BMJ Open Government’s subsidisation policy and utilisation of smoking cessation treatments: a population-based cross-sectional study in Taiwan

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ABSTRACT

Objectives This study examined the associations between the Second-Generation Cessation Payment Scheme (SCPS) and the use of smoking cessation treatments. Furthermore, these associations were compared between light and heavy smokers in Taiwan.

Design This study had a cross-sectional design.

Setting Data were obtained from the Taiwan Adult Smoking Behaviour Surveillance System 2010–2011 and 2013–2014; data for each year consisted of a nationally representative sample of adults aged 18 years and older.

Participants Current smokers who had either quit or made a serious attempt to quit smoking were selected for the analysis.

Primary outcome measure The primary outcome measure was the use of a smoking cessation clinic or pharmacy in a twice daily to quit smoking.

Results According to multivariate analysis, the SCPS was positively associated with the combined use of a smoking cessation clinic and pharmacy (OR=3.947; 95% CI: 2.865 to 5.470) compared with no use of any treatment; and the use of a smoking cessation clinic (OR=3.702; 95% CI: 2.550 to 5.350) compared with no use of any treatment. Furthermore, the use of combined treatments or difference in use before and after subsidisation policy introduction in an Asian country.

Evidence-based treatments—such as counselling and medication, including nicotine replacement therapy (NRT) and non-NRT medication—significantly improve a smoker’s likelihood of cessation success. Rather than using counselling and medication individually, the combination of these modalities is more effective.3 However, a low utilisation rate of smoking cessation treatment, reportedly 4.0%–36.1%, has been reported.4–7

In 2017, the smoking rate in Taiwan was 26.4% and 2.3% for men and women, respectively.8 Taiwanese smokers were estimated...
to have lost 22 years in life expectancy due to smoking-related diseases. Since 2002, a surcharge of NT$5 (US$0.14) per pack of cigarettes has been imposed for tobacco-related health and welfare, the proceeds of which have been used to subsidise smoking cessation services. In addition, the Taiwanese government implemented the Outpatient Smoking Cessation Services (OSCS) programme in 2002 and subsidised smoking cessation services including pharmacotherapy and a brief counselling session with a physician. Physicians must be certified from a training programme if they are to receive reimbursement for the OSCS. A study indicated that the training programme was effective in increasing physicians’ knowledge and adherence to a practice guideline. Many subsequent alterations were made to the OSCS programme, including specialties that provide smoking cessation services, patients’ out-of-pocket prescription copayment, and subsidies for low-income households. However, smokers had to pay a weekly out-of-pocket prescription copayment of NT$550–NT$1250 (US$18.33–US$21.67). For low-income individuals, this financial burden may have discouraged their use of smoking cessation services. Although the benefits of the OSCS programme outweighed the cost—it had an estimated net social benefit of US$196 million, the number of OSCS users gradually decreased from 2006 to 2011. Thus, to remove the financial barrier and increase the use of smoking cessation services, the government started the Second-Generation Cessation Payment Scheme (SCPS) in 2012.

Two US studies have evaluated the effect of subsidisation of smoking cessation treatment on its use. One study found that providing Medicaid programme coverage for smoking cessation yielded a 3-month increase in the use of smoking cessation medication. The subjects in that study belonged to a Medicaid population and were mostly from low-income families. Moreover, that study analysed only the rate of treatment use, without controlling for smoking behaviour or the individual characteristics of smokers. Another study, using a national sample of the US population, discovered that after controlling for individual-level predictors, Medicaid coverage had a positive effect only on non-NRT medication use; it had no effect on NRT and behavioural support use. That study did not evaluate the use of combined treatments or the difference in use before and after implementing the subsidisation policy. Thus, the influence of subsidisation policy on service use has not been well evaluated, especially in an Asian context. Therefore, using a population-based Taiwanese database, we evaluated the effect of a subsidisation policy (the SCPS) on the use of cessation treatments while controlling for individual-level factors.

One study discovered that the number of cigarettes smoked per day was related to the use of smoking cessation treatments. Thus, we divided smokers into light and heavy smokers, using a threshold of 15 cigarettes per day, and compared the influence of the SCPS on the use of smoking cessation treatments between light and heavy smokers.

This study had two purposes. First, we aimed to examine the associations between the government’s subsidisation policy and the use of smoking cessation treatments. Second, we sought to compare how these associations differed between light and heavy smokers in Taiwan.

Second-Generation Cessation Payment Scheme

The Taiwan government implemented the OSCS programme in 2002 to subsidise smoking cessation services that included pharmacotherapy by physicians. To reduce the economic barrier to smoking cessation and expand the scope of services, the government launched the SCPS in March 2012. With the SCPS, every smoker can now take two courses instead of one per year, and each course provides a combination of 8 weeks of medication and eight individual counselling sessions. Furthermore, the copayment is now 20% of the total medication cost, with an upper limit of NT$200 (US$6.67). By contrast, before the SCPS, smokers had subsidies of up to NT$250 (US$8.33) and a copayment of NT$550–NT$1250 (US$18.33–US$21.67) per week. Low-income smokers now receive full subsidies and are not bound by the previous weekly upper limit of NT$500 (US$16.66). In addition, the maximum length of a prescription has been extended from 2 to 4 weeks, and physicians can now prescribe more expensive medications, such as varenicline, at a low copayment. In addition to outpatient services, the scope of cessation services has been extended to inpatients, emergency rooms and pharmacy services. To improve care quality, case management and follow-up fees are now subsidised at NT$100 (US$3.33) per treatment course and NT$50 (US$1.66) per follow-up. However, physician fees are still NT$250 (US$8.33) per visit.

METHODS

Data source

We obtained yearly 2010–2011 and 2013–2014 data from the Taiwan Adult Smoking Behaviour Surveillance System (ASBS). The ASBS contains annual cross-sectional population-based data that are obtained from county-based random-digit-dailed computer-assisted telephone interview surveys that have been conducted by the Health Promotion Administration since 2004. Additional details regarding the methodology used by the ASBS are available on the ASBS website (https://www.hpa.gov.tw/Pages/List.aspx?nodeid=1710).

Study sample

We analysed data of adults who had reported being smokers, quit smoking or made a serious attempt to quit smoking. Smokers who had quit smoking more than 1 year previously were excluded. The ASBS sample was selected from a national non-institutionalised population of adults (aged ≥18 years) in Taiwan. Since 2013, those aged 13–15 years have been included. The study sample included 36 619 adults (aged ≥13 years) from 2010–2011 and 2013–2014. We employed weighted analysis to correct for non-response bias.
included in the population. Random samples were selected from each of the 25 counties and cities in Taiwan in accordance with the probability proportional to size principle. Depending on the population size, each county or city accounted for 300–800 samples in 2004–2012 and 300–1068 samples from 2013 onwards, resulting in an estimated total of 16 000–26 000 000 samples nationwide. In total, 16 295, 16 905, 25 964 and 26 145 adults completed the phone interview in 2010, 2011, 2013 and 2014, respectively. The ASBS survey included questions on demographic characteristics, tobacco use, smoking cessation behaviour and cessation treatment use.

**Outcome measures**

Smokers who had made an attempt to quit that lasted >24 hour in the previous 12 months were asked the following in the ASBS survey: ‘Did you use a smoking cessation clinic (including NRT, non-NRT medication, and behavioural treatment) or pharmacy (including NRT and non-NRT medication) to quit smoking in the past 12 months?’ Respondents answered yes or no to each method separately. Furthermore, ASBS participants were queried regarding their use of auxiliary resources—such as a Quitline, smoking cessation programme and traditional Chinese medicine. However, such resources were not included in our analysis because their costs are not subsidised under the SCPS.

**Control variables**

We identified individual-level predictors (all retrieved from the ASBS) on the basis of a method used elsewhere. The predictors were gender, age, education level (elementary or below, junior high school, high school, junior college, or undergraduate or above), marital status (single; married; or divorced, widowed or separated), monthly household income (≤NT$20 000 (US$667), NT$20 001–NT$40 000 (US$667–US$1333), NT$40 001–NT$60 000 (US$1333–US$2000), NT$60 001–NT$80 000 (US$2000–US$2667), NT$80 001–NT$100 000 (US$2667–US$3333) and ≥NT$100 001 (US$3333)), daily cigarette consumption (≤15 (light) or ≥16 (heavy)), smoking status (every day or some days) and self-reported health (from 1 (very poor) to 5 (very good)).

**Statistical analysis**

IBM SPSS Statistics V.22.0 was used for statistical analysis. Because the SCPS was introduced in 2012, we compared the use of smoking cessation treatments by smokers between 2010 and 2011 (before policy) and 2013 and 2014 (after policy). Multivariable logistic regression was used to assess associations between the government's subsidisation policy and the use of smoking cessation treatments by smokers previously treated among smokers after controlling the respondents’ individual-level characteristics (gender, age, education level, marital status, monthly household income, daily cigarette consumption, smoking status and self-reported health). Subsequently, we compared the aforementioned associations between the two daily cigarette consumption groups when controlling all covariates.

### Table 1  Demographic characteristics

| Variables                        | N (%)/mean±SD |
|----------------------------------|---------------|
| **Gender**                       |               |
| Male                             | 3653 (89.2)   |
| Female                           | 442 (10.8)    |
| **Age**                          | 45.94±14.49   |
| **Education level**              |               |
| Elementary or below              | 469 (11.5)    |
| Junior high school               | 680 (16.6)    |
| High school                      | 1666 (40.7)   |
| Junior college                   | 567 (13.8)    |
| Undergraduate or above           | 713 (17.4)    |
| **Marital status**               |               |
| Single                           | 976 (23.9)    |
| Married                          | 2685 (65.8)   |
| Divorced/widowed/separated       | 421 (10.3)    |
| **Monthly household income (NTU)** |       |
| ≤20 000                          | 640 (18.4)    |
| 20 001–40 000                    | 910 (26.1)    |
| 40 001–60 000                    | 707 (20.3)    |
| 60 001–80 000                    | 481 (13.8)    |
| 80 001–10 000                    | 267 (7.7)     |
| ≥100 001                         | 482 (13.8)    |
| **Daily cigarette consumption**  |               |
| ≤15 (light)                      | 2017 (49.4)   |
| ≥16 (heavy)                      | 2069 (50.6)   |
| **Smoking status**               |               |
| Everyday                         | 3353 (81.9)   |
| Some days                        | 742 (18.1)    |
| **Self-reported health**         | 3.71±1.08     |

### RESULTS

**Demographic characteristics**

In the study, 2060 and 2035 subjects in 2010–2011 and 2013–2014, respectively, were analysed. The vast majority of the respondents were men (89.2%), almost half had education no higher than high school education (40.7%), and more than half were married (65.8%), had a monthly household income of <NT$60 000 (64.8%), were heavy smokers (50.6%) and smoked everyday (81.9%). Their mean age was 45.94±14.49 years, and their self-reported health was 3.71±1.08 (table 1).

**Use of smoking cessation treatments**

As detailed in table 2, 18.0% of those attempting to quit had used some form of cessation treatment. Specifically, 12.8% used a smoking cessation clinic, 4.7% used a pharmacy, and 0.5% used both. After controlling for individual-level characteristics, smoking cessation services...
| Variables                        | Treatment use                                                                 | Any treatment (A) | A smoking cessation clinic (B) | A pharmacy (C) | Combining a smoking cessation clinic and pharmacy (D) |
|---------------------------------|-------------------------------------------------------------------------------|-------------------|--------------------------------|----------------|-------------------------------------------------------|
|                                 | None (%)/mean±SD 3197 (82.0%)                                                 | Ref.              | Ref.                           | Ref.           | Ref.                                                  |
|                                 | Smoking cessation clinic (%)/mean±SD 194 (4.7%)                               | 0.933 (0.775 to 1.124) | 0.902 (0.756 to 1.149)        | 1.356 (0.985 to 1.866) | 3.947 (1.399 to 11.463) |
|                                 | Pharmacy (%)/mean±SD 20 (0.5%)                                                |                   |                                |                |                                                       |
|                                 | Combining a smoking cessation clinic and pharmacy (%)/mean±SD 20 (0.5%)       |                   |                                |                |                                                       |
| Policy                          | Before policy (2010–2011)                                                      | 1554 (82.0)       | 259 (13.7)                     | 76 (4.0)       | 6 (0.3)                                               |
|                                 | After policy (2013–2014)                                                      | 1643 (81.9)       | 240 (12.0)                     | 108 (5.4)      | 14 (0.7)                                              |
| Gender                          | Male                                                                          | 2861 (82.1)       | 441 (12.7)                     | 163 (4.7)      | 19 (0.5)                                              |
|                                 | Female                                                                        | 336 (80.8)        | 58 (13.9)                      | 21 (5.0)       | 1 (0.2)                                               |
| Age                             | 45.94±14.75                                                                  | 46.20±13.33       | 45.47±12.70                    | 41.75±13.65    |                                                       |
| Education level                 | Elementary or below                                                           | 374 (84.8)        | 51 (11.6)                      | 14 (3.2)       | 2 (0.5)                                               |
|                                 | Junior high school                                                            | 527 (82.9)        | 69 (10.8)                      | 37 (5.8)       | 3 (0.5)                                               |
|                                 | High school                                                                   | 1310 (82.9)       | 204 (12.8)                     | 69 (4.3)       | 5 (0.3)                                               |
|                                 | Junior college                                                                | 417 (76.7)        | 89 (16.4)                      | 32 (5.9)       | 6 (1.1)                                               |
|                                 | Undergraduate or above                                                         | 569 (82.3)        | 86 (12.4)                      | 32 (4.6)       | 4 (0.6)                                               |
| Marital status                  | Single                                                                        | 793 (85.6)        | 91 (9.8)                       | 36 (3.9)       | 6 (0.6)                                               |
|                                 | Married                                                                       | 2070 (81.0)       | 346 (13.9)                     | 127 (5.0)      | 13 (0.9)                                              |
|                                 | Divorced/widowed/separated                                                     | 324 (79.8)        | 60 (14.8)                      | 21 (5.2)       | 1 (0.2)                                               |
| Monthly household income (NTU)  | ≤20 000                                                                       | 500 (82.8)        | 83 (13.7)                      | 16 (2.6)       | 5 (0.8)                                               |
|                                 | 20 001 to 40 000                                                              | 720 (83.3)        | 96 (11.1)                      | 43 (5.0)       | 5 (0.6)                                               |
|                                 | 40 001 to 60 000                                                              | 556 (81.9)        | 79 (11.6)                      | 42 (6.2)       | 2 (0.3)                                               |
|                                 | 60 001 to 80 000                                                              | 374 (82.0)        | 62 (13.6)                      | 18 (3.9)       | 2 (0.4)                                               |
|                                 | 80 001 to 10 000                                                               | 197 (78.2)        | 37 (14.7)                      | 17 (6.7)       | 1 (0.4)                                               |
|                                 | >1 00 000                                                                     | 369 (78.3)        | 76 (18.1)                      | 22 (4.7)       | 4 (0.8)                                               |
| Daily cigarette consumption     | ≤15 (light)                                                                   | 1645 (85.2)       | 206 (10.7)                     | 76 (3.9)       | 4 (0.2)                                               |
|                                 | >16 (heavy)                                                                   | 1545 (78.8)       | 292 (14.9)                     | 108 (5.5)      | 16 (0.8)                                              |
| Smoking status                  | Everyday                                                                       | 2577 (80.8)       | 434 (13.6)                     | 162 (5.1)      | 18 (0.6)                                              |
|                                 | Some days                                                                      | 620 (87.4)        | 65 (9.2)                       | 22 (3.1)       | 2 (0.3)                                               |
| Self-reported health            | 2.27±1.07                                                                     | 2.33±1.09         | 2.42±1.07                     | 2.85±1.27      |                                                       |

*a* Categories in the index group, indicated by letters corresponding to columns under treatment use.

*b* Reference category for comparison to index group directly above, indicated by letters corresponding to columns under treatment use.
were found to be used more by heavy smokers than light smokers, including any treatment (OR=1.594; 95% CI: 1.308 to 1.942), a smoking cessation clinic (OR=1.539; 95% CI: 1.232 to 1.922), a pharmacy (OR=1.632; 95% CI: 1.157 to 2.302) and combination of a smoking cessation clinic and pharmacy (OR=4.608; 95% CI: 1.331 to 15.949).

**Change in use of smoking cessation treatments before and after SCPS**

Table 2 details the use of smoking cessation treatments before and after the SCPS began to be implemented. The prevalence of use of only a smoking cessation clinic decreased from 13.7% in 2010–2011 to 12.0% in 2013–2014. The use of only a pharmacy increased from 4.0% in 2010–2011 to 5.4% in 2013–2014. The use of combination of a smoking cessation clinic and pharmacy increased from 0.3% in 2010–2011 to 0.7% in 2013–2014. After controlling for individual-level characteristics, the SCPS was associated with an increase in the likelihood of a smoker using the combination of a smoking cessation clinic and pharmacy (OR=3.947; 95% CI: 1.359 to 11.463). However, the change in the use of only one type of treatment (OR=0.933; 95% CI: 0.775 to 1.124), regardless of whether it was a smoking cessation clinic (OR=0.932; 95% CI: 0.756 to 1.149) or pharmacy (OR=1.356; 95% CI: 0.985 to 1.866), did not reach significance in the multivariable logistic regression.

**Individual-level characteristics and use of smoking cessation treatments**

With respect to individual-level characteristics, compared with those who had an elementary-level education or below, respondents who had a junior college education were more likely to use any type of smoking cessation treatment and a smoking cessation clinic. Married respondents were more likely to use at least one treatment and a smoking cessation clinic than single respondents. Elderly respondents were less likely to use a pharmacy and smoking cessation clinic in combination than younger respondents (OR=0.938; 95% CI: 0.892 to 0.987; table 2).

**Change in the use of smoking cessation treatments before and after SCPS among heavy smokers**

Table 3 details the effect of the SCPS on the use of smoking cessation treatment among heavy smokers. The use of only a smoking cessation clinic decreased from 16.2% in 2010–2011 to 13.8% in 2013–2014. The use of only a pharmacy increased from 4.5% in 2010–2011 to 6.4% in 2013–2014. The use of both a smoking cessation clinic and pharmacy increased from 0.3% in 2010–2011 to 1.2% in 2013–2014. After controlling for individual-level characteristics, the SCPS was associated with a significant increase in the use of a pharmacy (OR=1.676; 95% CI: 1.094 to 2.569) and the combination of a smoking cessation clinic and pharmacy (OR=8.984; 95% CI: 1.914 to 42.173).

**DISCUSSION**

This is the first study of an Asian country in which associations between the government’s subsidisation policy and the use of smoking cessation treatments are evaluated. Data were obtained from repeated cross-sectional surveys of a representative sample of the national population of Taiwan. We found that among heavy smokers, use of a pharmacy and combined use of a smoking cessation clinic and pharmacy were significantly increased after the SCPS was introduced. However, the SCPS had no associations with the use of smoking cessation treatment by light smokers (see online supplemental table 1). According to our study and the number of smokers reported in government statistics for Taiwan, we estimated that the number of heavy smokers using a pharmacy and the combination of a smoking cessation clinic and pharmacy increased from 79208 and 5281 in 2010–2011 to 110961 and 20805 in 2013–2014, respectively. This suggests that the subsidisation policy was mostly used by dependent smokers. The SCPS helped the group with great need of cessation treatment because heavy smokers are less likely than light smokers to quit successfully.

In this study conducted using the population-based Taiwanese ASBS database, the treatment use rate among adult smokers was 18%, which was similar to that of the US population from 2010 to 2011 but higher than that among those included in the Arkansas Medicaid programme from 2004 to 2008. However, the rate for the Taiwanese population was much lower than that of the population included in the Massachusetts Medicaid programme (37.0%) from 2006 to 2008. This may be attributable to the longer treatment course in Massachusetts (90 days) than in Taiwan (56 days). In addition, Massachusetts’ Medicaid enrollees were more likely to be women and have higher education than the respondents in this research. One study determined that women and more educated smokers were more likely to use treatment in an attempt to quit.

We discovered that after other known variables were controlled, the government’s policy of subsidising smoking cessation treatments was associated with an increase in the use of the combination of a smoking cessation clinic and pharmacy at the population level. Similarly, on the basis of the results of this study and government statistics, we estimated that the number of smokers using the combination of a smoking cessation clinic and pharmacy increased from 10888 in 2010–2011 to 22985 in 2013–2014. The subsidisation policy is likely to encourage those trying to quit smoking to take advantage of multiple treatment methods. The present result is similar to those of other studies on the effect of governments’ subsidisation policy on the use of smoking cessation treatments. For example, Arkansas Medicaid expanded its coverage to smoking cessation treatments on 1 October 2004, which generated an initial increase in the use of smoking cessation medication. In addition, a study conducted in the USA used a nationally representative sample database and determined that...
### Table 3  Logistic regressions on tobacco-cessation treatments among Taiwanese adults aged 18 years or above among heavy smokers (prepolicy and postpolicy)

| Variables                   | Treatment use | Any treatment       | A smoking cessation clinic | A pharmacy | Combination of a smoking cessation clinic and pharmacy |
|-----------------------------|---------------|---------------------|---------------------------|------------|------------------------------------------------------|
|                             |               | B+C+D<sup>a</sup>  | B+D<sup>a</sup>          | C+D<sup>a</sup> | D<sup>a</sup>                                        |
|                             |               | Adjusted OR (95% CI) | Adjusted OR (95% CI)     | Adjusted OR (95% CI) | Adjusted OR (95% CI)                                |
| Policy                      |               |                     |                           |             |                                                      |
| Before policy (2010–2011)   | 716 (78.9)    | 147 (16.2)          | 41 (4.5)                  | 3 (0.3)     | Ref.                                                 |
| After policy (2013–2014)    | 829 (78.7)    | 145 (13.8)          | 67 (6.4)                  | 13 (1.2)    | 1.003 (0.784 to 1.283)                                |
| Gender                      |               |                     |                           |             |                                                      |
| Male                        | 1460 (79.1)   | 274 (14.8)          | 97 (5.3)                  | 15 (0.8)    | Ref.                                                 |
| Female                      | 85 (73.9)     | 18 (15.7)           | 11 (9.6)                  | 1 (0.9)     | 1.396 (0.861 to 2.261)                               |
| Age                         | 48.12±13.79   | 47.98±13.19         | 47.81±11.21               | 43.56±9.53  | 0.993 (0.981 to 1.005)                               |
| Education level             |               |                     |                           |             |                                                      |
| Elementary or below         | 221 (82.8)    | 34 (12.7)           | 10 (3.7)                  | 2 (0.7)     | Ref.                                                 |
| High school                 | 297 (79.2)    | 48 (12.8)           | 27 (7.2)                  | 3 (0.8)     | 1.096 (0.686 to 1.753)                               |
| Junior college              | 648 (79.9)    | 116 (14.3)          | 42 (5.2)                  | 5 (0.6)     | 1.064 (0.672 to 1.683)                               |
| Undergraduate or above      | 189 (78.1)    | 40 (16.5)           | 11 (4.5)                  | 2 (0.8)     | 1.149 (0.683 to 1.992)                               |
| Marital status              |               |                     |                           |             |                                                      |
| Single                      | 331 (83.0)    | 50 (12.5)           | 14 (3.9)                  | 4 (1.0)     | Ref.                                                 |
| Married                     | 1017 (77.9)   | 198 (15.2)          | 79 (6.1)                  | 11 (0.8)    | 1.411 (0.987 to 2.017)                               |
| Divorced/widowed/separated  | 189 (76.2)    | 43 (17.3)           | 15 (6.0)                  | 1 (0.4)     | 1.819 (1.132 to 2.924)                               |
| Monthly household income (NTU) |           |                     |                           |             |                                                      |
| ≤20 000                     | 280 (80.9)    | 51 (14.7)           | 11 (3.2)                  | 4 (1.2)     | Ref.                                                 |
| 20 001 to 40 000             | 359 (79.1)    | 66 (14.5)           | 25 (5.5)                  | 4 (0.9)     | 0.719 (0.458 to 1.128)                               |
| 40 001 to 60 000             | 237 (77.2)    | 40 (13.0)           | 28 (9.1)                  | 2 (0.7)     | 0.724 (0.492 to 1.066)                               |
| 60 001 to 80 000             | 157 (78.5)    | 31 (15.5)           | 10 (5.0)                  | 2 (1.0)     | 0.846 (0.567 to 1.282)                               |
| 80 001 to 10 000             | 64 (71.1)     | 18 (20.0)           | 8 (9.9)                   | 0           | 0.773 (0.490 to 1.213)                               |
| >1 000 000                  |               |                     |                           |             |                                                      |
| Smoking status              |               |                     |                           |             |                                                      |
| Everyday                    | 1472 (78.5)   | 285 (15.2)          | 103 (5.9)                 | 15 (0.8)    | Ref.                                                 |
| Some days                   | 73 (84.9)     | 7 (8.1)             | 5 (5.8)                   | 1 (1.2)     | 1.420 (0.745 to 2.710)                               |
| Self-reported health         | 3.68±1.10     | 3.65±1.12           | 3.50±1.07                 | 3.06±1.34   | 0.904 (0.811 to 1.008)                               |

<sup>a</sup> Categories in the index group, indicated by letters corresponding to columns under treatment use.

<sup>b</sup> Reference category for comparison to index group directly above, indicated by letters corresponding to columns under treatment use.
Medicaid coverage had a positive influence on non-NRT medication use. These results imply that government subsidisation of smoking cessation treatment can significantly increase the uptake of evidence-based cessation methods.

However, the use of any type of smoking cessation treatment, a smoking cessation clinic or a pharmacy did not increase significantly after the SCPS policy was implemented in Taiwan. Studies have revealed that compared with the absence of financial coverage, partial financial coverage had no effect on NRT and behavioural treatments. However, full financial coverage increased the use of NRT relative to partial financial coverage. This implies that full financial coverage is more effective than partial financial coverage in encouraging smokers to use smoking cessation treatments. The behaviour of providers is another factor. In Taiwan, a cross-sectional nationwide survey was conducted to evaluate the effects of the SCPS policy on smoking cessation services from the physician’s perspective. In that study, only 18.7% of medical institutions reported that they increased their allocation of physicians for providing smoking cessation services, and 55.0% of physicians reported an increase in the willingness of patients to adopt pharmacotherapy for smoking cessation after the SCPS was introduced. This suggests that the low incentives given to medical institutions to hire smoking cessation providers and provider behaviour are responsible for the non-significant increase in use of smoking cessation treatment since the SCPS was introduced.

Our study has some limitations. First, this study had no control group (where the policy was unchanged), a general problem in population analysis. Second, data collected in the Taiwan ASBS were self-reported and may have been subject to recall bias. Third, we only included individual-level covariates in the model, and a future study should include county-level and city-level factors when evaluating the use of cessation treatment. Fourth, ethnicity influences how tobacco control policy affects the use of smoking cessation treatments. Because the ethnicity measurements were different between 2011–2013 and 2014, we did not include ethnicity in the model. Future studies should consider ethnicity. Fifth, we did not control for the effects of any macroeconomic shocks or policy change. Everyone in Taiwan has the national health insurance (NHI), and all smokers have equal opportunity to use tobacco treatments provided under the NHI. In addition, the tobacco control policy was the same in the periods before and after SCPS introduction. Therefore, the influence of any macroeconomic shocks or policy changes may have been negligible. Finally, we did not analyse the use of medications because the ASBS did not include medication data. Future research could compare the effect of subsidisation policy on the use of different cessation medications.

CONCLUSIONS
The current study demonstrated that the government’s subsidisation policy, the SCPS, was related to an increase in the combined use of a smoking cessation clinic and pharmacy. Among heavy smokers, the SCPS had a positive effect on use of a pharmacy and combined use of a smoking cessation clinic and pharmacy. However, among light smokers, the SCPS was not related to the use of smoking cessation treatments. Rather than providing partial subsidies, full financial subsidies should be considered to eliminate financial barriers. In addition, medical institutions should be more highly incentivised to hire more smoking cessation providers.

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