Stop-Smoking Medication Use, Subsidization Policies, and Cessation in Canada

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Introduction: In 2000, Quebec began reimbursing stop-smoking medications (SSMs) through their provincial public drug insurance plan. Several other Canadian provinces have since begun offering SSM subsidies. Clinical trials indicate that SSMs can increase quit success; however, little evidence exists on patterns of use in "real-world" settings and impact on population quit rates. This study examines Canadian trends in SSM use and quit success over time, comparing provinces with differing subsidization policies.

Methods: Secondary analyses were conducted in 2014 using nationally representative Canadian Tobacco Use Monitoring Survey data, 2004–2012, for current and former smokers who made a quit attempt in the past 2 years (N=26,094). Regression models tested for differences in SSM use and quit success in provinces with differing SSM coverage (i.e., none, partial, or comprehensive).

Results: Smokers were more likely to use nicotine replacement therapy (NRT) in jurisdictions with comprehensive SSM coverage versus jurisdictions with partial (OR=1.39, 95% CI=1.22, 1.59) or no coverage (OR=1.43, 95% CI=1.21, 1.68). Prescription medication use was more likely in provinces with partial (versus no) coverage (OR=1.27, 95% CI=1.01, 1.59). Overall, smokers who attempted to quit were more likely to remain abstinent in jurisdictions with comprehensive versus partial (OR=1.20, 95% CI=1.12, 1.28) or no coverage (OR=1.23, 95% CI=1.00, 1.50). An interaction between coverage and cigarettes per day was observed, suggesting potentially greater impact of comprehensive coverage among heavier smokers.

Conclusions: Comprehensive subsidization policies are associated with modest increases in NRT use and quit success, but do not appear to impact prescription SSM use.
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Introduction

Approximately half of Canadian smokers attempt to quit each year; however, only 10%–13% are able to maintain abstinence over the short term.[1] Long-term abstinence rates are typically lower: only 3%–5% of unassisted quitters remain abstinent for 6–12 months.[2] Several stop-smoking medications (SSMs) exist that increase the likelihood of long-term abstinence, including nicotine-replacement therapy (NRT) such as nicotine patches and gum, and prescription medications such as bupropion (Zyban) and varenicline (Champix).[3] RCTs have provided strong clinical evidence of the benefit of many of these medications.[4–6] For example, a meta-analysis of 111 RCTs concluded that NRT use increases long-term quit rates by more than 50%.[4]

Although the clinical efficacy of many SSMs is established, their effectiveness in real-world settings is less clear.[7] Some population-based studies have shown increased long-term abstinence among individuals who use formal cessation assistance; up to double the 1-year abstinence rates of those quitting on their own (15.2% vs 7.0%).[8] Other studies, however, have reported no benefit of SSMs in real-world settings where users are often less motivated, no longer receive professional advice, and have poor compliance.[9,10]

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A majority of Canadian smokers (55%) attempt to quit without using any SSM.[1] Among other reasons,[11–14] cost is a frequently cited barrier to SSM use.[15] For example, in 2011, a 12-week course of NRT or prescription medications cost between $125 and $340, depending on the product and dosage.[16] Meta-analyses have demonstrated that providing coverage for SSMs plus counseling increased quit attempts, SSM use, and 6-month abstinence.[17,18] Additionally, a recent U.S. study found that quit rates were lower when copayments were required and counseling was not covered.[19] A Canadian RCT also concluded that SSM coverage increased 6-month abstinence.[20]

Canadian provinces have begun to subsidize the cost of SSMs. Since 2000, Quebec residents insured under their public drug insurance plan have been eligible for reimbursement for the cost of any physician-prescribed SSM for 12 consecutive weeks each year.[21] Other provinces now also provide subsidies for SSMs through government-sponsored health plans or regional stop-smoking programs. The type and extent of coverage varies by province, including the mechanism, covered products (NRT and prescription medications), duration and amount, deductibles, and eligibility criteria (Appendix A, available online).

Relatively little evidence exists on the population-based impact of provincial subsidization programs in Canada. The present study examines trends in SSM utilization and quit success rates in Canada from 2004 to 2012, comparing the trends in provinces with different levels of coverage for SSMs among current and former smokers.

Methods

Study Sample

The current study used repeat cross-sectional data (i.e., different samples at each wave) collected annually from 2004 to 2012 from the Canadian Tobacco Use Monitoring Survey (CTUMS). CTUMS was conducted by Statistics Canada from 1999 to 2012, with data collected annually from February to December, using computer-assisted random digit–dialed telephone interviews. CTUMS samples were selected using a stratified random sampling procedure. The target population included all people aged ≥15 years, living in Canada, excluding residents of the Yukon, Northwest Territories, and Nunavut; full-time residents of institutions; and residents without telephones or with cell phones only. An equal number of respondents (approximately 2,000 per year) in each province were surveyed, and youth (aged 15–24 years) were oversampled to make up half of the respondents. A full description of the CTUMS methodology is available online from Statistics Canada.[22] Although CTUMS was conducted beginning in 1999, the present study only used data from 2004 on, owing to inconsistencies in respondent coverage for key questions regarding quit success across earlier survey waves. The analytic sample included former

and current smokers who had (tried to) quit in the past 2 years and were aged ≥18 years (in order to match the minimum age requirements common to all provinces for receiving SSM coverage). All CTUMS measures were reviewed and approved by Statistics Canada. Secondary analysis of this public-use data did not require IRB approval.

Measures

Demographic variables included age (continuous), sex, and education (less than secondary, completed secondary, completed college, or completed university). Smoking status was assessed by asking: *At the present time do you smoke cigarettes every day, occasionally, or not at all?* Current smokers were defined as respondents who reported smoking cigarettes *every day* or *occasionally*. Former smokers were defined as respondents who answered *not at all* but had smoked ≥100 cigarettes in their lifetime. Former smokers included a subgroup of "recent quitters" who quit in the past year. Never smokers (answered *not at all* and had not smoked 100 cigarettes in their lifetime) were excluded from the sample.[23] Cigarettes per day (CPD) was determined by calculating the average number of cigarettes smoked currently, or prior to cessation for former smokers.

Quit attempts were identified among current and former smokers as having tried to stop smoking for at least 24 hours, one or more times in the past 2 years. Quit success was defined as abstinence from smoking for at least 1 month at the time of the survey, among a subsample who made a quit attempt in the past year.

A series of questions examined use of SSMs in the past two years. Current and former smokers who tried to quit or quit smoking in the past two years were asked if they had (1) used a nicotine patch or gum such as Nicorette in the past two years, and (2) used a prescription medication such as Zyban, Wellbutrin, or Champix in the past two years. Champix was introduced on the Canadian market in 2007, and added as an example medication in the CTUMS questionnaire in 2009.[24]

Respondents were categorized into one of three SSM *coverage levels* (no coverage, partial coverage, or comprehensive coverage) based on coverage available in their province at the time they quit or made a quit attempt. Quit date information was not available for a subset of respondents: former smokers who quit 1–2 years before they were surveyed and current smokers who attempted to quit in the 2 years before they were surveyed. When this period overlapped with the introduction of a new SSM coverage policy, assumptions were required about the specific timing of the quit attempt and the coverage available. These assumptions were only applied to a small proportion of respondents (5.7%).

Separate coverage level variables were developed for each NRT and prescription medication coverage because changes in coverage for these products often occurred at different times. An *overall SSM coverage level* variable was also developed for use in models examining trends in quit success. Table 1 shows the coverage levels by province, with timeline information on changes for each of the three coverage variables (further detail in Appendix A).

Within the *NRT coverage* and *prescription medication coverage* variables, respondents were assigned to the *no coverage* level if their quit attempt occurred when there was no coverage for NRT or prescription medications, respectively. Respondents were assigned to *partial coverage* if their quit attempt occurred when

Table 1. Stop-Smoking Medication (SSM) Coverage in Canada, by Province[a]

Province	Nicotine replacement therapy (NRT) coverage (patch and/or gum)	Prescription medication coverage (e.g., Zyban, Wellbutrin, Champix)	Overall SSM coverage (NRT and prescription medications)
British Columbia	Comprehensive[b] (since Oct 2011)	Comprehensive (since Oct 2011)	Comprehensive (since Oct 2011)
Alberta	Comprehensive (since Nov 2010)	Comprehensive (Jan 2004 to present)	Comprehensive (since Nov 2010)
Saskatchewan	None[c] Jan 2004 to present)	Comprehensive since Jan 2011)	Partial[d] (since Jan 2011)
Manitoba	None (Jan 2004 to present)	Comprehensive (since Dec 2011)	Partial (since Dec 2011)
Ontario	Partial (since Jan 2006)	Comprehensive (since Aug 2011)	Partial (since Jan 2006)
Quebec	Comprehensive (Jan 2004 to present)	Comprehensive (Jan 2004 to present)	Comprehensive (Jan 2004 to present)
New Brunswick	None (Jan 2004 to present)	None (Jan 2004 to present)	None (Jan 2004 to present)
Nova Scotia	Partial (Jan 2004 to present)	Partial (Jan 2004 to present)	Partial (Jan 2004 to present)
Prince Edward Island	Partial (Jan 2004 to present)	Partial (Jan 2004 to present)	Partial (Jan 2004 to present)
Newfoundland & Labrador	None (Jan 2004 to present)	None (Jan 2004 to present)	None (Jan 2004 to present)

[a]SSM coverage statuses are listed as of December 2012. In all provinces where coverage increased to partial or comprehensive levels between 2004 and 2012, the coverage was initially classified as None, except in Alberta, where NRT and overall SSM coverage levels were initially classified as Partial before increasing to the Comprehensive level in November 2010.
[b]Comprehensive: comprehensive provincial coverage for product(s) through public drug insurance plans (eligibility criteria may apply).
[c]None: no coverage for product(s).
[d]Partial: some coverage for product, but recipients must be enrolled in a regional cessation program (within the 'overall SSM coverage' variable, this means there is either [a] some coverage for at least one, but possibly both, SSM product types [i.e., NRT or prescription medications] for individuals enrolled in regional cessation programs, or [b] there is comprehensive coverage for one product type but no coverage for the other type).
NRT, nicotine replacement therapy; SSM, stop-smoking medication

coverage for NRT or prescription medications was available to individuals actively enrolled in regional smoking-cessation programs (e.g., the Smoking Treatment for Ontario Patients [STOP] Program). Respondents were assigned to *comprehensive coverage* if their quit attempt occurred when more comprehensive coverage for NRT or prescription medications was available to individuals with eligible provincial public insurance plans. Some comprehensive programs required or recommended that recipients participate in cessation counseling (e.g., AlbertaQuits helpline).

Within the overall SSM coverage variable, respondents were assigned to no coverage if their quit attempt occurred when no coverage existed for either product type (NRT or prescription medication); partial if the coverage was available through a regional cessation program for at least one (or both) product types, or if there was comprehensive coverage for one type but no coverage for the other type; or comprehensive if there was province-wide coverage for both product types.

Statistical Analysis

Chi-square and ANOVA tests were used to examine bivariate associations between sample characteristics and SSM coverage levels. A total of three models were fitted using 2004–2012 CTUMS data to examine the effect of SSM coverage over time on: (1) NRT use; (2) prescription medication use; and (3) quit success (1 month–point abstinence) rates. Specifically, marginal logistic regression models used generalized estimating equations (GEEs) to estimate the population-average parameters while accounting for the correlation within

provinces. Each model included the following main effects: an indicator variable for coverage level (none, partial, or full); a class variable for survey year; and the covariates age, sex, education, and CPD. Two-way interaction variables between coverage level and the covariates year, CPD, and education were each added to the model in subsequent blocks. The education interaction did not improve the fit of the model, and consequently was removed from the analyses. Analyses were weighted to ensure estimates were representative of the Canadian population each year, unless otherwise noted. Analyses were conducted in 2014 using SAS, version 9.4.

Results

Sample Characteristics

Of the 184,485 CTUMS respondents surveyed from 2004 to 2012, a total of 26,094 were aged ≥18 years, classified as current or former smokers who made a quit attempt in the last 2 years, and retained for these analyses. Respondent characteristics (Table 2) differed significantly by overall SSM coverage level, in terms of education, smoking status, and CPD.

Use of Stop-Smoking Medications

Nicotine replacement therapy. Figure 1A shows trends in NRT use by NRT coverage levels and year.

Table 2. Sample Characteristics by Overall Stop-Smoking Medication (SSM) Coverage Level (N=26,094)

Characteristic	No coverage (n=15,725)	Partial coverage (n=7,392)	Comprehensive coverage (n=2,977)	Total sample (N=26,094)
Age (years)				
Mean (SD)	34.1 (15.7)	35.1 (16.2)	34.1 (16.0)	34.4 (15.9)
Gender (%)				
Male	48.9	49.1	48.2	48.9
Education (%)[a]				
Less than secondary	21.4	20.1	21.1	21.0
Completed secondary	51.2	49.7	47.2	50.3
Completed college	16.2	18.7	19.1	17.2
Completed university	9.9	10.4	11.3	10.2
Not reported	1.4	1.1	1.3	1.3
Smoking status (%)[a]				
Current smoker	77.9	77.2	75.1	77.4
Former smoker	22.1	22.8	24.9	22.6
Cigarettes per day (%)[a]				
0-9 cigarettes	41.2	39.8	38.9	40.5
10-19 cigarettes	35.8	35.8	36.5	35.9
20+ cigarettes	23.0	24.4	24.7	23.6

Note: Data shown are unweighted.
[a]Statistically significant difference between coverage levels for characteristic ($p < 0.05$).

Across all years, 40.7% of those who made a quit attempt in the past 2 years had used a nicotine patch or gum: 39.8% in provinces with no NRT coverage, 37.9% in provinces with partial coverage, and 45.1% in provinces with comprehensive coverage. GEE models were fitted to examine differences in NRT use among smokers attempting to quit from 2004 to 2012, by SSM coverage level. Respondents with comprehensive coverage for NRT products were significantly more likely to use NRT when trying to quit than those with no or partial coverage (OR=1.43, 95% CI=1.21, 1.68, $p < 0.001$ and OR=1.39, 95% CI=1.22, 1.59, $p < 0.001$, respectively). There was a significant effect of year on NRT use within Canada ($p < 0.001$), such that use during quit attempts was generally more likely in the earlier years than in 2010–2012 (Table 3).

There was a significant interaction between year and coverage level ($p < 0.001$), as the superiority of partial versus no coverage in terms of NRT use declined over time. There was also a significant interaction between CPD and coverage level ($p < 0.001$), such that among those with high cigarette consumption, the superiority of comprehensive to no and partial coverage in terms of NRT use was greater than the superiority of partial to no coverage.

Prescription medications. Figure 1B shows trends in prescription medication use during quit attempts by coverage levels and year. Across all provinces, 16.5% of respondents surveyed from 2004 to 2012 who made a quit attempt in the past 2 years had used a prescription medication such as Zyban, Wellbutrin, or Champix: 17.0% in provinces with no prescription medication coverage, 21.3% in provinces with partial coverage, and 15.3% in provinces with comprehensive coverage. GEE models were fitted to examine differences in medication use among smokers who attempted to quit from 2004 to 2012, by SSM coverage level. Respondents with partial coverage for prescription medications were significantly more likely to use a medication when trying to quit than respondents with no coverage (OR=1.27, 95% CI=1.01, 1.59, $p = 0.04$). There was a significant effect of year on medication use during quit attempts within Canada ($p < 0.001$), such that use during quit attempts was generally more likely in 2009–2012 than in 2008, and more likely in 2009–2011 than in 2005–2006 (Table 4).
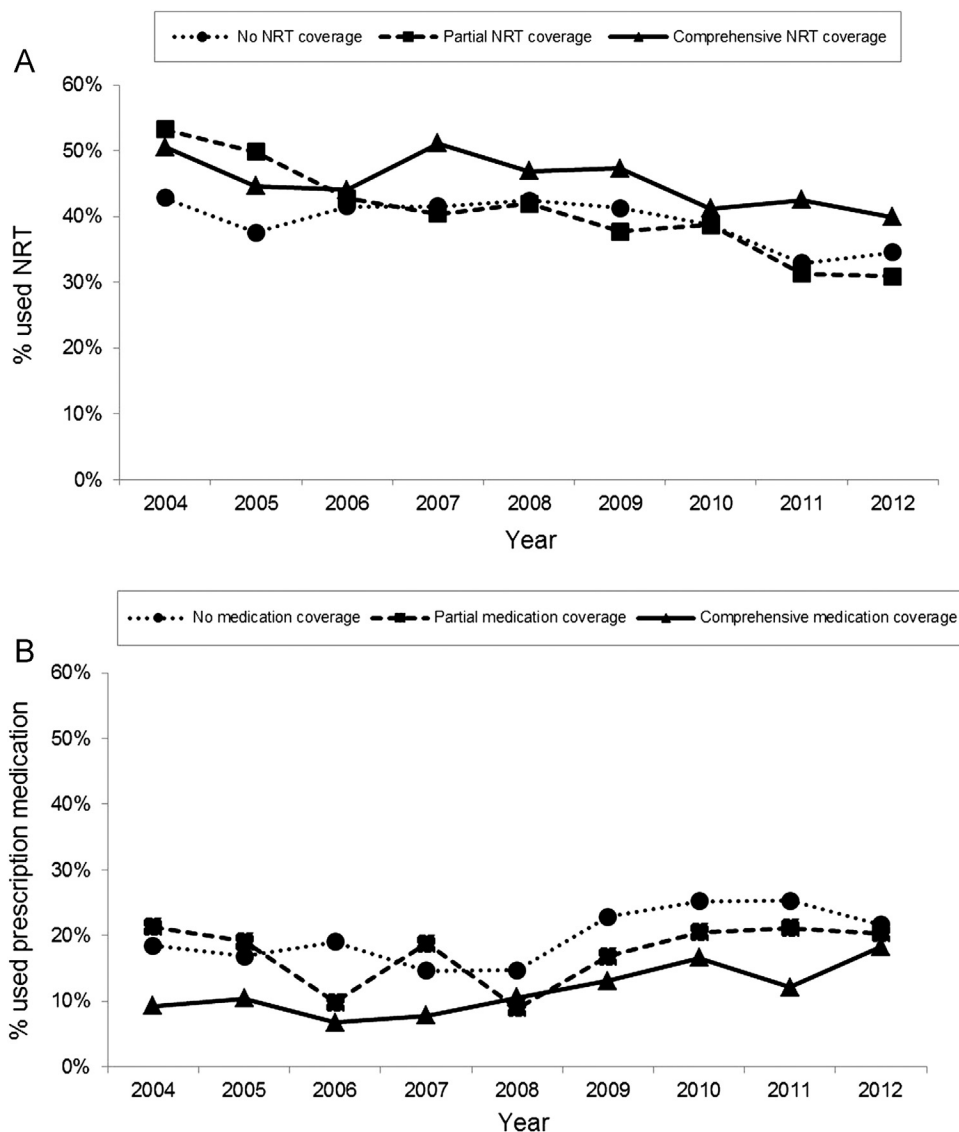
Figure 1. Prevalence of (A) nicotine replacement therapy (NRT) use, and (B) prescription medication use, among current and former smokers who tried to quit or quit smoking in the past two years, by NRT and prescription medication coverage levels, 2004−2012 (*n*=25,656).

There was a significant interaction between year and coverage level (*p* < 0.001), as the superiority of comprehensive coverage (versus no and partial coverage) increased over time in terms of medication use, whereas the superiority of partial coverage (versus no coverage) decreased in later years. There was no significant interaction between CPD and coverage level (*p*=0.11). Appendix B (available online) shows the prevalence of NRT and prescription medication use by province.

Quit Success
Figure 2 shows quit success rates by SSM coverage level and year. Across the 9-year period, 15.9% of those who had made a quit attempt in the previous year reported

being abstinent from smoking for at least 1 month at the time they were surveyed: 14.9% among respondents in provinces with no SSM coverage, 15.0% in provinces with partial coverage, and 18.5% in provinces with comprehensive coverage for all SSMs. GEE models were fitted to examine differences in quit success among smokers trying to quit from 2004 to 2012, by SSM coverage level. Quit success was higher in provinces with comprehensive coverage than in provinces with no and partial coverage (OR=1.23, 95% CI=1.00, 1.50, *p*=0.049 and OR=1.20, 95% CI=1.12, 1.28, *p* < 0.001, respectively). There was a significant effect of year on quit success within Canada (*p* < 0.001), such that quit success was more likely in 2005 than 2004, but less likely in 2006 and 2010 than in 2005 (Table 5).

Table 3. Adjusted Generalized Estimating Equations Predicting Nicotine Replacement Therapy Use by Coverage Level and Year (*n*=23,404)[a]

	β	OR	95% CI	*p*-value
Coverage level				
Comprehensive vs partial (ref)	0.33	1.39	1.22, 1.59	<**0.001**
Comprehensive vs none (ref)	0.36	1.43	1.21, 1.68	<**0.001**
Partial vs none (ref)	0.02	1.02	0.95, 1.10	0.52
Year[b]				
2012 vs 2009 (ref)	−0.36	0.70	0.61, 0.81	<**0.001**
2012 vs 2008 (ref)	−0.42	0.66	0.54, 0.79	<**0.001**
2012 vs 2007 (ref)	−0.43	0.65	0.59, 0.72	<**0.001**
2012 vs 2006 (ref)	−0.37	0.69	0.56, 0.86	**0.001**
2012 vs 2005 (ref)	−0.24	0.79	0.72, 0.86	<**0.001**
2012 vs 2004 (ref)	−0.48	0.62	0.50, 0.77	<**0.001**
2011 vs 2009 (ref)	−0.34	0.71	0.67, 0.76	<**0.001**
2011 vs 2008 (ref)	−0.40	0.67	0.61, 0.74	<**0.001**
2011 vs 2007 (ref)	−0.41	0.67	0.62, 0.71	<**0.001**
2011 vs 2006 (ref)	−0.35	0.70	0.61, 0.81	<**0.001**
2011 vs 2005 (ref)	−0.22	0.80	0.73, 0.89	<**0.001**
2011 vs 2004 (ref)	−0.46	0.63	0.58, 0.69	<**0.001**
2010 vs 2009 (ref)	−0.20	0.82	0.70, 0.96	**0.01**
2010 vs 2008 (ref)	−0.26	0.77	0.70, 0.85	<**0.001**
2010 vs 2007 (ref)	−0.26	0.77	0.62, 0.96	**0.02**
2010 vs 2006 (ref)	−0.21	0.81	0.76, 0.87	<**0.001**
2010 vs 2004 (ref)	−0.32	0.73	0.62, 0.85	<**0.001**
2009 vs 2005 (ref)	0.12	1.13	1.03, 1.25	**0.01**
2009 vs 2004 (ref)	−0.12	0.89	0.81, 0.97	**0.008**
2008 vs 2005 (ref)	0.18	1.20	1.04, 1.38	**0.01**
2007 vs 2005 (ref)	0.19	1.20	1.11, 1.32	<**0.001**
2006 vs 2004 (ref)	−0.11	0.90	0.81, 0.99	**0.04**
2005 vs 2004 (ref)	−0.24	0.78	0.67, 0.91	**0.002**
Age	0.01	1.01	1.00, 1.01	<**0.001**
Sex				
Female vs male (ref)	−0.06	0.94	0.79, 1.12	0.48
Education				
University vs college (ref)	−0.17	0.84	0.72, 0.98	**0.02**
University vs secondary (ref)	−0.16	0.85	0.74, 0.98	**0.02**
University vs less than secondary (ref)	0.04	1.04	0.91, 1.18	0.58
College vs secondary (ref)	0.01	1.01	0.95, 1.08	0.64
				(continued on next page)

Table 3. Adjusted Generalized Estimating Equations Predicting Nicotine Replacement Therapy Use by Coverage Level and Year (n=23,404)[a] *(continued)*

	β	OR	95% CI	*p*-value
College vs less than secondary (ref)	0.21	1.23	1.13, 1.35	<**0.001**
Secondary vs less than secondary (ref)	0.20	1.22	1.16, 1.27	<**0.001**
Cigarettes per day				
20+ vs 10–19 (ref)	0.22	1.24	0.99, 1.55	0.05
20+ vs 0–9 (ref)	0.97	2.63	2.13, 3.25	<**0.001**
10–19 vs 0–9 (ref)	0.75	2.11	2.06, 2.17	<**0.001**

Note: Boldface indicates statistical significance (*p*<0.05).
[a]Data shown are from main effects models adjusted for age, education, sex, and cigarettes per day.
[b]Only significant year contrasts are shown.

There was a significant interaction between year and coverage level (*p*<0.001), as the differences in quit success between those with comprehensive and no coverage, and between those with comprehensive and partial coverage, decreased modestly over time; however, this difference was not observed between those with partial and no coverage. There was also a significant interaction between CPD and coverage level (*p*<0.001), such that among those with high cigarette consumption, the superiority of comprehensive coverage to no and partial coverage in terms of quit success was greater than the superiority of partial to no coverage.

Discussion

This study demonstrates that SSM coverage may have had a modest effect on SSM use and quit success in Canada. NRT use was more common in provinces with comprehensive coverage than in those with partial or no coverage. The findings also suggest that providing partial (versus no) coverage for prescription medications may increase medication use, but that providing comprehensive coverage does not necessarily result in greater use. Respondents living in provinces with comprehensive coverage were more likely to quit compared to those in provinces with partial or no coverage.

It is unclear why comprehensive coverage was associated with higher rates of NRT but not prescription medication use. One potential reason for this discrepancy—and the presence of a significant difference in medication use between partial and no coverage, but not comprehensive coverage—is that provinces with partial coverage required enrollment in cessation programs. The program facilitators may have encouraged participants to try quitting with a prescription medication, which they might not have otherwise tried. Cost and access to medications may also depend
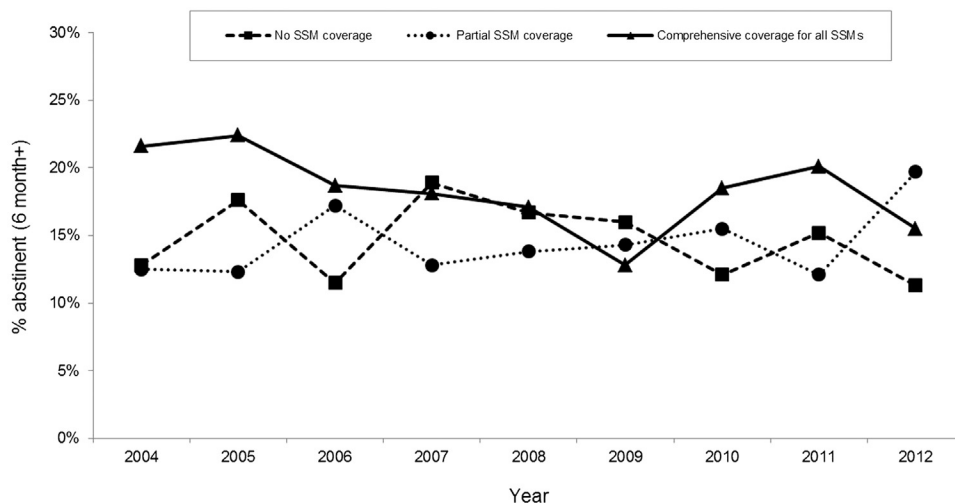

Figure 2. Percentage of current smokers and recent quitters who made at least one 24-hour quit attempt in the past 12 months and were abstinent for at least one month at the time of survey, by SSM coverage level, 2004–2012 (n=18,734).
SSM, stop-smoking medication.

Table 4. Adjusted Generalized Estimating Equations Predicting Prescription Medication Use by Coverage Level and Year (*n*=23,390)[a]

	β	OR	95% CI	*p*-value
Coverage level				
Comprehensive vs partial (ref)	-0.47	0.63	0.35, 1.13	0.12
Comprehensive vs none (ref)	-0.23	0.79	0.44, 1.42	0.44
Partial vs none (ref)	0.24	1.27	1.01, 1.59	**0.04**
Year[b]				
2012 vs 2008 (ref)	0.66	1.94	1.56, 2.41	**<0.001**
2011 vs 2008 (ref)	0.55	1.73	1.32, 2.27	**<0.001**
2011 vs 2006 (ref)	0.31	1.37	1.25, 1.50	**<0.001**
2011 vs 2005 (ref)	0.26	1.30	1.05, 1.61	**0.02**
2011 vs 2004 (ref)	0.22	1.24	1.16, 1.33	**<0.001**
2010 vs 2008 (ref)	0.66	1.94	1.67, 2.26	**<0.001**
2010 vs 2006 (ref)	0.43	1.53	1.16, 2.03	**0.003**
2010 vs 2005 (ref)	0.38	1.46	1.10, 1.93	**0.009**
2010 vs 2004 (ref)	0.33	1.39	1.10, 1.75	**0.005**
2009 vs 2008 (ref)	0.53	1.71	1.43, 2.04	**<0.001**
2009 vs 2006 (ref)	0.30	1.35	1.10, 1.65	**0.004**
2009 vs 2005 (ref)	0.25	1.28	1.01, 1.62	**0.04**
2008 vs 2004 (ref)	−0.33	0.72	0.52, 0.98	**0.04**
Age	0.02	1.02	1.02, 1.03	**<0.001**
Sex				
Female vs male (ref)	0.24	1.27	1.22, 1.32	**<0.001**
Education				
University vs college (ref)	−0.21	0.81	0.68, 0.96	**0.02**
University vs secondary (ref)	0.08	1.08	0.98, 1.19	0.11
University vs less than secondary (ref)	0.26	1.30	1.13, 1.49	**<0.001**
College vs secondary (ref)	0.29	1.34	1.11, 1.61	**0.002**
College vs less than secondary (ref)	0.47	1.60	1.25, 2.05	**<0.001**
Secondary vs less than secondary (ref)	0.18	1.20	1.12, 1.29	**<0.001**
Cigarettes per day				
20+ vs 10−19 (ref)	0.45	1.56	1.47, 1.66	**<0.001**
20+ vs 0−9 (ref)	1.01	2.74	2.34, 3.22	**<0.001**
10−19 vs 0−9 (ref)	0.56	1.76	1.43, 2.16	**<0.001**

Note: Boldface indicates statistical significance (*p*<0.05).
[a]Data shown are from main effects models adjusted for age, education, sex, and cigarettes per day.
[b]Only significant year contrasts are shown.

on private health insurance plans where coverage is highly variable and may change in response to provincial policies. Regardless, this pattern suggests that coverage of NRT products, rather than coverage of prescription medications, may be driving the higher quit success rates associated with comprehensive coverage.

Table 5. Adjusted Generalized Estimating Equations Predicting Quit Success by Coverage Level and Year (*n*=17,017)[a]

	β	OR	95% CI	*p*-value
Coverage level				
Comprehensive vs partial (ref)	0.18	1.20	1.12, 1.28	<**0.001**
Comprehensive vs none (ref)	0.20	1.23	1.00, 1.50	**0.049**
Partial vs none (ref)	0.02	1.02	0.81, 1.29	0.84
Year[b]				
2010 vs 2005 (ref)	−0.29	0.75	0.68, 0.82	<**0.001**
2006 vs 2005 (ref)	−0.30	0.74	0.68, 0.81	<**0.001**
2005 vs 2004 (ref)	0.30	1.35	1.02, 1.79	**0.03**
Age	−0.002	1.00	0.99, 1.00	0.23
Sex				
Female vs male (ref)	0.26	1.29	1.21, 1.39	<**0.001**
Education				
University vs college (ref)	0.48	1.62	1.35, 1.93	<**0.001**
University vs secondary (ref)	0.62	1.87	1.56, 2.24	<**0.001**
University vs less than secondary (ref)	0.87	2.39	1.48, 3.86	<**0.001**
College vs secondary (ref)	0.14	1.15	1.08, 1.23	<**0.001**
College vs less than secondary (ref)	0.39	1.48	1.06, 2.06	**0.02**
Secondary vs less than secondary (ref)	0.25	1.29	0.88, 1.85	0.19
Cigarettes per day				
20+ vs 10−19 (ref)	0.38	1.47	1.06, 2.04	**0.02**
20+ vs 0−9 (ref)	0.79	2.21	1.79, 2.72	<**0.001**
10−19 vs 0−9 (ref)	0.41	1.50	1.32, 1.72	<**0.001**

Note: Boldface indicates statistical significance (*p*<0.05).
[a]Data shown are from main effects models adjusted for age, education, sex, and cigarettes per day.
[b]Only significant year contrasts are shown.

The current findings from Canada are generally consistent with existing literature from other countries. For example, the Cochrane reviews also concluded that providing coverage to smokers increased the proportion quitting and utilizing treatment compared with providing no coverage, although the current study only found an effect of comprehensive coverage on NRT use, not medications.[17] However, coverage and treatment definitions differed: whereas other studies often defined comprehensive coverage as including counseling, this was not a requirement for the definition in this study.

The findings suggest that comprehensive SSM coverage may be most effective among heavier smokers (≥20 CPD). This is consistent with clinical practice guidelines and the lack of evidence demonstrating a benefit of SSMs among lighter smokers.[3]

Additionally, the findings indicate that prescription medication use during quit attempts was generally higher in some of the later years, which may in part reflect the introduction of new cessation medications in Canada, including Champix in 2007.[24] By contrast, NRT use appeared to decrease over time, despite reductions in price, increased access, and the availability of a wider variety of products.[25] Quit success rates among Canadian smokers did not improve substantially over the past decade.

Limitations and Strengths

The present study has several limitations, including those common to population-based surveys, such as recall bias. Although some degree of recall bias is likely for quit dates, CTUMS uses the same standard assessments as in major population-based surveys.

Furthermore, recall bias would apply equally over time and across SSM coverage levels; therefore, it could not account for the observed differences. Second, though the analyses were adjusted for education, it would be valuable in future studies to examine more specific measures of SES not collected by CTUMS, such as income. A third limitation concerns the categorization of coverage levels across provinces. Each province has different regulations on drug plan eligibility criteria, product coverage, deductibles, and the existence of other independent programs that may provide SSMs. Also, CTUMS did not assess access to subsidized SSMs through private health insurance programs. Future research should specify whether individuals' SSMs are subsidized through provincial drug plans, private coverage, or paid out of pocket. Additionally, assumptions about the timing of quit attempts and corresponding coverage level were required for some former smokers and current smokers whose specific quit date was unknown; thus, some respondents may have been misclassified into a higher or lower coverage level than that which existed at the time of their SSM use. However, the same assumptions were applied to all respondents across all coverage levels; therefore, this limitation is unlikely to account for the observed differences.

Study strengths include the use of data from CTUMS, the gold standard population-based tobacco survey in Canada, over a 9-year period. In addition, CTUMS uses probability-based sampling, which increases the generalizability of the findings. Although participants relying exclusively on cell phones were excluded from the sample, which may have disproportionally excluded a number of low-income and younger households, CTUMS nevertheless provides the most comprehensive Canadian annual data.[26–28]

Conclusions

Overall, comprehensive subsidization policies are associated with moderately higher use of NRT and quit rates, but do not impact use of prescription medications. Given that comprehensive subsidization policies have been implemented only recently in several provinces, additional monitoring should be a priority for future research.

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Appendix

Supplementary data