

**The arrival of a new life and smoking cessation:  
how fathers and mothers stop smoking for their babies**

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**Abstract**

This study explores the association of childbearing history with smoking cessation using a national survey that collected relevant information in Taiwan in 2000. Preliminary findings of this study reveal that very few men among those having children and smoking before the first child was conceived quit during their mates' pregnancy or children's infancy. A considerable proportion of women did refrain from smoking during pregnancy. However, most women who did so relapsed and smoked again during their children's infancy. Furthermore, as it is rare that parents quit smoking during pregnancy or their children's infancy, no substantial association can be found between parental social class and their decision to quit smoking in such periods. These results suggest that it is highly necessary for Taiwan's government to persuade parents to refrain from smoking for the sake their children's health.

*Keywords:* smoking cessation, father, mother, pregnancy, child, infancy

## **Introduction**

The accumulation of knowledge on the detrimental effects of tobacco use on human health has a long history. Nevertheless, not until the 1970s did people start to pay more attention on the negative influences on health of secondhand smoke (U.S. Department of Health, Education, and Welfare, 1979). The 1980s was a time of milestone for scientific evidence on this regard. For instance, the U.S. Surgeon General's 1986 report on the health consequences of tobacco use substantially identified health risks due to involuntary smoking (i.e., inhaling secondhand smoke, which is also referred to as ETS --- environmental tobacco smoke). In particular, this report highlighted the adverse effects on child health of parental smoking during pregnancy and their children's early childhood (U.S. Department of Health and Human Service, 1986). Ever since public concerns over the harmful effects of parental smoking on child health have even elevated to an extent that parental smoking has become a critical issue in child custody disputes in advanced societies, such as the United States (Cordes, 1993; Sachs, 1993; Schwartz, 1993; Hall, 1994; McCarthy, 1994; Glassman, 1994; Moorby, 1995; Zgrodnik, 1995; Butler, 1996; Johnson, 1997; Sobie, 1997). Nonetheless, parental smoking seems to be a less disputing issue in less developed countries.

Furthermore, while it has been well recognized that concerns over personal health consequences of cigarette smoking significantly reduce an adult's tendency to smoke and a smoking adult's consumption of cigarettes (U.S. Department of Health and Human Service, 1990), much less research has been done on the relationships between adults' decisions on tobacco use and childbearing.

Since information on the deleterious impacts of parental smoking on child health has emerged for a couple of decades, many adults may have acquired abundant information in this respect and subsequently take this issue into account in various stages of childbearing. Therefore, it is likely that the history of childbearing and the timing of smoking cessation in a family are associated. In this regard, there has been little research so far. Most studies documented in the literature pertain to parental smoking status associated with an isolated instance of pregnancy or birth, rather than the history of parental smoking over the births of several children to one family. Moreover, most research investigates situations in advanced countries where the majority of population is white. In general, the literature points out that women's age, marital status, socioeconomic status, and experience in quitting tobacco use are associated with their smoking status during pregnancy (Lu, Tong and Oldenburg, 2001). Research has also indicated that the

status of primipara is correlated with women's smoking during pregnancy (Lu et al., 2001). Compared to women's smoking status during pregnancy, men's smoking status during and after their mates' pregnancy is less explored.

Taiwan is a country with a high smoking prevalence rate for males and a relatively low smoking prevalence rate for females in recent years (Cheng, Wen, Tsai, and Tsai, 2003). In 1996, 1999 and 2001, the smoking prevalence rates of male adults (aged 18 or over) in Taiwan were 51.9%, 47.3% and 46.5%, respectively (Cheng et al., 2003). While the trend of smoking prevalence among Taiwanese male adults is downward, the smoking rate is still high. As to tobacco use among females, the smoking prevalence rate of Taiwanese female adults (aged 18 or over) has been around 3% to 5% over the past a couple of decades (Cheng et al., 2003). Although the smoking rate of Taiwanese female adults does not appear to have an increasing trend, it does not significantly decline, either. As Taiwan's government and the public have devoted much effort to reduce tobacco use in recent years, smoking has gradually received less and less social acceptance in Taiwan. Nevertheless, there is less publicity for issues regarding secondhand smoke in Taiwan, compared to certain advanced countries. The detrimental effect of parental smoking on their children's health also receives

less discussion in Taiwan than in certain advanced countries. There has been little research on parental smoking during pregnancy and in their children's early childhood, too. Furthermore, to our knowledge, there has been no research specifically exploring the pattern of smoking cessation and relapse for parents with young children in Taiwan. To furnish knowledge in this area, this study enquires into this issue.

Specifically, this study investigates three issues. The first is Taiwanese women's and their mates' smoking patterns right before pregnancy, during pregnancy and in their children's infancy. The second is the association between the pattern of smoking cessation and relapse for a parent with young children and the smoking pattern of this parent's mate. The third is the relationship of socioeconomic status with a parent's smoking cessation in the childbearing period. Data for the study are from a survey related to women's and their children's health, and conducted by the National Health Research Institutes in 2000. Since this is the first study that intends to examine Taiwanese parents' pattern of smoking cessation and relapse over a period covering the births of several children to one family, findings from this study can shed light on the relationship

of parental decision to bear children and that to consume tobacco, and provide insights into formation of policies pertaining to tobacco use and child health.

## **Materials and methods**

### ***Data***

This study utilizes data from a survey entitled “NHRI 2000 Survey of Health Status of Women and Children in Taiwan,” and conducted by the National Health Research Institutes (NHRI), Taiwan. It adopted a “probability proportional to size (PPS)” stratified sampling method and collected data in sixty townships (about one sixth of all townships). After cases with wrong addresses and those unreachable after three visits were excluded, this survey had a response rate of 76%.

This is a retrospective survey. For each child, the survey covered the child’s demographics, utilization of preventive care, and health conditions. It gathered information on maternal health knowledge and attitudes on children’s preventive care, parental demographics, the history of parental education, employment, and child-bearing experiences, and family socioeconomic situations, too. Furthermore, the survey also collected information on women’s and their mates’ smoking practices during the childbearing period, and some of their other health behaviors during pregnancy. Over 98% of the respondents were the children’s mothers. For a child who seldom lived with the mother, the



respondent was the child's main caregiver. This study excludes these cases because the central issues this study investigates are with respect to parental smoking. From this database, this study extracts a sample consisting of the mothers of a representative sample of Taiwanese children born in the period from March 1, 1995 to February 28, 1999. In total, there are 3183 mothers in the sample.

### *Statistical analyses*

According to the number of children a woman had, we categorize the 3208 women into six groups: those with one child (n=547), two (n=1716), three (n=771), four (n=119), five (n=27) and six (n=3). In the first part of analysis for this study, we analyze parental smoking patterns over their childbearing history. For each single childbirth experience, we examine a woman's and her mate's smoking behavior in the six months right before a pregnancy, during pregnancy, and in the child's infancy.

The second part of analysis for this study pertains to the association between the pattern of smoking cessation and relapse for a woman with young children and the pattern for the woman's mates. For each of the first two childbirth experiences, we examine the relationship of a woman's status of smoking

cessation during pregnancy with her mate's smoking pattern; we also analyze the relationship of a woman's status of smoking relapse in her child's infancy with her mate's smoking pattern. Similarly, we investigate the relationship of a man's status of smoking cessation during his mate's pregnancy with the mate's smoking pattern, and the relationship of a man's status of smoking relapse in his child's infancy with his mate's smoking pattern. We were to probe the relationship between a woman's status of smoking cessation with her mate's corresponding behavior and the relationship of a woman's status of smoking relapse with her mate's corresponding behavior. However, the small number of smoking couples prohibits us from doing so. Therefore, we adopt the analytical plan mentioned above as an alternative strategy to explore this issue.

The third of the analysis is with respect to the relationship of socioeconomic status with a parent's smoking cessation in the childbearing period. We apply the logit model to analyze the association between a parent's smoking cessation during the childbearing period and the parent's social class, which is measured by a socioeconomic index based on both education attainment and occupation (Miller, 1983). A table illustrating the definition of this socioeconomic index is presented in the appendix. We investigate whether a parent's social class is

related to the parent's decision to at least quit smoking for some time the during childbearing period. We construct a variable to indicate the parent's decision to quit smoking. The variable value is 1 if the parent quitted smoking for at least some time during the childbearing period before the interview, and it is 0 otherwise. For comparison purposes, we also analyze the association of a parent's social class with the parent's smoking status in the six months right before the first experience of pregnancy for the family. For the smoking status mentioned above, we also construct a binary variable to indicate it, and the value "1" indicates that a parent smoked in the six months right before the first experience of pregnancy for the family.

## **Results**

### ***Sample characteristics***

Table 1 presents sample characteristics. As shown in the table, more than a half of these parents had two children, and about a quarter of them had three children at the time of interview. The majority of them were married at the time of interview. More than a half of the mothers had paid job, and almost all fathers had paid job. Most parents had high school education. The educational level of fathers was a little higher than mother's. As more fathers had paid job and their average educational level was higher than the mothers', less fathers had low-rank social classes than mothers. The majority of families had a monthly income between 30,000 and 69,999 dollars. Regarding smoking behaviors, these results show that parental smoking prevalence at the time of interview was very similar to that in the six months before the first pregnancy experience of the family.

→ Insert Table 1

### ***Women's and their mates' smoking cessation during the women's pregnancy and in their children's infancy***

Table 2 reports parental smoking status in various periods over the childbearing history. These results reveal that around sixty percent of fathers

smoked during and after their wives' pregnancy. In particular, over eighty percent of fathers with five children smoked during and after their wives' pregnancy, and none in this group quit smoking in these periods. Since the smoking prevalence rate of Taiwanese adult males was around fifty percent in late 1990s, these results indicate that the smoking prevalence among these fathers-to-be and fathers with infants was actually higher than the general level of adult males in the same period. Moreover, very few fathers-to-be and fathers quit smoking during or after their wives' pregnancy, and most men in the small group of quitters relapsed again. The majority never quit.

As to mothers' tobacco use, results from our analysis show that around four percent of mothers smoked during and after pregnancy. This prevalence rate was close to the general level of adult females in Taiwan. Women with one and those with five children appeared to smoke more. Women with four children also appeared to have a smoking prevalence rate higher than the average level of adult females in Taiwan. In particular, around eleven percent of mothers with five children smoked during and after pregnancy, and none of them quit smoking in such periods. Compared to men, a considerable proportion of women did refrain from smoking during pregnancy. In spite of this, the majority of women who

refrained from smoking during pregnancy relapsed and smoked again during their children's infancy.

→ Insert Table 2

*Association of a parent's smoking cessation and relapse pattern with the smoking pattern of the parent's mate*

Table 3 presents results related to the association of a parent's smoking cessation during a pregnancy experience of the family with the mate's smoking pattern. These results indicate that over 90% of smoking mothers had smoking mates, and most of smoking mothers with smoking mates did not quit smoking during pregnancy. Few smoking mothers had non-smoking mates.

Nevertheless, these smoking despite that their mates never smoked basically just did not quit during pregnancy. As to men's smoking cessation pattern, almost all smoking men continued to smoke during their mates' pregnancy. These findings suggest that most smoking parents do not quit smoking during a pregnancy experience of a family, almost all men continue to smoke during their mates' pregnancy, and women who have at least some smoking experience despite that their mates never smoke are very unlikely to quit smoking during pregnancy.

→ Insert Table 3

Table 4 reports results regarding the association of a parent's smoking in a child's infancy with the mate's smoking pattern. These results show that most parents relapsed. Furthermore, the results suggest that the likelihood of relapse after the second child was born is higher than that associated with the first childbirth experience.

→ Insert Table 4

***Relationships of socioeconomic status with a parent's smoking cessation pattern in the childbearing period and with the smoking status right before the first pregnancy experience of the family***

Table 5 presents results from analyses with respect to factors associated with parental choice to quit for at least some time during the childbearing period. As men usually did not quit smoking during their wives' pregnancy or children's infancy, the association of their quitting decision in such periods with their social class was not substantial. Similar to the relationship between quitting decision and social class for men, the association of women social class and their quitting decision in such periods did not appear to be substantial. Table 6 reports results from analyses with respect to factors associated with parental smoking status in the six months before their first child was conceived. In contrast to results in

Table 5, these results indicate that social class is indeed associated with adults' smoking status, and family income level is associated with men's smoking status before their childbearing period.

→ Insert Table 5

→ Insert Table 6



## **Discussion**

Findings from this study suggest that information regarding the harmful effects on child health of secondhand smoke at home does not play an important role in encouraging adults to quit smoking in Taiwan, which is a highly developing country with a high smoking prevalence rate for men and a relatively low rate for women. It appears that parental smoking is highly likely to induce substantial health risks to the youth in Taiwan and deserves more attention in our society. It is thus important for Taiwan's government to devote more efforts to transforming knowledge on the adverse effects of secondhand smoke on child health into effective tools to encourage parental smoking cessation.

As almost all Taiwanese parents continue to smoke during the period awaiting childbirth and in their children's infancy, intervention programs for smoking cessation should be targeted to all smoking adults who plan to bear children. Furthermore, as most parents who refrain from smoking when awaiting childbirth relapse in their children's infancy, intervention programs for avoiding smoking relapse after childbirth should also be emphasized. In particular, parents appear to relapse more easily in their later children's infancy, and programs for keeping parents from relapsing should be even more

emphasized for parents who just have their second or later children.

The fact that very few Taiwanese parents quit smoking when awaiting childbirth and in children's infancy deserves more exploration. As shown by findings from this study, socioeconomic status is associated with Taiwanese adults' smoking status before their childbearing period, but has no association with parental choice to quit smoking for at least some time. Such phenomenon tends to suggest that health knowledge with respect to the harmful effects of parental smoking on child health is not influential on Taiwanese parents' decision on tobacco use. Future research should be conducted to unearth reasons for such differences so that effective policies for reducing parental smoking prevalence can be formulated.

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**Table 1: Sample characteristics**

|  | All women<br>(n=3183) | Women with<br>1 child (n=547) | Women with<br>2 children (n=1716) | Women with<br>3 children (n=771) | Women with<br>4 children (n=119) | Women with<br>5 children (n=27) | Women with<br>6 children (n=3) |
|--|-----------------------|-------------------------------|-----------------------------------|----------------------------------|----------------------------------|---------------------------------|--------------------------------|
| <i><u>Maternal current smoking status</u></i>  |                       |                               |                                   |                                  |                                  |                                 |                                |
| Smoker   | 4.68                  | 7.69                          | 4.20                              | 3.24                             | 5.88                             | 11.11                           | 0.00                           |
| Non-smoker   | 95.32                 | 92.31                         | 95.80                             | 96.76                            | 94.12                            | 88.89                           | 100.00                         |
| <i><u>Maternal smoking status in the six months before the first child was conceived</u></i> |                       |                               |                                   |                                  |                                  |                                 |                                |
| Smoker   | 4.59                  | 7.50                          | 4.02                              | 3.24                             | 6.72                             | 11.11                           | 0.00                           |
| Non-smoker   | 95.41                 | 92.50                         | 95.98                             | 96.76                            | 93.28                            | 88.89                           | 100.00                         |
| <i><u>Paternal current smoking status</u></i>  |                       |                               |                                   |                                  |                                  |                                 |                                |
| Smoker   | 58.08                 | 56.26                         | 56.42                             | 61.35                            | 64.10                            | 82.61                           | 66.67                          |
| Non-smoker   | 41.92                 | 43.74                         | 43.58                             | 38.65                            | 35.90                            | 17.39                           | 33.33                          |
| <i><u>Paternal smoking status in the six months before the first child was conceived</u></i> |                       |                               |                                   |                                  |                                  |                                 |                                |
| Smoker   | 59.92                 | 58.00                         | 58.25                             | 63.19                            | 66.67                            | 82.61                           | 66.67                          |
| Non-smoker   | 40.08                 | 42.00                         | 41.75                             | 36.81                            | 33.33                            | 17.39                           | 33.33                          |
| <i><u>Number of children</u></i>   |                       |                               |                                   |                                  |                                  |                                 |                                |
| One  | 17.19                 | 100.0                         | ---                               | ---                              | ---                              | ---                             | ---                            |
| Two  | 53.91                 | ---                           | 100.0                             | ---                              | ---                              | ---                             | ---                            |
| Three  | 24.22                 | ---                           | ---                               | 100.0                            | ---                              | ---                             | ---                            |
| Four   | 3.74                  | ---                           | ---                               | ---                              | 100.0                            | ---                             | ---                            |
| Five   | 0.85                  | ---                           | ---                               | ---                              | ---                              | 100.0                           | ---                            |
| Six  | 0.09                  | ---                           | ---                               | ---                              | ---                              | ---                             | 100.0                          |
| <i><u>Marital status</u></i>   |                       |                               |                                   |                                  |                                  |                                 |                                |
| Currently married  | 97.74                 | 94.87                         | 98.54                             | 98.31                            | 98.32                            | 85.19                           | 100.00                         |
| Not currently married  | 2.26                  | 5.13                          | 1.46                              | 1.69                             | 1.68                             | 14.81                           | 0.00                           |

**Table 1 (continued)**

|   | All women<br>(n=3183) | Women with<br>1 child (n=547) | Women with<br>2 children (n=1716) | Women with<br>3 children (n=771) | Women with<br>4 children (n=119) | Women with<br>5 children (n=27) | Women with<br>6 children (n=3) |
|---|-----------------------|-------------------------------|-----------------------------------|----------------------------------|----------------------------------|---------------------------------|--------------------------------|
| <i>Maternal cohort</i>                    |                       |                               |                                   |                                  |                                  |                                 |                                |
| Born before 1965                          | 21.38                 | 14.65                         | 16.91                             | 31.04                            | 46.22                            | 48.15                           | 100.00                         |
| Born in 1965-74                           | 69.50                 | 70.51                         | 72.94                             | 64.81                            | 52.10                            | 48.15                           | 0.00                           |
| Born in 1975-84                           | 9.12                  | 14.84                         | 10.15                             | 4.16                             | 1.68                             | 3.70                            | 0.00                           |
| <i>Maternal current employment</i>        |                       |                               |                                   |                                  |                                  |                                 |                                |
| With paid work                            | 55.52                 | 63.55                         | 56.38                             | 49.16                            | 51.26                            | 37.04                           | 66.67                          |
| w/o paid work                             | 44.48                 | 36.45                         | 43.62                             | 50.84                            | 48.74                            | 62.96                           | 33.33                          |
| <i>Paternal current employment</i>        |                       |                               |                                   |                                  |                                  |                                 |                                |
| With paid work                            | 97.65                 | 96.92                         | 98.05                             | 97.22                            | 97.44                            | 100.00                          | 100.00                         |
| w/o paid work                             | 2.35                  | 3.08                          | 1.95                              | 2.78                             | 2.56                             | 0.00                            | 0.00                           |
| <i>Maternal current educational level</i> |                       |                               |                                   |                                  |                                  |                                 |                                |
| < high school                             | 19.23                 | 12.25                         | 14.64                             | 28.40                            | 43.70                            | 77.78                           | 66.67                          |
| High school                               | 53.74                 | 53.02                         | 56.15                             | 51.23                            | 46.22                            | 22.22                           | 33.33                          |
| > high school                             | 27.03                 | 34.73                         | 29.21                             | 20.36                            | 10.08                            | 0.00                            | 0.00                           |
| <i>Paternal current educational level</i> |                       |                               |                                   |                                  |                                  |                                 |                                |
| < high school                             | 19.93                 | 12.84                         | 17.25                             | 26.82                            | 38.46                            | 52.17                           | 33.33                          |
| High school                               | 44.53                 | 45.14                         | 43.57                             | 45.57                            | 49.57                            | 39.13                           | 66.67                          |
| > high school                             | 35.54                 | 42.02                         | 39.18                             | 27.61                            | 11.97                            | 8.70                            | 0.00                           |
| <i>Maternal current social class</i>      |                       |                               |                                   |                                  |                                  |                                 |                                |
| I   | 1.64                  | 2.20                          | 1.57                              | 1.69                             | 0.00                             | 0.00                            | 0.00                           |
| II  | 6.67                  | 7.52                          | 7.58                              | 4.42                             | 5.88                             | 0.00                            | 0.00                           |
| III                                       | 27.08                 | 34.68                         | 29.15                             | 20.39                            | 10.92                            | 7.41                            | 0.00                           |
| IV  | 20.13                 | 20.55                         | 20.29                             | 20.13                            | 15.97                            | 14.81                           | 66.67                          |
| V   | 44.48                 | 35.05                         | 41.40                             | 53.38                            | 67.23                            | 77.78                           | 33.33                          |

**Table 1 (continued)**

|   | All women<br>(n=3182) | Women with<br>1 child (n=547) | Women with<br>2 children (n=1716) | Women with<br>3 children (n=771) | Women with<br>4 children (n=119) | Women with<br>5 children (n=27) | Women with<br>6 children (n=3) |
|---|-----------------------|-------------------------------|-----------------------------------|----------------------------------|----------------------------------|---------------------------------|--------------------------------|
| <u>Paternal current social class</u>        |                       |                               |                                   |                                  |                                  |                                 |                                |
| <i>I</i>                                    | 5.12                  | 5.81                          | 6.11                              | 3.40                             | 0.00                             | 0.00                            | 0.00                           |
| <i>II</i>                                   | 14.27                 | 15.83                         | 15.61                             | 11.68                            | 7.02                             | 0.00                            | 33.33                          |
| <i>III</i>                                  | 33.39                 | 36.67                         | 34.48                             | 29.08                            | 32.46                            | 26.09                           | 33.33                          |
| <i>IV</i>                                   | 33.82                 | 31.46                         | 32.49                             | 38.04                            | 35.09                            | 43.48                           | 0.00                           |
| <i>V</i>                                    | 13.41                 | 10.22                         | 11.31                             | 17.80                            | 25.44                            | 30.43                           | 33.33                          |
| <u>Average monthly family income (NT\$)</u> |                       |                               |                                   |                                  |                                  |                                 |                                |
| <=29,999                                    | 11.55                 | 11.90                         | 9.87                              | 12.84                            | 19.09                            | 47.62                           | 0.00                           |
| 30,000-69,999                               | 60.01                 | 58.33                         | 59.11                             | 63.35                            | 60.91                            | 52.38                           | 66.67                          |
| 70,000-99,999                               | 18.65                 | 19.64                         | 20.13                             | 15.58                            | 16.36                            | 0.00                            | 0.00                           |
| >=100,000                                   | 9.79                  | 10.12                         | 10.89                             | 8.23                             | 3.64                             | 0.00                            | 33.33                          |
| <u>Residential region</u>                   |                       |                               |                                   |                                  |                                  |                                 |                                |
| North Taiwan                                | 34.40                 | 38.39                         | 36.01                             | 29.70                            | 24.37                            | 29.63                           | 33.33                          |
| Central Taiwan                              | 29.66                 | 20.29                         | 27.68                             | 37.87                            | 46.22                            | 40.74                           | 0.00                           |
| South Taiwan                                | 33.84                 | 38.57                         | 34.15                             | 31.39                            | 24.37                            | 25.93                           | 66.67                          |
| East Taiwan                                 | 2.10                  | 2.74                          | 2.16                              | 1.04                             | 5.04                             | 3.70                            | 0.00                           |
| <u>Type of residential district</u>         |                       |                               |                                   |                                  |                                  |                                 |                                |
| Taipei                                      | 9.68                  | 10.97                         | 11.01                             | 6.87                             | 4.20                             | 3.70                            | 0.00                           |
| Kaohsiung                                   | 8.55                  | 10.97                         | 8.97                              | 6.87                             | 3.36                             | 3.70                            | 0.00                           |
| Other large cities                          | 24.44                 | 28.70                         | 24.88                             | 22.18                            | 13.45                            | 22.22                           | 33.33                          |
| Small cities / Towns                        | 38.30                 | 34.73                         | 36.07                             | 43.32                            | 52.94                            | 44.44                           | 33.33                          |
| Rural areas                                 | 19.04                 | 14.63                         | 19.06                             | 20.75                            | 26.05                            | 25.93                           | 33.33                          |

Note: Figures shown are percentages.



**Table 2: Parental smoking status in various periods over the childbearing history**

| Period  | Smoking prevalence rate (%) |          |
|---|-----------------------------|----------|
|   | Mothers                     | Fathers  |
| <u>All women with young children</u>                | (n=3183)                    | (n=3109) |
| <i>First child (n=3183)</i>                         | (n=3183)                    | (n=3109) |
| In the six months right before this pregnancy       | 4.59                        | 59.89    |
| During this pregnancy                               | 3.64                        | 59.31    |
| In the child's infancy                              | 4.40                        | 59.34    |
| <i>Second child (n=2657)</i>                        | (n=2636)                    | (n=2591) |
| In the six months right before this pregnancy       | 3.98                        | 60.29    |
| During this pregnancy                               | 3.15                        | 59.75    |
| In the child's infancy                              | 3.72                        | 59.78    |
| <i>Third child (n=929)</i>                          | (n=920)                     | (n=900)  |
| In the six months right before this pregnancy       | 3.91                        | 64.11    |
| During this pregnancy                               | 3.04                        | 63.89    |
| In the child's infancy                              | 3.59                        | 63.78    |
| <i>Fourth child (n=151)</i>                         | (n=149)                     | (n=143)  |
| In the six months right before this pregnancy       | 7.38                        | 69.23    |
| During this pregnancy                               | 5.37                        | 68.53    |
| In the child's infancy                              | 6.71                        | 67.83    |
| <i>Fifth child (n=30)</i>                           | (n=30)                      | (n=26)   |
| In the six months right before this pregnancy       | 10.00                       | 80.77    |
| During this pregnancy                               | 10.00                       | 80.77    |
| In the child's infancy                              | 10.00                       | 80.77    |
| <i>Sixth child (n=3)</i>                            | (n=3)                       | (n=3)    |
| In the six months right before this pregnancy       | 0                           | 66.67    |
| During this pregnancy                               | 0                           | 66.67    |
| In the child's infancy                              | 0                           | 66.67    |
| <u>Women each of whom had one child (n=547)</u>     |                             |          |
| <i>First child</i>                                  | (n=547)                     | (n=518)  |
| In the six months right before this pregnancy       | 7.50                        | 57.92    |
| During this pregnancy                               | 6.03                        | 57.14    |
| In the child's infancy                              | 7.68                        | 57.14    |
| <u>Women each of whom had two children (n=1716)</u> |                             |          |
| <i>First child</i>                                  | (n=1716)                    | (n=1691) |
| In the six months right before this pregnancy       | 4.02                        | 58.25    |
| During this pregnancy                               | 3.21                        | 57.54    |
| In the child's infancy                              | 3.79                        | 57.66    |
| <i>Second child</i>                                 | (n=1716)                    | (n=1691) |
| In the six months right before this pregnancy       | 3.67                        | 57.60    |
| During this pregnancy                               | 3.21                        | 57.19    |
| In the child's infancy                              | 3.90                        | 57.48    |

**Table 2 (continued)**

| Period   | Smoking prevalence rate (%) |         |
|--|-----------------------------|---------|
|  | Mothers                     | Fathers |
| <u>Women each of whom had three children (n=771)</u> |                             |         |
| <i>First child</i>                                   | (n=771)                     | (n=757) |
| In the six months right before this pregnancy        | 3.24                        | 63.14   |
| During this pregnancy                                | 2.59                        | 63.01   |
| In the child's infancy                               | 2.98                        | 63.01   |
| <i>Second child</i>                                  | (n=771)                     | (n=757) |
| In the six months right before this pregnancy        | 2.98                        | 63.01   |
| During this pregnancy                                | 2.59                        | 62.75   |
| In the child's infancy                               | 2.98                        | 63.01   |
| <i>Third child</i>                                   | (n=771)                     | (n=757) |
| In the six months right before this pregnancy        | 3.11                        | 62.62   |
| During this pregnancy                                | 2.72                        | 62.22   |
| In the child's infancy                               | 3.11                        | 62.35   |
| <u>Women each of whom had four children (n=119)</u>  |                             |         |
| <i>First child</i>                                   | (n=119)                     | (n=117) |
| In the six months right before this pregnancy        | 6.72                        | 66.67   |
| During this pregnancy                                | 4.20                        | 65.81   |
| In the child's infancy                               | 5.88                        | 64.96   |
| <i>Second child</i>                                  | (n=119)                     | (n=117) |
| In the six months right before this pregnancy        | 5.88                        | 64.96   |
| During this pregnancy                                | 4.20                        | 64.96   |
| In the child's infancy                               | 5.88                        | 64.96   |
| <i>Third child</i>                                   | (n=119)                     | (n=117) |
| In the six months right before this pregnancy        | 5.88                        | 64.96   |
| During this pregnancy                                | 4.20                        | 64.10   |
| In the child's infancy                               | 5.88                        | 64.10   |
| <i>Fourth child</i>                                  | (n=119)                     | (n=117) |
| In the six months right before this pregnancy        | 5.88                        | 65.52   |
| During this pregnancy                                | 4.20                        | 65.52   |
| In the child's infancy                               | 5.88                        | 64.66   |
| <u>Women each of whom had five children (n=30)</u>   |                             |         |
| <i>First child</i>                                   | (n=27)                      | (n=23)  |
| In the six months right before this pregnancy        | 11.11                       | 82.61   |
| During this pregnancy                                | 11.11                       | 82.61   |
| In the child's infancy                               | 11.11                       | 82.61   |
| <i>Second child</i>                                  | (n=27)                      | (n=23)  |
| In the six months right before this pregnancy        | 11.11                       | 82.61   |
| During this pregnancy                                | 11.11                       | 82.61   |
| In the child's infancy                               | 11.11                       | 82.61   |
| <i>Third child</i>                                   | (n=27)                      | (n=23)  |
| In the six months right before this pregnancy        | 11.11                       | 82.61   |
| During this pregnancy                                | 11.11                       | 82.61   |
| In the child's infancy                               | 11.11                       | 82.61   |

**Table 2 (continued)**

| Period  | Smoking prevalence rate (%) |         |
|---|-----------------------------|---------|
|   | Mothers                     | Fathers |
| <u>Women each of whom had five children (cont.)</u> |                             |         |
| <i>Fourth child</i>                                 | (n=27)                      | (n=23)  |
| In the six months right before this pregnancy       | 11.11                       | 86.96   |
| During this pregnancy                               | 11.11                       | 86.36   |
| In the child's infancy                              | 11.11                       | 86.36   |
| <i>Fifth child</i>                                  | (n=27)                      | (n=23)  |
| In the six months right before this pregnancy       | 11.11                       | 86.96   |
| During this pregnancy                               | 11.11                       | 86.36   |
| In the child's infancy                              | 11.11                       | 86.36   |
| <u>Women each of whom had six children (n=3)</u>    |                             |         |
| <i>First child</i>                                  | (n=3)                       | (n=3)   |
| In the six months right before this pregnancy       | 0                           | 66.67   |
| During this pregnancy                               | 0                           | 66.67   |
| In the child's infancy                              | 0                           | 66.67   |
| <i>Second child</i>                                 | (n=3)                       | (n=3)   |
| In the six months right before this pregnancy       | 0                           | 66.67   |
| During this pregnancy                               | 0                           | 66.67   |
| In the child's infancy                              | 0                           | 66.67   |
| <i>Third child</i>                                  | (n=3)                       | (n=3)   |
| In the six months right before this pregnancy       | 0                           | 66.67   |
| During this pregnancy                               | 0                           | 66.67   |
| In the child's infancy                              | 0                           | 66.67   |
| <i>Fourth child</i>                                 | (n=3)                       | (n=3)   |
| In the six months right before this pregnancy       | 0                           | 66.67   |
| During this pregnancy                               | 0                           | 66.67   |
| In the child's infancy                              | 0                           | 66.67   |
| <i>Fifth child</i>                                  | (n=3)                       | (n=3)   |
| In the six months right before this pregnancy       | 0                           | 66.67   |
| During this pregnancy                               | 0                           | 66.67   |
| In the child's infancy                              | 0                           | 66.67   |
| <i>Sixth child</i>                                  | (n=3)                       | (n=3)   |
| In the six months right before this pregnancy       | 0                           | 66.67   |
| During this pregnancy                               | 0                           | 66.67   |
| In the child's infancy                              | 0                           | 66.67   |

**Table 3: Association of a parent’s smoking cessation during a pregnancy experience of the family with the mate’s smoking pattern**

|                          |   | Maternal smoking cessation                                    |             |   |             |
|--------------------------|---|---|-------------|---|-------------|
|                          |   | A woman’s smoking cessation during first pregnancy<br>(n=129) |             | A woman’s smoking cessation during second pregnancy<br>(n=90) |             |
|                          |   | Quit  | Not quit    | Quit  | Not quit    |
| Paternal smoking pattern | 1 | 25 (21.37%)   | 92 (78.63%) | 12 (15.19%)   | 67 (84.81%) |
|                          | 2 | 0 ( 0.00%)  | 0 ( 0.00%)  | 0 ( 0.00%)  | 0 ( 0.00%)  |
|                          | 3 | 1 (8.33%)   | 11 (91.67%) | 0 ( 0.00%)  | 11 (100.0%) |

**Table 3 (continued)**

|                          |   | Paternal smoking cessation  |               |  |          |             |               |
|--------------------------|---|---|---------------|--|----------|-------------|---------------|
|                          |   | A man's smoking cessation during his mate's first pregnancy<br>(n=1862) |               | A man's smoking cessation during his mate's second pregnancy<br>(n=1548) |          |             |               |
|                          |   | Quit  | Not quit      | Quit   | Not quit |             |               |
| Maternal smoking pattern | 1 | 0 ( 0.00%)  | 92 (100.0%)   | Maternal smoking pattern   | 1        | 0 ( 0.00%)  | 67 (100.0%)   |
|                          | 2 | 0 ( 0.00%)  | 25 (100.0%)   |  | 2        | 0 ( 0.00%)  | 12 (100.0%)   |
|                          | 3 | 19 (1.09%)  | 1726 (98.91%) |  | 3        | 10 ( 0.68%) | 1459 (99.32%) |

Notes:

1. Percentages shown are column percentages.
2. The three smoking patterns are defined as follows: (1) always smoke or start smoking in the period, (2) quit in the period, and (3) never smoke.

**Table 4: Association of a parent’s smoking relapse in a child’s infancy with the mate’s smoking pattern**

|                          |   | Maternal smoking relapse   |             |   |             |
|--------------------------|---|--|-------------|---|-------------|
|                          |   | A woman’s smoking relapse in the first child’s infancy<br>(n=26) |             | A woman’s smoking relapse in the second child’s infancy<br>(n=12) |             |
|                          |   | Relapse  | Not Relapse | Relapse   | Not Relapse |
| Paternal smoking pattern | 1 | 17 (68.00%)  | 8 (32.00%)  | 11 (91.67%)   | 1 ( 8.33%)  |
|                          | 2 | 0 ( 0.00%)   | 0 ( 0.00%)  | 0 ( 0.00%)  | 0 ( 0.00%)  |
|                          | 3 | 1 (100.0%)   | 0 ( 0.00%)  | 0 ( 0.00%)  | 0 ( 0.00%)  |

**Table 4 (continued)**

|                          |   | Paternal smoking relapse                                       |             |                          |   |            |             |
|--------------------------|---|--|-------------|--------------------------|---|------------|-------------|
|                          |   | A man's smoking relapse in the first child's infancy<br>(n=19) |             |                          | A man's smoking relapse in the second child's infancy<br>(n=10) |            |             |
|                          |   | Relapse  | Not Relapse |                          |   | Relapse    | Not Relapse |
| Maternal smoking pattern | 1 | 0 ( 0.00%)   | 0 ( 0.00%)  | Maternal smoking pattern | 1   | 0 ( 0.00%) | 0 ( 0.00%)  |
|                          | 2 | 0 ( 0.00%)   | 0 ( 0.00%)  |                          | 2   | 0 ( 0.00%) | 0 ( 0.00%)  |
|                          | 3 | 10 (52.63%)  | 9 (47.37%)  |                          | 3   | 8 (80.00%) | 2 (20.00%)  |

Notes:

1. Percentages shown are column percentages.
2. The three smoking patterns are defined as follows: (1) always smoke or start smoking in the period, (2) quit in the period, and (3) never smoke.

**Table 5: Factors associated with parental choice to quit smoking**

|  | Mothers |           |            | Fathers |           |            |
|--|---------|-----------|------------|---------|-----------|------------|
|  | Coef.   | Std. Err. | odds ratio | Coef.   | Std. Err. | odds ratio |
| <i>Marital status (reference group: not currently married)</i>                     |         |           |            |         |           |            |
| Currently married  | 0.34    | 0.70      | 1.41       | ---     | ---       | ---        |
| <i>Social class (reference group: class I+II+III for mothers I+II for fathers)</i> |         |           |            |         |           |            |
| III  | ---     | ---       | ---        | -0.11   | 0.48      | 0.90       |
| IV   | 0.43    | 0.77      | 1.53       | -0.36   | 0.52      | 0.70       |
| V  | -0.13   | 0.66      | 0.88       | -0.83   | 0.74      | 0.44       |
| <i>Average monthly family income (reference group: &lt;=NT\$ 29,999)</i>           |         |           |            |         |           |            |
| 30,000 - 69,999  | 0.16    | 0.67      | 1.18       | 1.42    | 1.03      | 4.12       |
| 70,000 - 99,999  | -0.10   | 0.85      | 0.91       | 2.37    | 1.06      | 10.69      |
| >= 100,000   | 1.62    | 1.06      | 5.07       | 0.42    | 1.46      | 1.53       |
| <i>Residential region (reference group: north Taiwan)</i>                          |         |           |            |         |           |            |
| Central Taiwan   | 0.92    | 0.71      | 2.51       | 1.02    | 0.59      | 2.78       |
| South Taiwan   | 0.05    | 0.72      | 1.05       | 0.76    | 0.61      | 2.13       |
| East Taiwan  | -0.25   | 1.28      | 0.78       | 1.51    | 1.20      | 4.53       |
| <i>Type of residential district (reference group: Taipei)</i>                      |         |           |            |         |           |            |
| Kaohsiung  | -1.08   | 1.15      | 0.34       | -1.04   | 0.89      | 0.35       |
| Other large cities   | -1.29   | 0.62      | 0.28       | -1.04   | 0.62      | 0.35       |
| Small cities / Towns   | -1.22*  | 0.79      | 0.29       | -1.94*  | 0.74      | 0.14       |
| Rural areas  | -1.18   | 0.76      | 0.31       | -0.89   | 0.75      | 0.41       |
| Number of observations   |         | 133       |            |         | 1,640     |            |
| Log likelihood ratio: $\chi^2(16)$   |         | 11.18     |            |         | 28.22     |            |
| Note: ** p < 0.01; * p < 0.05; $\bar{\bar{}}$ p < 0.1.                             |         |           |            |         |           |            |



**Table 6: Factors associated with parental smoking status in the six months before their first child was conceived**

|  | Mothers           |           |            | Fathers            |           |            |
|--|-------------------|-----------|------------|--------------------|-----------|------------|
|  | Coef.             | Std. Err. | odds ratio | Coef.              | Std. Err. | odds ratio |
| <i>Marital status (reference group: not currently married)</i>                     |                   |           |            |                    |           |            |
| Currently married  | 2.24**            | 0.36      | 9.36       | ---                | ---       | ---        |
| <i>Social class (reference group: class I+II+III for mothers I+II for fathers)</i> |                   |           |            |                    |           |            |
| III  | ---               | ---       | ---        | 0.73**             | 0.12      | 2.07       |
| IV   | 0.62 <sup>▯</sup> | 0.34      | 1.86       | 1.16**             | 0.13      | 3.18       |
| V  | 1.62**            | 0.28      | 5.06       | 1.39**             | 0.16      | 4.00       |
| <i>Average monthly family income (reference group: &lt;=NT\$ 29,999)</i>           |                   |           |            |                    |           |            |
| 30,000 - 69,999  | 0.13              | 0.30      | 1.14       | -0.14              | 0.15      | 0.87       |
| 70,000 - 99,999  | 0.47              | 0.37      | 1.60       | -0.34 <sup>▯</sup> | 0.17      | 0.71       |
| >= 100,000   | -0.04             | 0.51      | 0.96       | -0.62**            | 0.20      | 0.54       |
| <i>Residential region (reference group: north Taiwan)</i>                          |                   |           |            |                    |           |            |
| Central Taiwan   | -1.38**           | 0.33      | 0.25       | 0.11               | 0.12      | 1.11       |
| South Taiwan   | -1.31**           | 0.30      | 0.27       | -0.23*             | 0.13      | 0.80       |
| East Taiwan  | 0.97 <sup>▯</sup> | 0.50      | 2.63       | -0.11              | 0.29      | 0.90       |
| <i>Type of residential district (reference group: Taipei)</i>                      |                   |           |            |                    |           |            |
| Kaohsiung  | 0.06              | 0.51      | 1.06       | 0.05               | 0.23      | 1.05       |
| Other large cities   | -0.07             | 0.28      | 0.93       | -0.02              | 0.16      | 0.98       |
| Small cities / Towns   | -0.90*            | 0.35      | 0.41       | -0.18              | 0.17      | 0.83       |
| Rural areas  | 0.05              | 0.36      | 1.05       | 0.23               | 0.20      | 1.26       |
| Number of observations   |                   | 2,896     |            |                    | 2,773     |            |
| Log likelihood ratio: $\chi^2(16)$   |                   | 148.29    |            |                    | 217.55    |            |
| Note: ** p < 0.01; * p < 0.05; <sup>▯</sup> p < 0.1.                               |                   |           |            |                    |           |            |

Appendix: Definition of socioeconomic class

| Occupational type               | High-rank professional, entrepreneur | Professional, manager | Administrative employee | Small shop owner, clerk | Skilled labor   | Semi-skilled labor | Non-skilled labor |
|---------------------------------|--------------------------------------|-----------------------|-------------------------|-------------------------|-----------------|--------------------|-------------------|
| Educational level               |                                      |                       |                         |                         |                 |                    |                   |
| At least some graduate school   | <b>Class I</b>                       |                       |                         | <b>Class III</b>        |                 |                    |                   |
| College                         |                                      |                       |                         |                         |                 |                    |                   |
| Some college                    |                                      | <b>Class II</b>       |                         |                         |                 |                    |                   |
| High school or some high school |                                      |                       |                         |                         |                 |                    |                   |
| Junior high school              |                                      |                       |                         |                         | <b>Class IV</b> |                    | <b>Class V</b>    |
| Elementary school or less       |                                      |                       |                         |                         |                 |                    |                   |