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BRIEF REPORT

Prevalence and demographic factors of smoking in Morocco

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Abstract
Objectives To study the prevalence and determinants of cigarette smoking in Morocco.
Methods A sample of 9,195 individuals aged 15–90 years, were randomly selected, using a stratified cluster sampling technique. A cross-sectional, household, community-based survey was conducted using a tested questionnaire. The interview covered personal, social and educational characteristics of the respondents and their smoking status. The association between current smoking and sociodemographic variables was estimated.
Results The overall prevalence of current smoking was 31.5% for males and 3.1% for females. In men, smoking was associated with lower educational level. In women, it was associated with higher educational level and social class.
Conclusion Cigarette smoking remains an important public health problem in Morocco. A comprehensive strategy for tobacco control is needed.

Keywords Smoking · Morocco

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Introduction

The evolution of tobacco use is described as an epidemic (World Health organization 2008). According to the World Health Organization, tobacco use causes one in ten deaths among adults worldwide—more than 5 million people a year (World Health organization 2008). Information on tobacco consumption is essential to improve the focus of prevention and control measures and thereby succeed in the struggle against tobacco use. Epidemiological information is viewed in the context of the tobacco use component of the Plan of Action on Addiction and the WHO Framework Convention on Tobacco Control (World Health organization 2008).

In Morocco, a study on cardiovascular risk factors conducted in 2000 found smoking rates of 31.5% for men and 0.6% for women (Tazi et al. 2003). However, no nationwide smoking-specific studies have been performed looking at prevalence and determinants. Therefore, we conducted a household survey to study the prevalence of, and factors related to, cigarette smoking in seven regions in Morocco.

Methods

This is a cross-sectional study of randomly selected Moroccan people aged 15–90 years. The sampling was performed with stratification by region, socioeconomic level, age and sex, taking into consideration the urban-to-rural ratios in each region.

The country was divided into seven regions: central north region (Fez and surroundings), occidental region (Casablanca and surroundings), northwest region (Tangier and surroundings), eastern region (Oujda and surroundings),

center south region (Marrakech and surroundings), south-west region (Agadir and surroundings) and the southern region (Laayoune and surroundings).

A large sample was needed to ensure that the population under study was fully represented and that the sample was distributed among the regions proportionately to the size of the population in each region. The sample was selected in a multistage, stratified cluster sampling procedure by region and socioeconomic level.

Only one person was interviewed in each house. The interview was personal and private; however, sometimes it was difficult to achieve total privacy. The interview covered personal, socioeconomic and educational characteristics of respondents, and included questions about their smoking status, duration of smoking and daily cigarette consumption.

Smoking habit was defined according to the International Union Against Tuberculosis and Lung Diseases guide (Slama 1998). Respondents were defined as current smokers (daily and occasional smokers) if they were smoking at the time of the survey and had smoked more than 100 cigarettes in their lifetime; they were defined as ex-smokers if they had smoked more than 100 cigarettes in their lifetime, but stopped smoking during more than 3 months at the time of the survey; and they were defined as never smokers if they had never smoked or had smoked less than 100 cigarettes in their lifetime (Slama 1998). Only cigarette smoking was considered excluding use of water pipe.

Data were entered into a personal computer using the Epi-info software (version 3.3.2). Classical tests (χ^2 test, ANOVA and Student *t*) were used for comparisons.

Results

A total of 9,195 subjects were included in the study. The overall survey response rate was 92.1%. The age of the study population ranged from 15 to 90 years, with a mean (SD) age of 31.08 ± 13.7 years. The overall prevalence of current smoking was 18.0%; 31.5% among men and 3.3% among women, with an average daily use of 14.3 ± 9.1 cigarettes.

Table 1 presents the data based on sex and age. Men in the sample were significantly more likely than women to smoke daily or occasionally, or to have been smokers in the past. Among smokers, daily consumption was not significantly higher among men than women. Men and women differed in the age distribution of smoking: the highest rates for men were found in the age group 30–39 years (42.0%), whereas for women the highest rates were for the age group 20–29 years (4.7%). There were also differences among men and women in the age

Table 1 Smoking behavior according to sex (M, F) and age bracket ($N = 9,195$) in Morocco, 2006

	Total				M				F			
	N	Current smokers (%)	Ex-smokers (%)	Age at which started smoking (Mean ± SD)	*N*	Current smokers (%)	Ex-smokers (%)	Age started smoking (Mean ± SD)	*N*	Current smokers (%)	Ex-smokers (%)	Age started smoking (Mean ± SD)
Age (years)												
≤19	2,270	10.6	5.8	14.27 ± 2.0	1,194	17.4	8.5	14.27 ± 2.0	1,076	3.1	2.8	15.30 ± 1.9
20–29	2,641	20.1	9.4	16.78 ± 3.1	1,338	35.2	16.1	16.78 ± 3.1	1,303	4.7	2.5	17.20 ± 3.1
30–39	1,908	22.9	11.3	18.28 ± 4.0	971	42.0	20.2	18.28 ± 4.0	937	3.0	2.0	20.59 ± 4.6
40–49	1,260	20.4	16.9	18.37 ± 4.7	634	38.2	30.6	18.37 ± 4.8	626	2.4	3.0	16.87 ± 5.6
50–59	660	19.2	19.4	19.15 ± 5.6	369	33.1	33.3	19.15 ± 5.1	291	1.7	1.7	25.33 ± 7.4
≥60	410	13.7	26.6	20.53 ± 6.3	263	20.5	41.1	20.53 ± 6.3	147	1.4	0.7	15.67 ± 2.1
Significance (*P*)		<0.001		<0.001		<0.001		<0.001		NS		<0.001

SD standard deviation

distribution of ex-smokers. The highest percentage of ex-smokers among men is found in the age group above 60 years (41.1%), whereas the highest ex-smoker rates among women was found in the age group of 40–49 years (3.3%). The average age of starting smoking was similar for men and women at just over 18 years and the initiation age appears to be decreasing.

Table 2 presents smoking status based on sex and education level, urban or rural residence and marital status. Among men, smoking rates were significantly inverse to education level (<0.001): illiterates had the highest smoking rates. Contrary to men, women's smoking rates were significantly associated with the level of education (<0.001), with the highest prevalence of smoking among those with university training. In terms of marital status, men and women who were divorced were more likely to be smokers (50% for men and 13.5% for women) and to have higher daily cigarette consumption. But while there was slight difference in men's rates between those who were single and those who were married, a significantly higher proportion of single women than married women smoked.

For both men and women, smoking rates were significantly higher among those who lived in urban, as opposed to rural, areas. According to the income levels of urban areas, men in the lowest and highest income areas had significantly higher rates than those in the middle income areas. Women in the highest income areas had significantly higher rates (9.0%) than in other income areas. Among women, the highest proportion of ex-smokers was found in high income areas (5.6%). There were no significant differences in the proportions of ex-smokers according to income levels of residential areas among men.

Discussion

The present study is the first large survey focusing on smoking in the general Moroccan population aged 15 years and above. Previous data on smoking prevalence in 2000 measured smoking and other cardiovascular risk factors in a sample of 1,802 persons aged 20 years and more (Tazi et al. 2003). That study found smoking prevalence of 34.5% for men and less than 1% for women. If we consider only subjects aged 20 years and more in our sample, smoking prevalence was 36.3% for men and 3.3% for women. It thus appears that smoking has not decreased in

Table 2 Prevalence of smoking according to sex (M, F) and social characteristics ($N = 9{,}195$) in Morocco, 2006

	Total			M			F		
	N	Currents smokers (%)	Ex-smokers (%)	*N*	Current smokers (%)	Ex-smokers (%)	*N*	Current smokers (%)	Ex-smokers (%)
Educational level									
Illiterate	1,619	14.1	9.1	547	38.8	25.6	1,072	1.5	0.7
Coranic school	454	22.0	20.7	338	29.6	27.8	116	0.0	0.0
Elementary	2,114	18.9	11.2	1,146	33.2	20.1	968	2.0	0.7
Secondary	3,117	17.8	9.7	1,694	29.2	15.0	1,423	4.1	3.3
University	1,762	19.5	14.3	997	29.7	20.9	765	6.1	5.8
Significance (*P*)	<0.001			<0.001			<0.001		
Residence area									
Urban	5,757	18.6	11.1	2,962	31.8	18.4	2,795	4.5	3.4
Urban low level	1,963	19.4	10.2	1,011	34.8	17.9	952	3.0	2.1
Urban middle level	2,258	15.1	10.5	1,148	26.8	17.7	1,110	2.9	3.0
Urban high level	1,536	22.7	13.1	803	35.1	19.9	733	9.0	5.6
Rural	3,438	16.9	11.8	1,819	31.0	21.7	1,619	1.1	0.7
Significance (*P*)	<0.0001			<0.0001			<0.0001		
Marital status									
Unmarried	4,957	18.5	8.4	2,812	29.2	12.7	2,145	4.3	2.8
Married	3,747	17.3	15.3	1,812	34.2	29.5	1,935	1.5	2.0
Divorced	216	25.0	9.3	68	50.0	25.0	148	13.5	2.0
Widowed	198	5.1	13.1	43	16.3	55.8	155	1.9	1.3
Significance (*P*)	<0.001			<0.001			<0.001		

SD standard deviation

Morocco since the year 2000, unlike the declines in prevalence rates that have occurred in neighboring countries in Europe (Janson et al. 2006).

The smoking rates reported for men were significantly higher than that of women in our study. In the Moroccan community, there is a social stigma against smoking by women, which is seen as shameful and inappropriate in some population categories, whereas throughout society, smoking by men is considered as normal or neutral. Women are not likely to correctly report on their smoking, and this is probably source of bias even if interviewers are women. Western influence on the behavior and lifestyle of the Moroccan population is increasingly manifest, with increase in smoking among females considered as a signal of "emancipation" by them. Indeed, the signs of the beginning of a new social behavior are present: smoking prevalence among women living in higher income areas is almost three times higher than the national percentage, reaching 9%, and twice as high as the national prevalence among those having a higher educational level or exercising high status white collar or executive positions in the work force.

Gender differences in tobacco use are similar to those prevalent in Europe and North America at the end of the Second World War, and seem to be linked to social norms (Fakhfakh et al. 2005). The proportion of male ex-smokers increased with age showing a peak level for subjects aged 60 years and more. For women, the highest proportion was found among women aged between 40 and 49 years. Smoking and quitting among women is thus a recent phenomenon, which is reflected in younger cohorts. Indeed, many of the results of this survey indicate that the smoking epidemic could grow among women and, to a lesser degree, among men. The transition between the uptake of smoking at both ends of the social spectrum is strong among women and still visible, although seemingly more in transition toward lower social classes among men.

The gap found in Morocco between male and female smoking prevalence is common in other Muslim countries, as well, and in some developing countries (Tessier et al. 1999). Comparison with other countries is difficult because recently measured prevalence rates are not always available. Nevertheless, it appears that smoking rates in Morocco fall in the middle ground in relation to its neighbors. In Alexandria, Egypt, a cross-sectional survey from 2000 of 2120 participants aged 15–86 years found a significantly higher smoking rate among men (48.5%) than women (1.5%), and the mean age of initiation of smoking was lower among men (18.1 years) than women (22.6 years) (Youssef et al. 2002). In Tunisia, a study conducted in 1996 on a representative national sample of 5,696 subjects aged 25 years and more reported that prevalence of tobacco use was 55.6% in men and 5.2% in women (Fakhfakh et al. 2002). In Algeria, prevalence was estimated to be 48.6% in men and 6.9% in women (Hamdi Cherif et al. 2006). In 1996, a cross-sectional survey in Kuwait showed that the prevalence of current smoking was 34.4% among men and 1.9% among women (Memon et al. 2000). In Oman, with a smoking prevalence of 11% among those aged 20 years and above, the highest prevalence of current smoking was found in people aged 40–49 years, with 18.7% of males and 0.9% of females (Al Riyami and Afifi 2004). In Bahrain, the prevalence of smoking among subjects aged 15 years and more (measured in 1995) was 25.3 and 9.3%, respectively (Yacoub et al. 1996).

In the present study, the mean age of starting smoking was 18.7 years for males and 24.3 years for females, and the age of initiation of smoking has been decreasing among both men and women. Khuder et al. have demonstrated in 1999 that age of initiation of smoking is a significant factor for continuation of smoking. Men who started smoking before 16 years of age had an odds ratio of 2.1 (95% CI: 1.4–3.0) for continued smoking compared to those who started at a later age (Khuder et al. 1999). The Global Youth Tobacco Survey (GYTS) in Morocco, a school-based survey of students in the seventh to ninth grades (ages 13–15 years), from 2006 confirmed that in Morocco smoking begins at young ages (Centres for disease control and prevention 2006). The study showed that 14.5% of students had smoked cigarettes at sometime (boys = 20.9%, girls = 5.7%) and that 6.4% currently smoke cigarettes (boys = 9.1%, girls = 2.2%) (Centres for disease control and prevention 2006).

The European Community Respiratory Health Survey (14 countries) has demonstrated that subjects with a lower educational level were less likely to quit smoking (Janson et al. 2006). In the Tunisian national study, tobacco use was high among poorly educated men from an economically deprived background (Fakhfakh et al. 2002). A study on determinants of smoking in Saudi Arabia showed that prevalence was higher among uneducated people and among those in certain occupations: manual workers, businessmen, army officers and office workers (Jarallah et al. 1999). The Oman study showed that higher educational level was protective against smoking (Al Riyami and Afifi 2004). In Europe, a study investigating the inequalities in the prevalence of smoking in the European Union underlined that educational level was a strong predictor of smoking and concluded that interventions should aim to prevent addiction to smoking among the less educated, by price policies, school-based programs and smoking cessation support for young adults (Huisman et al. 2005).

There is lack of understanding of the risks associated with smoking in Morocco. A British study has estimated the number of deaths that could be prevented in the UK by implementing population strategies to reduce smoking

prevalence. Reducing the prevalence of smoking by 1% point each year for 10 years would prevent 69,049 deaths at ages between 35 and 74 years during that period (Lewis et al. 2005). In the largest national cancer hospital in Morocco, lung cancer is the first most common type of malignant disease among men (19.8%) (Registre des Cancers de Rabat 2005). In the cancer registry of Casablanca, lung cancer represents 23.8% of cancer cases in men (Registre de cancers de la Région du grand Casablanca 2004). However, the rates of COPD and long-term cardiovascular consequences of tobacco are not known until now.

The World Health Organization (WHO) has provided countries with guidelines for comprehensive national tobacco control programs (World Health Organization). These guidelines include health promotion activities, media advocacy and encouragement of smoking cessation, legislative measures, fiscal measures such as tobacco taxation, and effective protective measures against involuntary exposure to second-hand smoke (World Health organization 2008). In May 2003, the member countries of the World Health Organization adopted a historic tobacco control treaty, the WHO Framework Convention on Tobacco Control (FCTC), which has the potential to reduce smoking death toll (World Health Organizations 2003). In Morocco, although tobacco advertising and promotion are prohibited in the local media, and smoking is not allowed in government administration and in public transportation, there is no close monitoring for non-compliance. Morocco signed the FCTC, but has not yet ratified it.

Thus, Morocco is currently unequipped to fight the growing smoking epidemic in its population. It is important to develop a monitoring system and to undertake a culturally appropriate comprehensive approach to tobacco cessation, including educational, economic, clinical and regulatory strategies in line with the WHO's recommendations. The government can show its desire to protect the population by ratifying the FCTC and putting into effect its articles in a national tobacco control program.

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