

# Comparative Analysis of Smoking Awareness Among Nursing Students and Professionals in Spain

Mario García-Suárez<sup>1-3</sup>, Beatriz Ordás-Campos<sup>2,3</sup>, Jesús Antonio Fernández-Fernández<sup>1,3</sup>, Carlos Méndez-Martínez<sup>1-3</sup>, Juan Gómez-Salgado<sup>4,5</sup>, Daniel Fernández-García<sup>1,3</sup>

<sup>1</sup>Health Research Nursing Group (GREIS), University of León, León, 24071, España; <sup>2</sup>Hospital Universitario de León, León, 24071, España; <sup>3</sup>Department of Nursing and Physiotherapy, University of León, León, 24071, España; <sup>4</sup>Department of Sociology, Social Work and Public Health. Faculty of Labour Sciences, University of Huelva, Huelva, 21071, España; <sup>5</sup>Graduate Program in Health and Safety. Universidad Espiritu Santo, Guayaquil, Ecuador

Correspondence: Juan Gómez-Salgado, Department of Sociology, Social Work and Public Health. Faculty of Labour Sciences, University of Huelva, Av. 3 de Marzo s/n. Campus El Carmen, Huelva, 21071, España, Tel +0034 959219700, Email [salgado@uhu.es](mailto:salgado@uhu.es)

**Background:** Tobacco consumption is considered one of the main risk factors in the development of non-communicable diseases such as respiratory, cardiovascular, or oncological diseases, among others. Nurses play an important role in identifying smokers and making them aware of the consequences of tobacco use, advising them on smoking cessation.

**Objective:** The aim of this study was to carry out a comparative analysis of the level of smoking awareness among nursing students and professionals.

**Methods:** Descriptive cross-sectional study using an anonymous self-administered questionnaire, previously validated. This questionnaire was given to nursing students between March and June 2022 and to nursing professionals between January and March 2023.

**Results:** The prevalence of tobacco use was found to be 14.5% among nursing students and 19.1% among nursing professionals. Regarding the level of awareness, professionals always obtained better results than students, with statistically significant differences when analysing the mean scores obtained in the questionnaires regarding awareness of the effects of tobacco consumption in active smokers (8.72 vs 8.07;  $p < 0.001$ ) and of the pathologies that could manifest in passive smokers (5.49 vs 5.27;  $p = 0.008$ ).

**Conclusion:** The results of the analysis show that professionals seem to be better educated and to use tobacco more than students. The awareness that professionals have about the different consequences of active and/or passive smoking does not lead to a decrease in the prevalence of smoking, probably because the number of years they have been using cigarettes is much higher than that of students. Similarly, proving an acceptable level of awareness does not result in professionals promoting smoking cessation programmes.

**Keywords:** nursing, tobacco use, awareness, student, nurse

## Introduction

Tobacco use is the leading preventable cause of mortality, morbidity, and premature death in the world. It implies a serious global health threat, with significant health effects over the life course of the smoker.<sup>1</sup>

According to the Global Burden Disease (GBD) study published in 2021, worldwide, a new increase in the prevalence of tobacco use has been observed in most developed countries with respect to previous data. In 2020, it stood at 22.3% of the general population, with an age-adjusted prevalence by sex of 36.7% and 7.8%, among men and women respectively, with these percentages increasing by 4% in the case of men and by 1.2% in the case of women in the last year alone.<sup>1,2</sup>

Early initiation of tobacco use in adolescence is closely related to persistent smoking in adulthood (about 80% of smokers who start in adolescence continue into adulthood), and it develops as a consequence of nicotine dependence and the presence of social factors. This contributes to the numerous adverse health effects associated with chronic smoking, with one third of smokers dying prematurely from smoking-related diseases.<sup>1,3,4</sup>

Moreover, tobacco consumption is considered one of the main risk factors in the development of non-communicable diseases and is the leading cause of morbidity and mortality worldwide, calculating a loss of more than ten years in life expectancy due to the risk of developing more than 30 diseases associated with consumption or its complications. These include oncological diseases, cardiovascular diseases, diabetes, chronic obstructive pulmonary disease, and pneumonia.<sup>5–8</sup>

The role of nurses in the identification of smokers, the performance of smoking cessation interventions, and the follow-up of patients during the cessation process is considered fundamental. As one of the largest groups of health professionals, nurses have the potential to make a significant contribution to the reduction of the tobacco epidemic in the community.<sup>9,10</sup>

Therefore, in order to ensure that nurses have the necessary knowledge, skills, and confidence in effective smoking cessation interventions, it is necessary to provide adequate training in tobacco control.<sup>9,11–13</sup> Similarly, a 2017 study by Bialous et al highlighted the importance of training nurses in tobacco control, knowledge of the health effects it can have on smokers, and the benefit of cessation interventions, all of which is essential to reduce the risks of tobacco use.<sup>14</sup>

In this sense, knowing the prevalence of smoking in current and future nursing professionals can provide information of great value to place these professionals and students in the right context. In this way, they will be able to undertake effective interventions in the future to promote smoking cessation among patients.

The aim of this study was to analyse the prevalence of tobacco consumption and to compare the level of awareness of the possible health consequences of tobacco consumption (direct effects) and exposure to environmental tobacco smoke (indirect effects) among nursing students and professionals in the city of León (Spain).

## Methodology

### Design

This is a descriptive cross-sectional study based on a self-administered questionnaire, carried out according to the recommendations of the STROBE declaration (*Strengthening the Reporting of Observational Studies in Epidemiology*).<sup>15</sup> The study was carried out at the School of Health Sciences of the University of León and the University Hospital of León, Spain. The target population for this intervention consisted of undergraduate nursing students at the University of León and nursing professionals working at the hospital.

### Participants

In the case of the students, data collection was carried out between March and June 2022. A total of 324 students out of the 400 enrolled (81% participation) decided to voluntarily fill in the questionnaire and met the inclusion criteria of being enrolled in one of the four years of the Degree in Nursing. Additionally, they handed in the informed consent form together with the questionnaire once they had completed it.

Regarding the professionals, data collection was carried out between January and March 2023, when a total of 252 nurses out of the 1092 who were working at the hospital on 1 March 2023 (23.1% participation) decided to fill in the questionnaire and gave their informed consent.

### Assessed Variables

The questionnaire was developed in accordance with the 2002 recommendations of the European Regional Office of the World Health Organization<sup>16</sup> and previously validated in a study in 2008,<sup>17</sup> to which modifications were added in 2015.<sup>18</sup>

The socio-demographic variables collected included sex, age, academic year, and origin of studies prior to entering University in the case of students. In the case of professionals, sex, age, service in which they worked, type of contract, and years of professional experience were included.

Data were also collected on whether participants were ‘smokers’ if participants reported using tobacco and/or e-cigarettes, ‘ex-smokers’ if participants reported having used tobacco and/or e-cigarettes in the past but not currently, or ‘non-smokers’ if participants reported never having used tobacco or e-cigarettes. In addition, participants who reported themselves as smokers were asked about their age at first use and the number of years they had been smoking.

Participants were asked about their awareness of different health problems that can develop as a direct consequence of tobacco use or those that can develop as a result of exposure to environmental tobacco smoke, known as 'passive smoking'.

Following the studies by Fernández-García, Ordás-Campos, and García-Suárez et al,<sup>19–21</sup> a number was assigned to each of the answers depending on the response, with 1 being 'main cause', 2 'one more cause', 3 'no relationship', and 4 'I am unaware of the relationship'. Thus, depending on the answers given by the participants, 1 point was assigned to answers corresponding to '1 and 2' (positive event), -1 point to answer '3' (negative event), and 0 points to answer '4' (neutral event).

Accordingly, the researchers decided that participants were deficient in smoking-related disease awareness if they did not score above 7 points, and 5 points in pathologies related to exposure to tobacco smoke (passive smoking).

## Statistical Analysis

A database was created using Epi InfoTM 7 software, which was also used for data analysis. Bivariate analysis for continuous variables (age) was performed using the *T*-test if the data had a normal distribution, and the Mann–Whitney *U*-test otherwise. Homogeneity of variance was determined using Bartlett's test.

The chi-squared test, or Fisher's exact test (where necessary), was used for the bivariate analysis of the categorical variables (sex, category, academic year, previous studies, type of contract, professional experience, and tobacco use). A value of  $p < 0.05$  was considered statistically significant.

## Ethical Considerations

This study was approved by the Ethics Committee of the University of León, with registration number: ETICA-ULE-030-2022, as well as by the Ethics Committee of the Hospital de León with registration number 2304 (31 January 2023), which were approved based on the criteria of the Declaration of Helsinki. The principles of confidentiality and the signing of the informed consent form were required for participation in the study. Additionally, students were informed that non-completion of the questionnaire would not affect their academic progress.

## Results

### Socio-Demographic Characteristics and Tobacco Use

A total of 576 participants completed the questionnaire proposed for this study, of which 324 (56.3%) were students and 252 (43.7%) were professionals, with a participation rate of 81% (324/400) and 23.1% (252/1092), respectively. The majority of the sample were female students (86.4%), coming from upper secondary education (82.1%) and with a mean age of 21.2 ( $\pm 5.2$ ) years. In the case of professionals, the majority were women, with more than 10 years of professional contract and with a temporary contract. The mean age was 40.2 ( $\pm 11.6$ ) years. The rest of the socio-demographic characteristics can be found in [Table 1](#).

In addition, the summarised characteristics of tobacco use among participants are presented in [Table 1](#). Accordingly, the overall prevalence of tobacco use was 16.5% (95/576), being 14.5% (47/324) among the students and 19.1% (48/252) among the nursing professionals. There was a higher prevalence of smokers among female students, but the situation was the other way around in the group of professionals, and no significant differences were found in either case. Statistically significant differences were found among first year students, as they were more likely to use tobacco than third and fourth-year students ( $p = 0.036$  and  $p = 0.014$ , respectively).

Meanwhile, the age of tobacco use initiation in students was 15.7 ( $\pm 1.5$ ) years and 17.8 ( $\pm 3.1$ ) years in professionals, this difference being statistically significant ( $p < 0.001$ ), while the mean number of years of tobacco use was 7 ( $\pm 8.2$ ) for students and 20.2 ( $\pm 12.6$ ) for professionals, this difference again being significant ( $p < 0.001$ ).

### Awareness Related to Smoking and Associated Pathologies

All study participants completed the questionnaire. Data related to the response options are reflected in [Table 2](#), while the mean scores obtained can be seen in [Table 3](#). Also, the ratio between competent and deficient participants can be seen in [Table 4](#).

**Table 1** Socio-Demographic and Tobacco Use Characteristics of Participants

			Socio-Demographic Characteristics		Tobacco Use		
			n	%	n	%	p value
TOBACCO USE	Students	Smokers Ex-smokers Non-Smokers			47 22 255	14.5 6.8 78.7	
	Professionals	Smokers Ex-smokers Non-Smokers			48 58 146	19.1 23 57.9	
STUDENTS	Sex	Female	280	86.4	42	15	0.524
		Male	44	13.6	5	11.4	
	Academic year	First	94	29	22	23.4	0.005*
		Second	90	27.8	15	16.7	
		Third	72	22.2	6	8.3	
		Fourth	68	21	4	5.9	
	Previous studies	Upper Sec. Ed.	266	82.1	35	13.2	0.139
No Upper Sec. Ed.		58	17.9	12	20.7		
	Age	Mean ± SD	21.2 ± 5.2		15.7 (±1.5)		
PROFESSIONALS	Sex	Female	215	85.3	40	18.6	0.666
		Male	37	14.7	8	21.6	
	Job position	Specialised	94	37.3	15	16	0.601
		Hospitalisation	118	46.8	24	20.3	
		Other	40	15.9	9	22.5	
	Type of contract	Permanent	114	45.2	17	14.9	0.129
		Temporary	138	54.8	31	22.5	
Work experience	More than 10 years	157	62.3	33	21	0.306	
	Less than 10 years	95	37.7	15	15.8		
	Age	Mean ± SD	40.2 ± 11.6		17.8 (±3.1)		

**Notes:** \*Post hoc analysis: statistical differences in tobacco use between first and third (23.4 vs 8.33;  $p=0.036$ ) and first and fourth (23.4 vs 5.88;  $p=0.014$ ).

Firstly, regarding smoking-related pathologies, the majority of participants indicated lung cancer (93.1%), throat cancer (75.4%), and laryngeal cancer (74%) as the ‘main consequence’ of tobacco use. In addition, 18.2% (105/576) of the participants (92 students and 13 professionals) were ‘unaware of the relationship’ between tobacco use and the occurrence of bladder cancer, as well as 11.1% (64/576; 48 students and 16 professionals) who were also unaware of the relationship between tobacco use and leucoplakia of the oral cavity (Table 2).

The mean score obtained through the scale proposed in the methodology was 8.72 points for professionals and 8.07 for students, a statistically significant difference ( $p<0.001$ ), and the score obtained by smokers was also higher than that of non-smokers ( $p=0.005$ ) (Table 3). Students who did not come from upper secondary education and who used tobacco obtained higher marks than those who came from upper secondary education and did not smoke, with significance values of  $p=0.005$  and  $p=0.013$ , respectively.

Similarly, third-year students scored higher than first and fourth-year students, respectively ( $p<0.001$  and  $p=0.024$ ). As regards professionals, those with a permanent contract and more than 10 years of experience obtained higher results than those with a temporary contract and less than 10 years of experience ( $p=0.034$  and  $p=0.004$ ).

In relation to the participants considered competent or deficient for smoking-related awareness and the occurrence of certain pathologies according to the scores obtained (Table 4), differences were found between students and

**Table 2** Awareness of the Direct and Indirect Effects of Tobacco Use (Values Expressed as n (%))

		Main Cause			One More Cause			No Relationship			Unaware of the Relationship		
		Students	Professionals	Total	Students	Professionals	Total	Students	Professionals	Total	Students	Professionals	Total
<b>Tobacco-caused diseases (direct effects)</b>	Lung cancer	304 (93.8)	232 (92.1)	<b>536 (93.1)</b>	20 (6.2)	20 (7.9)	<b>40 (7)</b>	0 (0)	0 (0)	<b>0 (0)</b>	0 (0)	0 (0)	<b>0 (0)</b>
	Chronic bronchitis	180 (55.6)	147 (58.3)	<b>327 (56.8)</b>	140 (43.2)	104 (41.3)	<b>244 (42.4)</b>	1 (0.3)	0 (0)	<b>1 (0.2)</b>	3 (0.9)	1 (0.4)	<b>4 (0.7)</b>
	Lung emphysema	165 (50.9)	129 (51.2)	<b>294 (51)</b>	147 (45.4)	116 (46)	<b>263 (45.7)</b>	2 (0.6)	2 (0.8)	<b>4 (0.7)</b>	10 (3.1)	5 (2)	<b>15 (2.6)</b>
	Throat cancer	237 (73.2)	197 (78.2)	<b>434 (75.4)</b>	82 (25.3)	54 (21.4)	<b>136 (23.6)</b>	2 (0.6)	0 (0)	<b>2 (0.4)</b>	3 (0.9)	1 (0.4)	<b>4 (0.7)</b>
	Peripheral vascular disease	60 (18.5)	79 (31.4)	<b>139 (24.1)</b>	226 (69.6)	166 (65.9)	<b>392 (68.1)</b>	8 (2.5)	1 (0.4)	<b>9 (1.6)</b>	30 (9.3)	6 (2.4)	<b>36 (6.3)</b>
	Bladder cancer	39 (12.0)	107 (42.3)	<b>146 (25.4)</b>	170 (52.5)	127 (50.4)	<b>297 (51.6)</b>	23 (7.1)	5 (2)	<b>28 (4.9)</b>	92 (28.4)	13 (5.2)	<b>105 (18.2)</b>
	Coronary heart disease	99 (30.6)	97 (38.5)	<b>196 (34)</b>	196 (60.5)	151 (59.9)	<b>347 (60.2)</b>	6 (1.9)	1 (0.4)	<b>7 (1.2)</b>	23 (7.1)	3 (1.2)	<b>26 (4.5)</b>
	Larynx cancer	226 (69.8)	200 (79.4)	<b>426 (74)</b>	93 (28.7)	52 (20.6)	<b>145 (25.2)</b>	1 (0.3)	0 (0)	<b>1 (0.2)</b>	4 (1.2)	0 (0)	<b>4 (0.7)</b>
	Oral cavity leucoplakia	160 (49.4)	138 (54.7)	<b>298 (51.7)</b>	115 (35.5)	94 (37.3)	<b>209 (36.3)</b>	1 (0.3)	4 (1.6)	<b>5 (0.9)</b>	48 (14.8)	16 (6.4)	<b>64 (11.1)</b>
<b>Diseases caused by exposure to tobacco smoke (indirect effects)</b>	Lung cancer	155 (47.8)	119 (47.2)	<b>274 (47.6)</b>	164 (50.6)	128 (50.8)	<b>292 (50.7)</b>	3 (0.9)	0 (0)	<b>3 (0.5)</b>	2 (0.6)	5 (2)	<b>7 (1.2)</b>
	Respiratory diseases	162 (50)	93 (36.9)	<b>255 (44.3)</b>	158 (48.8)	155 (61.5)	<b>313 (54.3)</b>	2(0.6)	1 (0.4)	<b>3 (0.5)</b>	2 (0.6)	3 (1.2)	<b>5 (0.9)</b>
	Cardiovascular diseases	55 (17)	59 (23.4)	<b>114 (19.8)</b>	231 (71.3)	171 (67.9)	<b>402 (69.8)</b>	13 (4)	9 (3.6)	<b>22 (3.8)</b>	25 (7.7)	13 (5.2)	<b>38 (6.6)</b>
	Children's asthma	114 (35.2)	76 (30.2)	<b>190 (33)</b>	176 (54.3)	153 (60.7)	<b>329 (57.1)</b>	8 (2.5)	8 (3.2)	<b>16 (2.8)</b>	26 (8)	15 (5.9)	<b>41 (7.1)</b>
	Other respiratory problems in children	96 (29.6)	64 (25.4)	<b>160 (27.8)</b>	197 (60.8)	165 (65.5)	<b>362 (62.9)</b>	9 (2.8)	5 (2)	<b>14 (2.4)</b>	22 (6.8)	18 (7.1)	<b>40 (6.9)</b>
	Low birth weight in newborns	99 (30.6)	101 (40.1)	<b>200 (34.7)</b>	147 (45.4)	123 (48.8)	<b>270 (46.9)</b>	12 (3.7)	1 (0.4)	<b>13 (2.3)</b>	66 (20.4)	27 (10.7)	<b>93 (16.2)</b>

**Table 3** Comparison of Mean Scores of Students and Professionals According to Level of Awareness

			Tobacco-Caused Diseases (Direct Effects)					Diseases Caused by Exposure to Tobacco Smoke (Indirect Effects)				
			Mean	SD	Min	Max.	p value	Mean	SD	Min	Max.	p value
<b>STUDENTS</b>	<b>Sex</b>	Female	8.08	1.47	−1	9	0.732	5.35	1.12	0	6	0.143
		Male	8.00	1.53	2	9		4.77	2.09	−3	6	
	<b>Academic year</b>	First	7.54	2.01	−1	9	<0.001 <sup>†</sup>	4.94	1.70	−1	6	0.016 <sup>††</sup>
		Second	8.20	1.21	4	9		5.37	0.91	3	6	
		Third	8.60	0.78	6	9		5.63	0.85	2	6	
		Fourth	8.07	1.26	4	9		5.22	1.41	−3	6	
	<b>Previous studies</b>	Upper Sec. Ed.	7.99	1.52	−1	9	0.005	5.29	1.27	−3	6	0.536
		No Upper Sec. Ed.	8.45	1.19	4	9		5.17	1.43	−1	6	
	<b>Tobacco use</b>	Smoker	8.47	1.14	5	9	0.013	5.21	1.30	2	6	0.751
		Non-smoker	8.00	1.52	−1	9		5.28	1.30	−3	6	
<b>PROFESSIONALS</b>	<b>Sex</b>	Female	8.73	0.81	4	9	0.730	5.51	1.08	0	6	0.413
		Male	8.68	0.82	5	9		5.35	1.21	0	6	
	<b>Job position</b>	Specialised	8.81	0.61	5	9	0.403	5.49	1.16	0	6	0.583
		Hospitalisation	8.64	0.92	4	9		5.42	1.15	0	6	
		Other	8.73	0.88	5	9		5.68	0.73	3	6	
	<b>Type of contract</b>	Permanent	8.82	0.63	5	9	0.034	5.60	0.98	0	6	0.077
		Temporary	8.63	0.93	4	9		5.40	1.19	0	6	
	<b>Work experience</b>	More than 10 years	8.82	0.63	5	9	0.004	5.61	0.98	0	6	0.021
		Less than 10 years	8.54	1.03	4	9		5.29	1.25	0	6	
<b>COMPARISON</b>	<b>Sex</b>	Female	8.36	1.27	−1	9	0.728	5.41	1.10	0	6	0.061
		Male	8.31	1.29	2	9		5.04	1.76	−3	6	
	<b>Category</b>	Student	8.07	1.48	−1	9	<0.001	5.27	1.30	−3	6	0.008
		Professional	8.72	0.81	4	9		5.49	1.10	0	6	
	<b>Tobacco use</b>	Smoker	8.62	0.98	5	9	0.005	5.37	1.26	0	6	0.973
		Non-smoker	8.30	1.31	−1	9		5.36	1.22	−3	6	

**Notes:** <sup>†</sup> Post hoc analysis: statistical differences in scores on the direct effects of tobacco use between first and third year (7.54 vs 8.6;  $p < 0.001$ ) and third and fourth year (8.6 vs 8.07;  $p = 0.024$ ). <sup>††</sup> Post hoc analysis: statistical differences in scores on the indirect effects of tobacco use between first and third year (4.94 vs 5.63;  $p = 0.013$ ).

professionals, with a higher number of students considered deficient (14.2% vs 3.2%;  $p<0.001$ ). In addition, among the students, there was a higher number of competent students in the third year, with significant differences compared to those in the first ( $p<0.001$ ), second ( $p=0.015$ ), and fourth year ( $p=0.015$ ).

When identifying pathologies caused by the inhalation of environmental tobacco smoke, the participants highlighted “one more cause” as the most frequent option in all the proposed response options. In addition, 20.4% (66/324) of the students and 10.7% (27/252) of the professionals were “unaware of the relationship” between exposure to tobacco smoke and the probability of a low birth weight. The rest of the responses can be seen in Table 2.

In this case, and as can be seen in Table 3, the mean scores obtained by the participants again showed statistically significant differences, with professionals once again obtaining a higher score than students (5.49 vs 5.27;  $p=0.008$ ). The remaining differences were found in those professionals with permanent contracts, who obtained higher mean scores than those with temporary contracts (5.61 vs 5.29;  $p=0.021$ ), and in third-year students, who obtained higher scores than first-year students (5.63 vs 4.94;  $p=0.013$ ).

Finally, concerning the consideration of the participants as competent/deficient (Table 4) in terms of the categorisation of the pathologies that can manifest due to exposure to tobacco smoke, no significant differences were found, but professionals again accounted for a lower number of not competent participants compared to students (14.7% vs 19.7%).

**Table 4** Students and Professionals Considered Competent or Deficient on the Basis of Their Mean Awareness Scores

			Tobacco-Caused Diseases (Direct Effects)			Diseases Caused by Exposure to Tobacco Smoke (Indirect Effects)		
			Competent n (%)	Deficient n (%)	p value	Competent n (%)	Deficient n (%)	p value
<b>STUDENTS</b>	<b>Sex</b>	Female	242 (86.4)	38 (13.6)	0.415	229 (81.8)	51 (18.2)	0.079
		Male	36 (81.8)	8 (18.2)		31 (70.5)	13 (29.5)	
	<b>Academic year</b>	First	70 (74.5)	24 (25.5)	<0.001 <sup>†</sup>	70 (74.5)	24 (25.5)	0.291
		Second	78 (86.7)	12 (13.3)		72 (80)	18 (20)	
		Third	71 (98.6)	1 (1.4)		62 (86.1)	10 (13.9)	
		Fourth	59 (86.8)	9 (13.2)		56 (82.4)	12 (17.6)	
	<b>Previous studies</b>	Upper Sec. Ed.	225 (84.6)	41 (15.4)	0.179	215 (80.8)	51 (19.2)	0.574
		No upper Sec. Ed.	53 (91.4)	5 (8.6)		45 (77.6)	13 (22.4)	
	<b>Tobacco use</b>	Smoker	43 (91.5)	4 (8.5)	0.227	38 (80.9)	9 (19.1)	0.910
		Non-smoker	235 (84.8)	42 (15.2)		222 (80.1)	55 (19.9)	
<b>PROFESSIONALS</b>	<b>Sex</b>	Female	208 (96.7)	7 (3.3)	0.859	184 (85.6)	31 (14.4)	0.775
		Male	36 (97.3)	1 (2.7)		31 (83.8)	6 (16.2)	
	<b>Job position</b>	Specialised	93 (98.9)	1 (1.1)	0.328	81 (86.2)	13 (13.8)	0.538
		Hospitalisation	113 (95.8)	5 (4.2)		98 (83.1)	20 (16.9)	
		Other	38 (95)	2 (5)		36 (90)	4 (10)	
	<b>Type of contract</b>	Permanent	112 (98.2)	2 (1.8)	0.242	98 (86)	16 (14)	0.792
		Temporary	132 (95.6)	6 (4.4)		117 (84.8)	21 (15.2)	
	<b>Work experience</b>	More than 10 years	154 (98.1)	3 (1.9)	0.141	139 (88.5)	18 (11.5)	0.063
		Less than 10 years	90 (94.7)	5 (5.3)		76 (80)	19 (20)	
	<b>Tobacco use</b>	Smoker	46 (95.8)	2 (4.2)	0.663	43 (89.6)	5 (10.4)	0.354
		Non-smoker	198 (97.1)	6 (2.9)		172 (84.3)	32 (15.7)	

(Continued)



**Table 4** (Continued).

			Tobacco-Caused Diseases (Direct Effects)			Diseases Caused by Exposure to Tobacco Smoke (Indirect Effects)		
			Competent n (%)	Deficient n (%)	p value	Competent n (%)	Deficient n (%)	p value
<b>COMPARISON</b>	<b>Sex</b>	Female	450 (90.9)	45 (9.1)	0.563	413 (83.4)	82 (16.6)	0.131
		Male	72 (88.9)	9 (11.1)		62 (76.5)	19 (23.5)	
	<b>Category</b>	Student	278 (85.8)	46 (14.2)	<0.001	260 (80.3)	64 (19.7)	0.112
		Professional	244 (96.8)	8 (3.2)		215 (85.3)	37 (14.7)	
	<b>Tobacco use</b>	Smoker	89 (93.7)	6 (6.3)	0.263	81 (85.3)	14 (14.7)	0.433
		Non-smoker	433 (90)	48 (10)		394 (81.9)	87 (18.1)	

**Notes:** †Post hoc analysis: statistical differences in the percentage of deficient students for direct effects of tobacco use between first and third (25.5 vs 1.4;  $p<0.001$ ), second and third (13.3 vs 1.4;  $p=0.015$ ), and fourth and third (13.2 vs 1.4;  $p=0.015$ ).

# Discussion

In the present study, the level of smoking awareness of both nursing students and professionals was analysed in terms of the effect of both tobacco consumption and exposure to tobacco smoke on the appearance of different pathologies.

The profile of the student participant in this study was female, as in the literature reviewed,<sup>18,21–28</sup> aged between 19 and 21 years as in 6 of the reviewed studies,<sup>18,21,23–26</sup> and coming from upper secondary education. The profile of the professional was also female, as in the 8 studies analysed,<sup>29–37</sup> with a mean age between 30 and 50 years, which was similar to the literature reviewed,<sup>29,31,32,34,36</sup> who worked in an inpatient unit, on a temporary contract, and with more than 10 years of work experience, which contrasts with the study by Chan et al,<sup>32</sup> in which 77% of the professionals had less than 10 years of experience.

As for tobacco use, the prevalence of tobacco use in this study was found to be 14.5% for students and 19.1% for professionals. In the case of students, the data from the present study are much lower than those obtained in the review of 46 studies in 2020 by Zeng et al,<sup>38</sup> who found a smoking prevalence among nursing students of 26.6%, similar to studies conducted in Spain, where a prevalence between 17.6% and 29.7% of student smokers was found,<sup>18,21,22,24,26</sup> and also similar to a study published in Mexico, which reported a prevalence close to 45%.<sup>23</sup> Only the study by VanDevanter et al<sup>25</sup> reported a lower prevalence than the present one, with 7.9% of students smoking in the 30 days prior to their questionnaire, but with 32.7% having smoked cigarettes at least once in their lifetime.

With respect to consumption and academic year, the students who smoked the most were those in the first year, with statistically significant differences compared to the rest of the academic years. This fact is not contrasted with the literature consulted, as there is disparity between the studies mentioning this item. Two studies<sup>21,24</sup> coincided in a greater prevalence of use among first-year students, but there is also evidence of increased use in the final years of university studies.<sup>26</sup> The fact that more smokers were found in the first year may be due to habits initiated in their educational centres during adolescence, mainly owing to the scarcity of preventive and educational measures carried out in these centres. In those studies in which students in the final years were more likely to smoke, the higher consumption could be due to the stress caused by the coincidence of academic workload coupled with clinical practice, and the use of cigarettes as a way of coping. Additionally, the prevalence of tobacco use analysed in a review carried out by Nilan et al in 2019 with professionals from various branches of the Health Sciences<sup>39</sup> and which included 229 studies, a prevalence of 21% was obtained, with a decrease over 15 years from 23% in 2000 to 18% in 2015, with nurses always being the heaviest tobacco users. This is consistent with 7 other studies reviewed in which the prevalence was higher than that reported in the present one.<sup>29–31,33,35,36,40</sup> Also, a study by Berkelmans et al<sup>37</sup> found a prevalence of 11%, while two studies from China and Peru found prevalence rates of 2.2% and 3% respectively, much lower than the one obtained in this study.<sup>32,34</sup>

With regard to the age at which consumption began, both students and professionals started using cigarettes during their school years and in adolescence. In the case of students, the data can be contrasted with different studies carried out in Spain and Mexico, in which the mean age at which students tried their first cigarette was between 15 and 17 years of



age or even younger, and remained the same over the years.<sup>18,21,23,24,26</sup> With regard to professionals, data are more difficult to compare as most studies listed 20 years of age as the starting point for tobacco use. Indeed, only two studies found that smoking started before the age of 20 years<sup>30,37</sup> and 2 others after that age.<sup>34,36</sup> Only O'Donovan et al,<sup>33</sup> with a mean age of onset at 16.1 years, gave an accurate value for the age at which participants had started smoking. With regard to the number of years of smoking habit, the literature consulted for students shows a range of less than 6 years on average of daily use,<sup>18,26</sup> whereas for professionals, only Berkelmans et al<sup>37</sup> found that more than 70% of respondents had been smoking regularly for more than ten years.

All these data are consistent with the findings of the present study, in which professionals started using tobacco later than students. Thus, since they are older, it is logical that they have been using tobacco for more years on a continuous basis.

## Awareness of the Direct Health Effects of Tobacco Use

Nearly 30% of the nursing students in this study were unaware of the relationship between smoking and the development of bladder cancer. In addition, smokers, together with third and fourth-year students, scored higher than those in the first two years and non-smokers.

In the literature reviewed, in those studies that assessed the same type of awareness,<sup>18,21,24,26</sup> there are similarities with the results obtained in the present study, as there are also high percentages of students who are unaware of the relationship between consumption and the appearance of bladder cancer or who believe that there is no such relationship, reaching percentages of 60%.<sup>24</sup> Yet, there is also an improvement in awareness with the passing of the academic years, considering the third year as a turning point regarding the level of awareness of the students, given that the results improve notably, which could be due to the clinical practice that could help them to consolidate the knowledge acquired at university, taught in the Public Health subject during the second year of the Degree in Nursing. Another study in Spain also revealed that 66% of students were aware of the risks of smoking and the appearance of cardiovascular diseases, with better results being obtained from the third academic year onwards.<sup>22</sup> In other studies, 14% of students were unaware of the relationship between smoking and the development of oral cancer,<sup>28</sup> a value similar to that obtained in the present study and in the study by VanDevanter et al,<sup>25</sup> in which, with significant differences, they found that cigarette smoking was the main reason for the development of lung, liver, gastrointestinal, and bladder cancer, as well as COPD and coronary heart disease, compared to other tobacco products. Finally, oral cancer and cardiovascular disease were also identified as possible consequences of tobacco product use in a study in Bahrain.<sup>27</sup>

In the case of professionals, the mean score obtained, based on the proposed method, was higher among professionals who had a permanent contract and more than ten years' experience. The studies reviewed<sup>31–33,36</sup> report similar figures to those obtained in this study, with percentages of between 70% and 99% in the description of tobacco consumption as one of the main causes of the appearance of pathologies such as lung cancer, bronchitis, emphysema, heart disease, etc. The study by O'Donovan et al also stands out,<sup>33</sup> showing that non-smokers obtain better results in this regard. However, the study by Hoseainrezaee et al<sup>35</sup> revealed that 64% of non-smokers stated that there was no relationship between tobacco use and the occurrence of associated pathologies. Professionals demonstrated a higher general level of awareness mainly due to years of experience. Although they did not categorically state that the pathologies were mainly caused by tobacco use, their general level of awareness was adequate for their profession.

## Awareness of the Indirect Health Effects of Tobacco Use

In the literature consulted where these variables were included, all the results showed great similarity with all the findings from the present study in terms of the responses given by the participating students,<sup>18,21,22,24,26</sup> and improved awareness also increased over the academic years, with the third year again being the one in which students obtained the best results. In addition, the study conducted by Martínez et al<sup>22</sup> in 2021 showed that 75% of students believed that exposure to tobacco smoke was the main cause of the possible appearance of lung cancer, a figure that differs from that obtained in the present study, in which only 47.8% of students considered it to be the main cause, probably as a consequence of a deficit in university teacher training, in which the different pathologies and their origins are not accurately studied in

depth. On the other hand, in the study by Ortega-Ceballos et al,<sup>23</sup> students identified the possible occurrence of cardiovascular diseases, respiratory diseases, and asthma in children due to tobacco smoke inhalation as the main cause.

As far as the professionals are concerned, in the literature consulted,<sup>29–32,34,36,40</sup> the possible pathologies that may occur due to exposure to environmental tobacco smoke were acknowledged, most notably in the study by Chan et al,<sup>32</sup> where 68% of respondents acknowledged that exposure to smoke could lead to low birth weight in newborns, as was the case in the present study, where 88% of professionals identified it as a “main cause” or “one more cause”.

When relating the results obtained to the participants, students have always obtained significantly worse results than professionals. All this could be related to the level of knowledge and university learning, which is insufficient, as the lack of awareness of numerous pathologies makes it necessary to change the way in which knowledge is transmitted. This is compounded by the fact that the professional experience they have is reduced, in most cases, to clinical practice. Thus, although it has proven to be slightly effective in consolidating certain areas of knowledge, clinical practice does not allow students to acquire a level that allows them to have greater control over the different doubts that may be raised by patients or other colleagues or professionals.

## Limitations

The main limitation of this study could arise from the possibility of the respondent introducing a ‘social desirability bias’ towards the answer they consider to be socially acceptable as opposed to their own opinion. Yet, the anonymous nature of the questionnaire and the absence of the interviewer at the time of completing the questionnaire could have minimised this effect.

Additionally, the sample size may have also been a limitation, as only one School of Nursing and one hospital located in the same city were considered, and the number of participating professionals was not very high.

## Conclusions

The rates of tobacco consumption in the nursing students analysed in this study were lower than those previously analysed, while in the case of professionals, the prevalence of consumption obtained was similar to the general population with the same age range.

While it was noted that undergraduate university education significantly contributed to the reinforcement of certain concepts in students, it must be borne in mind that many professionals can acquire a high level of knowledge through a variety of routes, such as access to other university schools or by taking courses. Even so, it is necessary to establish new methodologies and develop clinical simulation techniques that allow the development of critical thinking and different skills both to be able to provide advice to patients and to assist them in cessation techniques.

In the case of professionals, the experience and knowledge they may have acquired during their working life has led to better results than those obtained by students. However, the number of cessation interventions among their patients is still quite limited.

## Funding

No funding was received.

## Disclosure

The authors declare that they have no conflicts of interest in this work.

## References

1. World Health Organization. Tobacco. 2022. Available from: <https://www.who.int/es/news-room/fact-sheets/detail/tobacco>. Accessed April 5, 2023.
2. Reitsma MB, Kendrick PJ, Ababneh E, et al. Spatial, temporal, and demographic patterns in prevalence of smoking tobacco use and attributable disease burden in 204 countries and territories, 1990–2019: a systematic analysis from the global burden of disease study 2019. *Lancet*. 2021;397(10292):2337–2360. doi:10.1016/S0140-6736(21)01169-7
3. U.S. Department of Health & Human Services. Preventing tobacco use among youth and young adults: a report of the surgeon general [internet]. Atlanta: Center for Disease Control and Prevention; 2012. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK99237/>. Accessed February 20, 2025.

4. Kasza KA, Ambrose BK, Conway KP, et al. Tobacco-product use by adults and youths in the United States in 2013 and 2014. *N Engl J Med*. 2017;376(4):342–353. doi:10.1056/NEJMsa1607538
5. World Health Organization. World health statistics 2016: monitoring health for the sustainable development goals [internet]. 2016. Available at: [https://cdn.who.int/media/docs/default-source/gho-documents/world-health-statistic-reports/world-health-statistics-2016.pdf?sfvrsn=b069eb862\\_](https://cdn.who.int/media/docs/default-source/gho-documents/world-health-statistic-reports/world-health-statistics-2016.pdf?sfvrsn=b069eb862_). Accessed June 14, 2023.
6. Gómez Cerezo JF, López Paz JE, Fernández Pardo J. Actualización sobre las nuevas formas de consumo de tabaco. *Clín E Investig En Arterioscler Nov*. 2022;34(6):330–338. doi:10.1016/j.arteri.2022.03.004
7. Córdoba García R. Prevalencia y mortalidad por tabaco en España. *Med Clínica Dec*. 2015;145(12):532–533. doi:10.1016/j.medcli.2015.06.003
8. Kazemzadeh Z, Manzari ZS, Pouresmail Z. Nursing interventions for smoking cessation in hospitalized patients: a systematic review. *Int Nurs Rev*. 2017;64(2):263–275. doi:10.1111/inr.12320
9. Petersen AB, Meyer B, Sachs BL, Bialous SA, Cataldo JK. Preparing nurses to intervene in the tobacco epidemic: developing a model for faculty development and curriculum redesign. *Nurse Educ Pract*. 2017;25:29–35. doi:10.1016/j.nepr.2017.04.005
10. Rice VH, Heath L, Livingstone-Banks J, Hartmann-Boyce J. Nursing interventions for smoking cessation. Cochrane tobacco addiction group, editor. *Cochrane Database Syst Rev*. 2017;2017(12). doi:10.1002/14651858.CD001188.pub5.
11. Moxham L, Dwyer T, Reid-Searl K. Graduate nurses and nursing student's behaviour: knowledge and attitudes toward smoking cessation. *Nurse Educ Today Oct*. 2013;33(10):1143–1147. doi:10.1016/j.nedt.2012.11.024
12. Malin M, Jaakkola N, Luukkainen R, Heloma A, Lammipää A, Reijula K. Occupational health professionals' attitudes, knowledge, and motivation concerning smoking cessation—Cross-sectional survey. *J Occup Health*. 2020;62(1). <https://onlinelibrary.wiley.com/doi/10.1002/1348-9585.12145>.
13. Sarna LP, Bialous SA, Králíková E, et al. Tobacco cessation practices and attitudes among nurses in the Czech Republic. *Cancer Nurs*. 2015;38(6):E22–29. doi:10.1097/NCC.0000000000000222
14. Bialous SA, Sarna L, Wells MJ, et al. Impact of online education on nurses' delivery of smoking cessation interventions with implications for evidence-based practice: online education for nurses on smoking cessation. *Worldviews Evid Based Nurs Oct*. 2017;14(5):367–376. doi:10.1111/wvn.12197
15. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet Lond Engl*. 2007;370(9596):1453–1457. doi:10.1016/S0140-6736(07)61602-X
16. WHO Regional Office for Europe. European Strategy for Tobacco Control. 2002. Available from: [http://www.euro.who.int/\\_data/assets/pdf\\_file/0016/68101/E77976.pdf](http://www.euro.who.int/_data/assets/pdf_file/0016/68101/E77976.pdf). Accessed February 3, 2022.
17. Martín V, Fernández D, Ordóñez C, Molina AJ, Fernández E, de LJM. Valoración con tres métodos diferentes de la prevalencia de consumo de tabaco en estudiantes de primer curso de ciencias de la salud de la Universidad de León en 2006. *Rev Esp Salud Pública*. 2008;82(2):221–229. doi:10.1590/S1135-57272008000200008
18. Ordás B, Fernández D, Ordóñez C, et al. Changes in use, knowledge, beliefs and attitudes relating to tobacco among nursing and physiotherapy students: a 10-year analysis. *J Adv Nurs Oct*. 2015;71(10):2326–2337. doi:10.1111/jan.12703
19. Fernández-García D. Valoración de la eficacia/efectividad de una intervención educativa en la reducción del hábito tabáquico en alumnos de Ciencias de la Salud. Universidad de León, España; 2010. Available from: <https://buleria.unileon.es/bitstream/handle/10612/1557/Daniel.pdf?sequence=1>. Accessed May 15, 2022.
20. Ordás-Campos B, Fernández-García D, Ordóñez-Pascua C, Fernández-Cernuda I, Martínez-Isasi S, Carballo-Rodríguez A. Prevalencia de consumo de tabaco entre estudiantes universitarios de Enfermería: revisión sistemática. *Tiempos de Enfermería y Salud*. 2016;1(1):134.
21. García-Suárez M, Fernández-García D, Ordás-Campos B, et al. Analysis of knowledge of smoking-related diseases in Spanish nursing students. *Healthcare*. 2023;11(10):1438. doi:10.3390/healthcare11101438
22. Martínez C, Castellano Y, Laroussy K, et al. Knowledge Attitudes, and training in tobacco dependence and cessation treatment among nursing students in Catalonia (ECTEC Study): cross-sectional study. *Int J Ment Health Addict*. 2023;21:1041–1056. doi:10.1007/s11469-021-00640-w
23. Ortega-Ceballos PA, Terrazas-Meraz MA, Arizmendi-Jaime ER, Tapia-Domínguez M. Conocimientos, actitudes y factores asociados al consumo de tabaco en estudiantes universitarios de enfermería. *Enferm Univ*. 2018;15(2). <http://revista-enfermeria.unam.mx:80/ojs/index.php/enfermeriauniversitaria/article/view/497>.
24. Fernández D, Ordás B, Álvarez MJ, Ordóñez C. Knowledge, attitudes and tobacco use among nursing and physiotherapy students: prevalence, knowledge and attitudes towards smoking. *Int Nurs Rev Sept*. 2015;62(3):303–311. doi:10.1111/inr.12177
25. VanDevanter N, Zhou S, Katigbak C, et al. Behaviors, and social norms related to use of alternative tobacco products among undergraduate and graduate nursing Students in an Urban U.S. University Setting: nurses and alternative tobacco products. *J Nurs Scholarsh*. 2016;48(2):147–153. doi:10.1111/jnu.12192
26. Ordás-Campos B, Martínez-Isasi S, Casado-Verdejo I, Bárcena-Calvo C, Álvarez-álvarez MJ, Fernández-García D. Consumo de tabaco en estudiantes universitarios de Ciencias de la Salud: estudio de prevalencia. *Tiempos Enferm Salud*. 2017;2(1):49–57.
27. Hamadeh RR, Ahmed J, Jassim GA, Alqallaf SM, Al-Roomi K. Knowledge of health professional students on waterpipe tobacco smoking: curricula implications. *BMC Med Educ Dec*. 2018;18(1):300. doi:10.1186/s12909-018-1406-9
28. Hettiarachchi P, Jayasooriya P, Amarasinghe H, et al. Knowledge and attitudes of nursing students towards smokeless tobacco and areca nut control in central province of Sri Lanka. *Asian Pac J Cancer Care*. 2020;5(3):133–138. doi:10.31557/apjcc.2020.5.3.133-138
29. Hodgetts G, Broers T, Godwin M. Smoking behaviour, knowledge and attitudes among family medicine physicians and nurses in Bosnia and Herzegovina. *BMC Fam Pract*. 2004;5:12. doi:10.1186/1471-2296-5-12
30. Jawad A, Schultz A, Shahid O, Shakeel M, Chaudhry M. Attitudes towards tobacco consumption among healthcare professionals in a tertiary referral centre in Pakistan. *J Otolaryngol-ENT Res*. 2(1). <https://medcraveonline.com/JOENTR/attitudes-towards-tobacco-consumption-among-healthcare-professionals-in-a-tertiary-referral-centre-in-pakistan.html>.
31. Beletsoti-Stika P, Scriven A. Smoking among Greek nurses and their readiness to quit. *Int Nurs Rev*. 2006;53(2):150–156. doi:10.1111/j.1466-7657.2006.00483.x
32. Chan SSC, Sarna L, Wong DCN, Lam TH. Nurses' tobacco-related knowledge, attitudes, and practice in Four Major Cities in China. *J Nurs Scholarsh*. 2007;39(1):46–53. doi:10.1111/j.1547-5069.2007.00142.x

33. O'Donovan G. Smoking prevalence among qualified nurses in the Republic of Ireland and their role in smoking cessation. *Int Nurs Rev.* 2009;56(2):230–236. doi:10.1111/j.1466-7657.2008.00700.x
34. Pérez Saavedra V, Ferreira PS, Pillon SC. Tabaquismo en las enfermeras de un hospital nacional de Lima, Perú. *Rev Lat Am Enfermagem.* 2010;18(spe):550–556. doi:10.1590/S0104-11692010000700010
35. Hoseainrezaee H, Khodabandeh S, Kheradmand A, Pilehvarzadeh M. Frequency of smoking and specialized awareness among Doctors and Nurses of Hospitals in Kerman, Iran. *Addict Health.* 2013;5(1–2):51–56.
36. Sonmez CI, Aydin LY, Turker Y, et al. Comparison of smoking habits, knowledge, attitudes and tobacco control interventions between primary care physicians and nurses. *Tob Induc Dis.* 2015;13:37. doi:10.1186/s12971-015-0062-7
37. Berkelmans A, Burton D, Page K, Worrall-Carter L. Registered Nurses' smoking behaviours and their attitudes to personal cessation: nurses' smoking behaviour. *J Adv Nurs.* 2011;67(7):1580–1590. doi:10.1111/j.1365-2648.2010.05592.x
38. Zeng LN, Zong QQ, Zhang JW, et al. Prevalence of smoking in nursing students worldwide: a meta-analysis of observational studies. *Nurse Educ Today.* 2020;84:104205. doi:10.1016/j.nedt.2019.104205
39. Nilan K, McKeever TM, McNeill A, Raw M, Murray RL. Prevalence of tobacco use in healthcare workers: a systematic review and meta-analysis. *PLoS One.* 2019;14(7):e0220168. doi:10.1371/journal.pone.0220168
40. Connolly M, Floyd S, Forrest R, Marshall B. Mental health nurses' beliefs about smoking by mental health facility inpatients: MH Nurses' Beliefs about Patient Smoking. *Int J Ment Health Nurs.* 2013;22(4):288–293. doi:10.1111/j.1447-0349.2012.00871.x

## Risk Management and Healthcare Policy

### Publish your work in this journal

Risk Management and Healthcare Policy is an international, peer-reviewed, open access journal focusing on all aspects of public health, policy, and preventative measures to promote good health and improve morbidity and mortality in the population. The journal welcomes submitted papers covering original research, basic science, clinical & epidemiological studies, reviews and evaluations, guidelines, expert opinion and commentary, case reports and extended reports. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/risk-management-and-healthcare-policy-journal>

**Dovepress**  
Taylor & Francis Group