how people will be reacting to tobacco control interventions. Price changes may have different meanings for men in Quebec and Ontario than in British Columbia. It may well be that a general anti-tobacco ethos existed in British Columbia and that it operated through different mechanisms more
prevalent and stronger than in Quebec and Ontario through, for instance, restrictions of smoking in public places, restrictions on youth access to tobacco, and restrictions or banning of tobacco advertising and promotion, and health warnings. Compared to Quebec and Ontario, British Columbia had the highest population coverage with comprehensive and restrictive municipal no-smoking bylaws from 1978 to 1995. British Columbia did not regulate smoking, but Quebec and Ontario provincial no-smoking regulations were mostly minimally comprehensive and restrictive. Also, Quebec had no legislation on youth access to tobacco from 1978 to 1995, while Ontario and British Columbia did. Moreover, if British Columbia had advertising/promotion and public health education (health warnings) laws, Quebec and Ontario did not.

The impact of social factors seemed to vary as a function of some individual and interpersonal factors included in the models. These factors were determinant in men and women's cigarette smoking. Increasing age was related to a decrease in men's and women's decision to smoke and an increasing amount of cigarettes smoked. These trends are found in the latest 1999 Canadian Tobacco Use Monitoring Survey which is not included in our study. An increasing number of people in the household also decreased the prevalence of smoking and amount of cigarettes smoked (except for men's amount of cigarettes smoked). It is not clear to what extent household size is a measure of psychological support or instrumental/financial assistance in case of need or whether it may correspond to increased family pressures to stop smoking. It is known, however, that those who are separated and divorced are more likely to be current smokers (Health Canada, 1993b).

We must note some limits of this study. First, we experienced major problems with availability and use of some significant predictors of smoking in the data set. Data on individual sociopsychological factors were either not available overtime or not measured through questions with similar wording in the nine surveys. Stress, however, was proxied indirectly through such possible stressors as level of provincial unemployment or household size. Data on individual health behaviours that affect smoking behaviour had to be omitted due to the large number of cases with missing values. Similarly, data on individual socio-economic characteristics (e.g., family income, occupational status) had to be omitted due to the large number of cases with missing values. Data on social factors are also limited. These data are taken from different sources and are not always available. Over-time provincial data on tobacco industry advertising expenditures, governmental anti-tobacco activities, municipal data on tobacco control legislation are usually not available. Data on prices of cigarettes were only available for five points in time from 1985 to 1995. Systematic monitoring of tobacco control activities in Canada would thus be needed for a full evaluation of their impact.

Second, another difficulty was the quantification of tobacco control activities. Federal, provincial and municipal legislation relating to tobacco were measured through a weighted index in terms of their comprehensiveness and restrictiveness after content analysis from 1978 to 1995. All the ratings were mostly guided by existing American rating systems. We reduced part of the variance by aggregating at the provincial level, those data on municipal no-smoking bylaws as well as by using data from the survey of
the municipalities (Optima Consultants, 1995) which did not provide information on the type of amendments made in the laws over time. Additional work needs to go into the construction of the tobacco control policies indexes to ensure that they are valid and reliable measures of the tobacco control activities.

Third, the inclusion of highly correlated indicators of various aspects of policies related to smoking in public places, youth access, price and other tobacco control activities made it very difficult to evaluate the impact of these alternative approaches to reduce smoking.

Fourth, we should keep in mind when interpreting the data that the tobacco legislation measured in this study only measures the existence of the policy and not its actual enforcement in each province or municipality. There is evidence suggesting that it is the enforcement of those policies and not the policies themselves that change behaviour (Chaloupka et Grossman, 1996 in U.S. Department of Health and Human Services, 2000; Wasserman et al., 1991; Jason et al., 1991). Quebec is an important producer of tobacco and consumer of tobacco. As tobacco has been considered to be an important factor in the economy of the province and of the city of Montreal (Goss Gilroy, 1997), it is not surprising to find that compliance with these laws is very low in Quebec according to Nielsen reports (28.8% in the case of tobacco sellers). Results found by the Tobacco Bureau of Health Canada already showed that Francophones are more permissive about second-hand smoke (DSTJ Consultation, 1996). We should also not neglect inherent differences between the Canadian, Quebec and American legal and enforcement systems and, possibly, differences in the subjective experience that persons living in these two countries have within their respective legal systems. Measures of the comprehensiveness and restrictiveness of policy inputs would thus need to include measures of actual enforcement.

Fifth, we have to acknowledge the poor performance of our models. The level of significance of the coefficients are very sensitive to the large size of the samples. The poor performance of our models at explaining the shifts in smoking prevalence and amount smoked among women and men may also be explained by variables not included in our models, particularly by those for which we had incomplete data (e.g., occupation, income). When variables are omitted, the effect of the omitted variables is mathematically pushed onto the remaining variables so that the effect of the variables included in the equation is modified to account for what would have been the effect of the missing variables. The apparent effect of the remaining variables may be increased, decreased and, in some cases, the sign on their coefficients may change.

It is also possible that a somewhat modified research design including the use of a quasi-panel design with each province forming a quasi-panel consisting of the sequence of years may be more sensitive to capturing the effect of individual and social factors. It would also be important to measure over time individuals’ exposure to laws and media and perceptions of tobacco taxation, laws and media in addition to have measures of laws and media issued from official documents.
In addition, future work would need to be done to clarify the interrelationships between social drivers of smoking such as price, laws and media, and the relationships between these and intrapersonal, interpersonal and other social factors. One interesting question that arises from this study is the extent to which the different social drivers of a health behaviour such as smoking work in concert to effect change. In particular, it would be interesting to determine to what extent price and especially laws and media support each other in terms of the overall message it sends to the public about smoking behaviour. The timing of the introduction of the different social drivers of smoking behaviour would need to be further examined to determine for example if there are consistencies in terms of content and timing of the messages and meta-messages given directly and indirectly respectively, by changes in price or laws and media stories intended to improve the health behaviour of the population. Chaloupka (1999) already suggested the need of more interdisciplinary research in improving our understanding of the impact of macro-social influences on smoking behaviour.

Results also suggest that there is no simple and "one-size fits all" strategy for discouraging smoking. As differences were observed in the responsiveness of men and women to tobacco control policies, policymakers and practitioners need to keep in mind that tobacco control policies have to be tailored to the broader context of women and men's lives. The Priority Women and Smoking Project (Centre for Health Promotion and Atlantic Health Promotion Research Centre, 1995) already indicated that many priority women feel further marginalized by current approaches to tobacco control (e.g. increased taxes, smoking restrictions, anti-smoking messages). The social and cultural context of each province should also be taken into account when determining measures to deter people from smoking and help people to quit smoking. To enhance the effectiveness of tobacco control policies, raising tobacco taxation and increasing the comprehensiveness and restrictiveness of tobacco control legislation should be considered in concert with more global measures that provide support for health, housing, employment and child care.
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REFERENCES


Centre for Health Promotion and Atlantic Health Promotion Research Centre (1995). Bulletin, Centre for Health Promotion, University of Toronto (November).


Health Canada (1999). *Canadian Tobacco Use Monitoring Survey- Wave 1*. Ottawa, Canada: Cancer Bureau, Laboratory Centre for Disease Control, February-June.


Minors Protection Act, Provincial Penalties Adjustment, S.O.1989, c.72.


Tobacco Control Act, S.O.1994, c.10.


Tobacco Sales to Young Persons Act, S.C. 1993, c.5.


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**Note:** For the table, S.E. stands for Standard Error, EXP(B) stands for the exponentiated coefficient, and p for the p-value. The table compares the effects of various factors on smoking status and amount smoked for women and men, with significant differences highlighted. The interpretation of the coefficients and their significance levels (p-values) is crucial for understanding the impact of each factor.
Figure 1
The Society and Health Model on Smoking

EXTERNAL ENVIRONMENT

COMMUNITY

SUB-SYSTEMS

WOMEN

Age
Language
Education
Marital status
Occupation status
Income
Alcohol consumption
Exercise
Life changes
Obesity
Stress
Self-esteem
Self-efficacy
Type of Area

Peer Pressures

Advocacy / grass roots groups

Media**

Tax-induced prices of cigarettes**

Health care organisations

Government and public health institutions

Consumer associations

Spouse Support

Social Support

Friends

Family Pressures*

Teachers associations

Business associations

Insurance companies

Tobacco companies

Law and regulations**

State of the economy**

*available in the selected surveys
** data collected in this study

Figure 2. Smoking Prevalence by Sex and Province (1978-1996)

Surveys Name and Year

% current smokers


Quebec M
Ontario M
BC M
Quebec F
Ontario F
BC F

CHS78-79
CP81
HPSS85
CP88
HPSS90
QSS91
NPHS94-95
NPHS96-97
Figure 3. Amount Smoked per Day by Sex and Province (1978-1996)

Figure 4. Average Prices for 200 Cigarettes by Province (1985-1996)
### The Social Context of Smoking Behavior

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