Workplace smoking policies and their association with male employees’ smoking behaviours: a cross-sectional survey in one company in China

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ABSTRACT

Objectives The present work sought to evaluate different worksite smoking control policies and their associations with employees’ smoking behaviours and attitudes among Chinese male workers.

Methods This was a cross-sectional survey with a self-administered standardised questionnaire, conducted among seven production workplaces of one multinational company in Shanghai in 2008. In total, 1043 male workers were involved. Current smoking prevalence, daily cigarette consumption, quitting intention and their potential association with workplace smoking control policies (smoke free or restricted smoking) were measured.

Results Current smoking prevalence in workplaces where smoke-free policies had been imposed for 3 years was 55.5%, about 18% lower than in workplaces that only restricted smoking. Smokers in smoke-free workplaces also smoked 3.4 cigarettes less per day, made more quit attempts, were more confident of successfully quitting and more willing to accept a company sponsored cessation programme. Those patterns declined or were not found among the workplaces where smoking control policies had been imposed for 10 years. Smoker quitting intentions were not associated with workplace smoking policies regardless of the duration of the policies imposed.

Conclusions A smoke-free workplace policy was found to have a significant association with lower smoking prevalence and daily cigarette consumption, but not with employee quitting intentions. Restrictive smoking policies had no impact on employee smoking behaviours. The impact of workplace smoking control policies may vary over time.

As the most preventable cause of premature death and disability, cigarette smoking is one of the most important public health challenges worldwide. After home, the workplace is where people spend most time and is thus the place where potential exposure to secondhand smoke (SHS) is greatest. Smoke-free workplaces are important because of their value in protecting non-smoking employees from SHS and because creation of smoke-free environments is one of the most effective strategies for reducing tobacco consumption, increasing smokers’ desire to quit and increasing their likelihood of cessation.

With a population of 1.3 billion, China is the world’s largest producer and consumer of tobacco. As estimated in the China Tobacco Control Report 2007, there are more than 350 million smokers and about 540 million regular SHS smokers in China, which is still believed to be in an early stage of the tobacco epidemic. The working population aged 50 to 50 years has the highest smoking prevalence. The proportions of relapsed quitters and former smokers are comparable in all occupational groups, with blue-collar workers having the lowest rate of quitting among various occupations. Workplaces are often described as an ideal setting to help smoking employees reduce cigarette consumption, increase their desire to quit and increase their likelihood of cessation by imposing policies prohibiting and restricting smoking in workplaces. Since the 1980s, the Chinese government has introduced a series of regulations to prohibit smoking in public settings such as public transport, theatres and hospitals. However, the implementation of these policies—and therefore their impact—has been far from satisfactory. Most workplace smoking control policies were inspired by safety and production concerns rather than to protect employees’ health. This has resulted in a diversity of smoking policies imposed in workplaces over the country. Partially because of that, there have been few studies evaluating workplace smoking policies and their impact on employee smoking behaviours in China. Furthermore, most research on workplace smoking control policies has been focused on the protection of non-smokers, rather than on smokers who also benefit from the policies.

This study sought to investigate smoking prevalence and behaviours of Chinese workers whose workplaces had introduced types of smoking control policies for 3 or 10 years, to evaluate the relationship between workplace smoking control policies and employees’ smoking behaviours.

METHODS

A smoking-related survey was conducted in a multinational company in Shanghai as part of the company’s health promotion campaign during December 2007 to July 2008. All seven production plants located in Shanghai were included in this survey. The workforces involved ranged from 49 to 613. Because of safety and production requirements, fully smoke free (n=3) or restrictive smoking policies (n=4) had been strictly implemented in all plants since their establishment. These policies had been equally and persistently implemented by all plants since their commencement. A ‘smoke-free policy’ was defined as smoking being prohibited everywhere at the workplace site. In such workplaces, smoking is only allowed outside the workplace fence. A ‘restrictive smoking policy’ means that smoking is only permitted in a designated indoor...
smoking room on site. Of these seven plants, two worksites (one with a smoke-free policy, one with a restrictive smoking policy) had implemented their policies for 5 years, and the other five sites (two with smoke-free policies and three with restrictive smoking policies) had implemented their policies for about 10 years.

Before the survey, the purpose of the study was explained to the plant management and commitment obtained to support the study. To encourage worker participation, employees in all worksites were sent brochures and/or emails and exposed to posters promoting the survey. Each plant designated one survey coordinator who received a half-day training session. During March and May 2008, a self-administered questionnaire was distributed via the coordinators to all employees. Completion of the questionnaires was anonymous. Questions covered:

- Occupation: professionals and managers, laboratory workers and technicians, sales and marketing, production operators.
- Smoking status: ever smokers were defined as those who had smoked at least 100 lifetime cigarettes and current smokers were those who reporting smoking at the time of survey. Current smokers were further stratified as light (<10 cigarettes per day), moderate (10–19 cigarettes per day), heavy (20–29 cigarettes per day) and very heavy smokers (≥30 cigarettes per day).
- Intention to quit was categorised as no quitting intention in the next 6 months; intention to quit within 6 months; and quitting intention as no quitting intention in the next 6 months or having an intention to quit by age, education, occupation and night shift workers with 3-year smoking control policies had a higher smoking prevalence (75.9%) than the production workers (68.6%). Trend analyses indicated that smoking prevalence decreased with higher education levels across all workplaces (p<0.01), regardless of type of smoking policy. No such trend was found between smoking prevalence and age (p>0.05). Night shift workers from plants with 3-year smoking control policies had a higher smoking prevalence (62.4% to 90.0%) than day shift workers (40.0% to 49.5%).

Table 1 shows current smoking prevalence and intention to quit by age, education, occupation and night shift workers with two types of smoking control policies in their workplaces. In workplaces that had implemented smoking policies for 5 years, employees from completely smoke-free workplaces had a smoking prevalence 24.3% lower than those with only restrictive smoking workplaces (55.5% vs 73.3%). However, there was no difference between employees working at sites that have had smoking policies in place for 10 years. Among occupational groups, production operators consistently had the lowest smoking prevalence, regardless of the type of smoking policy at their workplaces and the period the policy had been imposed for (p<0.05). For workplaces where smoking policies had been imposed for 10 years, professionals and laboratory technicians had the lowest smoking prevalence, while sales/marketing workers had a higher smoking prevalence (75.9%) than the production workers (68.6%). The results were as follows:

| Policy in place for 3 years | Policy in place for 10 years |
|----------------------------|-----------------------------|
| Restricted, % (n)          | Smoke free, % (n)           | Restricted, % (n) | Smoke free, % (n) |
| Age ≤30                    | 77.4 (24)                   | 45.8 (72)*        | 39.6 (144)        | 40.4 (47) |
| 30–39                      | 61.5 (13)                   | 61.7 (133)        | 59.7 (139)        | 61.5 (65) |
| 40–49                      | 47.1 (17)                   | 73.6 (208)        | 64.6 (48)         | 74.7 (68) |
| 50+                        | 100 (1)                     | 60.0 (5)          | 62.0 (100)        | 80.0 (20) |
| Education                  |                             |                  |                  |
| 10 years                   | 84.6 (32)                   | 61.5 (117)*       | 73.8 (277)        | 72.3 (83) |
| 13–14 years                | 55.6 (9)                    | 59.7 (62)†        | 50.0 (80)         | 64.2 (39) |
| ≥15 years                  | 35.4 (48)                   | 26.0 (104)        | 28.6 (35)         | 42.1 (34) |
| Occupation                 |                             |                  |                  |
| Production operators       | 69.5 (32)                   | 59.9 (157)†       | 68.6 (369)        | 71.7 (106) |
| Professionals              | 30.0 (10)                   | 33.3 (18)†        | 34.6 (78)         | 36.4 (33) |
| Laboratory technicians     | 33.3 (6)                    | 48.9 (47)†        | 36.0 (80)         | 41.2 (34) |
| Sales/marketing            | 100 (1)                     | 60.0 (5)          | 75.9 (58)         | 57.1 (71)† |
| Night shift work           |                             |                  |                  |
| Yes                        | 90.0 (30)                   | 62.4 (157)†       | 70.1 (321)        | 72.0 (75) |
| No                         | 40.0 (15)                   | 40.0 (70)         | 48.1 (270)        | 49.5 (105) |
| Total                      | 73.3 (45)                   | 55.5 (227)†       | 60.1 (591)        | 58.9 (180) |

*p<0.01.
†Using the Mann–Whitney test.
The proportion of smokers who smoked their first cigarette within 5 min after waking up was the highest (17.2%) in 10-year restrictive smoking workplaces. This was nearly twice the proportion (9.4%) in the 10-year smoke-free workplaces and three times that of the workplaces with 3-year policies (4.8% to 6.1%). The workplaces with restrictive smoking policies had the highest numbers of very heavy smokers (6.8%) compared to all other groups (0% to 0.9%).

Although a majority (70%) of all smokers believed smoking had a moderate to severe impact on their health, nearly a quarter of employees thought smoking was either harmless or had only a mild impact on their health. Around 15% of smokers believed that quitting smoking even had a negative impact to their health. These findings were similar to the results of the 1996 China National Smoking Prevalence Survey and the results of previous research. However, around 90% of smokers were supportive of smoking policies in workplaces and public settings.

The results of multiple logistic and linear regression analyses on the relationship between daily cigarette consumption and quitting intention and potential confounders are shown in table 3. No significant association between age and daily cigarette consumption was found among workplaces with 5 years of smoking policy implementation. But smokers from workplaces with 10 years of restrictive smoking control policies who were aged more than 40 years consumed more cigarettes, 3–5.8 per day, than younger smokers. However, the smokers in the over 50 age group were twice as likely to intend to quit as smokers aged less than 30 years.

Education was not associated with daily cigarette consumption, or with quitting intention. The professional group from workplaces with 10 years of restrictive smoking policies smoked significantly less—2.5 cigarettes per day—than production operators (p<0.01). The laboratory technicians from workplaces with smoking policies in place for 3 years had significantly stronger quitting intentions, while similar responses were also found in the sales and marketing groups from the workplaces that had smoking control policies in place for 10 years. For unknown reasons, smokers from workplaces that had had smoking policies for 10 years showed more significant quitting attempts over the past year and more confidence with regard to their quitting results. This was not found among the employees from the workplaces that had had smoking policies for 5 years. Smokers who were willing to participate in a company-sponsored cessation programme were unsurprisingly 3–6 times more likely to intend to quit smoking than those uninterested in the company cessation programme (p<0.01), no matter how long the smoking control policies had been imposed at their workplaces.

For workplaces with 3-year smoking policies, employees from completely smoke-free workplaces smoked significantly less (3.4 cigarettes per day) than smokers from workplaces with only restrictive smoking policies (p<0.01). However, this impact was not seen between the workplaces where smoking policies had been in place for 10 years.

No significant association was found between workplace smoking control policies and smokers’ quitting attitudes regardless of how long the smoking policies had been in place.

**DISCUSSION**

This is the first study in China to investigate smoking control policies in plants and their association with employee smoking behaviours, as well as their changes over time. The results show that workplace smoking control policies may have a strong association with smoking prevalence and daily cigarette consumption, but their association with smokers’ quitting intentions is weak. This association seems more significant among workplaces that have had their policies in place for a shorter time.

Workplace smoke-free policy appeared to have a strong association with lower smoking prevalence, as well as reducing the number of cigarettes smoked. Smoke-free policies were associated with a greater proportion of light smokers, fewer heavy smokers and a longer time until first cigarette after waking. The patterns of smoking prevalence and daily cigarette consumption in restrictive smoking workplaces were quite similar to that reported in the 2002 China national smoking survey, although the majority of workplaces in the national survey did not restrict onsite smoking at all. Our results are also consistent with the findings of a Taiwanese study in which the smoking prevalence of male employees was significantly lower (29.5%) in workplaces with restrictive smoking policies than those with either restrictive (42.7%) or unrestricted policies (44.5%).

The pronounced effects of a completely smoke-free workplace on smoking prevalence and daily cigarette consumption may have decayed over time: the significant impact found in the workplaces where smoke-free policies had been imposed for 5 years was not found in workplaces where the policy had been implemented for 10 years. Smoking prevalences in workplaces where restrictive or smoke-free smoking policies had been implemented for 3 years had significantly lower (29.5%) in workplaces with prohibitive smoking policies than those where restrictive or smoke-free smoking policies had been implemented for 10 years. Smoking prevalences in workplaces where smoke-free policies had been implemented for 10 years were significantly less (2.5 cigarettes per day)—than production operators (p<0.01). The laboratory technicians from workplaces with smoking policies in place for 3 years had significantly stronger quitting intentions, while similar responses were also found in the sales and marketing groups from the workplaces that had smoking control policies in place for 10 years. For unknown reasons, smokers from workplaces that had had smoking policies for 10 years showed more significant quitting attempts over the past year and more confidence with regard to their quitting results. This was not found among the employees from the workplaces that had had smoking policies for 5 years. Smokers who were willing to participate in a company-sponsored cessation programme were unsurprisingly 3–6 times more likely to intend to quit smoking than those uninterested in the company cessation programme (p<0.01), no matter how long the smoking control policies had been imposed at their workplaces.

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imposed for 10 years were quite similar to each other (60.1% vs 58.9%), which was also similar to the 2002 national survey result of 57.4%.

Occupation is another factor associated with employee smoking behaviours. In our study, production operators had the highest smoking rate among all occupation groups. But salesmen and marketing employees, who are normally more educated than production operators, had similar smoking rates to production operators. As emphasised in the 2009 China National Smoking Report, awareness of the health impacts of cigarette smoking among the Chinese population is still very low and this issue is further exacerbated by the implementation of largely ineffective health promotion campaigns.14 More importantly, cigarettes are still a common commercial product in China and smoking is perceived as an important component of social activity and a way of communicating.10 15 16 Mao et al, in their study on factors influencing smoking by Chinese adults, indicated that in most Chinese social situations positive perceptions of smoking will be highly influential in increasing smoking rates and uptake.17 This may partially explain the highest smoking rate being in sales/marketing employees in our study. Because of their working roles, those group employees are exposed daily to such smoke with their customers or clients. Their high smoking rates, therefore, could reflect a combination of lack of knowledge of health effects, permissive smoking in most public settings (even if smoking is not allowed in their workplaces) and positive social perceptions of smoking. However, education appears to impact on quitting behaviour. We found university educated smokers had a higher proportion who reported that they had made quitting attempts in the past 12 months, around 60% of current smokers, in their workplace with smoking policies implemented for 10 years in their workplace with smoking policies implemented for 3 years.

Table 3 Results of multiple logistic (ORs) and multiple linear (β weight) regression analyses of factors associated with smokers’ daily cigarette consumption and quitting attitudes (N=620)

| Workplace with smoking policies implemented for 3 years | Workplace with smoking policies implemented for 10 years |
|--------------------------------------------------------|--------------------------------------------------------|
| **Daily cigarette consumption, β weight (95% CI)**     | **Daily cigarette consumption, β weight (95% CI)**     |
| Age                                                    | Age                                                    |
| <30                                                    | Reference                                              |
| 30–39                                                  | 1.431 (–0.325 to 3.187)                                 |
| 40–39                                                  | –2.630 (–6.467 to 0.806)                               |
| ≥50                                                    | 1.187 (–3.823 to 6.198)                                |
| **Quitting attitudes, OR (95% CI)**                     | **Quitting attitudes, OR (95% CI)**                     |
| Age                                                    | Age                                                    |
| <30                                                    | Reference                                              |
| 30–39                                                  | 0.411 (0.158 to 1.068)                                 |
| 40–39                                                  | 0.313 (0.040 to 2.457)                                 |
| ≥50                                                    | 2.290 (0.074 to 70.938)                                |
| **Education**                                          | **Education**                                          |
| ≤9 years                                               | Reference                                              |
| 10–12 years                                            | –0.146 (–1.941 to 1.650)                               |
| 13–14 years                                            | 1.298 (–1.667 to 4.264)                                |
| ≥15 years                                              | –1.165 (–4.199 to 1.870)                               |
| **Occupation**                                         | **Occupation**                                         |
| Production operators                                   | Reference                                              |
| Professionals                                          | –1.672 (–5.840 to 2.497)                               |
| Laboratory technicians                                 | 0.613 (0.229 to 1.635)                                 |
| Sales/marketing                                        | 13.168 (2.506 to 69.187)*                              |
| **Night shift work**                                   | **Night shift work**                                   |
| No                                                     | Reference                                              |
| Yes                                                    | 1.634 (–0.545 to 3.812)                                |
| **First cigarette after waking up (min)**              | **First cigarette after waking up (min)**              |
| <5                                                     | Reference                                              |
| 6–30                                                   | –1.825 (–5.596 to 1.945)                               |
| 31–60                                                  | –4.838 (–8.557 to –1.120)*                             |
| >60                                                    | –7.266 (–10.921 to –3.612)                             |
| **No. of quitting attempts in the past 12 months**     | **No. of quitting attempts in the past 12 months**     |
| 0                                                      | Reference                                              |
| 1                                                      | 2.579 (0.030 to 5.129)*                                |
| 2                                                      | 1.764 (–0.430 to 3.959)                                |
| >2                                                     | 1.281 (–0.977 to 3.539)                                |
| **Self-confidence about quitting**                     | **Self-confidence about quitting**                     |
| Will not succeed                                       | Reference                                              |
| May not succeed                                        | –0.295 (–3.549 to 2.959)                               |
| Uncertain                                              | –0.843 (–3.791 to 2.105)                               |
| May succeed                                            | –0.365 (–3.294 to 2.563)                               |
| Will succeed                                           | –3.265 (–6.537 to 0.006)                               |
| **Acceptance to cessation programme in workplace**     | **Acceptance to cessation programme in workplace**     |
| No                                                     | Reference                                              |
| Yes                                                    | –0.443 (–2.243 to 1.358)                               |
| **Smoking policies in workplace**                      | **Smoking policies in workplace**                      |
| Restrictive smoking                                    | Reference                                              |
| Smoke free                                             | –3.384 (–5.529 to 1.240)*                              |

*p<0.05. †p<0.01.
smokers had tried to stop for at least a day in the preceding 12 months. This contrasts with smokers from Western countries with long-standing tobacco control policies, such as in the US where most smokers report wanting to quit.18 19 While smoke-free policies have been extensively implemented in workplaces in the West, even more importantly cigarette smoking is increasingly being denormalised, making smoking a socially unacceptable behaviour.20 Unfortunately, this is far from being the case in China and serves to weaken the effects of workplace smoking restrictions.

We found no significant association between smoking control policies and employees’ quitting intentions. Implementing workplace smoke-free policies for safety and production reasons, as opposed to employee health protection, could partially be relevant in explaining this. Smedslund et al, using meta-analytic procedures, compared 19 studies on the effectiveness of workplace cessation programmes and found smoking cessation interventions showed initial effectiveness, but the effect seemed to decrease over time and was not present beyond 12 months.21 The authors attributed this to the proportion of committed ‘hardcore’ smokers who may be less motivated to quit and more likely to be nicotine dependent. In our study, the workplaces where smoking policies had been imposed for 10 years had more heavy to very heavy smokers than the workplaces where smoking control policies had been imposed for 5 years. The smokers from these workplaces with policies in place for 10 years also made less quitting attempts (50%) in the last 12 months than smokers (80%) from workplaces where the relevant smoking restrictions had been implemented for 5 years.

After China ratified the WHO Framework Convention on Tobacco Control in 2005, a series of regulations were enacted by the Chinese government to strengthen tobacco control in public settings such as public transport, cinemas and hospitals, but very few workplaces were affected.14 Even in these public settings, the effects of tobacco control are still less than satisfactory. China is still considered to be in the early stages of the tobacco epidemic. The prevalence of smoking in Chinese men seems to have levelled off, but has not yet dropped. In 2005, as estimated, a total of 673 000 deaths were attributable to smoking in China.22 The adverse health effects of smoking cause a huge economic burden to the Chinese society, with an estimated cost of $5 billion in 2000. Of this, $1.7 billion or 3.1% of national healthcare expenditure, was spent on treating smoking-related diseases.23 To reduce such a huge social and economic burden, effective and sustained tobacco control programmes are urgently needed to curb the tobacco epidemic in China. More stringent smoking control policy, therefore, needs to be emphasised in workplaces in China to move more smokers to consider quitting smoking.

The limitations of this study are those inherent in any cross-sectional research: no causal inferences can be drawn between workplace smoking control policies and employee smoking behaviours. It is possible that lower smoking rates were evident among employees whose workplaces imposed smoke-free policy before the policies were adopted. Small sample sizes in some subgroups could be another bias in this study, which may limit our data analyses. Another possible limitation in this study is that we relied on participant self-report of smoking behaviour. However, we can conceive of no reasons in the conduct of the survey as to why respondents should falsely report their smoking status. Since this survey was conducted in one multinational company in Shanghai, the findings may not reflect China at large.

In conclusion, this study found a significant association between the stringency of workplace tobacco control policy and lower smoking prevalence and daily cigarette consumption, although these impacts varied over time. However, smokers’ quitting intentions were not associated with workplace smoking policies. These results call for more stringent workplace smoking policies. Such initiatives should also be extended across China to other public places and the home.

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