

Taxation Policies to Reduce Tobacco Consumption in Canada.

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In 1989, approximately one third of Canadians over 15 years of age were cigarette smokers. Studies by the Royal College of Physicians of London and the US Surgeon General have clearly demonstrated the negative impact of smoking on health and have established smoking as a risk factor for cardiovascular disease, cancer and respiratory problems. It has been estimated that at least 38 000 Canadians die each year from smoking-related diseases. There are many approaches to combat tobacco consumption which include education, smoking cessation programs and legislation. Between 1980 and 1990, Canada imposed heavy taxation on tobacco products that resulted in a 35% decrease in tobacco consumption by the adult population and a 62% decrease in consumption by the teenage population. However, in the past two years smuggling has forced federal and provincial governments to reduce these high taxes on tobacco products. It has been estimated that the recent tax cuts will increase the number of smokers by approximately 800 000. Therefore, a new taxation policy should be introduced which differs from the previous tax in some key aspects. Any new tax increase should be moderate to help avoid the problem of tobacco smuggling and a portion of the tax should be directed to fund smoking cessation programs.

INTRODUCTION

Smoking- A major health problem in Canada

In 1989, approximately 6.5 million Canadians, or 32% of the population 15 years of age or over, were cigarette smokers (1). More than 38 000 Canadians die each year of diseases associated with the consumption of tobacco (2). Landmark studies by the Royal College of Physicians of London in 1962 and the United States Surgeon General in 1964 established that smoking is detrimental to health (3). Further studies clearly established smoking as a risk factor for cardiovascular disease (4), cancer (5) and respiratory problems (6). In addition, the life-expectancy of a person who smokes two packs per day is about eight years less than a non-smoker (7). However, the dangers of smoking have largely been ignored by the public as evidenced by the high percentage of

smokers in Canada. Since smoking is arguably the largest avoidable cause of death in Canada, health strategies aimed at reducing smoking are appropriate. In the past taxation policies have been used successfully to reduce smoking in Canada, however, recent cutbacks in cigarette taxes have threatened to reverse these trends.

Canada's tobacco taxation crisis

Canada increased tobacco taxes eight-fold between 1980 and 1990 which resulted in a 35% decrease in tobacco consumption by the adult population and a 62% decrease in consumption by the teenage population (8). In February of 1994 the Federal government dropped taxes by five dollars per carton to discourage smuggling from regions with lower taxation policies (9). This decision was encouraged by pressure from tobacco companies and retailers who sell tobacco products. The federal government also offered an incentive program for provincial governments to lower taxes by matching any provincial tax decrease dollar for dollar up to five dollars per carton. The Quebec pro

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vincial government quickly signed on, cutting its cigarette taxes which intensified the smuggling problem in Ontario. This prompted the Ontario provincial government to reduce its taxes by \$9.60 per carton. This "domino effect" eventually reached the east coast affecting taxation policies in the Maritime provinces. These taxation cuts have sent waves through the medical community due to the profound detrimental effect these policies will have on the health of Canadians. It has been estimated that these taxation cuts will lead to an increase in the number of smokers by approximately 800,000, of which 20% will be teenagers (10). Therefore, it is imperative that the government reintroduce tougher tobacco taxation policies to prevent this potential health disaster. However, the structure of these new taxation policies should be slightly different from those introduced between 1980 and 1990.

INTERVENTION STRATEGIES AND POTENTIAL IMPACT

Legislation as an intervention strategy for smoking

Many different approaches can be used to deal with the problem of smoking. These include education through health care workers, formal schooling and community programs that aim to prevent people from starting smoking and encourage smokers to quit. Educational tactics are necessary measures to reduce tobacco consumption, but are not sufficient to deal with the problem of smoking. More stringent government regulation of the tobacco industry is justified because smoking is such a serious health hazard. The importance of government regulation in dealing with health problems was emphasized by Sir George Young at the thirty-first world health assembly when he stated: "...the solution to many of today's medical problems will not be found in the research laboratories of our hospitals, but in our parliaments. For the prospective patient, the answer may not be cure by incision at the operating table, but prevention by decision at the Cabinet table." (7) This statement brings out the importance of government regulation as an essential component of population health strategies. Another benefit of legislation as an intervention for smoking is that it places the authority of the government behind the entire smoking control program. It gives a stimulus to all the components of the program and can enhance the impact of other related interventions such as health education programs.

Taxation as an effective intervention for smoking

Governmental regulation of the tobacco industry as a form of intervention can have many approaches including advertisement regulations, restriction on sales to minors and tobacco taxes. Of these regulations, taxation has a profound effect on tobacco consumption and preferentially reduces smoking in younger people. The changes in consumption resulting from a price increase

can be described by a term called price elasticity. For cigarettes, the price elasticity value determined from several studies is approximately -0.4 which means that an increase of 10% in price will yield a 4% decrease in tobacco consumption (11-13).

Table 1 shows price elasticity values for different age categories and reveals a large difference between younger and older age groups (13). Note that there is a tremendous decrease in consumption with increasing tobacco price for ages 12-17 (price elasticity = -1.40). It has been demonstrated that many people begin smoking between the ages of 12 and 17 (14). Therefore, this age range is a prime target for an intervention to eliminate the smoking habit before it begins.

Taxation strategies to deal with smuggling

Table 1: Age-specific estimates of the price elasticity on demand for cigarettes (Adapted from Ref. 13)

Age group	Price elasticity
12-17	-1.40
26-35	-0.47
36-74	-0.45

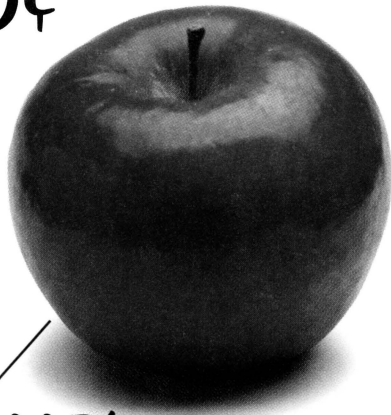
A successful taxation policy will have to be consistent across the country to reduce interprovincial smuggling. The importance of this type of policy is highlighted by Quebec's decision to drop taxes which resulted in a tremendous influx of contraband cigarettes into Ontario. In addition, US tobacco taxation policies will have to be considered to avoid further smuggling problems. With the current focus on free trade between Canada and the United States, some form of tax equity between the two countries might not be an impossible dream. However, in the short term it would be very difficult to achieve consistent taxation policies in both Canada and the United States. Therefore, increases in Canadian tobacco taxes should be accompanied by increased policing of the Canadian border. It must not be forgotten that the previous taxation strategy implemented between 1980 and 1990 failed primarily due to a large increase in the smuggling of tobacco products. Therefore, any future increase in tobacco taxes would have to be done incrementally while monitoring levels of cigarette smuggling.

Taxation strategies to deal with addicted smokers

Taxes can be designed to result in a general or differential increase in price on a particular product class. A general tobacco tax would apply equally to all tobacco products while a differential tax would be reduced for certain types of tobacco products. For example, a differential tax could favor brands with low nicotine.

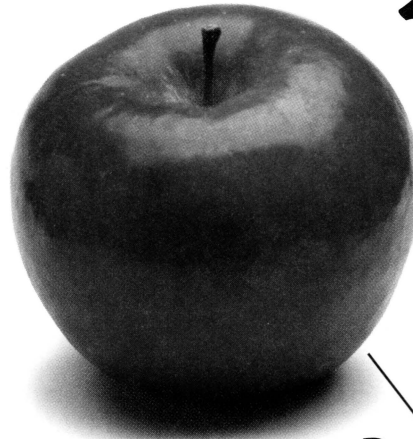
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† response rates based on seated DBP were 76% vs. 75% at 6 weeks for Renedil® (5-10 mg/d) and amlodipine (5-10 mg/d) respectively (n=118)

†† sitting SBP/DBP reductions at 12 weeks: Renedil® 5-10 mg/d (-14/-12); nifedipine 30-90 mg/d (-16/-13) n=203

‡ Based on prices in the Ontario Drug Benefit Formulary, rev'd Sept. 5, 1996. Acquisition cost/month: Renedil®, 5-10 mg/d (\$19.80 - \$29.68); Norvasc™, 5-10 mg/d (\$38.40 - \$57.00), Adalat® XL, 60-90 mg/d (\$43.80 - \$71.70). Excludes dispensing fees.

1. Koenig, W. Drug Invest. 5(4):200-205, 1993. 2. Fagan, T.C. et al. Clin. Ther. 16(4):633-646, 1994.

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Contraindications: 1) Known hypersensitivity to felodipine or other compounds of the dihydropyridine class. 2) Women of childbearing potential, in pregnancy, and during lactation. Fetal malformations and adverse effects on pregnancy have been reported in animals. **Teratogenic Effects:** Studies in pregnant rabbits administered from 0.4 to 4 times the maximum recommended human dose on a mg/m² basis showed digital anomalies consisting of reduction in size and degree of ossification of the terminal phalanges in the fetuses. The frequency and severity of the changes appeared dose-related and were noted even at the lowest dose. These changes have been shown to occur with other members of the dihydropyridine class. Similar fetal anomalies were not observed in rats given felodipine. In a teratology study in cynomolgus monkeys, no reduction in the size of the terminal phalanges was observed but an abnormal position of the distal phalanges was noted in about 40 percent of the fetuses. **Non-teratogenic Effects:** In a study on fertility and general reproductive performance in rats, prolongation of parturition with difficult labour and an increased frequency of fetal and early postnatal deaths were observed in the groups treated with doses of 9.6 mg/kg/day and above. Significant enlargement of the mammary glands in excess of the normal enlargement for pregnant rabbits was found with doses greater than or equal to 1.2 mg/kg/day. This effect occurred only in pregnant rabbits and regressed during lactation. Similar changes in the mammary glands were not observed in rats or monkeys.

Warnings: Congestive Heart Failure: The safety and efficacy of RENEDIL (felodipine) in patients with heart failure have not been established. Caution should be exercised when using RENEDIL in hypertensive patients with compromised ventricular function, particularly in combination with a beta-blocker. Acute hemodynamic studies in a small number of patients with New York Heart Association Class II or III heart failure treated with felodipine have not demonstrated negative inotropic effects. **Hypotension, Myocardial Ischaemia:** RENEDIL may, occasionally, precipitate symptomatic hypotension and rarely syncope. It may lead to reflex tachycardia which, particularly in patients with severe obstructive coronary artery disease, may result in myocardial ischaemia. Careful monitoring of blood pressure during the initial administration and titration of felodipine is recommended. Care should be taken to avoid hypotension especially in patients with a history of cerebrovascular insufficiency, and in those taking medications known to lower blood pressure. **Beta-Blocker Withdrawal:** RENEDIL gives no protection against the dangers of abrupt beta-blocker withdrawal. Any such withdrawal should be a gradual reduction of the dose of beta-blockers. **Outflow Obstruction:** RENEDIL

should be used with caution in the presence of fixed left ventricular outflow obstruction. **Precautions: Peripheral edema:** Mild to moderate peripheral edema was the most common adverse event in the clinical trials. The incidence of peripheral edema was dose-dependent. Frequency of peripheral edema ranged from about 10 percent in patients under 50 years of age taking 5 mg daily to about 30 percent in those over 60 years of age taking 20 mg daily. This adverse effect generally occurs within 2-3 weeks of the initiation of treatment. Care should be taken to differentiate this peripheral edema from the effects of increasing left ventricular dysfunction. **Elderly Patients or Patients with Impaired Liver Function:** Patients over 65 years of age as well as patients with impaired liver function may have elevated plasma concentrations of felodipine and, therefore, may require lower doses of RENEDIL. These patients should have their blood pressure monitored closely during the initial administration and dosage adjustment of RENEDIL, and should rarely require doses above 10 mg per day. **Gingival Hyperplasia:** RENEDIL can induce gingival enlargement in patients with pronounced gingivitis and parodontitis. However, such changes may be reversed by measures of good oral hygiene and mechanical debridement of the teeth.

Pregnancy and Lactation: See CONTRAINDICATIONS.

Use in children: RENEDIL is not recommended in children since the safety and efficacy in children have not been established.

Drug Interactions: Beta-Adrenoceptor Blocking Agents: A pharmacokinetic study of felodipine in conjunction with metoprolol demonstrated no significant effects on the pharmacokinetics of felodipine. The AUC and C_{max} of metoprolol, however, were increased approximately 31 to 36 percent, respectively. In controlled clinical trials, however, beta-blockers including metoprolol were concurrently administered with felodipine and were well tolerated. **Digoxin:** When given concomitantly with felodipine as conventional tablets the peak plasma concentration of digoxin was significantly increased. With the extended release formulation of felodipine there was no significant change in peak plasma levels or AUC of digoxin. **Cimetidine:** In healthy volunteers pharmacokinetic studies showed an approximately 50 percent increase in the area under the felodipine plasma concentration time curve (AUC) as well as the C_{max} of felodipine when given concomitantly with cimetidine. It is anticipated that a clinically significant interaction may occur in some hypertensive patients. Therefore, it is recommended that low doses of RENEDIL be used when given concomitantly with cimetidine. **Erythromycin:** Concomitant treatment with erythromycin has been shown to cause an increase in felodipine plasma levels. **Phenylethanolamine and phenobarbital:** In a pharmacokinetic study maximum plasma concentrations of felodipine were considerably lower in epileptic patients on long term anticonvulsant therapy (phenytoin, carbamazepine, phenobarbital) than in healthy volunteers. The mean area under the felodipine plasma concentration-time curve was also reduced in epileptic patients to approximately 6% of that observed in healthy volunteers. Since a clinically significant interaction may be anticipated, alternative antihypertensive therapy should be considered in these patients. **Interaction with Grapefruit Juice:** Published data show that through inhibition of cytochrome P-450, flavonoids present in grapefruit juice increase the plasma levels of felodipine, and thus can augment its pharmacodynamic effects (see FULL PRODUCT MONOGRAPH). Therefore, the administration of felodipine with grapefruit juice should be avoided. **Other Concomitant Therapy:** In healthy subjects there were no clinically significant interactions when felodipine was given concomitantly with indomethacin or spironolactone.

Adverse Reactions: In 1102 patients treated with felodipine, either alone or in combination with other antihypertensive agents, adverse events were reported in 52% of patients and caused discontinuation of therapy in 9%. The most common adverse events (incidence of at least 1%) were: peripheral

edema (21.3%), headache (14.9%), feeling of warmth/flush (13.2%), dizziness/vertigo (4.6%), fatigue (2.4%), palpitation (1.6%), extrasystoles (1.5%), nausea (1.5%), pain (1.5%), paraesthesia (1.2%), chest pain (1.1%).

Most of the adverse events were of mild to moderate severity, and, with the exception of peripheral edema, transient.

Incidence (%) of peripheral edema, headache and feeling of warmth/flush reported in clinical trials (some patients were randomized to dose, others were dose titrated):

	5 mg (n=342)	10 mg (n=638)	20 mg (n=425)	TOTAL (n=1102)
Peripheral edema	8.2	15.5	25.2	21.4
Headache	8.8	14.6	9.6	14.9
Feeling of warmth/flush	7.0	12.4	10.1	13.2

In addition, the following events were judged serious and reported with an incidence of less than 1 percent: angina pectoris, myocardial infarction, atrial fibrillation, brain stem disorder, abnormal hepatic function.

Dosage and administration: RENEDIL (felodipine) should be swallowed whole and not crushed or chewed. The dose should be adjusted individually according to patient response. Recommended initial dose: 5 mg once daily. The 2.5 mg tablet is available for dose titration purposes. Usual maintenance dosage range: 5-10 mg once daily. Dose adjustment, if necessary, should be done at intervals of not less than two weeks. Maximum recommended daily dose: 20 mg once a day. In clinical trials, 20 mg once daily showed an increased blood pressure response but also a large increase in the rate of peripheral edema and other vasodilatory adverse events.

Modification of the recommended dosage is usually not required in patients with renal impairment. **Elderly or Patients with Impaired Liver Function:** Patients over 65 years of age or patients with impaired liver function may have elevated plasma concentrations of felodipine. In these patients, an initial treatment of 2.5 mg daily should be considered. In general, doses above 10 mg should not be considered in these patients.

Availability: RENEDIL 2.5 mg: yellow, circular, biconvex, film-coated tablet, engraved H/FF on one side. RENEDIL 5 mg: pink, circular, biconvex film-coated tablet, engraved H/FC on one side. RENEDIL 10 mg: red-brown, circular, biconvex film-coated tablet, engraved H/FD on one side. In compliance blister packages (30 tablets). **NOTE:** These extended release tablets must not be divided, crushed or chewed.

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Differential taxation is a useful means of encouraging addicted smokers to purchase less addictive cigarettes. Many smokers cannot quit because of an addiction to nicotine that is present in the cigarettes (15,16). A differential tax would encourage these individuals to smoke cigarettes with less nicotine which would improve their chances of breaking the smoking habit (17). In Canada, maximum permissible limits of harmful substances are fixed by an agreement with the tobacco industry. The Cigarette and Cigarette Tobacco Advertising and Promotion Code of the Canadian Tobacco Manufacturers' Council states that the average tar and nicotine content of cigarette smoke must not exceed 22 mg of tar and 1.6 mg of nicotine per cigarette (7). Attempting to alter this legislation to force reductions in nicotine and tar would involve a tremendous battle with the tobacco companies. However, introducing a differential tax allows the issue of harmful and addictive substance control to be addressed without confronting it directly. This type of taxation policy would be an excellent precursor to tougher regulatory legislation on levels of nicotine and tar.

Taxation at different levels

There is also the question of what level to impose the tax. It has been proposed that raising taxes on tobacco products could be accomplished by the following methods: increasing customs duties on imported products; increasing the licensing fee for tobacco dealers; increasing the excise tax paid by manufacturers; and increasing the sales tax at the Federal and Provincial levels (18). It is important that taxation increases are consistent across Canada to prevent smuggling. Therefore, it would be appropriate to implement a taxation intervention at the level of the federal sales tax that would affect the entire country uniformly. In addition, provinces should be encouraged by the federal government to have similar tobacco taxation policies.

Effective lobbying- the key to stimulating parliamentary action

Reintroduction of stricter tobacco taxation policies will require extensive lobbying of the federal government by the medical profession and allied anti-smoking groups. Lobbying must be done in a coordinated fashion to counter the political power of the tobacco industry which has access to large financial resources. Similar problems are faced in the United States which is highlighted by the fact that in 1991 the National Cancer Institute spent 47 million dollars to develop anti-smoking intervention technologies while the major cigarette manufacturers spent 3.6 billion dollars in advertising (19). Therefore, there is a clear need for co-ordination of anti-smoking groups.

Programs to assist in smoking cessation

To complement rises in tobacco taxes it would be

appropriate to provide increased financing for smoking cessation programs. These smoking cessation programs could also be integrated with the taxation strategy. A small percentage (1-5%) of the tax could be channeled to fund smoking cessation programs. In Finland this strategy is used and 0.5% of tobacco tax must go toward education, research and evaluation of smoking control (7). In addition, if the smoking cessation programs were effective in reducing smoking then the tax money "lost" by the government may return indirectly in reduced health care costs from smoking-related illnesses.

EVALUATING TAX INTERVENTIONS

Any type of tax intervention to combat the problem of smoking would have to be evaluated for its effectiveness. This evaluation would involve measuring consumption of tobacco products. The gross amount of tobacco consumption could be determined by monitoring cigarette sales throughout Canada. This would allow for determination of the impact of the price increase on the entire population. However, it is important to know how different groups within the population are affected by the taxation policy. Therefore, large scale surveys of smoking habits would have to be conducted. This data could also be used to verify the consumption estimates generated from the total tobacco sales, which might be an underestimate of consumption due to smuggling. By comparing these statistics one could monitor the prevalence of smuggling. Studies should also be conducted on the effects of increased taxation policies on children and lower socioeconomic class individuals to adequately deal with their needs. In the long term, changes in disease prevalence related to smoking such as lung cancer and heart disease should be assessed.

CONCLUSION

Implementing an effective taxation intervention

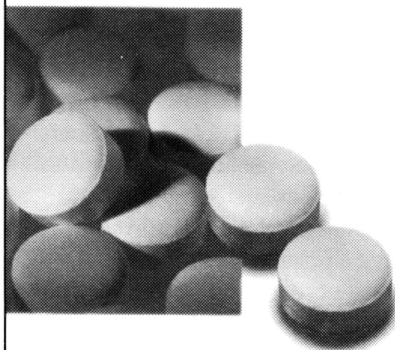
The implementation of an effective taxation program to combat smoking would involve consolidating non-smoking interest groups to lobby for more rigorous tobacco taxation policies. This lobbying effort should focus on the implementation of a moderate tax increase in which a fraction of the revenue generated is applied to smoking cessation programs. In addition, there should be a consistent tax increase across the country to reduce interprovincial smuggling. To deal with international smugglers, more stringent policing of Canadian borders would be indicated. The new tobacco tax would then be evaluated for its effectiveness in reducing smoking and appropriate modification in the taxation policy could then be applied.

Smoking is the number one preventable cause of mortality in Canada and is a risk factor for the develop

ment of cardiovascular disease, lung disease and cancer (4-6). The consumption of tobacco is intimately related to the price, as reflected in price elasticity values. The use of taxation policies to inflate the cost of tobacco products is justified by the ensuing reduction in consumption which ultimately leads to reduced tobacco-related morbidity and mortality in the population.

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