

# Burden of smoking in Moroccan rural areas

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## عبء التدخين في أرياف المغرب

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**الخلاصة:** هدفت هذه الدراسة إلى التعرف على تقديرات انتشار التدخين في الوقت الحالي وخصائصه في الأرياف المغربية. وشملت الدراسة 3438 شخصاً تزيد أعمارهم عن 15 عاماً من الجنسين، وبلغ معدل الانتشار الخام للتدخين في الوقت الحالي (التدخين في الوقت الحالي والسابق الأكثر من مئة سيجارة خلال فترة الحياة) 16.9% لدى المراهقين والبالغين في سكان الأرياف، و31% لدى الرجال منهم و1.1% لدى النساء منهم. وقد بدأ التدخين (74.4% من الرجال و68.8% من النساء) قبل سن العشرين عاماً مع المدخنين. وأوضح التحليل المتعدد للمتغير اللوجستي أن العمر والجنس والحالة الزوجية والمهنة ومنطقة السكن هي أقوى المحددات للتدخين في الوقت الحالي. كما أوضحت هذه النتائج معدلاً مرتفعاً للتدخين بين الذكور في أرياف المغرب.

**ABSTRACT** The aim of this study was to estimate the prevalence and characteristics of current smoking among rural Moroccans. The population study included 3438 individuals aged 15 years and above from both sexes. The crude prevalence of current smoking (currently smoked and had smoked > 100 cigarettes in lifetime) was 16.9% in the adolescent and adult rural population: 31.0% among men and 1.1% among women. The majority of smokers (74.4% of men and 68.8% of women) began smoking before age 20 years. Multiple logistic regression analysis showed that age, sex, marital status, occupation and region of residence were the strongest determinants of current smoking. These results showed a high prevalence of smoking among males in the rural population of Morocco.

## Poids du tabagisme dans les zones rurales marocaines

**RÉSUMÉ** Le but de cette étude était d'estimer la prévalence et les caractéristiques du tabagisme actif chez les ruraux marocains. La population étudiée comptait 3 438 individus âgés de 15 ans et plus, hommes et femmes. La prévalence brute du tabagisme actif (consommation actuelle ou antérieure de tabac supérieure à 100 cigarettes dans la vie) était de 16,9 % au sein de la population rurale adulte et adolescente : 31,0 % chez les hommes et 1,1 % chez les femmes. La majorité des fumeurs (74,4 % des hommes et 68,8 % des femmes) commençaient à fumer avant 20 ans. Une analyse de régression logistique multiple a démontré que l'âge, le sexe, le statut matrimonial, la profession et la région de résidence sont les principaux facteurs déterminants liés au tabagisme actif. Ces résultats mettent en avant la forte prévalence du tabagisme chez les hommes issus de la population rurale marocaine.

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## Introduction

Smoking is an established risk factor for many diseases and is one of the most important public health problems worldwide [1–4]. It is a major cause of death in Morocco, where there is a high rate of tobacco-associated diseases, particularly ear, nose and throat cancers, lung cancer and cardiovascular and respiratory diseases. By 1990 there were an estimated 1309 deaths per 100 000 males aged over 45 years from cancers of the trachea, lung and bronchus and 328 deaths per 100 000 from lip, oral cavity and pharynx cancer. By comparison, the rates for women aged over 45 years were 178 per 100 000 for lung cancers and 44 per 100 000 for oral cancers [5].

The World Health Organization report on the global tobacco epidemic in 2008 (the MPOWER package) reported a current prevalence of smoking among Morocco adults of 14.2%, with a rate of 29.5% for males and 0.3% for females [4]. It also stated that there was no clear policy for tobacco control at the national level. Although tobacco advertising and promotion are prohibited in the local media, and smoking is not allowed in government buildings and in public transport, there is no close monitoring for noncompliance. Morocco signed the Framework Convention on Tobacco Control in 16 April 2004, but has not yet ratified it [4].

The rural population in Morocco numbers 13.5 million people, representing 44.6% of the country's inhabitants [6,7]. No nationwide studies on tobacco smoking have been performed in Moroccan rural areas. The only study was conducted in 2000 by Tazi et al., which focused on cardiovascular risk factors and showed that the smoking prevalence in rural areas was 31.5% in men and 0.6% in women [8].

A nationwide survey (the MARTA survey) was undertaken to estimate the prevalence and socioeconomic and

demographic correlates of current tobacco consumption among individuals 15 years and older in the Moroccan population. This report looks at the results from rural areas.

## Methods

### Sample

A cross-sectional survey based on a representative sample of the Moroccan population was conducted in 2005–06. The sample for the survey ( $n = 9195$ ) was selected to be representative of the nation as a whole. The survey adopted a multi-stage, stratified probability sampling design. In the first stage, 7 regions representing 43.8% of the total population were selected to be representative of the ethnic and sociodemographic characteristics of all 16 Moroccan regions, and the sample was distributed according to proportional allocation of the Moroccan population. In each region, 1 district (*wilaya*) was randomly chosen according to the size of the population. Then, each *wilaya* was grouped into 2 strata; the first stratum was the *wilaya* centre, covering the urban area, and the second stratum was the villages or remote areas surrounding the centres, called rural areas.

### Questionnaire

The questionnaire collected data on sociodemographic characteristics (age, sex, marital status, family income, place of residence, educational level, occupation) and smoking status. Respondents were asked, "Have you smoked at least 100 cigarettes or more during your entire life?" Those who replied "yes" were asked, "Do you smoke now?" The definitions of smoking were as follows: current smoker (currently smoked and had smoked at least 100 cigarettes or more during their lifetime); exsmoker (smoked more than 100 cigarettes in their lifetime but had stopped smoking for more than 3 months at the time of the survey), never smoker (never

smoked a cigarette or had smoked less than 100 cigarettes in their lifetime). The questionnaires were administered by trained interviewers.

### Analysis

The data were entered into a personal computer using *Epi-Info*, version 3.3.2. The chi-squared test was used to compare current smokers and never smokers for the categorical variables and the *t*-test was used to compare the means and standard deviation (SD) of quantitative data. For the multivariate analysis, a stepwise logistic regression was used. Odds ratios (OR) with 95% confidence intervals (CI) for each variable were calculated as an estimate of the likelihood of smoking, and probability values were determined. Interactions among the determinant variables were assessed.

## Results

### Prevalence of smoking

A total of 3438 respondents aged 15 years and over [mean age 31.8 (SD 13.9) years], participated in the study: 1819 males (52.9% of the sample) [mean age 31.8 (SD 14.5) years] and 1619 females [mean age 31.7 (SD 13.2) years].

Overall, 16.9% of the respondents were classified as current smokers, 11.8% as exsmokers and 71.3% as never smokers. Self-reported smoking status for men was: current smoking 31.0%; exsmoking 21.7%, never smoking 47.3%. Among women, the rates were: current smoking 1.1%, exsmoking 0.7%, never smoking 98.2%. Among current smokers, 65.4% had a history of attempted smoking cessation, half (54.0%) of whom had tried to stop in the previous 12 months and 31.1% had stopped smoking for 3 months or more.

Table 1 shows the prevalence of current smoking according to demographic variables. Among males smoking prevalence was highest in the age group 30–39 years (42.3%) ( $P < 0.001$ ), while

**Table 1 Prevalence of current smoking among rural Moroccans by selected demographic characteristics and by sex**

| Variable                              | Males              |           |                 | Females            |           |                 | Total              |           |                 |
|---------------------------------------|--------------------|-----------|-----------------|--------------------|-----------|-----------------|--------------------|-----------|-----------------|
|                                       | No. of respondents | % smoking | <i>P</i> -value | No. of respondents | % smoking | <i>P</i> -value | No. of respondents | % smoking | <i>P</i> -value |
| <b>Age (years)</b>                    |                    |           | < 0.001         |                    |           | -               |                    |           |                 |
| 15-19                                 | 465                | 18.5      |                 | 366                | 1.4       |                 | 831                | 11.0      |                 |
| 20-29                                 | 479                | 35.5      |                 | 429                | 1.6       |                 | 908                | 19.5      |                 |
| 30-39                                 | 376                | 42.3      |                 | 374                | 0.8       |                 | 750                | 21.6      | < 0.001         |
| 40-49                                 | 234                | 35.9      |                 | 253                | 0.8       |                 | 487                | 17.7      |                 |
| 50-59                                 | 154                | 27.9      |                 | 123                | 0.8       |                 | 277                | 15.9      |                 |
| ≥ 60                                  | 106                | 20.8      |                 | 64                 | 0.0       |                 | 170                | 12.9      |                 |
| <b>Marital status</b>                 |                    |           | < 0.001         |                    |           | -               |                    |           |                 |
| Single                                | 1054               | 30.0      |                 | 680                | 2.1       |                 | 1734               | 19.0      |                 |
| Married                               | 711                | 31.9      |                 | 828                | 0.0       |                 | 1539               | 14.8      | < 0.001         |
| Divorced                              | 16                 | 68.8      |                 | 39                 | 7.7       |                 | 55                 | 25.5      |                 |
| Widowed                               | 20                 | 10.0      |                 | 67                 | 1.5       |                 | 87                 | 3.5       |                 |
| <b>Education level</b>                |                    |           | < 0.001         |                    |           | -               |                    |           | < 0.001         |
| Koranic school                        | 304                | 40.5      |                 | 633                | 1.3       |                 | 937                | 14.0      |                 |
| Illiterate                            | 208                | 28.9      |                 | 63                 | 0.0       |                 | 271                | 22.1      |                 |
| School                                | 607                | 34.4      |                 | 437                | 0.7       |                 | 1044               | 20.3      |                 |
| Secondary                             | 509                | 23.6      |                 | 392                | 1.5       |                 | 901                | 14.0      |                 |
| University and above                  | 187                | 27.3      |                 | 87                 | 1.2       |                 | 274                | 19.0      |                 |
| <b>Occupation</b>                     |                    |           | < 0.001         |                    |           | -               |                    |           |                 |
| Farmer worker or manager              | 174                | 31.6      |                 | 10                 | 0.0       |                 | 184                | 29.9      |                 |
| Trade professional, shopkeeper        | 193                | 34.7      |                 | 37                 | 0.0       |                 | 230                | 29.1      |                 |
| Housewife                             | -                  | -         |                 | 749                | 0.0       |                 | 749                | 0.0       |                 |
| No occupation                         | 219                | 41.6      |                 | 279                | 0.7       |                 | 498                | 18.7      | < 0.001         |
| Public or private white-collar worker | 93                 | 26.9      |                 | 53                 | 0.0       |                 | 146                | 17.1      |                 |
| Public or private executive           | 30                 | 20.0      |                 | 5                  | 0.0       |                 | 35                 | 17.1      |                 |
| Blue-collar worker, service employee  | 588                | 40.3      |                 | 166                | 3.0       |                 | 754                | 32.1      |                 |
| Police, army or security              | 34                 | 29.4      |                 | 15                 | 40.0      |                 | 49                 | 32.7      |                 |
| Craftsman                             | 372                | 10.2      |                 | 297                | 1.7       |                 | 669                | 6.4       |                 |
| Student                               | 34                 | 50.0      |                 | -                  | -         |                 | 34                 | 50.0      |                 |
| Other                                 | 44                 | 25.0      |                 | 1                  | 0.0       |                 | 45                 | 24.4      |                 |
| <b>Income (dirhams/month)</b>         |                    |           |                 |                    |           |                 |                    |           |                 |
| < 1000                                | 243                | 38.3      |                 | 165                | 1.2       |                 | 408                | 23.3      | < 0.001         |
| 1000-2000                             | 491                | 31.8      | < 0.001         | 320                | 1.9       | -               | 811                | 20.0      |                 |
| 2000-4000                             | 434                | 32.0      |                 | 277                | 0.7       |                 | 711                | 19.8      |                 |
| 4000-6000                             | 120                | 23.3      |                 | 78                 | 0.0       |                 | 198                | 14.1      |                 |
| > 6000                                | 50                 | 28.0      |                 | 28                 | 0.0       |                 | 78                 | 18.0      |                 |
| Unknown                               | 405                | 25.2      |                 | 701                | 0.7       |                 | 1106               | 9.7       |                 |
| <b>Family size</b>                    |                    |           | 0.92            |                    |           | 0.11            |                    |           | 0.85            |
| ≤ 6                                   | 995                | 31.7      |                 | 925                | 1.5       |                 | 1920               | 17.2      |                 |
| > 6                                   | 677                | 31.0      |                 | 555                | 0.4       |                 | 1232               | 17.2      |                 |

**Table 1 Prevalence of current smoking among rural Moroccans by selected demographic characteristics and by sex (concluded)**

| Variable      | Males              |           |                 | Females            |           |                 | Total              |           |                 |
|---------------|--------------------|-----------|-----------------|--------------------|-----------|-----------------|--------------------|-----------|-----------------|
|               | No. of respondents | % smoking | <i>P</i> -value | No. of respondents | % smoking | <i>P</i> -value | No. of respondents | % smoking | <i>P</i> -value |
| <b>Region</b> |                    |           | < 0.001         |                    |           | –               |                    |           | < 0.001         |
| Agadir        | 316                | 31.3      |                 | 299                | 1.3       |                 | 615                | 16.8      |                 |
| Casablanca    | 249                | 38.6      |                 | 178                | 5.1       |                 | 427                | 24.6      |                 |
| Fez           | 273                | 23.4      |                 | 206                | 0.0       |                 | 479                | 13.4      |                 |
| Marrakech     | 36                 | 33.3      |                 | 36                 | 2.8       |                 | 72                 | 18.1      |                 |
| Oujda         | 403                | 25.1      |                 | 393                | 0.3       |                 | 796                | 12.8      |                 |
| Laayoun       | 84                 | 25.0      |                 | 57                 | 0.0       |                 | 141                | 14.9      |                 |
| Tangier       | 458                | 37.3      |                 | 450                | 0.7       |                 | 908                | 19.2      |                 |

among females smoking prevalence was highest in the age group 20–29 years (1.6%). For education, the highest prevalence of smoking was reported by men who had only Koranic school education (40.5%) and by women who had attained secondary education (1.5%). The highest prevalence by profession was for “soldier/policeman/security” among males (50.0%) and for “other” among females (40.0%) (this category comprised mainly sex workers). The highest prevalence of smoking by income was for the lowest household income category of < 1000 dirhams per month (about US\$ 125) among males (38.3%) and for the second lowest income category of 1000–2000 dirhams per month among females (1.9%). Of all marital status possibilities, those who were divorced had the highest prevalence of smoking among males and females (42.3% and 1.6% respectively). By region, the highest prevalence was observed in the region of Casablanca in both men and women (respectively 38.6% and 5.1%).

In summary, for males a high rate of smoking was significantly associated with middle age, being divorced, Koranic or primary school education level, blue-collar profession or unemployed, low household income and living in the Casablanca region ( $P < 0.05$ ). Statistical tests were not performed on the female group due to the very low prevalence of smoking.

### Multivariate logistic regression

Table 2 gives the adjusted ORs from multivariate logistic regression models to differentiate the adjusted association between different socioeconomic and demographic characteristics and the risk of cigarette smoking. Compared with the youngest group (15–19 years), respondents aged 40–49 years had a greater likelihood of smoking tobacco (OR 4.2; 95% CI: 2.3–7.9). Males were 55.9 times more at risk of being smokers than females (95% CI: 29.9–104.8). Compared with married subjects, divorced subjects had a greater likelihood of smoking (OR 17.2; 95% CI: 2.6–0.03). People working in the police, army or security service had the highest risk of smoking (OR 3.7; 95% CI: 1.2–11.4) and students had the lowest risk compared with those without employment (OR 0.2; 95% CI: 0.1–0.4). The differences by region persisted even after adjusting for all other cofactors. No significant association with smoking was observed for education level or income after controlling for other characteristics.

The majority of male and female current smokers (74.4% and 68.8% respectively) started before the age of 20 years; 22.1% started smoking before the age of 15 years. The mean age of starting smoking was 17.4 (SD 4.3) years

for males and 17.9 (SD 2.9) years for females ( $P < 0.29$ ) (Table 3).

Of the current male smokers, 43.1% smoked  $\leq 10$  cigarettes/day and 45.0% smoked 11–20 cigarettes/day. Of the current female smokers, 56.3% smoked  $\leq 10$  cigarettes/day (Table 4). The mean number of cigarettes smoked/day was 14.0 (SD 8.4) for males and 10.6 (SD 7.1) for females ( $P < 0.01$ ).

The mean duration of smoking was 14.04 (SD 11.04) years for men and 7.87 (SD 9.15) years for women ( $P < 0.01$ ).

### Discussion

The MARTA study is the first large survey to provide nationally representative aggregate prevalence estimates of tobacco consumption by different socioeconomic and demographic characteristics in the rural Moroccan population aged 15 years and over. The study showed that 16.9% of the adolescent and adult population in rural Morocco were classified as current smokers. Since smoking status was determined by interview without any biochemical validation the figure should be considered approximate in view of the likelihood of under-reporting, particularly by women and children [9]. To remedy this problem, further studies can be conducted using biochemical validation of smoking with recruitment of subjects outside

**Table 2 Multiple logistic regression analysis comparing current and never smokers for variables significantly associated with current smoking**

| Variable                              | Adjusted OR | 95% CI     | P-value | P-value (all variables) |
|---------------------------------------|-------------|------------|---------|-------------------------|
| <b>Age (years)</b>                    |             |            |         |                         |
| 15-19                                 | 1           | -          | -       |                         |
| 20-29                                 | 1.9         | 1.3-2.8    | < 0.01  |                         |
| 30-39                                 | 3.1         | 1.9-5.1    | < 0.001 | < 0.01                  |
| 40-49                                 | 4.2         | 2.3-7.9    | < 0.001 |                         |
| 50-59                                 | 2.6         | 1.3-5.1    | 0.1     |                         |
| ≥ 60                                  | 1.4         | 0.6-3.1    | 0.49    |                         |
| <b>Sex (males vs females)</b>         | 55.9        | 29.9-104.8 | < 0.01  | < 0.01                  |
| <b>Marital status</b>                 |             |            |         |                         |
| Single                                | 1.4         | 0.9-2.1    | 0.12    |                         |
| Married                               | 1           | -          | -       | < 0.01                  |
| Divorced                              | 17.2        | 2.6-0.03   | < 0.01  |                         |
| Widowed                               | 1.4         | 0.3-6.5    | 0.69    |                         |
| <b>Education level</b>                |             |            |         |                         |
| Koranic school                        | 0.9         | 0.6-1.4    | 0.70    |                         |
| Illiterate                            | 1           | -          | -       | 0.08                    |
| School                                | 1.3         | 0.9-2.0    | 0.19    |                         |
| Secondary                             | 1.1         | 0.7-1.8    | 0.63    |                         |
| University and above                  | 1.5         | 0.8-2.6    | 0.19    |                         |
| <b>Occupation</b>                     |             |            |         |                         |
| Farmer worker or manager              | 0.8         | 0.4-1.3    | 0.30    |                         |
| Trade professional, shopkeeper        | 0.8         | 0.5-1.3    | 0.39    |                         |
| Housewife                             | < 0.0       | -          | 0.96    |                         |
| No occupation                         | 1           | -          | -       |                         |
| Public or private white-collar worker | 0.5         | 0.2-0.9    | 0.048   | < 0.001                 |
| Public or private executive           | 0.3         | 0.1-1.1    | 0.06    |                         |
| Blue-collar worker, service employee  | 0.9         | 0.6-1.4    | 0.68    |                         |
| Police, army or security              | 3.7         | 1.2-11.4   | 0.02    |                         |
| Craftsman                             | 1.3         | 0.6-3.1    | 0.51    |                         |
| Student                               | 0.2         | 0.1-0.4    | < 0.001 |                         |
| Other                                 | 2.1         | 0.7-6.3    | 0.19    |                         |
| <b>Income (dirhams/month)</b>         |             |            |         |                         |
| < 1000                                | 1           | -          | -       |                         |
| 1000-2000                             | 0.9         | 0.6-1.3    | 0.52    |                         |
| 2000-4000                             | 0.7         | 0.5-1.1    | 0.10    | 0.11                    |
| 4000-6000                             | 0.4         | 0.2-0.8    | 0.01    |                         |
| > 6000                                | 0.5         | 0.2-1.3    | 0.18    |                         |
| Unknown                               | 0.7         | 0.5-1.1    | 0.09    |                         |
| <b>Region</b>                         |             |            |         |                         |
| Agadir                                | 0.6         | 0.4-0.9    | 0.02    |                         |
| Casablanca                            | 1           | -          | -       |                         |
| Fez                                   | 0.3         | 0.2-0.5    | < 0.001 | < 0.001                 |
| Marrakech                             | 0.9         | 0.3-2.4    | 0.84    |                         |
| Oujda                                 | 0.3         | 0.2-0.5    | < 0.001 |                         |
| Laayoun                               | 0.5         | 0.2-0.9    | 0.04    |                         |
| Tangier                               | 0.7         | 0.4-1.1    | 0.08    |                         |

OR = odds ratio; CI = confidence interval.

of their domicile or school. Comparing the overall rate of smoking in rural areas in other Arab and Muslim states, the prevalence of smoking in our study was higher than that reported from Pakistan 14.6% [10], Saudi Arabia 11.6% [11] and Oman 6.9% [12], but lower than that reported from Algeria 19.9% (non-representative sample) [13].

In general, a much higher proportion of men (40%–60%) than women (2%–10%) smoke in developing countries [14]. Comparing with data from other Arab Muslim states, the prevalence of smoking among men in rural Morocco (31.0%) was higher than that reported from Oman 13.8% [12], but lower than that reported from Tunisia 48.7% [15] and from Algeria 39.4% (nonrepresentative sample) [13]. Comparing the rate of smoking in rural areas with that of women in some other Arab states, the prevalence in rural Morocco (1.1%) was higher than 0.2% reported from Oman [12], 0.4% from Algeria [13] and 0.7% from Tunisia [15]. The gender difference in this and other studies may be because smoking by women is not perceived as socially acceptable in Morocco and there may be religious and economic arguments against it [16]. There may also have been under-reporting by some women for sociocultural or religious reasons.

In our study, the highest prevalence of smoking was observed among men aged 30–39 years and women aged 20–29 years. Smoking rates were very high among men and women of the most productive age group (20–59 years). Of Morocco's rural population of 13.5 million, 5.87 million people (3.18 million men and 2.69 million women) are in this age group [7]. Extrapolating from these data we can estimate that around 1.2 million people in this age group are current smokers. This high prevalence calls for immediate targeted smoking cessation programmes.

The majority of regular smokers begin smoking in early adolescence. In our study 74.4% of the male smokers and

**Table 3 Age at starting smoking and number of cigarettes smoked per day for current smokers by sex**

| Variable                               | Males      |      | Females    |      | Total      |      |
|--|------------|------|------------|------|------------|------|
|  | No.        | %    | No.        | %    | No.        | %    |
| <b>Age at starting smoking (years)</b> |            |      |            |      |            |      |
| ≤ 10                                   | 17         | 3.1  | 0          | 0.0  | 17         | 3.0  |
| 11–14                                  | 105        | 19.1 | 3          | 18.8 | 108        | 19.1 |
| 15–19                                  | 288        | 52.3 | 8          | 50.0 | 296        | 52.2 |
| 20–29                                  | 130        | 23.6 | 5          | 31.3 | 135        | 23.8 |
| 30–39                                  | 9          | 1.6  | 0          | 0.0  | 9          | 1.6  |
| ≥ 40                                   | 2          | 0.4  | 0          | 0.0  | 2          | 0.4  |
| Mean (SD)                              | 17.4 (4.3) |      | 17.9 (2.9) |      | 17.6 (4.4) |      |
| <b>No. of cigarettes/day</b>           |            |      |            |      |            |      |
| ≤ 10                                   | 239        | 43.1 | 9          | 56.3 | 248        | 43.5 |
| 11–20                                  | 249        | 45.0 | 7          | 43.8 | 256        | 44.9 |
| 21–30                                  | 52         | 9.4  | 0          | 0.0  | 52         | 9.1  |
| 31–40                                  | 11         | 2.0  | 0          | 0.0  | 11         | 1.9  |
| > 40                                   | 3          | 0.5  | 0          | 0.0  | 3          | 0.5  |
| Mean (SD)                              | 14.0 (8.4) |      | 10.6 (7.1) |      | 13.9 (8.4) |      |

SD = standard deviation

68.8% of female smokers had started smoking before they reached age 20 years. International research suggests that early initiation of smoking predicts longer duration, heavier daily consumption and increased chances of nicotine dependence [17,18]. Considering Morocco's high rate of population growth and its young population (44.9% of Moroccans are aged 20 years or younger) [7], a major effort should be directed to influence the choices that children and adolescents make about tobacco use.

Low education level has been associated with a risk of smoking in many populations [19–21]. This is important as many studies, including the European Community Respiratory Health Survey

(14 countries), have demonstrated that subjects with a lower education level were less likely to quit smoking [22]. Our results showed that smoking prevalence was significantly higher among Moroccan men with a lower level of education. There was also a relatively high rate among men with university education and above; this may indicate a situation similar to that of industrialized countries where, before the advent of antismoking campaigns, smoking was popular among the higher social classes because it had connotations of elevated social status and prestige. Among women, a higher prevalence of smoking was recorded for those with only Koranic school, secondary school

and university level education and above. Thus, for both men and women, interventions need to be targeted at those with lower education [23].

The prevalence of tobacco consumption varied significantly across different Moroccan rural regions even after controlling for individual socioeconomic and demographic characteristics. The highest prevalence was observed in the region of Casablanca in both males and females. This regional level variation may reflect distinct regional sociocultural patterns. Casablanca is the economic capital of Morocco and even the rural surroundings are affected by some of the lifestyle options available to the

**Table 4 Number of cigarettes smoked per day for current smokers by sex**

| No. of cigarettes/day | Males      |      | Females    |      | Total      |      |
|-----------------------|------------|------|------------|------|------------|------|
|                       | No.        | %    | No.        | %    | No.        | %    |
| ≤ 10                  | 239        | 43.1 | 9          | 56.3 | 248        | 43.5 |
| 11–20                 | 249        | 45.0 | 7          | 43.8 | 256        | 44.9 |
| 21–30                 | 52         | 9.4  | 0          | 0.0  | 52         | 9.1  |
| 31–40                 | 11         | 2.0  | 0          | 0.0  | 11         | 1.9  |
| > 40                  | 3          | 0.5  | 0          | 0.0  | 3          | 0.5  |
| Mean (SD)             | 14.0 (8.4) |      | 10.6 (7.1) |      | 13.9 (8.4) |      |

SD = standard deviation.

urban population, with higher incomes and wider range of educational levels.

This study has also shown that smoking prevalence varied with marital status in Moroccan rural areas. A higher prevalence of smoking was observed for divorced subjects in both sexes. Divorced people may suffer more sociocultural and financial stress than others, which may lead them to smoke. The high smoking prevalence among married men raises a concern about the health effects of passive smoking among those in the same household [24], and may also increase the risk of smoking initiation among children [25].

With a daily average for men of 14.0 cigarettes smoked and 13.9 in the total

sample, tobacco consumption among smokers in this study was similar to the average of 13 cigarettes/day reported for the Eastern Mediterranean region [9] and the 14 cigarettes/day for less developed countries. Moreover, it was lower than the average of 22 cigarettes tabulated for more developed countries. In addition to the significantly low prevalence of smoking among women, consumption was significantly lower than among men for cigarettes/day.

Our findings indicate that tobacco use in rural areas of Morocco is high, and concerted efforts are needed to curb the epidemic. Cross-sectional studies should be conducted regularly to monitor changes in prevalence,

knowledge, attitudes, behavioural and socioeconomic determinants of starting, continuing and quitting smoking. These studies would provide baseline data for antismoking interventions and allow evaluation of these programmes.

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