Passive smoking at work: the short-term cost

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Abstract

***Study objective*—To estimate the impact of passive smoking at work on use of health care services and absenteeism.**

***Design*—Cross sectional survey.**

***Setting*—A workforce in Hong Kong.**

***Participants*—5142 never-smoking police officers in a total sample of 9926.**

***Main results*—A consistently strong association was found among men between length of time exposed to passive smoking at work and self reported consultations with a doctor, use of medicines and time off work. Results for women were similar but most were not statistically significant.**

***Conclusions*—The exposure of healthy adults to passive smoking at work is related to utilisation of health care services and extra time off work. This results in costs to the health services, to employers and to those exposed.**

(*J Epidemiol Community Health* 2000;**54**:673–676)

Few would now dispute the evidence that active smoking leads to premature death, chronic ill health and acute respiratory illnesses[1 2] and smokers take more days off work than their non-smoking colleagues.[3] Passive smoking may have a biological effect equivalent to that of a small amount of active smoking and there is growing evidence that, in adults, it is causally associated with lung cancer,[4] ischaemic heart disease[5 6] and late onset asthma.[7] In the children of smokers, exposure to secondhand smoke is consistently related to lower respiratory illnesses in infancy and early childhood[8–10] and this acute effect may manifest itself in increased expenditure on, or use of, medical care services.[11–14] However, the findings on utilisation have not been consistent.[15 16] An acute effect in adults has been more difficult to detect but a recent longitudinal study identified a small deficit in lung function in those with higher cotinine levels from passive smoking.[17] Because of the lack of apparent association with self reported home exposure, these authors hypothesise that exposure outside the home may be important. This supports a previous finding that US workers exposed to secondhand smoke at work had higher levels of a nicotine metabolite in their blood than those not exposed.[18] Absence from work has been identified as a possible consequence of passive smoking in population-based survey data from the US[19] but this survey had few participants who were exposed to secondhand smoke at work, possibly because of effective smoking bans in the workplace. Smoking is not yet banned in many Hong Kong workplaces and many non-smoking workers are exposed to their colleagues' smoke. In this study we examined whether exposure to secondhand smoke at work was associated with absence from work, use of medical services or use of medications as indicators of an acute effect of passive smoking at work.

A survey was carried out on a large workforce estimated to have a relatively high prevalence of smoking and no enforcement of bans on smoking within the work premises at that time. The risk factor of interest was passive smoking at work only; passive smoking at home was controlled for in the analyses.

Methods

In late 1995, a health survey was carried out at the request of both staff and senior management on all officers of the Hong Kong Police, that is, Traffic, Foot Patrol and Marine Police divisions, including 764 officers with primarily administrative jobs. A confidential structured questionnaire was self completed under controlled conditions. Data on past and current health and smoking history were collected using a Chinese translation of the Medical Research Council Respiratory Health Questionnaire.[20] Questions on whether the person was exposed to other people smoking near them at home or at work were included and also for how long. Utilisation of health services was assessed by the self reported number of visits made to a doctor, reasons for the visits, use of medication and reason for this use in the previous 14 days. Time off work was determined by asking whether the respondent had taken days off in the previous six months for illness and, if so, how many days were taken. Respondents were unaware of the hypothesis being tested.

Validation of self reported smoking status was carried out on 79 officers at one station that was selected for piloting of the methods. These officers were no different from the remainder of the force. Expired air carbon monoxide (CO) concentrations were measured using a hand held Bedfont Micro II Smokerlyzer. Of 24 self reported non-smokers, none had CO levels exceeding 10 parts per million while 50 of the 55 self reported smokers did. We concluded therefore that the self reported status of never-smokers was reasonably valid.

The main analyses were carried out only on those who claimed that they had never smoked. The median of self reported duration of exposure to smoky working conditions was used to group those exposed into shorter or longer exposure. Exposure was then used as an independent variable in logistic regression analyses; odds ratios (OR) and 95% confidence intervals were estimated. A wide range of possible

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Accepted for publication
4 May 2000

Table 1 Prevalence of doctor consultation, of consultation for respiratory problems, of use of medication and of time off work by passive smoking exposure at work and gender for never smokers (unadjusted prevalence) (p value from χ^2 test)

		Passive smoking exposure at work			
		Nil	*⩽ median (1 year)*	*> median*	*p value*
	M	n=866 (21.0%)	n=1115 (27.0%)	n=2141 (51.9%)	
	F	n=142 (20.4%)	n=187 (26.8%)	n=368 (52.8%)	
Consultation for respiratory problem in the past 14 days (%)	M	15.8	18.1	21.2	0.002
	F	21.8	21.4	26.4	0.337
Medication use in past 14 days (%) for respiratory problem	M	16.3	24.7	27.9	<0.001
	F	26.1	31.6	33.4	0.267
Time off work because of illness in past 6 months (%)	M	13.4	20.0	24.0	<0.001
	F	24.6	36.4	36.7	0.028

confounders were included as independent variables. The dependent variables were visiting a doctor for a respiratory problem, using medication for a respiratory problem and taking time off work because of illness. Analysis of covariance (ANCOVA) was used to test the difference in the mean total numbers of visits to a doctor (for any reason) and days off work, adjusting for the same confounding factors. If anyone reported more than five visits to a doctor in the past 14 days, this was re-coded as five visits. The number of days taken off work in the past six months had been reported in bands; a conservative estimate, using the lower end of the respective band, was used. The analysis was performed using SPSS 8.0.

Results

The response rate to the survey was 89.9% (9926 out of a possible 11 038). Of these 5142 (51.8%) were never-smokers of which 728 (14.2%) were female. Smokers are over-represented in this working population (around 46%) compared with the Hong Kong population (27% in men and 3% in women are daily smokers). Ex-smokers were excluded from these analyses. Among the never smokers, 1130 (22.0%) claimed to be exposed to passive smoking at home and 4005 (77.9%) at work while 3013 (58.6%) were exposed only at work. Overall, women had higher utilisation of health services than men with 34.3% reporting a consultation with a doctor within the past 14 days compared with 26.6% of men (χ^2=18.3, 1df, p<0.001). Women were also more likely to take time off work (36.4% compared with 25.4%, χ^2=38.4, 1df, p<0.00001).

Complete data on passive smoking exposure at work were obtained for 4819 people. The median length of exposure for the whole group was just over one year. Table 1 shows the self reported utilisation in the past 14 days and the number who took time off work during the past six months, by exposure to passive smoking. For each measure of utilisation or absence in men, there is a significant increase in prevalence with increasing length of exposure to passive smoking. For women there is a similar trend that is significant for time off work.

Age is the most important confounder and although little difference was found between adjusted and unadjusted estimates of association, all subsequent analyses were adjusted for age, marital status, education level, rank, type of police duties and self reported alcohol intake. The ORs for men exposed for more than one year were significant for each dependent variable while for those exposed less than one year, only use of medications and time off work were significant (table 2). The test for trend confirms that the likelihood of a consultation with a doctor, use of medication and

Table 2 Adjusted odds ratios for utilisation and time off work by exposure to smoking at work (unexposed as baseline)

		Passive smoking exposure at work: OR (95% CI)		
		⩽ median (1 year)	*> median*	*p for trend*
Consultation for respiratory problem in the past 14 days	M	1.15 (0.91, 1.46)	1.36 (1.11, 1.66)**	0.002
	F	1.15 (0.64, 2.05)	1.52 (0.93, 2.49)	0.067
Medication used for respiratory problem in past 14 days	M	1.53 (1.23, 1.90)****	1.79 (1.48, 2.17)****	<0.0001
	F	1.39 (0.82, 2.35)	1.55 (0.98, 2.46)	0.068
Time off work because of illness in past 6 months	M	1.51 (1.19, 1.91)***	2.04 (1.65, 2.51)****	<0.0001
	F	1.51 (0.90, 2.53)	1.58 (1.00, 2.49)*	0.072

Covariates are age, marital status, level of education, rank, type of police officer, amount of alcohol consumed and passive smoking at home. *p<0.05, **p<0.01, ***p<0.001, ****p<0.0001.

Table 3 Number of visits to a doctor in the past 14 days and number of days off work in the past six months by passive smoking exposure (p value from ANCOVA)

		Passive smoking exposure at work			
		Nil	*⩽ median*	*> median*	*p value*
Mean number of consultations in the past 14 days (SE)	M	0.32 (0.03)	0.35 (0.03)	0.45 (0.02)	<0.001
	F	0.45 (0.09)	0.51 (0.07)	0.62 (0.05)	0.205
Mean time off work because of illness in the past 6 months in days (SE)	M	0.11 (0.02)	0.14 (0.02)	0.21 (0.01)	<0.001
	F	0.24 (0.08)	0.34 (0.07)	0.39 (0.05)	0.285

Covariates are age, marital status, level of education, rank, type of police officer, amount of alcohol consumed and passive smoking at home.

taking time off work increased significantly with the duration of passive smoking. In women, all the ORs were greater than one but only that for time off work for those exposed for more than a year was statistically significant. When further controlled for length of time in the police force, the findings did not change.

The mean total number of visits to a doctor in the past 14 days and the number of days off work in six months both increased with length of exposure to passive smoking, although neither result was statistically significant in women (table 3).

KEY POINTS

- Passive smoking at work is strongly associated with absence from work, doctor consultations and use of medications.
- Smoking in the workplace results in costs to employers, non-smoking employees and health services.
- Bans on smoking in workplaces and other public buildings must be universal and enforced.

Discussion

This survey was carried out on a healthy workforce, almost half of which has never smoked but most officers were, at that time, regularly exposed to secondhand smoke at work. This exposure is most likely to be from other officers smoking in the communal areas, from smoking in offices or from exposure from other people; officers were not supposed to smoke when on patrol.

The limitations of cross sectional surveys are acknowledged but the consistency of the trends and the dose response relation with duration of exposure in both men and women supports the inference of a causal association between passive smoking and increased utilisation and time off work.

All of the data are self reported but the expired air CO measurements suggest that the smoking status data are valid. Willemsen *et al*[21] found that self reported exposure to secondhand smoke in the working environment correlated moderately well (r=0.65, p<0.001) with nicotine concentrations in the air. We cannot rule out the possibility of some bias in the self reported data on utilisation and absence although bias alone would be very unlikely to produce the results shown in the three separate variables of utilisation and absenteeism.

It could be argued that those who report passive smoking at work may be different from those who do not and that confounders may therefore be at least partially responsible for our results. Indeed, an inverse association between passive smoking and socioeconomic status has been demonstrated.[19 22 23] We controlled for socioeconomic status by including, as covariates, rank of officer and educational level achieved. Similarly, those who expose themselves to others' smoke may take other lifestyle risks and these other risks may partly or wholly account for the observed effects. We found no association between exposure to passive smoking and alcohol consumption but, none the less, included the amount of alcohol consumed as a covariate in all analyses.

The analyses using data on women showed the same associations as the analyses for men but most of the results were not statistically significant. This was probably a result of the small number of women in this workforce and low power of the analyses. There was no other indication that the results for women differed in any way from those for men.

In areas where no effective smoking restrictions are in place, the prevalence of passive smoking is likely to be high, as indeed we found in this study with 76% of non-smokers reporting exposure to secondhand smoke at work. The US Environmental Protection Agency estimated that a smoke free work environment would produce net benefits of US$39–$72 billion.[24] They assumed also that there would be benefits accruing from reduced exposure of non-smokers to secondhand smoke but were unable to quantify this benefit. From our study findings, the savings in reduced absenteeism of non-smokers would seem worthwhile.

In many countries, a high proportion of working environments are not yet smoke free and non-smoking employees are regularly exposed to secondhand smoke. In addition, many leisure environments are a regular source of exposure. In the face of mounting evidence of short-term costs as well as longer term costs and health detriment, we must take steps to protect, not only children, but also adults, from passive smoking by ensuring effective bans on smoking in all workplaces and other sites where involuntary exposure occurs.

We thank A Lamb, L Aharonson-Daniel, A S M Abdullah, J Cheang, M Chi, D Ho, D Kwan, K W Lee and S Ma for assistance in fieldwork and data processing.

Funding: Hong Kong Police.
Conflicts of interest: AJH is chairman of the Hong Kong Council on Smoking and Health (COSH); THL is a member of the COSH research committee. PA is a member of People Acting for a Smokeless Society (PASS), Hong Kong.

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