Information disclosure and smoking risk perceptions

Potential short-term impact on Spanish students of the new European Union directive on tobacco products

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Background: The Directive 1999/0244 (COD), recently approved by the European Parliament, proposed that the content and presentation of health warnings on cigarette packets be modified. The aim of the present study was to analyse the potential effect of the planned measures on the perceptions by Spanish youth of the risks associated with smoking. **Method:** A sample of 435 students attending the University of La Rioja were surveyed on their perceptions of the principal health risks attributable to the consumption of tobacco i.e. lung cancer, respiratory diseases and cardiovascular disease. A questionnaire was administered before and after they were presented with a demonstration of the health warnings on cigarette packets based on the new European Union directive. **Results:** Perceptions changed significantly following exposure to the content and type of information of the new packaging. In general, the university students attributed a higher health risk to smoking following the presentation. **Conclusions:** The measures developed by the public sector to present a higher profile of anti-tobacco health warnings do influence the target population in the desired direction, at least in the short term. Hence, given that the perception of risk influences the election to smoke, it is predictable that when these types of policy decisions are applied, there will be a tendency towards a reduction in the incidence and prevalence of tobacco consumption.

Keywords: health promotion, risk perceptions, smoking

Over the last few decades several epidemiological studies have identified tobacco consumption as one of the principal risk factors in a wide range of morbidity including malignant tumours, respiratory diseases and cardiovascular disturbances.[1] The elevated risk attributed by these studies together with the high levels of the smoking habit that still persist in Spain[2] as well as in the majority of other member states of the European Union (EU)[3] is a cause for considerable concern to the health authorities of the EU. The consumption of tobacco is currently seen as the primary avoidable cause of premature death.[4] On the basis of several published reports,[5,6] the European Council estimated that tobacco was responsible for more than half a million deaths each year within the current boundaries of the EU.[7] In Spain, according to the most recent studies, it is estimated that tobacco will be the causative factor of more than 60,000 deaths per year.[8]

As with other developed countries, the responsible authorities of the EU have adopted two major types of anti-tobacco policies with the objective of palliating the damage to health of the population that is occasioned by tobacco.[9] The first of these policies has been directed towards reducing the number of smokers, using several anti-tobacco measures such as increasing the cost of tobacco via taxation, the introduction of restrictions on advertising by the tobacco industry, restricting the sites where tobacco may be consumed in public and the greater provision of information regarding the risks inherent in tobacco consumption, principally by means of more prominent health warnings on cigarette packets. The second type of anti-tobacco strategy, called the 'low tar' policy[10] is designed to encourage those smokers who have difficulties in quitting the smoking habit[11] to switch to brands with a lower yield of nicotine and tar and, by doing so, to reduce their exposure to the addictive and harmful tobacco components.[12,13]

Both policies have had a clear effect on the presentation and labelling of tobacco and the recently-approved Directive 1999/0244(COD)[14] of the European parliament is an important further modification[15,16] in the implementation of these anti-tobacco measures.[17–19] Apart from strict regulation of the harmful components and the additives that these products contain, the European Directorate provides for an increase in the physical size of the health warnings on the cigarette packets (a minimum of 30% and 40% of the front and back surfaces of the packet, respectively). Further, the new health warnings displayed on the packets are to be more direct and stronger than those used to-date.

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In keeping with the previous considerations of the European Directorate,[14] one of the principal aims of the new reforms is to achieve a high level of health protection by greater provision of information to the general population by highlighting the risks that are deeply embedded in tobacco products. The young are a particular target population in that the European Parliament and Council have indicated that approximately 80% of new smokers in the EU are below the age of 18 years.

In relation to the Spanish situation, it needs to be remarked that the decrease in the smoking habit over the last ten years has been less than the mean recorded in the countries of the EU. This situation, common to other countries in Southern Europe,[20] could be explained by the observation that despite the consumption of tobacco being reduced in males there is a clear tendency towards an increase in prevalence in women over this period, especially among the higher educated sub-groups.[2,21]

According to the most recent *Encuesta Nacional de Salud* (ENS)[2] [National Health Survey] conducted in 1997, 35.78% of the Spanish population over the age of 16 years smokes and, despite the proportion of smokers having diminished during the last decade in the 16–24 year age group,[21] the prevalence of smoking in this group is still 39.75%. As in the rest of Europe, smokers in Spain start the habit in adolescence (on average at 17 years of age) and, as noted by recent studies,[22] if young people reach the age of 20 years without having smoked then the probability of ever smoking is extremely low. As such, it is of vital importance to direct preventive strategies towards this group of young people.

The aim of the present empirical study was to evaluate the impact of the reforms proposed by the European Directive[14] on the perception of the health risks of smoking among young Spanish university students. Since the beliefs regarding health risks condition the decision to smoke,[23–25] the present study will allow us to assess whether the new reforms of the European Directive are useful strategies in reducing the incidence of tobacco consumption in one of the target groups. This could be of particular interest not only for the Spanish health authorities and other health authorities in Europe but also for the new member states into the EU who will face a similar problem to that currently encountered in Spain.

METHODS

As suggested by Etter et al.,[26] the design of questionnaires such as those used prior to the establishment of certain anti-tobacco measures, especially based on the provision of information to the public, are useful methods for assessing improvement in knowledge and on its impact and suitability. With this objective, we designed a survey and used a questionnaire in a sample of university students. Information was collected through a confidential self-administered questionnaire that was applied twice to the same population sample. The first stage of the questionnaire referred to risk perceptions derived from tobacco consumption. Subsequently, packets of cigarettes that had been modified in accordance with the new laws were presented to the subjects and the same questionnaire was re-applied. Respondents were in classrooms and a table had the modified packets prominently displayed for the students to observe and to handle, if desired. The whole process lasted about one hour. The procedure followed is similar to that employed in previous studies[27] directed towards evaluating the influence of public information on individuals' perceptions of the basis of risks. Using this procedure of a panel of data, it is possible to observe the manner in which the perceptions of risk of the young person questioned respond to the modifications planned in this new European directive.

A sample of 435 young people between the ages of 18 and 24 years were randomly selected from among the 7,250 students attending courses of study at the University of La Rioja. The study units were classrooms. A selection of classrooms was made from among all the courses followed at the university. The selection included short intensive degree-course students as well as those following longer, protracted degree courses so as to control for sampling differences. The sampling procedure also included at least one group of students from each degree course offered at the university so as to avoid bias. All students fulfilled the eligibility criteria of being between the ages of 18 and 24 years and were attending classes on the days on which the survey was conducted, i.e. 16 to 24 May 2000.

Applying the survey to university students to assess risk perceptions of young people is valuable because they represent a high proportion of young adult Spaniards (about 44% of the 18–24 age group attend university) and also because, as in other countries, they constitute a leading group that tends to set the mores to be emulated by others.

The method of data collection was from the questionnaire which was filled-in directly and anonymously by the student. The survey sought the type of demographic information that is generally required from university students. Additionally, the current questions solicited information on certain habits such as consumption of alcohol and tobacco, some socio-economic characteristics as well as a value assigned to the health risks of smoking.

From the collated data the respondents were classified into two groups with respect to the smoking habit: one group contained the habitual smokers which included those who admitted to currently smoking at least one cigarette a day and the other group contained the non-smokers. This group contained all those who never smoked as well as those who were ex-smokers and those who smoked only occasionally.

Also included were questions that generated quantitative data such as assigning values to the perceived risk associated with tobacco consumption and with tobacco smoke in the environment and the susceptibility to lung cancer, respiratory diseases and cardiovascular diseases, reduced life expectancy and other risks of less relevance.

The questionnaire is analogous in form to that employed by Viscusi[23] and Antoñanzas et al.[28] in assessing risk perception on an empirical basis. The present authors will supply copies of the questionnaire on request.

Several tests of comparison were applied in the statistical analyses. For qualitative variables, differences in the characteristics in the study sample as a function of the tobacco habit were compared using the Pearson's χ^2 test.[29] In the overall study sample and the two subgroups analysed separately, changes in the proportions pre- and post-exposure to the publicity information were compared using the McNemar's χ^2 test for matched data.[30] Finally, analyses of the quantitative variables of risk perception in both informative contexts were with the Student paired t-test.

RESULTS

Overall, 31.26% of the university students declared themselves as smokers. This was similar to the overall prevalence identified by the latest 1997 ENS[2] survey of students in the 18 to 24 year age group (32.80%). Of immediate note in the sample was the high level among the female students (34.75%) compared to their male counterparts (26.14%). Although the ENS survey did not differentiate on education type or level, there were major differences from our findings with respect to gender; the percentage of smokers being 32.14% and 33.49% in females and males, respectively, in the ENS survey. However, this peculiar characteristic of smoking habits among Spanish students has been highlighted in other recent studies.[31,32]

Table 1 summarizes the characteristics of the study sample. As with other empirical studies[31,33,34] in relation to the smoking habit, we observed differences in the gender variable, university course-of-studies followed and level of alcohol consumption. There was a higher prevalence among the female students as well as the university students following a medium-level course and with a higher level of alcohol consumption. Other variables were not statistically different which is logical given the homogeneous nature of the reference population.

Table 2 summarizes the awareness of smoking risks pre- and post-exposure to the packaging publicity. An elevated proportion of those surveyed recognized an association between tobacco consumption and the principal groups of morbidity attributable to this risk factor. Initially (pre-publicity) 89% of the study sample associated the consumption of tobacco with the development of lung cancer, 96% with respiratory diseases and 79% with cardiovascular diseases. Awareness regarding diabetes, a 'control' variable in the survey, remained relatively low at around 16%.

McNemar's χ^2 statistic[30] was applied to the paired proportions of the two parts of the survey. With the exception of the respiratory diseases, the differences in the proportions (before and after exposure to the new packaging publicity) were statistically significant. In all cases there were increases in the proportions of respondents who related the consumption of tobacco to the groups of diseases. This increase was lower in the group of smokers. The proportions of respondents who perceived smoking as being a risk factor for lung cancer, respiratory disease and cardiovascular disease rose to 96%, 97% and 87%, respectively.

Table 3 summarizes the perceptions, pre- and post-publicity, of the relative risks of lung cancer, respiratory disease and cardiovascular disease from exposure to tobacco. The paired t-statistic contrasts the hypothesis of equality of means in the two evaluations of the risks assessed within the two parts of the survey. The magnitude of the risk that the students (smokers as well as non-smokers) assigned to the consumption of tobacco increased significantly following the presentation of the new health warnings. The mean value of the perceived risk for lung cancer rose from 4.39 to 5.96, from 5.45 to 7.05 for respiratory diseases and from 3.74 to 5.05 for cardiovascular diseases. As seen in *figure 1*, these values are maintained with a high degree of coherence in the different intervals of risk and suggest that the important aims of the reforms undertaken by the EU (i.e. to increase awareness among the young regarding the risks associated with tobacco consumption) were attained, at least in the short term.

Table 1 Some personal characteristics of respondents as a function of smoking habit

Variable	All respondents n=435 Mean	SEM	Regular smokers n=136 Mean	SEM	Non-smokers n=299 Mean	SEM	χ^2-statistic[d]	p-value[d]
Male	0.41	0.02	0.34	0.04	0.44	0.03	3.85	0.04
University career[a]	0.36	0.02	0.26	0.04	0.40	0.03	7.24	<0.01
Males	0.36	0.03	0.21	0.06	0.42	0.04	5.44	0.01
Females	0.35	0.02	0.29	0.04	0.39	0.03	2.73	0.09
Academic year	2.02	0.05	2.05	0.07	1.99	0.07	4.95	0.17
Urban	0.63	0.02	0.61	0.03	0.65	0.03	0.29	0.59
Social class[b]	3.18	0.02	3.21	0.04	3.16	0.03	6.43	0.16
Alcohol use[c]	2.01	0.09	2.40	0.12	1.82	0.13	41.03	<0.01
Males	2.91	0.14	3.44	0.19	2.68	0.19	25.03	<0.01
Females	1.36	0.10	1.64	0.13	1.23	0.15	23.96	<0.01

a: Categoric dichotomous variable: 0 for 1st cycle of the degree course; 1 for 2nd cycle of the degree course.
b: Categoric variable that classifies respondents in an ordinal scale of 1 to 5 according to social class.
c: Categoric variable that classifies respondents in an ordinal scale of 0 to 5 according to the frequency of alcohol intake.
d: Pearson's χ^2 test.
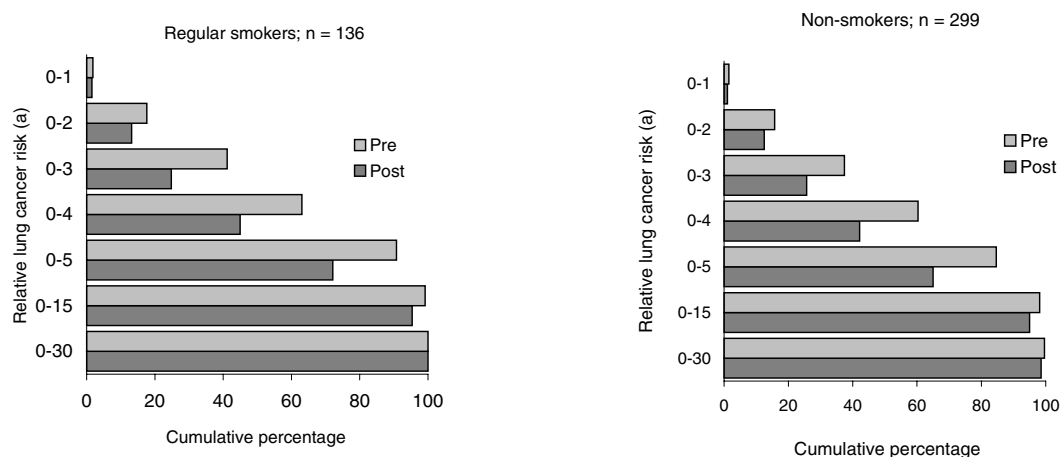SEM: Standard error of mean

Figure 1 Distributions of beliefs regarding relative risk of lung cancer for smokers[a] as a function of smoking behaviour of the respondents; **(a)** left panel: regular smokers; **(b)** right panel: non-smokers
a: Reported ratio of the risk for smokers and non-smokers of getting lung cancer during their lifetime

Table 2 Respondents acknowledging smoking to be a disease risk factor pre- and post-publicity based on the new EU directives

	Pre n=435		Post n=435		Variation %	χ^2-statistic[a]	p-value[a]
	Proportion	n	Proportion	n			
Lung cancer	0.89	385	0.96	419	8.83	26.69	<0.01
Regular smokers	0.90	122	0.95	129	5.74	3.13	0.07
Non-smokers	0.88	263	0.97	290	10.27	22.32	<0.01
Respiratory diseases	0.96	418	0.97	422	0.96	0.45	0.50
Regular smokers	0.96	131	0.98	133	1.53	1.50	0.22
Non-smokers	0.96	287	0.97	289	0.70	0.07	0.78
Cardiovascular diseases	0.79	345	0.87	379	9.86	20.08	<0.01
Regular smokers	0.80	109	0.85	116	6.42	2.12	0.14
Non-smokers	0.79	236	0.88	263	11.44	18.38	<0.01
Diabetes	0.16	71	0.30	128	80.28	45.12	<0.01
Regular smokers	0.15	20	0.26	35	75.00	13.07	<0.01
Non-smokers	0.17	51	0.31	93	82.35	30.95	<0.01

a: McNemar's χ^2 test for matched data.

Table 3 Respondents' perceptions of relative risks for smokers pre- and post-publicity based on the new EU directives

	Pre n=435		Post n=435		Variation %	t-statistic[b]	p-value[b]
	Mean	SEM	Mean	SEM			
Relative lung cancer risk for smokers[a]	4.39	0.16	5.96	0.39	35.76	4.32	<0.01
Regular smokers	4.24	0.27	5.63	0.41	32.78	3.87	<0.01
Non-smokers	4.46	0.21	6.10	0.53	36.77	3.28	<0.01
Relative respiratory disease risk for smokers[a]	5.45	0.27	7.05	0.50	29.36	3.32	<0.01
Regular smokers	5.04	0.32	7.01	0.75	39.09	2.73	<0.01
Non-smokers	5.64	0.37	7.07	0.65	25.35	2.29	0.02
Relative cardiovascular disease risk for smokers[a]	3.74	0.13	5.05	0.37	35.03	3.72	<0.01
Regular smokers	3.71	0.17	4.83	0.53	30.19	2.31	0.02
Non-smokers	3.75	0.18	5.15	0.49	37.33	3.00	<0.01

a: Reported ratio of the risk for smokers and non-smokers of getting lung cancer, respiratory disease or cardiovascular disease during their lifetime.
b: Paired t test.
SEM: Standard error of mean

Tables 4 and *5* show the mean perceptions of the respondents, pre- and post-publicity, of developing lung cancer, respiratory diseases and cardiovascular diseases during the lifetime of the smoker and of the passive smoker and, also, of their perceptions of the shortening of life expectancy and the probability of low birth-weight infants being born to mothers who smoke. Overall, the increment in perceived risk was highly significant in the group of smokers as well as in the non-smokers. The maximum increment in the mean perception of the risks associated with the smoking habit in the overall study sample was observed to be 20.79% *(table 4)* and the increment in the perception of risks associated with passive smoking was 33.77% *(table 5)*. The mean increase in perception of risk was lower in the smokers than in the non-smokers.

DISCUSSION

Informative anti-tobacco measures, from the perspective of an economic analysis, are worthwhile since the process of electing to smoke results from a certain degree of incertitude on the part of the consumer, regarding the prejudicial consequences of such a decision to start smoking.[35–37] As pointed out by Becker et al.,[38] Viscusi et al.,[23] and Chaloupka et al.,[39] the underlying economic principal is that the health risks from tobacco represent an important cost to the consumer as measured as a function of the potential deterioration of the vital capacity of the smoker in the long term, apart from the loss of health and wellbeing. Perceptions of the health risks act as dissuasive elements to smokers and potential smokers and, as such, constitute an important variable in the demand for tobacco.[24,25,40–42]

Table 4 Respondents' perceptions of risks for smokers pre- and post-publicity based on the new EU directives

	Pre n=435		Post n=435		Variation %	t-statistic[c]	p-value[c]
	Mean	SEM	Mean	SEM			
Lung cancer risk (× 100)[a]	43.77	1.18	51.64	1.24	17.98	12.48	<0.01
Regular smokers	37.90	1.93	45.21	2.20	19.29	6.14	<0.01
Non-smokers	46.43	1.45	54.56	1.47	17.51	10.93	<0.01
Respiratory disease risk (× 100)[a]	54.08	1.27	57.16	1.27	5.70	3.92	<0.01
Regular smokers	48.12	2.29	51.49	2.33	7.00	2.63	<0.01
Non-smokers	56.78	1.51	59.73	1.49	5.20	2.99	<0.01
Cardiovascular disease risk (× 100)[a]	34.97	1.14	42.24	1.19	20.79	10.12	<0.01
Regular smokers	30.64	1.76	36.63	2.06	19.55	4.25	<0.01
Non-smokers	36.85	1.38	44.68	1.44	21.25	9.43	<0.01
Life expectancy reduction[b]	12.46	0.45	14.24	0.51	14.29	4.70	<0.01
Regular smokers	11.30	0.98	12.83	0.91	13.54	1.86	0.06
Non-smokers	12.99	0.48	14.88	0.61	14.55	4.67	<0.01

a: Reported number of smokers out of 100 who will get lung cancer, respiratory disease or cardiovascular disease during their lifetime because they smoke.
b: Difference in life expectancy between non-smokers and smokers.
c: Paired *t* test.
SEM: Standard error of mean

Table 5 Respondents' perceptions of risks associated with passive smoking pre- and post-publicity based on the new EU Directive

	Pre n=435		Post n=435		Variation %	t-statistic[d]	p-value[d]
	Mean	SEM	Mean	SEM			
Lung cancer risk (× 100)[a]	19.07	0.85	25.51	1.03	33.77	9.80	<0.01
Regular smokers	15.03	1.17	21.50	1.74	43.05	5.11	<0.01
Non-smokers	20.87	1.11	27.31	1.26	30.86	8.38	<0.01
Cardiovascular disease risk (× 100)[a]	16.81	0.91	21.31	0.98	26.77	5.39	<0.01
Regular smokers	13.12	1.26	20.19	1.84	53.89	4.63	<0.01
Non-smokers	18.40	1.18	21.79	1.16	18.42	3.42	<0.01
Life expectancy loss[b]	5.41	0.25	7.09	0.48	31.05	3.62	<0.01
Regular smokers	4.60	0.48	6.26	0.74	36.09	2.27	0.03
Non-smokers	5.78	0.28	7.47	0.62	29.24	2.87	<0.01
Low birth weight babies[c]	30.39	1.29	35.69	1.36	17.44	6.64	<0.01
Regular smokers	27.19	2.14	31.67	2.23	16.48	3.17	<0.01
Non-smokers	31.85	1.59	37.52	1.69	17.80	5.86	<0.01

a: Reported number of passive smokers out of 100 who will get lung cancer or cardiovascular disease during their lifetime because they live or work with smokers or in an environment containing tobacco smoke.
b: Difference in life expectancy between non-smokers and passive smokers.
c: Reported percentage of low birth weight babies attributable to mother with smoking habit.
d: Paired *t* test.
SEM: Standard error of mean

The gender-related differences between our survey and that of the latest Spanish National Survey (ENS) could have resulted from several causes due to non-straightforward comparability of the two population samples. The ENS survey included university students as well as non-university adolescents. Further, the temporal difference between the two surveys could have had an important effect. Our more recent survey extends and confirms the findings of a trend towards a higher incidence of smoking in young educated females together with an opposite trend in their male counterparts; a socio-cultural change that has taken place over the recent past.[2,21]

In assessing the possible effects of the latest anti-tobacco measures adopted by the EU,[14] several empirical studies highlighted the existence of important differences in the influence exerted by the health warnings, as a function of their presentation and content, on the level of consumption by the target populations. On one hand, non-econometric assessments conducted on the repercussions suggest that the use of small and discrete labels that provide little or no specific information on the consequences of smoking, will have practically no effect whatsoever. Conversely, direct and strong messages prominently displayed provide results in the desired direction.[43] Our survey was on a sample of Spanish university students whose perceptions were assessed before and after their exposure to an experimental tobacco packaging designed according to the proposed European directives. In our survey a high proportion of the respondents (table 2) clearly recognized an association between tobacco consumption and the principal groups of diseases such as lung cancer, respiratory diseases and cardiovascular disease (89%, 96% and 79% of respondents, respectively) and these values rose to 96%, 97% and 87% following the experimental exposure to the new packaging of the cigarette packets as envisaged by the EU directives.

On the other hand, the few econometric studies performed in this field indicate that the presentation of health warnings regarding the risks of smoking have been conducive to a significant reduction in the consumption of tobacco.[44–47] These results would suggest that smokers within the general public and, more specifically, non-university students in the 18–24 age group would react to these new warnings as they have done on previous occasions.

The results obtained in the present study indicate that the latest anti-tobacco measures developed by the EU, and which seek a higher profile and effect with respect to the presentation of the health warnings on the cigarette packets, do influence risk perceptions of the target population of young people in the desired direction. However, the effect may be only in the short term since, as remarked by several authors in various empirical studies,[48–52] information strategies related to tobacco have a clear impact on implementation but which tend to get diffused and reduced in effect over a period of time. The increments in the perceptions of risks that were observed in the study sample were, on average, consistent with the hoped-for objectives of the Parliament and the Council of Europe.

In this sense, it may be readily assumed that the new warnings, *per se*, already transmit the information on risks without prior demonstration. Underpinning this assumption are two aspects: the high statistical significance of differences in beliefs found in our experimental study, and the publicity campaigns that usually accompany the advent of new regulations.

Given that the perception of risk influences the individual's decision to smoke, these publicity actions constitute efficacious measures in reducing the incidence of tobacco use in young university students. The results also indicate that these modifications in the information content influence the young smokers less than the non-smokers, which again highlights the differences in attitudes of individuals with respect to the known risks.[23–25,40,41]

The current situation regarding the perception of the magnitude of the risk associated with tobacco consumption (even by supposedly well-informed university students) can be described as far from desirable. Comparisons of the subjective evaluations by the present study population sample of the relative risks of mortality resulting from exposure to tobacco (table 3) with those of one of the most relevant recent epidemiological studies, i.e. the Cancer Prevention Study–II[1] indicate that the perceived risks of lung cancer and of respiratory diseases are, in general, greatly underestimated by our study population. Although perception increased, this underestimation persisted despite the application, in an experimental form, of the proposed reforms of the new European directive[14] with respect to the presentation style and content of the health warnings on the cigarette packets. It would be worthwhile to reinforce the idea of health risk of tobacco consumption by reiterating explicit health warnings together with quantitative, rather than qualitative, information on tobacco products.

According to the most recent estimates of mortality in Spain attributable to this risk factor,[8] it is of note that these two groups of diseases (lung cancer and respiratory disease) represent a high relative importance among the various diseases associated with tobacco consumption. Failure to provide more effective information on these and other health risks associated with the smoking habit and, by doing so, failing to help individuals make an informed choice when electing to smoke, is a gross dereliction of responsibility by health service providers and planners.

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