

## SMOKING AMONG MACEDONIAN WORKERS FIVE YEARS AFTER THE ANTI-SMOKING CAMPAIGN

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To assess the efficacy of nationwide anti-smoking campaign, we compared the findings of a study on worker smoking performed in 2005 with our latest cross-sectional study completed in 2010. It included 753 randomly selected workers, of whom 126 office, 108 construction, 93 agricultural, 97 petroleum refinery, 114 textile, 117 food processing workers, and 98 cleaners. Information was collected with a self-administered questionnaire. The prevalence of current smokers among all workers was 35.4 %, ranging from 30.2 % in office workers to 43.5 % in construction workers. It did not significantly differ from the prevalence recorded in 2005 (35.4 % vs. 36.8 %, respectively;  $P=0.441$ ). Mean pack-years smoked among all smokers was  $12.4\pm 2.3$ , ranging from 10.9 in administrative workers to 13.7 in agricultural workers. We did not find any significant difference in the prevalence of current smokers between male and female workers and between workers aged less or more than 40 years, as well as between workers of higher and lower education. The prevalence of ex-smokers was 10.5 %, ranging from 8.4 % in construction workers to 12.1 % in administrative workers, whereas the prevalence of passive smokers was 29.1 %, ranging from 26.2 % in food processing workers to 32.9 % in agricultural workers.

Our findings indicate that the prevalence of current and passive smokers has remained high regardless of the anti-smoking campaign and call for stricter implementation of anti-smoking regulations.

**KEY WORDS:** *current smoker, ex-smoker, occupation, passive smoker, prevalence, tobacco smoke*

Tobacco smoking takes an enormous toll on the global burden of disease (1-3). Its adverse health effects are attributable to approximately 2,500 toxins in the tobacco plant and approximately 4,000 substances in the tobacco smoke. At least 250 of these are harmful and more than 60 are known or suspected to cause cancer (4, 5).

As many epidemiological and clinical studies indicate, the adverse health effects related to tobacco smoke include heart disease, lung cancer, chronic obstructive pulmonary disease, as well as an increase in the number and severity of asthma attacks, increased susceptibility to lung infections (such as pneumonia

and bronchitis), other breathing problems including cough, mucus production, chest discomfort, and reduced lung function (4, 6, 7). In addition, despite controversial results of the studies that investigated joint effects of tobacco smoke and specific workplace exposure, the role of such interaction in health impairment could not be excluded (8-10). To prevent adverse health effects, governments worldwide increase tobacco taxes, regulate tobacco content, control tobacco import, issue tobacco warning labels, promote anti-tobacco education, programmes to quit smoking and smokeless life-style, encourage the use of stop-smoking drugs, restrict or ban tobacco

advertising, sponsorships and promotions, ban smokeless tobacco products (such as chewing tobacco and snuff), and restrict or ban smoking in work and public places (11, 12). The Republic of Macedonia has adopted many of these anti-smoking activities such as the 2005 law restricting indoor smoking to separated rooms (13) and the 2008 law banning indoor smoking in all public buildings, workplaces, and public transportation (14).

The aim of our study was to see whether these activities had an effect on smoking among Macedonian workers by comparing the latest findings with a study performed in 2005.

## SUBJECTS AND METHODS

This cross-sectional study was performed at the Institute for Occupational Health of the Republic of Macedonia, Skopje - WHO Collaborating Center and GA<sup>2</sup>LEN Collaborating Center from May to November 2010.

It included 753 randomly selected workers who completed the questionnaire (96.1 % of all invited) from public administration, construction, agriculture, petroleum refining, textile industry, food processing, and cleaning). Three hundred eighty-nine were men and 364 women, aged 19 to 64 years (Table 1). All subjects gave informed consent to participate in the study.

### Questionnaire

Information on smoking was collected using a self-administered questionnaire. Smoking was classified according to the World Health Organization (WHO) Guidelines for Controlling and Monitoring the Tobacco Epidemic (5). Current smoker was defined as a subject who smoked any tobacco product at the time of the survey. Daily smoker was defined as a current smoker who smoked at least once a day, except on days of religious fasting, while occasional smoker was defined as a current smoker who did not smoke every day. Daily smokers provided information on years of smoking and daily mean cigarettes smoked. From this information we calculated pack-years smoked (one pack-year denotes one year of smoking 20 cigarettes a day) using a website calculator designed by Masters and Tutt (16).

Ex-smoker was defined as a subject who used to smoke, but now does not smoke at all. Ex-smokers

**Table 1** *Demographics of the study subjects*

Sex, age, occupation, and level of education	Study subjects (n=753)
<b>Men to women ratio</b>	1:1
<b>Age in years: Mean (range)</b>	38.7±12.9 (19 to 64)
<b>Subjects aged ≤40 years</b>	346 (45.9)
<b>Occupation</b>	
Public administration	126 (16.7)
Construction	108 (14.3)
Agriculture	93 (12.4)
Petroleum refining	97 (12.9)
Textile industry	114 (15.1)
Food processing	117 (15.5)
Cleaning	98 (13.0)
<b>Level of education</b>	
High (University degree)	216 (28.7)
Primary and secondary education	537 (71.3)

*Numbers (%) are given, unless indicated otherwise.*

were divided in those who quit smoking less than or more than two years ago).

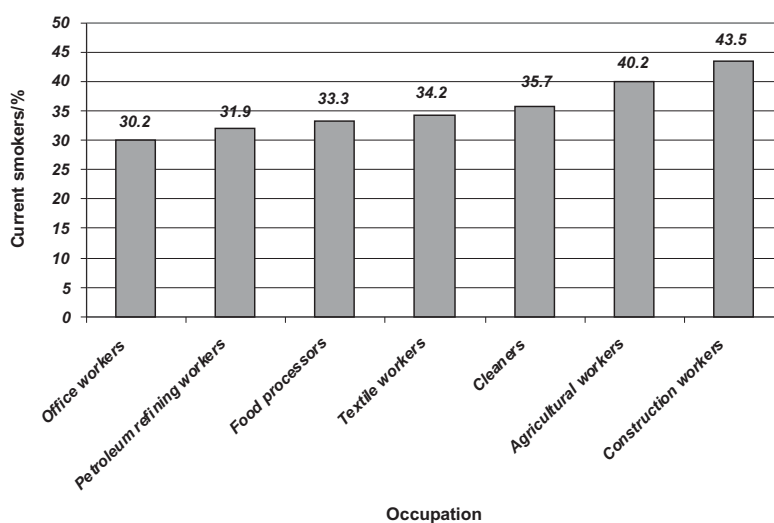
Passive smoker was defined as a subject exposed to environmental tobacco smoke (ETS), that is, with at least one smoker in the household and/or the workplace (17, 18). In addition, passive smokers were divided in those who were exposed to ETS for less than or more than four hours per day.

### Statistical analysis

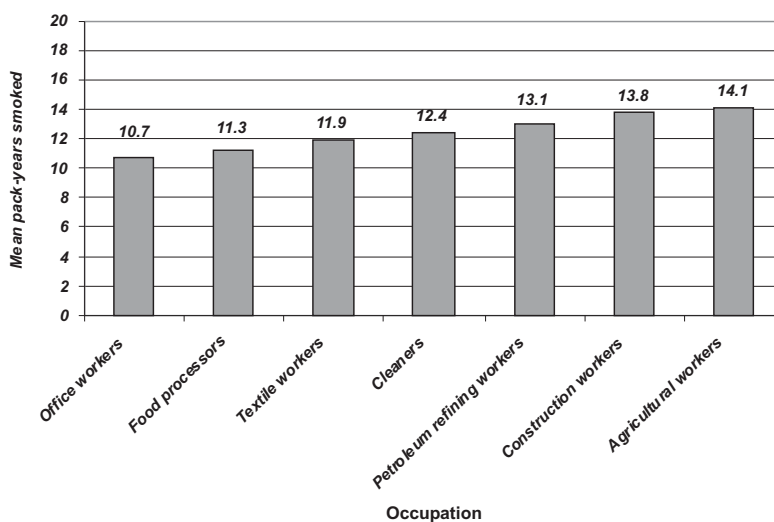
For data description and analysis we used the Statistical Package for the Social Sciences (SPSS) version 11.0 for Windows. Continuous variables were expressed as mean values with standard deviation (SD) and nominal variables as numbers and percentages. The chi-square test was used for testing differences in prevalence. Pack-years smoked were compared using the independent-samples *t*-test. P-value below 0.05 was considered statistically significant.

## RESULTS

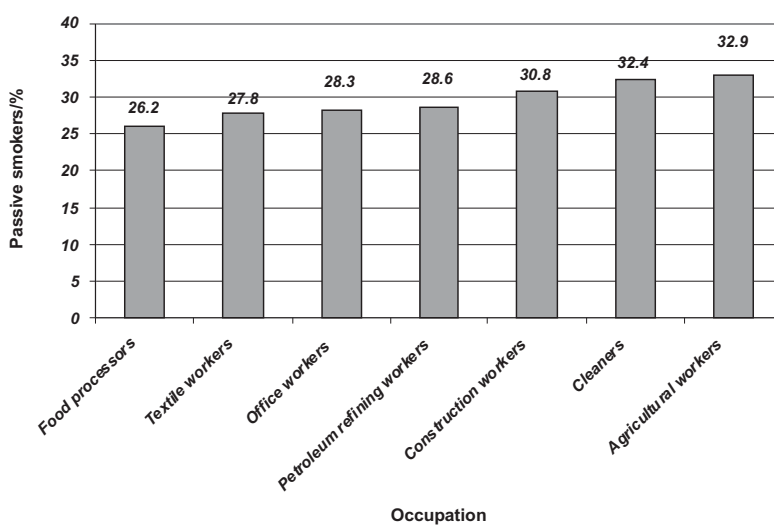
The prevalence of the current smokers among all subjects was 35.4 % (267 of 753), 94.4 % (252 of 267) of whom were daily smokers. The prevalence of



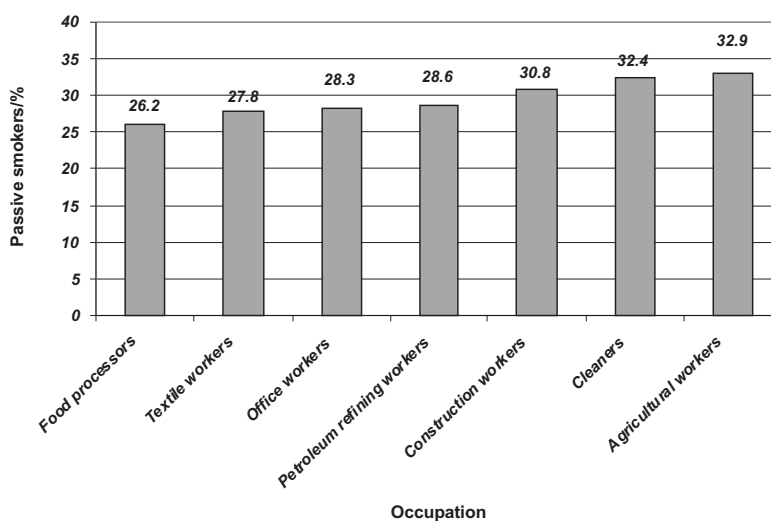
**Figure 1** Distribution of current smokers by occupation



**Figure 2** Distribution of daily smokers by pack-years smoked



**Figure 3** Distribution of ex-smokers by occupation



**Figure 4** Distribution of passive smokers by occupation

current smokers ranged from 30.2 % in office workers to 43.5 % in construction workers. We found no significant difference between occupations (Figure 1).

This prevalence of current smokers is similar to the prevalence established in our study performed in 2005 (35.4 % vs. 36.8 %, respectively,  $P=0.441$ ; chi-square test) (19).

Mean pack-years smoked in all daily smokers was  $12.4 \pm 2.3$  ( $12.9 \pm 1.8$  in men and  $11.3 \pm 3.7$  in women), ranging from 10.7 in office workers to 14.1 in agricultural workers. Again, there was no significant difference between occupations (Figure 2).

Men and women did not differ significantly in the prevalence of current smokers (38.6 % vs. 33.7 %, respectively,  $P=0.344$ ; chi square test) and neither did subjects below 40 from those above 40 years of age (37.9 % vs. 34.1 %, respectively,  $P=0.294$ ; chi square test). The prevalence of current smokers was lower in subjects with high (university) education than in subjects with lower education, but not significantly (29.6 % vs. 40.8 %, respectively,  $P>0.05$ , chi square test).

The prevalence of ex-smokers among all subjects was 10.5 % (79 of 753), ranging from 8.4 % in construction workers to 12.1 % in office workers (Figure 3). Differences in the distribution of ex-smokers by sex, age, and education level were not significant either.

The prevalence of passive smokers was 29.1 % (219 of 753) among all subjects, ranging from 26.2 %

in food processing to 32.9 % in agricultural workers (Figure 4). Differences in the distribution of passive smokers by occupation sex, age, education level, and years of exposure to ETS were not significant.

## DISCUSSION

Between the studies performed in 2005 (19) and this one in 2010, the Macedonian government launched a broad anti-smoking campaign that included indoor smoking restriction and ban laws, educational programmes, promotion of smokeless life-style, tobacco warning labels, etc.. However, the comparison among the same occupations between these two years showed no decline in smoking.

As the prevalence of current smokers in this study is similar to its prevalence in the general Macedonian population (34.2 %) (20), we can compare our results with the US New Jersey Adult Tobacco Survey of the general population (21) and with the Australian National Health Survey in workers (22). These countries have come up with more effective anti-smoking strategies and achieved a significant decline in the prevalence of current smokers in both general population and worker populations over the last decade. Similarly effective have been the Slovenian tobacco control measures (23).

In our study, the prevalence of current smokers was the highest in construction and agricultural workers. Similar prevalence was reported for

construction workers in the US study by Bang & Kim (24), by the Centers for Disease Control (CDC) report for May 2003 (25), and by the Australian Bureau of Statistics Report for 2007-2008 (22). Unlike our study, these reports found a significant difference between construction workers and office workers.

Another indication of the success of anti-smoking campaigns is the prevalence of ex-smokers, which in our study (10.5 %) showed a minor increase with respect to 2005 (8.1 %) (19), whereas the CDC reported a much higher prevalence in certain occupations (e.g. public administration) reaching up to 20 % (25).

The prevalence of passive or second-hand smokers in our study (29.1 %) remained similar to 2005 (31.5 %) (19) and 2007 (27.4 %) (26). Most passive smokers of all occupations were exposed to ETS for less than four hours. In a longitudinal study in 12 European countries, Australia and the USA, Janson et al. (27) reported a drop in passive smoking between 1990 and 1994. They also found that people with lower education were more than twice as likely to be exposed to ETS and suggested that anti-smoking strategies should primarily target people with lower education. Our study has not confirmed these findings, as we found a similar prevalence of passive smokers across all occupations and educational levels.

There were some limitations to our study, which should be taken into account when interpreting the results. First, this survey is designed as a cross-sectional study, instead of longitudinal, which renders comparison between this and the 2005 study somewhat imprecise. We could not perform a longitudinal study because of high worker turnover, construction and agriculture in particular. Second, five years is not long enough to evaluate the effects of an anti-smoking campaign, but may provide preliminary information. However, continuous monitoring of smoking in the working population may provide guidelines to better targeting and modifying anti-smoking programmes.

The strength of the study, on the other hand, is that it included all aspects of smoking (current, ex-, and passive smoking) in a large sample across several occupations.

In conclusion, our findings suggest that the anti-smoking campaign in Macedonia has left much to be desired and call for stricter enforcement of the adopted anti-smoking regulations and for additional activities that would target all workers and occupations to prevent adverse health effects of tobacco smoking.

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### **Sažetak**

#### **PUŠENJE MEĐU MAKEDONSKIM RADNICIMA PET GODINA NAKON KAMPANJE PROTIV PUŠENJA**

Želeći utvrditi djelotvornost kampanje protiv pušenja u Makedoniji, usporedili smo rezultate istraživanja o pušenju u radničkoj populaciji provedenog 2005. s rezultatima našega najnovijega presječnoga randomiziranog ispitivanja koje je dovršeno 2010. Ispitivanje je obuhvatilo 753 radnika, od kojih je 126 uredskih, 108 građevinskih, 93 poljoprivrednih, 97 u rafineriji nafte, 114 tekstilnih, 117 prehrambenih te 98 čistač(ica). Podaci su prikupljeni s pomoću upitnika koji su ispunjavali ispitanici. Prevalencija aktivnih pušača među svim radnicima bila je 35,4 %, od 30,2 % u uredskih radnika do 43,5 % u građevinskih. Nije se značajno razlikovala od prevalencije zabilježene 2005. (35,4 % odnosno 36,8 %,  $P=0,441$ ). Srednja vrijednost kutija/godina u pušača bila je  $12,4 \pm 2,3$ , od 10,9 u uredskih do 13,7 u poljoprivrednih radnika. Značajnih razlika u aktivnome pušenju nije bilo među ženama i muškarcima, radnicima starijim i mlađima od 40 godina, niti među radnicima višeg i nižeg obrazovanja. Prevalencija bivših pušača bila je 10,5 %, od 8,4 % u građevinskih do 12,1 % u uredskih radnika, dok je prevalencija pasivnih pušača bila 29,1 %, od 26,2 % u radnika u preradi hrane do 32,9 % u poljoprivrednih radnika.

Naši rezultati pokazuju da je prevalencija aktivnih i pasivnih pušača ostala visoka bez obzira na kampanju protiv pušenja te pozivaju na strožu provedbu propisa koji ograničavaju pušenje.

**KLJUČNE RIJEČI:** *aktivni pušač, bivši pušač, duhanski dim, pasivni pušač, prevalencija, zanimanje*

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