Evolution of attitudes, trends and perceptions of smoking among middle and secondary school students in the Gharb Region, Morocco, 2010–2015

Introduction

Tobacco use is an important public health issue, and it is the single biggest avoidable cause of death and disability worldwide.1,2 The burden of disease caused by smoking is enormous, with more than 6 million premature deaths annually.3 According to the World Health Organization (WHO), tobacco causes 4.9 million deaths per year, a figure expected to rise to more than 10 million deaths per year by 2030.4 The health risks of tobacco smoking are well documented.5 Smoking causes a wide range of irreversible diseases, leading to microbial infections (such as respiratory infections, periodontitis and bacterial meningitis) as well as various cancers related to smoking.6 Smoking among adolescents has been reported to be associated with delayed recovery from injuries and a higher incidence of atherosclerosis, chronic obstructive pulmonary disease, Crohn’s disease, rheumatoid arthritis and premature death.7 Smoking is highly prevalent among young people in some socio-economic contexts; it primarily begins in early adolescence.8 Smoking among adolescents has been reported to be associated with many factors that commonly play a role in the initiation of smoking, including social factors; smoking among family members, peers and teachers; psychological relaxation; and economic factors.9

In Morocco, the results of the Global Youth Tobacco Survey (GYTS) conducted by the Moroccan Ministry of Health in schools highlighted the need for awareness of the prevalence of youth smoking. Prevalence in the 13–15-year age group was 10.8% (in 2001), 11% (2006) and 9.5% (2010).9 To combat and to limit the health risks of tobacco smoking among Moroccan adolescents, in the
In 2007, the Lalla Salma Foundation – Cancer Prevention and Treatment, in collaboration with the Ministry of Health and the Ministry of Education, launched a tobacco control strategy at the level of three regions: Rabat-Salé-Zemmour-Zaer, Souss-Massa-Drâa and Grand Casablanca. It was gradually extended to be a national programme in 2009–2010. The overall goal of this strategy is to provide a framework for the implementation of tobacco control measures to promote the health and well-being of Moroccan students in the future and to protect them from the harmful effects of smoking and exposure to second-hand tobacco smoke.

The activities of this programme include the placement of smoking cessation signs in all schools, training health professionals in tobacco cessation consultation and training of teachers and peer educators of health clubs established in the schools in information, education and communication on the harmful effects of tobacco consumption.

Objectives of the programme include raising awareness and changing knowledge, attitudes and practices regarding the consumption of tobacco products, protecting smokers and non-smokers, and reducing the number of users.

The follow-up of the evolution of tobacco smoking provides important information to follow the dynamic of this public health issue. Our study aims to examine the trend of smoking by comparing two cross-sectional studies, to measure change in the degree of awareness and knowledge, attitudes and practices regarding the consumption of tobacco products. The first study was conducted in 2010 before the implementation of a national programme against smoking, and the second one in 2015, 5 years after the initial implementation.

**Methods**

**Type of study**

Two cross-sectional studies were conducted in 2010 and 2015 among students of middle and secondary schools of the Gharb Region in Morocco.

**Duration of the study**

The study lasted for 5 years, from December 2010 to December 2015.

**Eligibility criteria**

To be included in the study, children had to be aged between 10 and 20 years old, must have had informed consent provided by their tutors, and had to belong to the selected middle and secondary schools in the region of Gharb-Chrarda-Béni-Hssen.

**Steering committee**

A steering committee was constituted to lead and coordinate all the activities concerning the two studies. This committee included principal investigators of the study, a representative of the Ministry of Education, local authorities and parents’ union representatives of the selected schools.

**Study site**

The region where the studies took place was situated in the north-west of Morocco. The population of the Gharb-Chrarda Region is 2 million inhabitants (6% of the Moroccan population); it contains both rural and urban areas, and all socio-economic classes are represented (National Statistics Department 2014). Subsequently, factors influencing smoking are the same as in other parts of the country.

**Sampling**

The list of middle and secondary schools (and classes) was obtained from the Ministry of Education of Morocco.

In 2010, the study included 10% of all the schools of the region.

**Step 1:** The list of all schools was analysed by OpenEpi software (with every school corresponding to an exclusive number) using the random function; the software randomly chose 10% of the secondary schools and 10% of middle schools. There were around 100 secondary schools and 95 middle schools in the region, of which nine secondary schools and nine middle schools were selected for inclusion.

**Step 2:** All students in the selected classes who gave their consent were included in the study.

In 2015, the sample calculation was done using the formula of prevalence studies, with a confidence interval of 95% (0.05) and an estimate of an 80% response rate. Concerning the number of desired estimates we chose to present the results by age and sex (four age groups: 11–12, 13–15, 16–17, 18 and over), which gave us a total of eight estimates.

The cluster sampling was accomplished in two steps:

- The size of the sample was divided by the number of grade levels (first, second and third year of middle school and first, second and third year of secondary school). This allowed us to reach the subpopulation (age and sex) on which the estimates would be made; the total size was divided per level.
- Then a cluster sample proportional to the size of the classes (cluster) was selected: 66 classes from 34 secondary schools and 66 classes from 50 middle schools were identified in 2015. The investigation allowed participation of all students who were present on the day of the investigators’ visit.

**Constitution of the investigation teams and their training**

Three teams were designated, one for each city (Kenitra, Sidi Kacem and Sidi Slimane are the three cities of the
Gharb Region). Each team was led by a supervisor and two investigators. A training session was organised for the investigators in preparation for the two studies. The aim was to explain the objectives and the methodology to all the investigators, to explain the tasks of each one. The questionnaire was reviewed following the sessions.

**Pilot test**

A pilot test was conducted in four classes of different levels in a non-participant school. Its main objectives were to test the questionnaire – to estimate the average time required to administer it and to test its comprehension by the students. A debriefing meeting was organised; the study organisation and questionnaire were adapted and validated. The questionnaire was reviewed by the steering committee.

**Data collection**

The identified schools were informed by their administrative authorities of the schedule of the study. Once the investigators were present in the schools, a short meeting was organised with the director and the administrative staff.

An auto administered questionnaire was used in the two studies. The same instrument was used for both studies for the most part, with some items regarding the specific objectives of each of the two studies.

For both of the studies, the questionnaire was administered by a staff of health specialists and from the Ministry of Education.

At the entry of each selected class, the objectives of the study were explained for the students and their teacher. The investigators stayed in the class to collect the questionnaires and to respond to the students’ questions, if any.

Data regarding tobacco use were collected at the beginning of the study from children in all subject groups, using a self-administered questionnaire.

We collected data on demographic characteristics, the extent of information on smoking, sources of information on smoking, perceptions of smoking and prevalence.

**Case definition**

Since its implementation the programme has defined smoking as follows:

- **former smoker**: someone who hasn’t smoked for the last 6 months
- **smoker**: someone who has smoked at least one cigarette per day for the last 6 months
- **non-smoker**: someone who hasn’t smoked at least one cigarette per day in the preceding 6 months

- **second-hand smoker**: someone who has been exposed to second-hand smoke within their home or in class for the past 30 days.

**Statistical analysis**

Data analysis was done by the software IBM SPSS Statistics version 20. The nominal variables were presented as proportion. A chi-square test was used to test independence between nominal variables. In the case of cells with a theoretical frequency \( n < 5 \), we take Fisher’s \( p \)-value. Two-sided \( p \)-values < 0.05 were considered significant.

**Ethical considerations**

The purpose and the protocol of the study were presented and explained to the local authorities, regional medical representatives, school headmasters, teaching staff and parents’ union representatives in schools, who in turn explained clearly the benefits of the study to the children’s parents. Subsequently, oral consent was obtained from children and their parents or tutors, respectively, before the beginning of the survey. Volunteering parents and children were included in the study.

This study received approval from the Ministry of National Education. The ethical clearance number is 18/23.

**Results**

The demographic characteristics are presented in Table 1.

The level of information on smoking and its harmful effects are illustrated in Table 2. The proportion of students informed about tobacco and its negative effects was higher in the 2015 study (94.0%) than the 2010 study (92.5%) \((p > 0.05)\) (Table 2).

**TABLE 1: Demographic characteristics of schoolchildren enrolled in the study in 2010 and 2015.**

| Variables | 2010 | | 2015 | | 2015 | |
|-----------|------|-----|------|-----|-----|-----|
|           | \( n \) | \( \% \) | \( n \) | \( \% \) | \( p^* \) |
| Sex       |      |     |      |     |     |     |
| Female    | 2931 | 55.2 | 1995 | 49.3 | 0.0001 |
| Male      | 2380 | 44.8 | 2053 | 50.7 |       |
| Sum       | 5311 | -    | 4048 | -    |       |
| Years strata |      |     |      |     |     |     |
| 10–12 years | 213  | 4.0 | 42   | 1.1 | < 0.001 |
| 13–15 years | 2862 | 54.1 | 1526 | 38.5 |       |
| 16–17 years | 1545 | 29.2 | 1245 | 31.4 |       |
| ≥ 18 years | 672  | 12.7 | 1155 | 29.1 |       |

Note: Results are presented as frequencies and proportions, \( n \) [%].

\(^*\) \( p \)-values were determined using the chi-square test (the chi-square value was corrected for cells with a theoretical frequency less than 5).

**TABLE 2: Level of information on smoking among schoolchildren involved in the study in 2010 and 2015.**

| Variables | 2010 study | 2015 study | \( p^* \) |
|-----------|------------|------------|-----------|
|           | \( n \) | \( \% \) | \( n \) | \( \% \) |       |
| Not informed | 399 | 7.5 | 247 | 6.0 | > 0.05 |
| Informed   | 4913 | 92.5 | 3882 | 94.0 | > 0.05 |

Note: Results are presented as frequencies and proportions, \( n \) [%].

\(^*\) \( p \)-values were determined using the chi-square test (the chi-square value was corrected for cells with a theoretical frequency less than 5).
Table 3 shows a comparison of sources of information on smoking in the 2010 and 2015 studies. Analysis of the table shows that in the 2010 study, parents, primary schools and television and radio were more involved in student information on smoking and its harmful effects compared to the study of 2015 (Table 3).

Table 4 shows the perception of smoking among students in 2010 and 2015. Comparison between the indicators in the 2010 and 2015 studies on the perceptions of students about tobacco and its harmful effects shows that the prevalence of students claiming that tobacco is not a pleasure and does not cause harm was significantly much higher in 2015 than in 2010 (86.3% and 76.5% in 2015 versus 70.9% and 56.4% in 2010, respectively). The prevalence of students informed about the harmfulness of tobacco on health was high in both studies, 95.5% in 2010 and 94.4% in 2015 (Table 4).

Table 5 illustrates the prevalence of smoking among students in both studies. The comparison between the 2010 and 2015 studies shows that the prevalence of students who smoked increased in 2015 (2.9%) compared to 2010 (1.8%) (Table 5).

Table 6 shows that 36.9% of students were exposed to smoking in their home. The students were influenced most by their best friends smoking (32.9%), followed by their parents (27.5%) and finally by their brothers and sisters (15%).

Discussion

Worldwide, the health impact of smoking is now well documented. Smoking is one of the leading individual risk factors for the development of the most common chronic non-communicable diseases (cardiovascular, respiratory and a number of malignant diseases), for effects on infants, children and young people’s development and health, as well as for disability, premature death and environmental pollution. Reduction in smoking prevalence is therefore one of the most important public health measures that should be implemented to improve the health of Morocco’s population. This study was designed to investigate the evolution of smoking among middle and secondary school students in the Gharb Region, Morocco, between 2010 and 2015 and to have more information that can help in public health research.

Our results showed that Moroccan students have favourable knowledge of the health risks associated with tobacco smoking. Indeed, the prevalence of informed students about tobacco and its harmful effects is slightly higher in the 2015 study (94.0%) compared to the 2010 study (92.5), and the prevalence of students claiming that tobacco is not a pleasure and does not calm the nerves was significantly higher in the 2015 study than in the 2010 study (86.3% and 76.5% in 2015 versus 70.9% and 56.4% in 2010, respectively). Moreover, the prevalence of students who smoked increased slightly in 2015 (2.9%) against 2010 (1.8%). It is not easy to compare our findings with those from other countries owing to the different methodologies used. However, the smoking prevalence in our sample was much lower than that reported in a large sample of high school students.
students in Porto, Portugal, which found that 21.5% of the participants were current smokers. In Ethiopia, a higher prevalence (28.6%) of smoking was found among adolescents. Similarly, in Chile, the prevalence of smoking was 15.4% among adolescent students aged 13–15 years. Smoking prevalence among young people in Serbia is the highest in Europe. In fact, 54.7% of teenagers aged 13–15 have already smoked a cigarette, with 31.3% of them having done so by the age of 10. Our study showed that the majority of the students considered smoking to be harmless to their health. Surprisingly, similar to recent studies conducted in Italy, England and Germany among students, the knowledge of the health risks associated with cigarette smoking was considerably low.

On the other hand, our results showed that in the 2010 study, parents, primary school and TV and radio were the primary sources of information to the students about smoking and its harmful effects compared to the study in 2015. This could be explained either by the differences in the two samples or the place of tobacco control in the primary and middle school curriculum, which may be less marked.

Although it is widely recognised that children smoke their first cigarette while attending primary school, smoking is most likely to begin during adolescence, when various factors, such as peer pressure, family influence, social class and other psychosocial determinants influence an individual to start and maintain the habit. Indeed, in the 2015 study, 36.9% of students were exposed to smoking in their home. This prevalence is higher than the GYTS 2010 study, which reports a prevalence of 19.7%. The results of the study argue that the students are influenced by their best friends (32.9%), followed by their parents (27.5%) and finally by their brothers (15%). The inverse case was found in the GYTS 2010 study, which classifies the parents in first place (31%), followed by brothers (22%) and finally friends (12%). Then again, many studies have found that tobacco use is less likely among students belonging to nuclear families, arguing that close contact among parents and children in nuclear families might play a protective role against taking up a risky behaviour such as tobacco use.

**Conclusion**

This study reports the positive evolution in the knowledge of students about smoking and its effects. The prevalence of students who smoked increased slightly in 2015. Efforts must be made to reach the long-term objective of reducing the prevalence of smoking among the students. The results of this study suggest the need to address family influences on adolescent smoking and to investigate the introduction of a programme for education and training of students on tobacco dependence prevention, because schools are expected to be the favoured vehicle for health promotion.

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**Competing interests**

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

**Authors’ contributions**

All authors have contributed to this publication and hold themselves jointly and individually responsible for the content. The authors’ responsibilities were as follows: S.M., E.M., L.B., Y.C.K. and H.E. conceived and designed the study, supervised the data collection tools, training of staff, quality control, and S.M., F.E.Z. and E.M. analysed data, performed the statistical analysis, interpreted the results, conducted literature research and edited the article.

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**Data availability statement**

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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