Evaluation of smoking control policies in Norway
2003–2007
HEMIL/SIRUS Report no 4

Smokefree restaurants and pubs:

Air quality, self reported health and job satisfaction

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PREFACE

The National Institute for Alcohol and Drug Research (SIRUS) and Research Centre for Health Promotion (HEMIL),[1] University of Bergen, collaborate in carrying out a comprehensive evaluation of Norwegian tobacco control policies for the period 2003–2007. The findings of the evaluation will be published in a series of articles in national and international scientific journals. To ensure faster and easier access than is normally the case with articles in such journals, however, we are publishing some of the results in a series of reports, of which this is one.

We would like to thank Karl Erik Lund, Jostein Rise and Marianne Lund, SIRUS and Rita Lill Lindbak, Directorate for Health and Social Affairs, for reading and commenting earlier drafts of this report. We are also indebted to Terje Svendsen and Håkon Kavli (MMI), who were in charge of the collection of data among employees. All these deserve thanks for the many useful and constructive ideas they offered during the planning of this study.

Bergen, April 2005
Jørn Hetland, Leif Edvard Aarø

[1] The Research Centre for Health Promotion (HEMIL) is organized as a section under the Department of Education and Health Promotion, University of Bergen. It carries out research and administers educational programmes in matters related to health promotion. Its various research teams address issues such as health behaviour and health behaviour change (including programme evaluation), impact of social contexts on health and wellbeing, anti-social behaviour (bullying in particular), and politics related to health. The Centre is involved in research on preventive and health-promoting efforts in developing countries. HEMIL has been a WHO collaborating centre since 1990.

SUMMARY

June 1st. 2004 some revisions of the Norwegian tobacco control legislation entered into force. From this date, there was a total ban on smoking in all food and drink establishments. The Research Centre for Health Promotion (HEMIL), University of Bergen, was responsible for conducting a survey among employees in the hospitality business to detect possible changes in the employees' experienced air quality, self-reported health, and job satisfaction.

The survey is a prospective panel-study with three data collections; one baseline and two follow-up surveys. The follow-up data collections took place five months and one year after the introduction of the smoke ban. This report is based on data from the baseline survey and the first follow-up survey. Based on a standardised interview guide (Appendix A) a 10 minute telephone interview with 1525 employees in the hospitality business was performed in May 2004. At the first follow-up 847 from this original sample participated.

Findings from the baseline survey (before the introduction of the smoke-ban) revealed that a substantial part of the employees in the hospitality business reported that they were bothered by tobacco smoke from others at their workplace. Also other aspects of the indoor climate were experienced as negative among many employees. Furthermore, the baseline survey showed a substantial variation in general health complaints and respiratory symptoms. Finally, it was shown that the employees to a great extent were satisfied with their work before the introduction of smoke-free hospitality premises.

The first follow-up study showed that there had been a major reduction in the number of employees who were bothered by smoke from others (from 44 % to 6 %), and that there had been a clear reduction of indoor air-quality problems such as bad smell, dry air, and "stuffy" air. Furthermore there had also been a marked reduction in the number of employees reporting general health complaints and a moderate reduction in the employees' experiences of respiratory symptoms during this period. Finally, we found that the employees, also after the introduction of the smoke-ban, reported high satisfaction with their work. Still, a moderate change towards lower job satisfaction had occurred. However, this weak but statistically significant decrease in job satisfaction detected only occurred among employees who smoke.

Thus we can, with great certainty, conclude that the introduction of smoke-free hospitality businesses has led to a substantial improvement in the subjectively experienced air-quality among employees. It is also likely that the reduction in general health complaints and respiratory symptoms can be at least partly explained by the improved air-quality.

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1. BACKGROUND

The June 1st 2004 amendment to the Act on the harmful effects of tobacco made smoking illegal in restaurants, pubs and all other businesses in the hospitality industry. The reform thus brought staff in the hospitality business into step with virtually all other Norwegian employees whose right to a smoke-free working environment had been enact since 1988.

A major evaluation is currently under way of the Government's 2003–07 tobacco control programme, of which the present one-year panel study among workers in the hospitality sector is one component. The survey is conducted by the Research Centre for Health Promotion (HEMIL), University of Bergen, on behalf of the Directorate of Health and Social Affairs (Shdir), and explores smoking habits, perceived air quality, health, job satisfaction, strategies to accommodate smoking customers, enforcement of the ban, and expectations and attitudes to the total ban on smoking before and after it entered into force. This report documents findings from the baseline (May 2004) and first follow-up (September/October 2004) data collections. In the following we set out to present findings in four areas:

I. Perceived air quality

II. General health complaints

III. Respiratory symptoms

IV. Job satisfaction

The present report is divided into two main sections. In the first section results based on the full study sample at baseline are presented in order to a draw a picture of the pre-reform situation. The second section presents results based on reports from those responding both at baseline and at the first follow-up data collection. This in order to detect possible changes over time in the three domains noted above.

2. EARLIER RESEARCH

There appears to be widespread consensus among experts that exposure to environmental tobacco smoke over longer periods of time is detrimental to health. Studies show that passive smoking is related to an increased risk of lung cancer (Hackshaw, Law, & Wald, 1997) and cardiovascular disease (Law, Morris, & Wald, 1997; Wells, 1998). Less attention has been paid, however, to the more immediate effects of second-hand smoke such as respiratory symptoms, (Leaderer & Samet, 1994) headache, dizziness and irritated eyes (Eisner, Smith, & Blanc, 1998). In addition, the link between passive smoking and breathing difficulties in the existing research is not unequivocal. While some studies suggest that there is a relationship between exposure to second-hand smoke and the development of respiratory symptoms (Dayal, Khuder, Sharrar, & Trieff, 1994; Greer, Abbey, & Burchette, 1993; Robbins, Abbey, & Lebowitz, 1993), others have not found support for the existence of such relationship (Jaakkola, Jaakkola, Becklake, & Ernst, 1996; Schwartz & Zeger, 1990).

The total ban on smoking in eating and drinking establishments offers a convenient opportunity to study the relationship between exposure to environmental tobacco smoke and short time health outcomes. As is widely known, employees in the hospitality sector are highly exposed to second-hand smoke from smoking customers (Siegel, 1993). It is a reasonable assumption that the total ban will reduce such exposure. Consistent with this assumption, Eisner et al. (1998) found a clear decline in the exposure of staff to second-hand smoke before and after California made smoking illegal in bars and restaurants. Furthermore, the prevalence of sensory irritation symptoms and respiratory symptoms among the employees declined markedly after introduction of the smoking ban. The researchers behind this study suggest that there is a direct connection between the improvement of the indoor air quality and the decline of symptoms. Surveys of commercial airline crew paint a similar picture – improved air quality leads to better health (Wieslander, Lindgren, Norback, & Venge, 2000). It would therefore be reasonable to expect the Norwegian ban to produce a similar effect.

Searches in scientific databases revealed no published studies on possible effects of a ban on smoking in eating and drinking establishments on the employee's job satisfaction. However, it

is a reasonable assumption that significantly cleaner air, as demonstrated by the study in Californian bars and restaurants, may have a positive effect on the psychosocial climate as well. On the other hand, several reports in the media warned against a reduction in the number of customers and increased risk of bankruptcies. In line with this, an earlier report from the present study shows a small increase (8%) in the proportion of employees that report that they fear for their jobs as a result of the smoke ban (Hetland & Aarø, 2005). This might, of course, have a negative impact on job satisfaction. Finally, it is reasonable to assume that a smoking ban in bars and restaurants may have negative effects on job satisfaction among employees who are smokers.

3. METHODOLOGY

3.1 Design

The present study is a two-wave follow-up study among employees in the hospitality business. The baseline data collection was completed in May 2004, the first follow-up survey in September/October 2004, and a second follow-up survey in May 2005. The data were collected by the market research company MMI using telephone interviews. The commissioning parties were the Directorate of Health and Social Affairs and the Research Centre for Health Promotion.

3.2 Sample and selection procedures

Relevant restaurants and other hospitality establishments were contacted by telephone, and one employee from each establishment was selected according a predefined procedure designed to ensure random selection. A standardised questionnaire was used for the ten-minute telephone interviews with the selected employees (Appendix A).

1,525 respondents took part in the baseline survey: 719 males and 806 females (Table 1). Average age was 35.1 years. From this original sample, 847 participated in the next data collection (first follow-up survey). Attrition at the second data collection was 44.5 %.

Analyses of attrition revealed no significant differences between respondents proceeding to the follow-up round and those who did not, with regard to self-reported air quality, general and respiratory health problems, and smoking habits at the baseline study. We are therefore reasonably confident that no systematic mechanism was involved, causing respondents to abstain from the follow-up survey.

Table 2 offers a breakdown of the establishments at which the respondents worked. As respondents were allowed to tick more than one response option, the total percentage is higher than 100 % (140 %), and the total number of responses is 2,139. As the table shows, the establishments were predominantly restaurants (55 %), cafés/cafeterias/roadside cafés (30 %), or bars/pubs (38 %). Six percent were discos or night clubs and 5 % coffee bars.

3.3 Measurement

Perceived air quality: Perceived air quality was measured by a four item scale, borrowed from the *Örebro Indoor Climate Questionnaire* (Skulberg et al., 1996) and modified in order to fit with the purpose of the present study (See Appendix A).

General health complaints: measured by a eight item scale, borrowed from the *Örebro Indoor Climate Questionnaire* (Skulberg et al., 1996) and modified in order to fit with the purpose of the present study (See Appendix A).

Respiratory symptoms: Respiratory symptoms were measured by a modified version of five questions developed by Gulsvik et al. (1991). In the original version, compiled for respiratory disease patients, response options were “yes” or “no”. Because the questions were to be given to a non-patient population and in order to capture more details and variation in informants’ responses, we applied a wider ranger of response categories. (See Appendix A)

Job satisfaction: Job satisfaction was measured by an abbreviated version (five items) of Brayfield and Rothe’s job satisfaction index (Brayfield & Rothe, 1951, cited in Judge et al., (2001). (See Appendix A)

3.4 Analyses

The section on results from the baseline survey (Results: Part 1) includes frequency analyses of individual variables for each of the four focus areas based on data from the full study sample. Furthermore, principal components analyses (pariwise deletion of cases and varimax rotation) and tests of Cronbach's Alpha were conducted in order to examine dimensionality and reliability of scales.

In Results: Part 2 we move on to frequency analyses of individual variables for each of the four focus areas based on data from respondents who participated in the baseline and the first follow-up study. For categorically ordered variables, we applied Wilcoxon's total sample test to test for differences between measurement occasions 1 and 2. Furthermore, based on the principal components analyses and reliability tests, sumscores for each of the four focus areas were computed and differences between means were tested by T-tests for correlated data. All analyses were performed by SPSS 13.0.

4. RESULTS: PART 1

4.1 Perceived air quality

Table 3 shows percentage distributions of reported problems with indoor air quality at the working premises. As the table shows, second-hand smoke is the most frequently cited problem. At the baseline measurement 44 % of the respondents reported that they sometimes or more often experience discomfort from exposure to environmental tobacco smoke. Furthermore, 38 %, 38 % and 34 %, respectively, complained of poorly ventilated (stuffy), dry, or smelly indoor climate.

In order to use the four items measuring indoor air quality problems as a sumscore, a principal component analysis (a statistical technique similar to factor analysis) was conducted. The principal component analysis showed adequate loadings for the four items on one single underlying air quality dimension (Table 3b). Reliability tests indicated satisfactory internal consistency levels (alpha= .73).

4.2 General health complaints

Table 4 presents the percentage distribution of general health complaints reported by employees in the hospitality business. The table reveals that there is large variation in the frequency of the various symptoms among the employees.

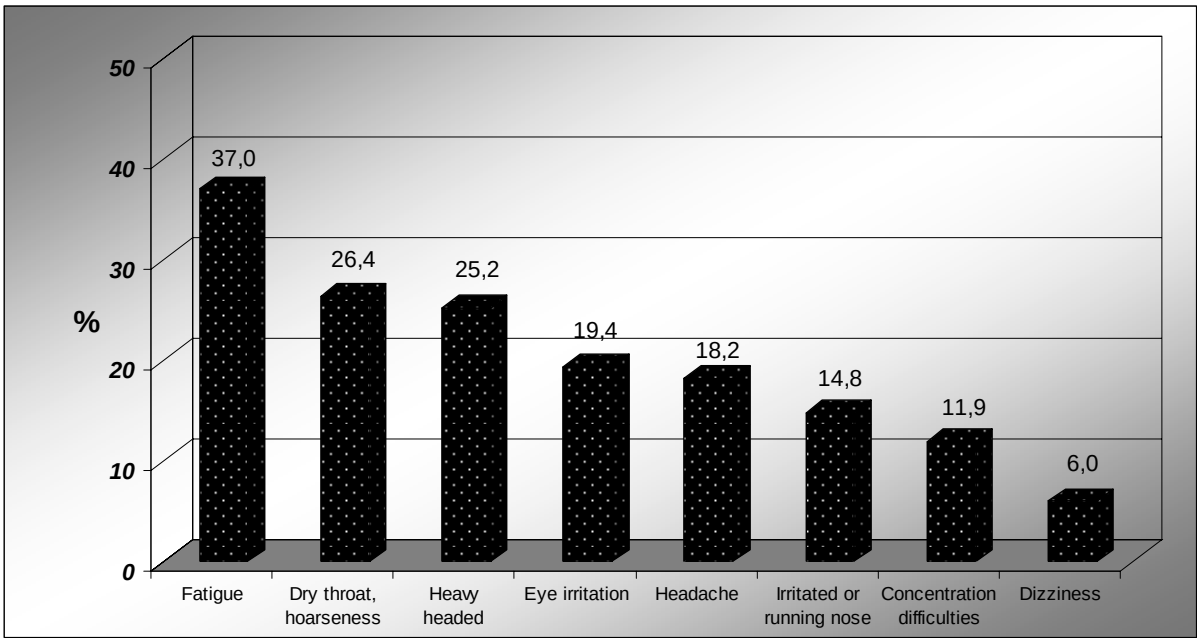


Figure 1. Percentage of employees that report complaints at least every week.

This is illustrated in Figure 1 which shows symptoms occurring at least every week, with fatigue, hoarseness (dry throat) and heavy headedness featuring as the most prevalent symptoms, and dizziness and concentration difficulties among the least prevalent.

In order to use the symptoms as a sum-score for later analyses of change, a principal component analysis was conducted (Table 4b). The analysis shows adequately high symptoms loading on a single component. The reliability test indicated satisfactory internal consistency (Alpha = .80).

4.3 Respiratory symptoms

Table 5 shows the frequency of respiratory symptoms, again with some variation between symptom prevalence levels. As Figure 2 shows, the most frequently reported symptoms occurring at least every week were daytime cough and early morning cough, while the least prevalent symptom was wheezing.

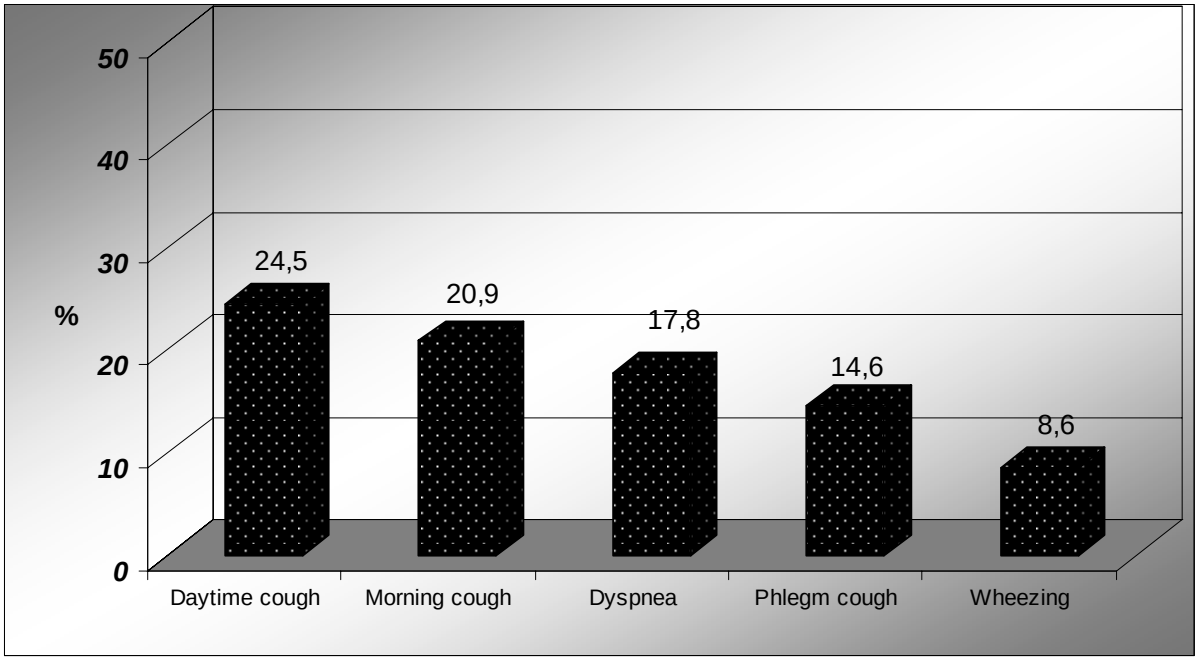


Figure 2. Respiratory symptoms occurring every week or more often

In order to use the symptoms as a sum-score for later analyses of change, a principal component analysis was performed. The analysis showed all symptoms loading on a single underlying dimension (Table 5b). The reliability test showed satisfactory internal consistency (Alpha= .80).

4.4 Job satisfaction

Table 6 displays a frequency distribution of the five indicators designed to measure job satisfaction among employees. As we see, 92.2 % of the respondents report that they strongly agreed or agreed that they were satisfied with their job; 95.4 % being enthusiastic about their work; and 87.3 % finding real enjoyment with their job. We also observe that 67.6 % strongly disagree or disagree with the statement “Workdays seem like they will never end”; and that 93.4 % strongly disagree or disagree with a statement suggesting that they find their work unpleasant.

A principal components analysis of the five job satisfaction indices also produced a single underlying factor (Table 6b). Component loadings of all items, apart from “Workdays seem

like they will never end", were satisfactory. Lastly, the reliability test of the scale showed adequate, but not very high internal consistency (Alpha= .69).

5. FINDINGS: PART 2

5.1 Change in perceived air quality

Table 7 contains a comparison of pre and post reform measurements of perceived indoor air quality. The table shows a markedly and significant reduction in reported air quality problems. Figure 3 shows the proportion of employees who report that they perceive problems with the indoor air quality sometimes or more often. We see the most pronounced improvement in those problems which are related to second-hand smoke. While 44.1 % of the respondents reported that they were bothered by tobacco smoke from others sometimes or often before the smoking ban, only 6.2 % were reporting similar problems with a similar frequency five months after the ban entered into force. This is a reduction of 37.9 percentage points.

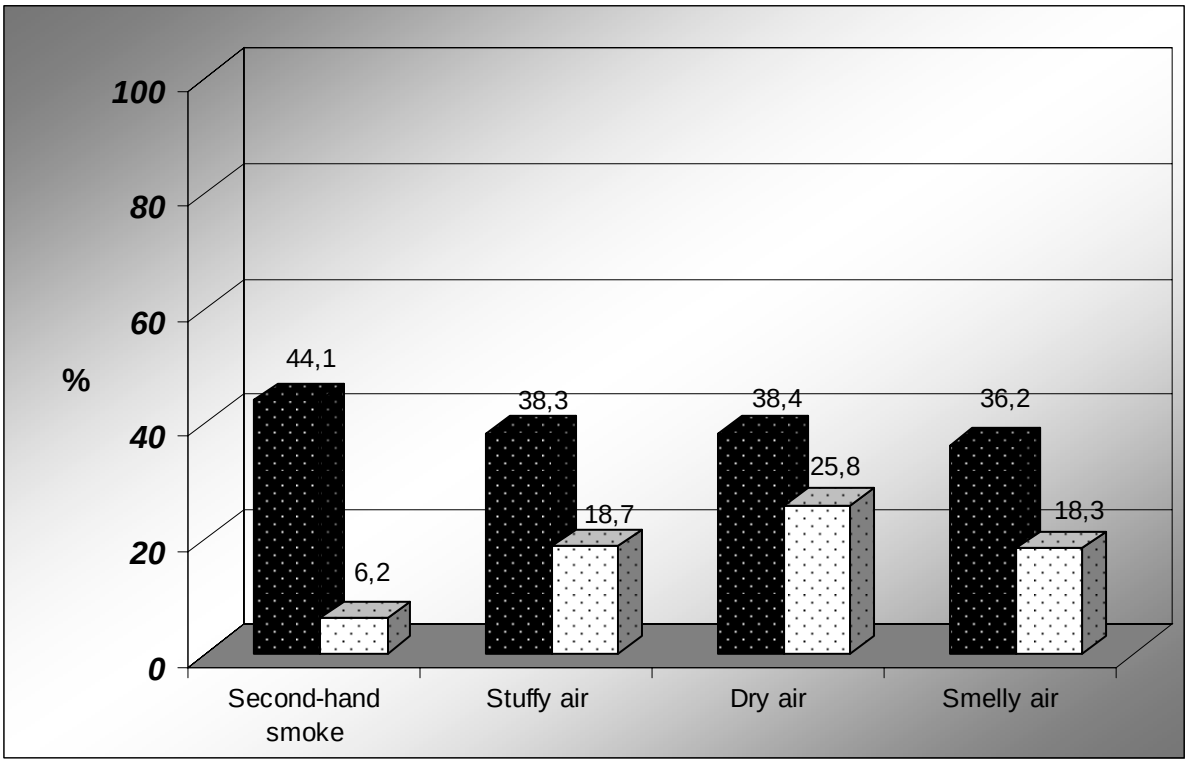


Figure 3. Pre and post reform reports of air quality problems occurring sometimes or more often.

As the figure shows, there were also fewer problems with stuffy, dry or smelly air after the total ban came into place (reduced by 19.6, 12.6 and 17.9 percentage points respectively).

Table 7b compares pre and post reform air quality, based on a sum-score of the four items on air quality problems. As we see from the table, there was a significantly lower level of air quality problems found after the introduction of the smoke ban ($\Delta\overline{\chi}$ = - 0.34, t = -16.88, p< 0.01). When converted to effect size statistics, the change proved to be quite high (Cohen's d = 0.59).

5.2 Change in general health complaints

Table 8 compares general health complaints reported by respondents before and after the introduction of the total smoke ban in bars and restaurants. We see a significant reduction across all eight symptoms. Figure 4 shows the change in the different complaints before and after the introduction of the smoke ban. The largest decline was found in hoarseness (dry throat), irritated eyes and heavy-headedness, (13.3, 12.8 and 10.5 percentage points respectively).

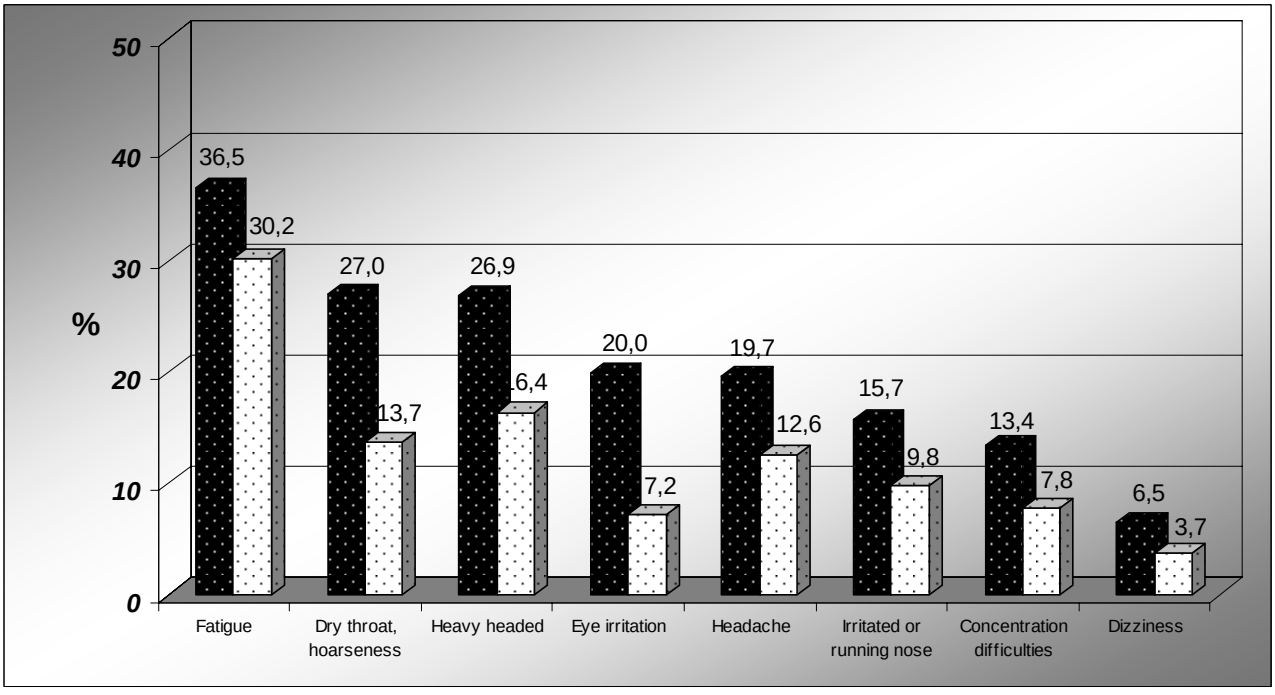


Figure 4. Pre and post reform general health complaints occurring weekly or more often.

We also see a reduction in reports of headaches, fatigue, irritated or runny nose, and concentration difficulties between 5.5 and 7 percentage points, while reports of at least weekly episodes of dizziness fell by 2.8 percentage points.

Table 8b shows the average difference between pre and post reform general health complaints based on a sum-score of the eight general health complaints. The higher the score, the more prevalent are the symptoms. The table shows a significantly lower level of general health complaints after the reform, when compared with the baseline measurement ($\Delta\overline{\chi}$ = 0.21, t = 9.30, p< 0.01). This corresponds to an effect size somewhere in between medium and low (Cohen's d = 0.33).

5.3 Change in respiratory symptoms

Table 9 compares pre and post reform respiratory symptoms. We see significant declines in early morning and daytime coughing, coughing producing mucus, and heavy breathing. There was, however, no significant decrease in the prevalence of wheezing.

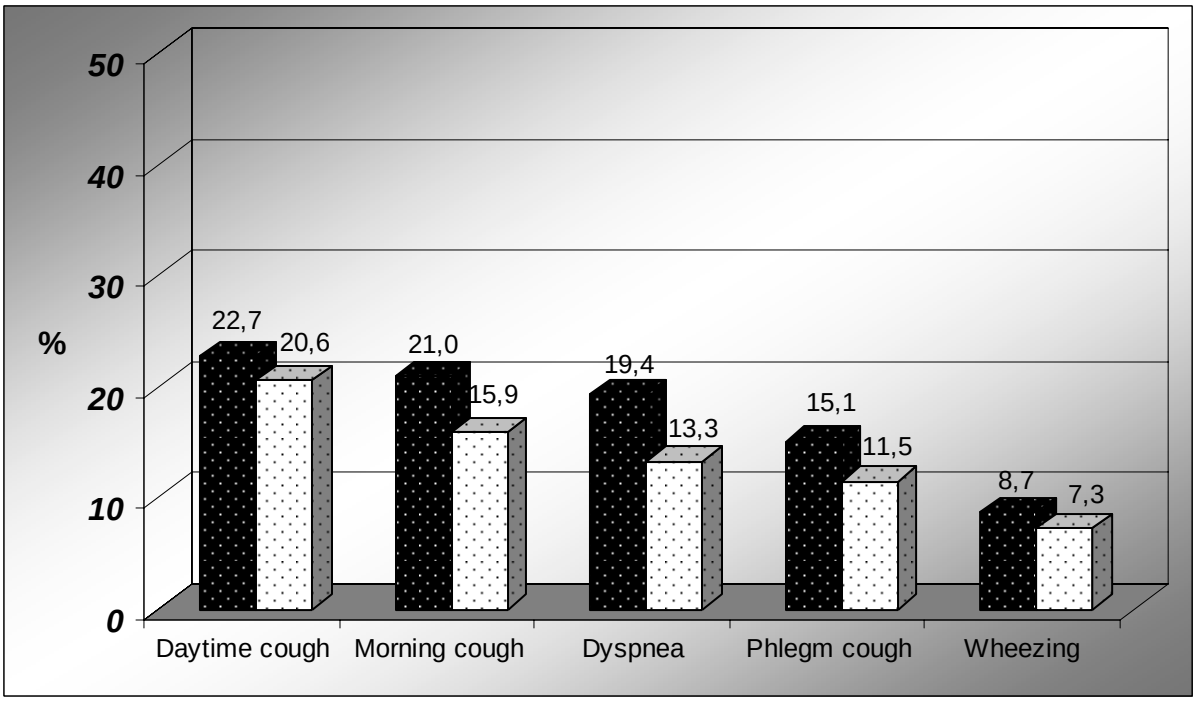


Figure 5. Pre and post reform respiratory symptoms occurring weekly or more often.

Figure 5 compares pre and post reform respiratory symptoms occurring at least weekly. Heavy breathing and early morning cough decline most. Heavy breathing fell by 6.1 percentage points, and respondents reporting early morning cough fell by 5.1 percentage points. Other symptoms declined as well, such as coughing with mucus production (3.6 percentage points), and early morning cough (2.1 percentage points).

Table 9b compares pre and post reform respiratory symptoms among staff, based on a sum-score of the five respiratory symptoms. The higher the score, the more prevalent are the symptoms. As shown in table 9b there has been a significant reduction in the level of respiratory symptoms a few months after the reform ($\Delta\bar{\chi}$ = 0.11, t = 3.98, p< 0.01), though it is more modest compared with the improvements in general health complaints. Calculated effect size confirms a relatively modest magnitude of change (Cohen's d = 0.15).

5.4 Change in employees job satisfaction

Table 10 compares pre and post reform job satisfaction rates. Of the five job satisfaction indices, three are holding a positive direction (satisfied with job; enthusiastic about work most days; finds real enjoyment with work), while two have been given a negative direction (workdays seem like they will never end; job is unpleasant). Table 9 shows a significantly negative change on the three positive indices, while on the two negative indices no significant changes were found. The percentage that report enjoying work declined by 8.3 percentage points. Similarly, the two indices "satisfied with job" and "enthusiastic about work" declined by 6.6 and 4.4 percentage points respectively.

Table 8b shows the change in the mean level of job satisfaction based on a sum-score of the five job satisfaction indices. To achieve the same direction for all five indices, the negatively worded indices were reversed before included in the sumscore. Consequently, a high score signifies a high level of job satisfaction. The table reveals a moderate, but significant, reduction in the level of job satisfaction ($\Delta\bar{\chi}$ = 0.06, t = 2.68, p< 0.01). According to the effect size calculation, the decline was negligible (Cohen's d = 0.09), and subsequent analyses

show that the reduction was only present among those of the respondents who reported that they were smokers at both data collection occasions.

6. DISCUSSION

6.1 Post reform air quality, self reported health and job satisfaction

The results in the present report show that second hand smoke was a considerable problem in the working environment of employees in bars and restaurants. Before the reform, about half of our respondents reported problems with second-hand smoke. It was more surprising to find, however, that other indoor air quality factors also caused problems. 35–38 % complained about stuffy, dry, and smelly air at their workplace.

Studies show that some health complaints are rather common in the working population, and these complaints account for 50 % of extended sick leave and early retirement in Norway (Eriksen, Svendsrod, Ursin, & Ursin, 1998). In line with earlier research among white collar workers (Reijula & Sundman-Digert, 2004; Skyberg et al., 2003) we found symptoms like fatigue, heavy-headedness, eye irritation to be relatively common among staff in the hospitality business, while dizziness and concentration difficulties were much rarer. Because we used a different approach to the measurement of general health complaints in this survey compared to earlier surveys, the results were not directly comparable. Consequently, we are therefore unable to say with confidence how much our data differ from those of earlier studies.

According to a recent Government White Paper (Stortingsmelding nr. 16, 2002–2003), the prevalence of chronic respiratory disease in Norway is growing, and illnesses affecting the respiratory organs represent the third most likely cause of death in the country (*Stortingsmelding nr 16: Resept for et sunnere Norge*, 2002-2003). Existing research has shown that respiratory problems are associated with an increased likelihood of hospitalization (Vestbo & Rassmussen, 1989),disability (Comstock, Stone, Tonascia, & Johnson, 1981), and mortality (Lange, Nyboe, Appleyard, Jensen, & Schnohr, 1990). In the present study we found a wide variation in the prevalence of respiratory symptoms reported by the employees. For symptoms occurring at least weekly, early morning and daytime coughing stand out as the most common complaints, while the rarest is wheezing. This may be because wheezing indicates a more serious underlying condition than the other symptoms. Here too however, it

is difficult to compare prevalence with other studies due to differences in the measurements of respiratory symptoms.

As far as job satisfaction is concerned, the results from the present study indicate that before the reform most respondents appeared to be quite satisfied with their work, they enjoyed their work and derived pleasure from it. Furthermore, a clear minority of the employees reported that they experienced their work as unpleasant or boring.

6.2 Changes in air quality

Making eating and drinking establishments smoke-free was done to give employees a smoke-free environment, and this survey indicates that the amendment is having the desired effect. During the partial ban (smoke-free zone arrangements), virtually every second employee was bothered by second-hand smoke. Five months later, that figure is reduced to 6 %. Previously published findings from the evaluation (Hetland & Aarø, 2005) show high compliance with the ban throughout the industry. It would therefore be reasonable to assume that the exposure to environmental tobacco smoke which continues to bother 6 % of the staff does not originate on the workplace premises.

When it comes to other indoor air quality problems, there were clear improvements on the three variables stuffy, dry and smelly indoor environment. The total ban on smoking seems therefore to have brought improvements over and above the elimination of environmental tobacco smoke.

6.3 Changes in self reported health

In line with previous studies of restaurant and bar staff in California (Eisner, Smith, & Blanc, 1998) and commercial airline crew (Wieslander, Lindgren, Norback, & Venge, 2000), our study found clear improvements in general health complaints a few months after the reform entered into force. All symptoms included in the survey showed improvements, some more than others. The strongest reduction was found in episodes of hoarseness and irritated eyes

occurring at least weekly, indicating a close relationship between these particular symptoms and poor air quality in smoke-filled workplaces.

Eisner et al.'s California study (1998) found an improvement in respiratory symptoms after the introduction of the smoking ban. Our study confirms their findings, though improvements here are not as strong as for the general health complaints. Furthermore, we find no significant improvement in the percentage of staff reporting problems with wheezing. It is possible that wheezing may indicate a more chronic and severe respiratory condition, requiring more time in a smokefree environment before changes are detectable.

It seems reasonable to assume that the reduction in general health complaints and respiratory symptoms found in this study are either completely or partly a result of improvements in air quality in workplaces. However, it is important to take into account that other factors apart from smoke-free air could also have affected the reporting of respiratory and general health complaints.

First, attitudes among staff towards the reform may have had an effect, with those positive to the reform tending to report greater health gains than those that were negative. Theories of social desirability point to another potential response bias. The fact that the employee unions spearheaded calls for a total ban may have contributed to a more favourable reporting of symptom decrease. It is important to keep in mind, however, that the data were collected prospectively, and we have therefore been able to compare responses to questions which were identical across three data collections. This approach leads to far less biased reporting regarding outcomes of the reform than would have been the case with retrospective reporting.

Second, staff smoking habits may have influenced responses. Lower improvement rates would be expected among smokers. Since the majority of our sample smoked, health gains would probably be less visible for the group as a whole. Also, improved health may be due to staff smoking less, or having given up smoking altogether. Analyses presented elsewhere, not included in this report, nonetheless show significant general and respiratory health gains when we eliminate respondents who stopped or started smoking from the analyses.

Third, seasonal differences could have affected symptom reports. The baseline survey was conducted in early May, a time of the year with high airborne pollen counts likely to exacerbate several of the symptoms covered by the survey. The second follow-up survey, which took place exactly one year after the baseline survey, will provide results which can not be that easily explained by seasonal variation in climate and aspects of air quality. This will be dealt with in a separate report from this study.

6.4 Changes in job satisfaction

Despite clear improvements in air quality and as well as improvement in the employee's self reported health, we find a slight reduction in job satisfaction levels. Although staff continue to enjoy their work after the reform, they confirm to a somewhat lower degree that they are happy about their work, and that they enjoy and derive pleasure from it.

External factors may affect staff responses in this area too. First, we note the decline in job satisfaction is limited to employees who themselves smoke. One would expect smokers to report lower satisfaction rates following the total ban on smoking because the ban made it harder for them to smoke during work hours.

One extrinsic factor, about which there has been considerable concern, is the economic effect of the reform on trade, resulting in bankruptcies and redundancies. This could aggravate a sense of job insecurity among staff and potentially also affect their job satisfaction. Nor may we completely disregard the possible effect on job satisfaction of employee's attitudes to the reform. Employees in favour of the reform would be more likely to report higher post reform job satisfaction levels than employees who disagreed with the reform from the outset. We shall return to this issue in subsequent reports from the study.

6.5 Strengths and weakness of the present study

The data used in the present report are collected over a short time period by trained telephone interviewers. The constructs of interest were measured by the use of well tested scales and

items that have been applied in previous research. The scales employed showed acceptable to high internal consistency as measured with Cronbach's alpha. This strengthens our impression of adequate quality of instruments. Furthermore, the large sample size and the fact that this study is a prospective panel study also count on the positive side.

The greatest design problem with a study of this kind is related to the lack of a reference group with which to compare changes taking place among those who have experienced the introduction of the smoking ban. But because the reform came into force throughout the entire country at simultaneously, there was no Norwegian reference group available, and a non-Norway-based reference group would have been unfeasible for reasons of comparability. We therefore advise some caution in the interpretation of the findings of this survey,

Another potential weakness was the high non-response rate. Only 44 % of respondents from the baseline survey took part in the follow-up survey. A non-response rate of this magnitude was not unexpected. Many workers in the hospitality business are employed part-time only, or they are relatively young. These are factors that contribute to high turnover-rates. Our comparisons between those who stayed on and those who dropped out did however not reveal any systematic differences between the two groups. This makes it less likely that systematic attrition had a significant effect on differences found between the baseline and first follow-up survey.

6.6 Conclusion

The baseline measurement revealed that a sizeable proportion of employees in the hospitality business suffered from exposure to environmental tobacco smoke in their workplace before the introduction of a total smoke ban. Many of these were bothered by other air quality factors as well. Furthermore, the baseline survey revealed wide variation across the various respiratory symptoms and general health complaints. We also found a high degree of job satisfaction among the employees.

A comparison of baseline and follow-up survey data reveals systematic differences in several areas.

1. The proportion of employees that complain about second hand smoke is markedly reduced
2. Indoor air quality is considered improved in other respects as well
3. The prevalence of reported general health complaints is reduced
4. The prevalence of reported respiratory problems is reduced
5. Staff report high job satisfaction rates before and after the reform. However, a slight drop in job satisfaction rate was detected among smokers after introduction of the smoke ban.

The design of this study does not allow us to declare with complete confidence that the differences we found are attributable to the total ban on smoking throughout the hospitality industry. It is, however, most likely that the improvements in perceived air quality found in the present study may be ascribed to the total ban. It is further likely that the improved indoor air quality has led to the observed decline in respiratory and general health complaints. We also note the moderate deleterious effect on job satisfaction among smoking members of staff of the reform.

It may be possible to draw firmer conclusions after analyses of data from the second follow-up survey, scheduled exactly a year after the baseline survey. Seasonal variations in air quality, health problems, and job satisfaction rates will be easier to control for than was possible in the present report.

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TABLES

Table 1. Sample by gender and age-groups

	Baseline		First follow-up	
	n	%	n	%
Gender				
Male	719	47.1	405	47.8
Female	806	52.9	442	52.2
Total	1525	100.0	847	100.0
Age-groups				
15-24 yrs	321	21.0	167	19.7
25-44 yrs	881	57.8	501	59.1
45-70 yrs	323	21.2	179	21.1
Total	1525	100.0	847	100.0

Table 2. Number of employees by type of business.

Type of business	N	%
Restaurant	840	55.1
Café's and taverns	462	30.3
Coffee bar	74	4.9
Pub/Bar	574	37.6
Nightclub/disco	97	6.4
Venue for private dining and parties	27	1.8
Hotel	24	1.6
Fast food restaurants	10	0.7
Conference centre	14	0.9
Hostel/Bed & Breakfast	13	0.9
Other	4	0.3
Total	2139	140.3

Table 3. Percentage distribution of how often one experiences problems with the indoor air-quality

	Yes, often	Yes, sometimes	Seldom or never	Total	Total
	%	%	%	%	N
Second-hand smoke	22.4	21.4	56.3	100	1525
Stuffy air	13.5	24.0	62.5	100	1524
Dry air	17.3	20.4	62.2	100	1522
Smelly air	13.8	20.5	65.7	100	1525

Table 3b. Principal component analysis (Varimax) of experienced problems with indoor air quality

	Factor
	1
Second-hand smoke	0.71
Stuffy air	0.80
Dry air	0.70
Smelly air	0.77

Alpha = .73

Table 4. Percentage distribution of general health complaints

	About every day	More than once a week	About every week	Seldom	Never	Total	
	%	%	%	%	%	%	N
Fatigue	8.0	11.7	17.5	25.2	37.7	100	1518
Heavy headed	3.4	8.0	14.0	28.2	46.3	100	1519
Headache	2.0	6.0	10.3	32.1	49.6	100	1518
Dizziness	0.9	2.0	3.1	18.4	75.6	100	1519
Concentration difficulties	2.0	3.4	6.7	25.0	62.9	100	1521
Irritated eyes	4.0	6.3	9.2	22.6	57.8	100	1520
Irritated or runny nose	3.7	3.8	7.6	24.8	60.2	100	1520
Hoarseness, dry throat	6.5	8.0	12.0	28.7	44.9	100	1518

Table 4b. Principal component analysis (Varimax) of general health complaints

	Factor
	1
Fatigue	0.67
Heavy headed	0.77
Headache	0.69
Dizziness	0.59
Concentration difficulties	0.64
Irritated eyes	0.62
Irritated or runny nose	0.60
Hoarseness, dry throat	0.61

Alpha = .80

Table 5. Percentage distribution of reported respiratory symptoms

	About every day	More than once a week	About every week	Seldom	Never	Total	
	%	%	%	%	%	%	N
Morning cough	7.1	6.6	7.2	19.3	59.8	100	1335
Day cough	9.7	6.3	8.6	26.5	48.9	100	1336
Phlegm cough	4.6	3.6	6.3	17.3	68.1	100	1334
Dyspnea	4.9	5.5	7.5	19.6	62.5	100	1334
Wheezing	2.3	2.4	3.9	14.6	76.7	100	1333

Table 5b. Principal component analysis (Varimax) of respiratory symptoms

	Factor 1
	1
Morning cough	0.80
Day cough	0.75
Phlegm cough	0.77
Dyspnea	0.74
Wheezing	0.65

Alpha = .80

Table 6a. Percentage distribution of job satisfaction items

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Total	
	%	%	%	%	%	%	N
Fairly satisfied with work	1.7	1.4	3.9	31.5	61.5	100	1523
Most days enthusiastic about work	1.1	0.9	2.7	29.7	65.7	100	1520
Days at work seem like they never end	38.6	28.8	13.2	13.7	5.8	100	1520
Find real enjoyment in work	2.0	2.3	8.4	35.1	52.2	100	1522
Consider work to be rather unpleasant	72.7	20.7	2.8	2.7	1.2	100	1523

Table 6b. Principal component analysis (Varimax) of job satisfaction factors

	Faktor
	1
Fairly satisfied with work	0.83
Most days enthusiastic about work	0.82
Days at work seem like they never end	-0.41
Find real enjoyment in work	0.79
Consider work to be rather unpleasant	-0.62

Alpha = .69

Table 7. Indoor air-quality pre and post to the smoke ban in bar and restaurants. Wilcoxon Signed Rank Test.

	Yes, often	Yes, sometimes	Seldom or never	Total	
	%	%	%	%	N
Second-hand smoke					
Pre	22.2	21.9	55.9	100	828
Post	1.7	4.5	93.8	100	828
			Z = -15.4**		
Stuffy air					
Pre	15.4	22.9	61.8	100	827
Post	6.5	12.2	81.3	100	827
			Z = -9.2**		
Dry air					
Pre	18.8	19.6	61.6	100	825
Post	9.3	16.5	74.2	100	825
			Z = -7.5**		
Smelly air					
Pre	15.3	20.9	63.8	100	828
Post	6.6	11.7	81.6	100	828
			Z = -8.4**		

** P< 0.01

Table 7b. Mean difference in indoor air-quality pre and post to the smoke ban in bars and restaurants.. T-test.

	$\overline{\chi}$	sd	N
Air-quality			
Pre	2.43	0.58	824
Post	2.77	0.34	824
	$\Delta\overline{\chi}$ = - 0.34; t = - 16.88**		

** P< 0.01

Table 8. General health complaints pre and post to the smoke ban in bars and restaurants. Wilcoxon Signed Rank Test.

	About every day	More than once a week	About every week	Seldom	Never	Total	
	%	%	%	%	%	%	
Fatigue							
Pre	7.0	11.9	17.7	24.9	38.4	100	823
Post	9.2	8.3	12.9	27.6	42.0	100	823
			Z= - 2.2*				
Heavy headed							
Pre	3.6	8,0	15.6	27.4	45.4	100	822
Post	2.1	5.2	8.8	29.3	54.6	100	822
			Z= -6.4**				
Headache							
Pre	2.4	6.1	11.4	30.5	49.5	100	822
Post	2.1	3.2	7.3	31.6	55.8	100	822
			Z= - 4.9**				
Dizziness							
Pre	1.3	1.9	3.2	17.7	75.8	100	823
Post	0.6	0.9	2.2	15.9	80.4	100	823
			Z = - 3.5**				
Concentration							
Pre	2.2	4.1	7.6	25.6	60.4	100	824
Post	1.6	2.4	4.1	22.8	69.1	100	824
			z= - 5.2**				
Irritated eyes							
Pre	4.5	6.3	9.3	22.3	57.5	100	824
Post	1.1	2.3	3.4	19.2	74.0	100	824
			Z = - 9.6**				
Irritated or runny nose							
Pre	4.1	3.8	7.8	23.6	60.8	100	823
Post	2.7	2.4	5.1	25.9	63.9	100	823
			Z = - 3.3**				
Hoarseness, dry throat							
Pre	7.3	7.8	12.0	27.9	45.0	100	823
Post	3.8	4.0	6.2	27.7	58.3	100	823
			Z= - 8.0**				

*P<0.05; ** P< 0.01

Table 8b. Mean difference in general health complaints pre and post to the smoke ban in bars and restaurants.. T-test.

	$\overline{\chi}$	Sd	N
General health complaints			
Pre	1.80	0.70	810
Post	1.59	0.59	810
	$\Delta\overline{\chi}$ = 0.21; t = 9.30**		

** P< 0.01

Table 9. Respiratory symptoms pre and post to the smoke ban in bars and restaurants. Wilcoxon Signed Rank Test

	About every day	More than once a week	About every week	Seldom	Never	Total	
	%	%	%	%	%	%	N
Morning cough							
Pre	7.4	6.1	7.5	17.9	61.0	100	716
Post	6.4	4.6	4.9	16.8	67.3	100	716
			Z= - 3.2**				
Day cough							
Pre	9.8	4.7	8.2	27.6	49.7	100	716
Post	6.8	5.2	8.6	25.4	54.0	100	716
			Z= -2.5**				
Phlegm cough							
Pre	4.3	2.7	8.1	16.9	68.0	100	715
Post	3.2	3.5	4.8	16.4	72.2	100	715
			Z= - 2.6**				
Dyspnea							
Pre	5	5.3	9.1	18.0	62.5	100	715
Post	4.3	2.9	6.0	18.3	68.4	100	715
			Z= - 3.9**				
Wheezing							
Pre	2.1	1.7	4.9	14.6	76.7	100	717
Post	2.4	1.7	3.2	12.0	80.8	100	717
			Z= - 1.6				

** P< 0.01

Table 9b. Mean difference in respiratory symptoms pre and post to the smoke ban in bars and restaurants.. T-test.

	$\overline{\chi}$	Sd	N
Respiratory symptoms			
Pre	1.69	0.82	713
Post	1.58	0.78	713
	$\Delta\overline{\chi}$ = 0.11; t = 3.98**		

** P< 0.01

Table 10. Job satisfaction factors pre and post to the smoke ban in bars and restaurants. Wilcoxon Signed Rank Test.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Total	
	%	%	%	%	%	%	N
Fairly satisfied with present work							
Pre	1.2	1.2	4.3	31.0	62.2	100	828
Post	1.8	1.9	4.3	36.4	55.6	100	828
			Z = - 3.2**				
Most days enthusiastic about work							
Pre	1.1	1.2	2.3	30.3	65.1	100	828
Post	1.3	2.4	3.4	32.1	60.7	100	828
			Z= - 2.8 **				
Days at work seem like they never end							
Pre	40.1	28.0	13.5	12.8	5.6	100	825
Post	42.4	27.9	9.0	14.2	6.5	100	825
			Z= - 0.23				
Find real enjoyment in work							
Pre	2.2	1.9	9.3	34.0	52.5	100	826
Post	1.8	3.8	9.6	40.7	44.2	100	826
			Z= -3.5**				
Consider work to be rather unpleasant							
Pre	75.1	18.5	2.7	2.8	1.0	100	827
Post	70.6	23.9	1.9	2.7	0.8	100	827
			Z= - 1.3				

** P< 0.01

Table 10b. Mean difference in employee's job satisfaction pre and post to the smoke ban in bars and restaurants. T-test.

	$\overline{\chi}$	sd	N
Job satisfaction			
Pre	4.38	0.61	823
Post	4.32	0.64	823
	$\Delta\overline{\chi}$ = 0.06; t = 2.68 **		

** P< 0.01

APPENDIX A: ITEMS AND SCALES

Subjective indoor air-quality:

Have you been bothered by one or more of the following factors at your work the past two months?

a) Stuffy air
b) Dry air
c) Unpleasant smell
d) Second-hand smoke

Response categories: Yes, often (1), Yes, sometimes (2), Seldom or never (3)

General health complaints

The past two months: How often have you experienced the following symptoms/complaints?

a) Tiredness/fatigue
b) Heavy-headedness
c) Headache
d) Dizziness
e) Concentration difficulties
f) Itching, irritated eyes
g) Irritated or running nose
h) Hoarseness, dry throat

Response categories: About every day (1), More than once a week (2), About every week (3), More seldom (4), Never (5)

Respiratory symptoms

The past two months: How often have experienced the following symptoms/complaints?

a) Coughing or having to clear your throat in the morning
b) Coughing during the day
c) Phlegm when coughing
d) Breathlessness
e) Wheezing sound in your chest

Response categories: About every day (1), More than once a week (2), About every week (3), More seldom (4), Never (5)

Job satisfaction

We now turn to some additional questions about your work.

To what degree do you agree or disagree with the following statements?

a) I feel fairly satisfied with my present job
b) Most days I am enthusiastic about my work
c) Each day at work seems like it will never end
d) I find real enjoyment in my work
e) I consider my job to be rather unpleasant

Response categories: Strongly disagree (1), Disagree (2), Neither agree nor disagree (3), Agree (4), Strongly agree (5)