Predictors of smoking initiation – Results from the Global Adult Tobacco Survey (GATS) in Poland 2009–2010

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Abstract

Introduction: Improving the access to information on determinants of the smoking epidemic is essential for increasing the effectiveness of tobacco control policies. While the statistics of smoking prevalence in Poland are available, data on smoking initiation and its social correlates are still poorly described.
Objective: To investigate the association of socio-demographic indicators with regular smoking initiation among adults.
Materials and method: Data from the Global Adult Tobacco Survey (GATS) on socio-demographic and smoking-related characteristics of respondents were used. GATS is a nationally representative household survey. GATS provided data on a representative sample of 7,840 adult individuals – 2,207 male and 1,321 female ever smokers. Logistic regression analysis was performed and the χ2 test for relevant calculations.
Results: Among males, the regular smoking initiation rate was significantly higher compared to females (59.2% vs. 34.2%; p<0.01). Mean age of smoking initiation was lower in men compared to women (18.4±3.6 vs. 20.0± 4.7 p < 0.01). Lack of awareness on smoking health consequences was strongly associated with initiating of regular smoking among both genders (unaware vs. aware respondents: OR = 3.0 CI 2.3–4.0; p < 0.001 in men and OR = 3.07 CI 2.3–3.9; p<0.001 in women). Older age, vocational education and unemployment were associated with regular smoking initiation among men and women. Also, not being religious considerably contributed to increased likelihood of smoking initiation in women (OR = 4.4 CI 2.5–7.7; p<0.001).
Conclusion: The results indicate that policies focused on preventing smoking onset among Poles are needed to reduce tobacco epidemic, with the ultimate goal of translating evidence into policy.

Key words

tobacco smoking, smoking initiation, socio-demographic factors, smoking prevention, adults, GATS, Poland

INTRODUCTION

According to recent analysis, mortality is higher in men than women across Europe, but there is considerable variation in the magnitude of this gap (from an 'excess' of 188 deaths per 100,000 per year in Iceland, to 942 per 100,000 per year in the Ukraine) [1]. It has been estimated that smoking-related deaths accounted for up to 60% of the gender gap, and the contribution of smoking to the gender gap in all-cause mortality is twice that of alcohol [1]. Disparities in the rate of excess deaths due to smoking can be attributed to gender differences in the uptake of smoking among European countries in earlier decades. It is suggested that smoking and drinking are such significant drivers of the gender gap in life expectancy, as these behaviours have long been a powerful way of portraying gendered identities. The researchers warn that these behaviours are culturally-bound, and these cultural constructions of behaviours are partially shaped and exploited by the alcohol and tobacco industries [2].

In Poland, over 40% of the gender gap is attributable to the smoking mortality [1]. The number of smokers in Poland has been reduced from 14 million at the end of the 1970s to 10 million in 2000, from 62% of adult men to 40%, and from 30% of adult women to 20% [3, 4]. Following these changes, the upward trend in mortality from lung cancer in the 1980s has been reversed, and by the end of the 1990s mortality had decreased by about 20% compared to the peak level [5, 6]. Poland has also experienced a reduction in the burden of cardiovascular disease, part of which is attributed to reduced cigarette consumption [7]. Regardless, over 33% of men and 21% of women report tobacco smoking on a daily basis, and the health consequences of smoking are one of the biggest concerns of public health in Poland [8]. Unfortunately, smoking prevalence, especially among women, has remained at the similar level for several years and tobacco control measures seem not to be sufficiently effective in this group [7].

Improving access to information on determinants of the smoking epidemic is essential for increasing the effectiveness of tobacco control measures. Apart from smoking prevalence, other outcome measures, such as initiation rates, cessation rates and consumption level are needed to provide in-depth knowledge of the effect of socio-economic background on smoking, especially from a life-course perspective [9]. While statistics of smoking prevalence in Poland are available, epidemiological data on smoking initiation and its social

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correlates among adults are still poorly reported in the literature [8, 10].

OBJECTIVE

The aim of the study was to investigate the association of socio-demographic indicators with initiation of regular smoking. Smoking initiation rate was also calculated for both genders. The mean age of smoking initiation was also evaluated in a number of subgroups of study participants.

MATERIALS AND METHOD

Data on smoking status of non-institutional residents of Poland in all 16 voivodships aged 15 years and older, and their socio-demographic characteristics, came from the Global Adult Tobacco Survey (GATS) which has been described elsewhere in detail [8, 11, 12]. GATS is a cross-sectional, nationally representative household survey [8, 12]. GATS data were collected electronically by trained pollsters during in-person interviews between 2009–2010. The GATS multi-stage sampling design and study protocol is based on standard methodology. The questionnaire is also universal for all partners implementing this survey, with some country-specific adaptations [13].

Study variables. Initiation of regular smoking was the main outcome variable in the presented study. An ever regular smoker was defined as a person who reported that he/she smokes or smoked in the past on a regular basis. Regular smoking refers to the smoking of at least one cigarette per day during at an least one year period in the lifetime. The category for ever smokers covered current and ex-smoker subgroups. Smoking initiation rate was defined as the proportion of the individuals who had started regular smoking among all subjects. Data on gender and age of the respondents were also included in the analysis in addition to age at smoking onset information. Age at smoking onset was characterized as the age at which respondents started to smoke tobacco on a regular basis. Data on educational attainment of all subjects was also used in the analysis. Educational level was categorized as: primary, vocational, secondary, and higher education.

The measure of economic activity classified subjects currently with a permanent job as employed, currently with no permanent job as unemployed, and pupils, students, persons occupied with household keeping, retired, and pensioners due to disability as economically non-active. Further, respondents were asked whether their place of residence was a rural or urban area (urban area up to 50,000, 50,000–200,000, and over 200,000 inhabitants). Awareness of the negative health consequences of smoking were also taken into account; the respondents were categorized as aware (those who answered 'yes' to the question: Do you think that tobacco smoking causes serious diseases?), and not aware (those who answered 'no' and 'do not know'). Furthermore, the respondents were divided according to whether they religious or not: those who declared themselves to be religious were categorized as 'a believer practicing regularly'; 'believer but not practicing regularly'; or 'believer but not practicing'.

Statistical analyses. Statistical associations of the given categories of characteristics in the analyzed groups were assessed with the chi-square test. All analyses were performed separately for men and women in six age groups: under 25, 25–29, 30–39, 40–49, 50–59, 60 years and older. For comparison of proportions, the chi-square test was used. Univariate and multivariate logistic regression analyses of unweighted data was used to obtain odds ratios (ORs) and 95% confidence interval (CI) of each indicator on smoking initiation. First, crude coefficients – odds ratios (OR) of the impact of odd variables on the smoking initiation were calculated. Multifactorial analysis considering the simultaneous effect of all variables on the possibility of smoking initiation was then conducted. All p values were two-sided and p<0.05 was used to indicate statistical significance. The STATISTICA Windows XP version 8.0 programme was used to perform the statistical analysis.

RESULTS

GATS covered data from 7,840 sampled individuals – 2,207 male and 1,321 female ever smokers. Characteristics of the study population are presented in Table 1.

The mean age at regular smoking initiation. Mean age of smoking initiation was lower in men compared to women (18.4±3.6 vs. 20.0± 4.7 p < 0.01). (Tab. 2). Males and females from the younger age subgroups had started to smoke regularly at an earlier age compared to the older subgroups (p<0.05). Average age at smoking onset was significantly lower among men with primary education compared to those with higher educational attainment. In this instance, there were no significant differences among women. Respondents who declared being unemployed had the lowest age of smoking initiation. Age at smoking initiation was also significantly earlier among non-religious study participants. Additionally, male respondents living in large cities had a lower age of smoking initiation compared to males from rural areas. Overall, men who reported being unaware of health risks of smoking started to smoke earlier compared to those who were aware.

Regular smoking initiation rates. Among males, the regular smoking initiation rate was significantly higher compared to females (59.2% vs. 34.2%; p<0.01).

The initiation rates increased with age in men, reaching 68.4% in the oldest age group (Tab. 3). The highest initiation ratios were observed among men with vocational education (68.8%), unemployed (73.5%), and living in small cities with up to 50,000 inhabitants (39.8%). Among males who were unaware of negative health consequences of tobacco use, the initiation rate was 80.9%. The highest initiation rates were also among males who considered themselves as believers, but not practicing regularly (59.2%) or not practicing at all (67.1%).

In the population of females, the highest initiation rates were among respondents in the age group 50–59 (48.2%), with vocational education (42.7%), unemployed (42.5%), residents of urban areas with over 200,000 inhabitants (Tab. 4). In the group of women aware of smoking health consequences, the initiation rate was 32.1% and among those unaware 58.7%. Among women considering themselves religious and

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Table 1. Characteristic of the study population – Global Adult Tobacco Survey (GATS) Poland 2009–2010

Variable	Male Total n=3726		Male ever smoker N =2207			Female Total n=3857		Female ever smoker N=1321		
	n	%	n	%	95% CI	N	%	n	%	95% CI
Age (years)										
<25	467	12.5	144	30.8	26.6-35.0	419	10.9	90	21.5[a]	17.6-25.4
25–29	358	9.6	186	52.0	46.8-57.2	368	9.5	134	36.4[b]	31.5-41.3
30–39	743	19.9	409	55.0	51.4-58.6	726	18.8	251	34.5[b]	31.0-38.0
40–49	671	18.0	451	67.2	63.6-70.8	626	16.2	287	45.8[b]	44.9-52.7
50–59	681	18.3	466	68.4	64.9-71.9	711	18.4	343	48.2[b]	44.5-51.9
≥60	805	21.6	551	68.4	65.2-71.6	1007	26.1	216	21.4[b]	18.9-23.9
Education										
Primary	713	19.1	449	63.0	59.5-66.5	897	23.3	190	21.2[b]	18.5-23.9
Vocational	1228	33.0	845	68.8	66.2-71.4	822	21.3	351	42.7[b]	39.3-46.1
Secondary	1330	35.7	708	53.2	50.5-55.9	1513	39.2	570	37.7[b]	35.3-40.1
High	454	12.2	205	45.2	40.6-50.0	625	16.2	210	33.6[b]	29.9-37.7
Occupational classification										
Economically not active	1312	35.2	762	58.1	55.4-60.8	2040	52.9	651	31.9[b]	29.9-33.9
Employed	2179	58.5	1273	58.4	56.3-60.5	1624	42.1	588	36.2[b]	33.9-38.5
Unemployed -currently with no permanent job	234	6.3	172	73.5	67.8-79.2	193	5.0	82	42.9[b]	35.9-49.9
Place of residence										
Rural	2002	53.7	1186	59.2	57.0-61.4	1923	49.9	552	28.7[b]	26.7-30.7
Urban										
Up to 50,000	656	17.6	394	60.1	56.4-63.8	713	18.5	243	34.1[b]	30.6-37.6
50,000-200,000	422	11.3	258	61.1	56.4-65.8	516	13.4	219	42.4[b]	38.1-46.7
Over 200,000	645	17.3	369	57.2	53.4-61.0	705	18.3	307	43.5[b]	39.8-47.2
Religiosity										
Believer practicing regularly	1698	45.6	964	56.8	54.4-59.2	2185	56.7	553	25.3[b]	23.5-27.1
Believer but practicing irregularly	1261	33.9	747	59.2	56.5-61.9	1217	31.6	515	42.3[b]	39.5-45.1
Believer but not practicing	608	16.3	408	67.1	63.4-70.8	394	10.2	215	54.6[b]	49.7-59.5
Not religious	158	4.2	88	55.7	48.0-63.4	61	1.6	38	62.3	50.1-74.5
Place of residence when aged about 14 years old										
Village	2032	54.6	1207	59.4	57.3-61.5	2082	54.0	599	28.8[b]	26.9-30.7
Urban										
Small town up to 50,000	726	19.5	443	61.0	57.5-64.5	677	17.6	257	38.0[b]	34.3-41.7
Medium size town 50,000-100,000	341	9.2	206	60.4	55.2-65.6	451	11.7	182	40.4[b]	35.9-44.9
City over 100,000	626	16.8	351	56.1	52.2-60.0	647	16.8	283	43.7[b]	39.9-47.5
Awareness of smoking health consequences										
Yes	3360	90.2	1912	56.9	55.2-58.6	3545	91.9	1138	32.1[b]	30.6-33.6
No	365	9.8	295	80.8	76.8-84.8	312	8.1			

[a] – p ≤ 0.01men ever smoking vs. women ever smoking
[b] – p ≤ 0.001 men ever smoking vs. women ever smoking.

practicing regularly, the lowest smoking initiation rates were found – 25.3%, and the highest among the non-religious – 62.3% (p<0.001).

Logistic regression analysis. Results of the univariate and multivariate logistic regression analyses are presented in Tables 3–4. In the multivariate analysis, apart from place of residence and religion, in men most of the variables tested in the model were strongly correlated with regular smoking initiation.

Lack of awareness on smoking health consequences was the strongest, independent predictor of initiating regular smoking among both genders (unaware vs. aware respondents OR = 3.0 CI 2.3–4.0; p < 0.001 in men and OR = 3.07 CI 2.3–3.9; p < 0.001 in women). Also being non-religious considerably contributed to increased likelihood of smoking initiation but only in women (OR = 4.4 CI 2.5–7.7; p < 0.001 religious vs. non-religious). However, being not religious was not associated with increased risk of smoking initiation among males. Furthermore, older age occurred as a significant, independent predictor of the initiation of tobacco smoking among men and women (Tab. 3–4). The odds of smoking onset increased with age and were highest for the oldest age group (p < 0.0001). Moreover, low education attainment was associated with beginning to smoke for both genders. The likelihood of starting to smoke on a regular basis was higher

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Table 2. Mean age of smoking initiation in men and women ever smokers by selected characteristics – Global Adult Tobacco Survey (GATS) Poland 2009–2010

Characteristic	Overall N=3528		Male N=2207		Female N=1321	
	Mean	±SD	Mean	±SD	Mean	±SD
Age (years)						
<25	16.72[a]	1.99	16.66[d]	2.08	16.82[f]	1.85
25–29	17.63[b]	2.23	17.46	2.32	17.86	2.10
30–39	18.53[c]	2.96	18.24[e]	2.98	19.00[g]	2.87
40–49	19.38	3.92	18.85	3.73	20.22[h]	4.08
50–59	19.27	4.43	18.40	3.92	20.42[i]	4.80
≥60	19.90	5.30	18.78	4.10	22.69	6.73
	18.98	4.11	18.37	3.60	19.98	4.67
P	[a]Age<25 vs 25-29; vs 30-39; vs 40-49; vs 50-59; vs ≥60: p<0,001 [b]Age 25-29 vs 30-39; vs 40-49; 50-59;≥60: p<0,001 [c]30-39 vs 40-49 p<0,01; vs 50-59 p<0,05; vs ≥60 p<0,001		[d]Age<25 vs 25-29; vs 30-39; vs 40-49; vs 50-59; vs ≥60: p<0,001 [e]Age 30-39 vs 40-49; 50-59;≥60: p<0,001		[f]Age<25 vs 25-29; vs 30-39; vs 40-49; vs 50-59; vs ≥60: p<0,001 [g]30-39 vs 40-49; 50-59;≥60: p<0,01 [h]40-49 vs ≥60: p<0,001 [i]50-59 vs ≥60: p<0,001	
Education						
Primary	18.61[j]	4.64	17.89[m,n,o]	4.01	20.30	5.53
Vocational	18.73[k,l]	3.75	18.27	3.25	19.82	4.54
Secondary	19.26	4.29	18.71	3.77	19.93	4.77
High	19.37	3.59	18.63	3.31	20.06	3.71
	18.98	4.11	18.37	3.60	19.98	4.67
p	[j]Primary vs vocational: p<0,001 [k]Vocational vs secondary: p<0,02 [l]Vocational vs high: p<0,001		[m]Primary vs vocational: p<0,05 [n]Primary vs secondary: p<0,001 [o]Primary vs high: p<0,001		-	
Occupational classification						
Non-economically active	19.43[p,q]	4.80	18.60[r]	4.04	20.48[s]	5.44
Employed	18.83	3.59	18.38	3.30	19.68	3.95
Unemployed	17.71	3.53	17.21	3.48	18.75	3.43
	18.98	4.11	18.37	3.60	19.98	4.67
P	[p]Non economically active vs employed: p<0,01 [q]Non economically active vs unemployed: p<0,001		[r]Non economically active vs unemployed: p<0,001 Employed vs unemployed: p<0,001		[s]Non economically active vs unemployed: p<0,004	
Place of residence						
Rural	18.93	3.97	18.53[t]	3.69	19.79	4.41
Urban						
Up to 50,000	18.95	4.34	18.38	3.76	19.87	5.00
50,000-200,000	18.93	4.10	18.01	3.70	19.98	4.30
Over 200,000	19.15	4.27	18.08	3.03	20.41	5.09
Total	18.98	4.11	18.37	3.60	19.98	4.67
P	-		[t]Rural vs urban 50-200 000: p<0,0			
Religiosity						
Believer practicing regularly	19.35[u,v]	4.37	18.73[y,z,uu]	3.66	20.44[xx,yy]	5.21
Believer but not practicing regularly	18.98[w,x]	3.96	18.27	3.39	19.98	4.47
Believer but not practicing	18.36	3.81	17.94[ww]	3.85	19.15	3.63
Not religious	17.42	2.99	17.15	3.05	18.03	2.79
Total	**18.98**	**4.11**	**18.37**	**3.60**	**19.98**	**4.67**
P	[u]believer practicing regularly vs. believer but not practicing regularly: p<0,03 [v]believer practicing regularly vs. believer but not practicing; vs not religious: p<0.001 [w]believer but not practicing regularly vs. not religious: p<0.005 [x]believer but not practicing regularly vs. not religious: p<0.001		[y]believer practicing regularly vs. believer but not practicing regularly: p<0.02 [z]believer practicing regularly vs. believer but not practicing: p<0,001 [uu]believer practicing regularly vs. not religious: p<0,001 [ww]believer but not practicing regularly vs. not religious: p<0,02		[xx]believer practicing regularly vs. believer but not practicing regularly: p<0.001 [yy]believer practicing regularly vs. not religious: p<0.01	
Awareness of smoking health consequences						
Yes	18.60[z]	3.85	17.93[zz]	3.50	19.66	4.13
No	19.03	4.15	18.43	3.62	20.03	4.75

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Total	18.98	4.11	18.37	3.60	19.98	4.67
P	[z]aware vs not aware: p<0,03		[zz]aware vs not aware: p<0,02			
Place of residence when were about 14 years old						
Village	19.03	4.22	18.46	3.73	20.16	4.85
Urban						
Small town up to 50,000	18.81	3.93	18.17	3.50	19.89	4.37
Medium size town 50,000–100,000	18.97	4.10	18.39	3.29	19.62	4.78
City over 100,000	19.01	4.02	18.28	3.46	19.90	4.48
Total	**18.98**	**4.11**	**18.37**	**3.60**	**19.98**	**4.67**
p	-		-		-	

Table 3. Odds Ratios (OR) and 95% Confidence Intervals (CI) in men (N =3725) – Global Adult Tobacco Survey (GATS) Poland 2009–2010

Variable	Total (n)	Smoking initiation rate	Standard error	Univariate logistic regression		Multivariate logistic regression[a]	
				OR	95% CI	OR	95% CI
Age (years)							
<25	467	30.8	2.14	0.21	0.16-0.26[d]	0.16	0.12-0.21[d]
25–29	358	52.0	2.64	0.50	0.39-0.64[d]	0.36	0.26-0.50[d]
30–39	743	55.0	1.83	0.56	0.46-0.69[d]	0.39	0.29-0.52[d]
40–49	671	67.2	1.81	0.95	0.76-1.17	0.64	0.48-0.85[c]
50–59	681	68.4	1.78	1.00	0.81-1.23	0.71	0.55-0.93[b]
≥60	805	68.4	1.64	1.00	reference	1.00	reference
Education							
Primary	713	63.0	1.81	2.07	1.62-2.62[d]	2.29	1.72-3.05[d]
Vocational	1228	68.8	1.32	2.68	2.15-3.34[d]	2.52	1.97-3.22[d]
Secondary	1330	53.3	1.37	1.38	1.12-1.71[c]	1.55	1.24-1.95[d]
High	454	45.2	2.34	1.00	Reference	1.00	reference
Occupational classification							
Economically not active	1312	58.1	1.36	0.99	0.86-1.13	0.71	0.57-0.88[c]
Employed	2179	58.4	1.06	1.00	Reference	1.00	reference
Unemployed	234	73.5	2.89	1.97	1.46-2.67[d]	1.72	1.24-2.39[d]
Place of residence							
Rural	2002	59.2	1.10	1.00	reference	1.00	reference
Urban							
Up to 50,000	656	60.1	1.91	1.03	0.86-1.24	0.83	0.65-1.05
50,000-200,000	422	61.1	2.37	1.08	0.87-1.34	1.00	0.75-1.32
Over 200,000	645	57.2	1.95	0.92	0.77-1.10	1.02	0.79-1.32
Religiosity							
Believer practicing regularly	1698	56.7	1.20	1.00	reference	1.00	reference
Believer but not practicing regularly	1261	59.2	1.38	1.11	0.95-1.28	1.35	1.14-1.59[d]
Believer but not practicing	608	67.1	1.91	1.55	1.28-1.89[d]	1.99	1.60-2.48[d]
Not religious	158	55.7	3.95	0.96	0.69-1.33	1.37	0.95-1.99
Place of residence when about 14 years of age							
Village	2032	59.4	1.09	1.00	reference	1.00	reference
Urban							
Small town up to 50,000	726	61.0	1.81	1.07	0.90-1.27	1.37	1.08-1.73[c]
Medium size town 50,000-100,000	341	60.4	2.65	1.04	0.82-1.32	1.31	0.96-1.78
City over 100,000	626	56.1	1.98	0.87	0.73-1.05	1.05	0.80-1.37
Awareness of smoking health consequences							
Yes	3360	56.9	0.85	1.00	Reference	1.00	Reference
No	365	80.8	2.06	3.19	2.44-4.18[d]	3.02	2.28-4.00[d]

[a] – Fully adjusted model including: age, education, occupational classification, place of residence, place of residence when about 14 years old, religiosity, awareness of smoking health consequences.
[b] – p ≤ 0.05
[c] – p ≤ 0.01
[d] – p ≤ 0.001

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Table 4. Odds Ratios (OR) and 95% Confidence Intervals (CI) in women (N=3857) – Global Adult Tobacco Survey (GATS) Poland 2009–2010

Variable	Total (n)	Smoking initiation rate	Standard error	Univariate logistic regression		Multivariate logistic regression[a]	
				OR	95% CI	OR	95% CI
Age (years)							
<25	419	21.5	2.01	1.00	0.76-1.32	0.66	0.49-0.89[c]
25–29	368	36.4	2.51	2.10	1.62-2.72[d]	1.32	0.96-1.81
30–39	726	35.5	1.78	1.94	1.56-2.40[d]	1.20	0.92-1.58
40–49	626	45.8	1.99	3.10	2.49-3.85[d]	2.09	1.60-2.75[d]
50–59	711	48.2	1.87	3.41	2.76-4.21[d]	2.49	1.95-3.17[d]
≥60	1007	21.4	1.29	1.00	reference	1.00	reference
Education							
Primary	897	21.1	1.36	0.53	0.42-0.67[d]	0.88	0.66-1.18
Vocational	822	42.7	1.73	1.47	1.19-1.83[d]	1.77	1.38-2.27[d]
Secondary	1513	37.7	1.25	1.19	0.98-1.45	1.32	1.06-1.63[b]
High	625	33.6	1.89	1.00	Reference	1.00	reference
Occupational classification							
Economically not active	2040	28.8	1.00	0.61	0.53-0.69[d]	0.99	0.83-1.20
Employed	1624	40.1	1.22	1.00	Reference	1.00	reference
Unemployed-currently with no permanent job	193	42.5	3.56	1.10	0.82-1.49	1.42	1.03-1.97[b]
Place of residence							
Rural	1923	28.7	1.03	1.00	reference	1.00	reference
Urban							
Up to 50,000	713	34.1	1.78	1.28	1.07-1.54[c]	1.00	0.79-1.27
50 000-200,000	516	42.4	2.18	1.83	1.50-2.24[d]	1.29	0.99-1.68
Over 200,000	705	43.5	1.87	1.92	1.60-2.29[d]	1.29	1.00-1.66[b]
Religiosity							
Believer practicing regularly	2185	25.3	0.93	1.00	reference	1.00	reference
Believer but not practicing regularly	1217	42.3	1.42	2.17	1.87-2.51[d]	1.97	1.67-2.32[d]
Believer but not practicing	394	54.6	2.51	3.54	2.84-4.42[d]	3.27	2.55-4.20[d]
Not religious	61	62.3	6.21	4.88	2.88-8.26[d]	4.38	2.50-7.66[d]
Place of residence when about 14 years of age							
Village	2082	28.8	0.99	1.00	reference	1.00	reference
Urban							
Small town up to 50,000	677	38.0	1.87	1.51	1.26-1.82[d]	1.08	0.85-1.36
Medium size town 50,000-100,000	451	40.4	2.31	1.68	1.36-2.07[d]	1.15	0.87-1.51
City over 100,000	647	43.7	1.95	1.92	1.60-2.31[d]	1.14	0.87-1.50
Awareness of smoking health consequences							
Yes	3545	32.1	0.78	1.00	Reference	1.00	Reference
No	312	58.7	2.79	3.00	2.37-3.80[d]	3.07	2.28-3.95[d]

[a] – Fully adjusted model including: age, education, occupational classification, place of residence, place of residence when aged about 14 years old, religiosity, awareness of smoking health consequences.
[b] – p ≤ 0.05
[c] – p ≤ 0.01
[d] – p ≤ 0.001

among men and women who reported vocational education than among subjects with higher education (men: OR = 2.5; 95% CI 2.0–3.2; p < 0.001; women: OR = 1.8; 95% CI 1.4–2.3; p < 0.001).

Furthermore employment status was associated with the possibility of smoking onset among both genders. The probability of smoking initiation was nearly twice as high among unemployed men (OR = 1.7; 95% CI: 1.2–2.4; p < 0.001), and also about 1.5 times higher for unemployed women (OR = 1.4; 95% CI: 1.0–2.0; p < 0.05) compared with the employed subjects. Significantly higher probability of smoking initiation was among men (OR = 3.0; 95% CI: 2.3–4.0; p < 0.001) and

women (OR = 3.0; 95% CI: 2.3–3.9; p < 0.001) who were not aware of negative health consequences compared to those not aware. While place of residence did not influence smoking initiation in men, it did in women. Among women, living in large cities was associated with increased risk of ever smoking compared to rural residents (OR = 1.3; 95% CI: 1.0–1.7; p < 0.001). In contrast, place of residence when respondents were about 14 years old did not influence smoking among women, but among men, those living in a small-size town had a significantly lower probability of smoking initiation, compared to those growing up in a village (OR = 1.4; 95% CI: 1.1–1.7; p < 0.001).

DISCUSSION

The current smoking status in a particular population is the net result of various processes of initiation, maintenance and cessation of smoking [14]. Analysis of the presented data on predictors of smoking initiation, assesses age of smoking initiation by selected characteristics in a representative sample of Poles. The average age at smoking initiation varies by country, income, education, and age cohort [15, 16, 17, 18]. In Poland, the mean age of regular smoking initiation was 18.4±3.6 in men and 20.0± 4.7 in women (p < 0.01). In 2010 among women, the average age at smoking initiation in Sweden was 17.1, 17.9 in Ireland, 18.1 in France, 18.6 in Italy, and 19.6 in the Czech Republic [15]. Over 80% of female smokers had started smoking by the age of 20. Sweden had the highest percentage of women who started smoking at a very young age, with 29.3% starting between 14–15 years of age and 12.0% starting before the age of 14. The Czech Republic had the lowest percentage of young initiators with 13.7% starting between the ages of 14–15, and 1.4% starting younger than 14 years old. The highest percentage of women began smoking between the ages of 16–17 in all countries, except Sweden [15]. Differences in age at initiation by country may reflect variation in stages of the cigarette smoking epidemic between countries or complexity of tobacco control measures implementation [19]. Similar to findings from other surveys, in the presented survey a decrease in the age of smoking initiation was observed among subjects from the younger subgroups in both genders [17, 20, 21]. For instance, Schulze et al. also observed reduction of the median age at smoking onset between the 5-year gender-birth cohorts, beginning with those born between 1926–1970 [17].

Consistent with the presented findings, La Vecchia et al. found that Italian women are initiating smoking at an earlier age than previous generations [16]. Older age was also significantly associated with constant smoking in women from five European countries [15]. In particular, older women in Italy, the Czech Republic and Sweden all showed a significant increasing trend of a smoking history [15]. Smoking causes nicotine addiction over time which leads to increasing the number of cigarettes smoked and raises a health hazard. This problem is particularly important in relation to persons who started smoking tobacco regularly at a young age [12]. The earlier one starts smoking, the greater the cancer and cardiovascular disease risk in middle and older age. The decreasing age of smoking initiation is alarming because the negative health impact of smoking will probably be larger in the contemporary young cohort [12, 20].

Programmes that delay smoking initiation might have considerable value, even if they do not succeed in fully preventing the uptake of smoking [22]. Delaying smoking initiation among adolescents could eventually reduce the rate of smoking through increasing the potential for successful cessation [22]. In this light, the presented observation that the mean age of smoking initiation among religious men and women compared to non-religious respondents is about 1.5 years higher (p<0.001) and over 2.0 years higher (p<0.01), respectively (Tab. 2), seems to be very interesting and promising. It indicates the possibility of using religious centres for strengthening the effectiveness of tobacco control messages, especially those addressing youth and young adults.

The presented study shows that the younger age of smoking initiation is related to poor a socio-economic situation, which is in agreement with the results of earlier studies [15, 17, 23]. Schulze and Mons found that the mean age of smoking initiation differed by education level in Germany [17]. In the future, due to earlier age at smoking onset in a socio-economically disadvantaged population compared to the upper class, widening inequalities in smoking related mortality and morbidity may be found among Poles [20, 24].

Another important issue examined in the presented study was the initiation rate of regular smoking. Among males, the regular smoking initiation rate was significantly higher compared to females (59.2% vs. 34.2%; p < 0.01). This, of course, reflects previous trends in smoking patterns and influence of the current status of the tobacco epidemic in Poland [7, 25]. Furthermore, the initiation rates were higher among the older age groups – 50–59 or over 60, compared to younger subjects. In general, this can be explained by older people having more time to experiment with smoking, and became regular smokers during their lifetime, compared to younger groups. In addition, the rates of initiation of regular smoking were highest among men as well as women with vocational education and those unemployed, compared with respondents with a better socio-economic situation. Similarly, in repeated cross-sectional surveys of the population of the Netherlands from 2001–2008, Nagelhout et al. found significant differences in initiation ratios between respondents with higher and lower education and income among both men and women. The study results indicated that lower SES respondents more often started smoking than higher SES respondents in 2001 as well as 2008 [26]. These findings are also in accordance with other reports [27]. In the presented study, a very interesting result was that religious women had three times lower rates of smoking initiation compared with non-religious females (Tab. 2). Unfortunately, these figures cannot be compared with results from other studies due to lack of statistics on that topic.

Finally, in the presented study, predictors of initiation of regular smoking in adult Poles were examined. As far as can be ascertained, this is the first available analysis evaluating a high number of factors that may influence smoking initiation in Poland. Risk of ever initiating regular smoking was higher among representatives of the older compared to the younger age groups, an issue that has been explained previously. In the GATS, low educational attainment and unemployment were strongly associated with regular smoking initiation among both men and women. The results of the presented study regarding socio-economic factors and smoking onset are comparable with findings from other studies. Smoking initiation was found to be more prevalent among adolescents attending middle school compared with adolescents attending high school [26, 28]. In a study by Leinslau et al., in Estonia, an individual's educational level was the strongest predictor of ever initiating regular smoking in that country [27]. Among men, a strong inverse relationship was found in all age groups, whereas among women the reverse was found in the age groups younger than 50 [27]. Schaap et al. noticed that in 19 European countries, less educated women aged 25–39 were more likely to have ever smoked than more educated women in all countries, except Portugal. In the age group 40–59, the educational pattern differed between countries. Women aged 60 and over who were less educated were less likely to have ever smoked in all countries, except Norway and the UK. The size of inequalities varied considerably between countries and reversed within three age groups [29]. Diffusion of the

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smoking epidemic among women from high to lower socio-economic groups occurred across all parts of Europe [29]. Analogous associations were observed elsewhere [30, 31, 32, 33]. Also, Kim et al. revealed that compared to women who graduated from college, women who did not graduate from college had a higher likelihood of smoking initiation (high school: OR, 1.35, 95% CI, 1.04 to 1.75; ≤middle school: OR, 1.72, 95% CI, 1.17 to 2.51) [34].

As previously described, people with higher education are usually characterized by a greater knowledge including health knowledge which helps them to take appropriate care of their health, and to make proper choices regarding health behaviours [8]. Previous reports have shown that smoking is usually initiated during adolescence, which may clarify why an individual's educational level is such an important factor. In addition, educational level is strongly related to the parental socio-economic position, and thereby also to childhood living conditions which, in their own terms, may affect smoking initiation [27]. Education is one of the most widely used and valid indicators of socio-economic position [35, 36]. Compared with other indicators – such as occupation, which can only be applied to those actively engaged in work – it has a substantial advantage because it allows the classification of all individuals in a population [35].

In the presented study it was also decided to take occupation into account in the analysis. In the GATS in Poland, unemployment had a direct independent association with smoking initiation. Unemployed males had close to a twice as high risk and unemployed females had about one and a half times higher risk of ever initiating regular smoking, compared to employed respondents. Leinslau et.al consistently found independent, although weaker, associations between smoking initiation and indicators of current social disadvantages, such as low occupational class and unemployment [27]. According to Gilman et al., a significantly increased risk of smoking initiation was observed among people from lower socio-economic backgrounds [14]. Low SES in childhood also increased the risk for progression to regular smoking, and was associated with a reduced likelihood of smoking cessation. Progression to regular smoking and smoking persistence were also associated with lower adult SES in the cited report. A study on Korean women indicated that smoking initiation was significantly higher in women who had manual jobs (OR, 1.65; 95% CI, 1.20- 2.27) or other jobs (OR, 1.37; 95% CI, 1.01–1.87) than in women who had non-manual jobs. Age-adjusted OR of the low income group (1.74; 95% CI, 1.35–2.24) compared to the high income group was statistically significant [34]. But not all studies support these findings, especially among women [15].

Unless lack of awareness on smoking health consequences was the strongest predictor of ever initiating regular smoking among both genders due to cross-sectional design of the study, the results of the presented should be treated with caution because it was impossible to evaluate the health awareness of subjects at the time of smoking onset. It can only be hypothesized that current health awareness may be associated with higher education, or even better socio-economic background in childhood which influenced a decreased risk of smoking initiation among respondents who were aware of the devastating health consequences of smoking [37]. This suggests that interventions on smoking initiation and cessation should be considered throughout the entire life course [37].

Although in men there was no association between place of residence and smoking initiation, among women living in the largest cities an increased risk of smoking onset was found. In Estonia, the highest initiation rates were found among divorced women, and in the same way, among women living in Tallinn, the capital city [27]. Potential contributors to higher smoking initiation risk among women living in large cities, compared with those from the rural areas, include various factors, such as: the adoption of smoking as a symbol of independence and success, influenced by the mass media, tobacco advertising, the promotion of cigarettes as a way to relieve stress, improve performance, lose weight, and as a means of social acceptance [35]. The targeting of young women by the tobacco industry is an increasing problem in recent years, and females from large cities are especially exposed to these activities [38]

To the best of our knowledge, this is the first analysis tackling issues of smoking initiation and religion in Poland. One of the most interesting findings of the presented study is the presence of a more than four times lower risk of smoking initiation, and a more than 2.0 years higher age of starting regular smoking among religious compared to non-religious women. Among men there was no statistical association between religion and smoking initiation; however, the mean age of smoking initiation among religious men was about 1.5 year higher compared to non-religious respondents.

The abstinence from substance abuse is one of the principles of the teaching of most if not all of the churches. The findings of the presented study are comparable with the results of other studies [39, 40]. According to some reports, religion may play a part in health beliefs and behaviours, including tobacco use [41, 42]. Reports reveal that religion in different faiths is associated with less use of tobacco [42, 43, 44]. Some researchers suggest that members of the same community, even if they adhere to different faiths, seem to have similar patterns of tobacco use. Maziak et al. have previously reported that wherever differences occurred, it is not clear whether this is due to religion or to broader social differences of which religion is only one [45]. However, Nonnemaker et al. found that adolescents' decisions to experiment with smoking are influenced by both the individual practice of their faith, and by participation in a larger faith community [46]. Nevertheless, the effects of private and public religion were specific to different decision points on the smoking uptake process. Private religion was protective against initiation of regular smoking among non-smokers. It also was protective against initiation of experimental smoking, but only when the young person frequently attended religious services or a religious youth group. Although private religion appeared to discourage the uptake of smoking, it was unrelated to reduction or cessation once a young person has become addicted to cigarettes. In contrast, public religion did predict reduction and cessation of cigarette use among regular smokers. These findings demonstrate that the areas in which religion are significant range beyond the individual and include religious institutions. The GATS findings, supported by earlier studies, imply using the possible opportunity to enlist the religion network as a means for delaying or preventing smoking uptake.

The Polish tobacco control law should protect the right of non-smokers to live in a smoke-free environment, promote a tobacco-free life style, create legal and economic conditions to encourage reduction in tobacco use, inform

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the public about the adverse effects of smoking and the levels of harmful substances (through messages on tobacco packets and in advertisements in magazines for adults) [6, 47]. Moreover, a decrease in the maximum level of harmful substances in tobacco products is recommended, prohibition of smoking in health and educational institutions and other public buildings, with the explicit acquiescence of local governments to restrict smoking in additional places [6, 25]. Experiences from other countries indicates that in order to prevent smoking initiation among minors, one needs to prohibit the sale of tobacco products to them. Other strategies include sales through vending machines and in packets with less than 20 cigarettes,; prohibiting advertising and promotion of tobacco products on television and radio, in cinemas, newspapers, magazines for children and teenagers, in educational and cultural institutions, and in sports facilities. For that purpose, another important strategy is also to require on each packet of cigarettes two different warnings on the adverse effects of tobacco and on levels of tar and nicotine contents. The messages should cover 30% of each side of the cigarette packet, and display the penalties of imprisonment and fines for violating the law [6, 25]. But in Poland, not all the above- mentioned policies have been fully implemented [25, 48].

Study limitations. The GATS provided nationally representative data based on a large number of respondents, but the known potential limitation was using self-reports to obtain information. This issue,however, has been discussed in earlier reports and should not significantly impact the quality of the presented study [8, 12]. An additional possible limitation of epidemiological studies is the high non-response rate; nevertheless, the response rate in the GATS exceeded 65% of the typical level, or even higher than in other nationwide population-representative questionnaire surveys in Poland [10]. Moreover, this level of participation rate meets the GATS sample size requirements and standards reviewed and approved by international experts [8]. The participation rates differ among GATS countries. It should be emphasized that the GATS has been applied in both low and middle-income countries which vary significantly in terms of economic, social and cultural context. This has an impact on the respondents' willingness to participate in the study and also the access to respondents. For example, in the Russian Federation, the overall survey participation rate was 97.7%, in Turkey – 93.7%, and in the Ukraine – 80.1%. Unfortunately, it is difficult to determine the most important reasons that affected these results. While the GATS questionnaire included an extensive set of questions including smoking status or questions on age of smoking onset, the personality characteristics that are considered important determinants of smoking initiation were not evaluated [28]. Data on childhood socio-economic status of respondents were also not available, nor was data on parents, siblings or friends smoking taken into consideration. Reasons for smoking initiation were also not assessed.

Another limitation of the GATS project was the cross-sectional design which caused all information to be collected at the time of interview. While some of the characteristics may not have changed over the lifetime, others, such as employment status, may have changed and such former conditions cannot be verified. This impacts on the researchers ability to come to conclusions about some factors as a predictor of smoking initiation. This suggests that further, more in-depth research is needed in order to inform tobacco prevention and control experts about those who smoke and why they initiate smoking. This would improve targeting, development, and implementation of effective programmes and policies focused on reducing smoking initiation among adults.

CONCLUSIONS

The results of the presented study indicate that policies focused on preventing smoking onset among Poles are needed to reduce the tobacco epidemic, with the ultimate goal of translating evidence into policy. Target-specific smoking prevention programmes focused on young people, including girls and women, as well as socially disadvantaged groups should be a priority for tobacco control in Poland. Among others, effective enforcement of tobacco control measures is crucial for improving the current situation. Some previous experiences from other countries suggest that two key strategies should be used to reduce smoking initiation among young adults: counter-industry campaign strategies and smoke-free policies [49, 50]. Implementing smoke-free policies in housing and workplaces has been linked to a lower percentage of individuals who initiate smoking as they make the transition from adolescence to young adulthood [50]. The most recent data shows that lack of smoking acceptance in schools and restaurants may protect against initiation of cigarette smoking, and could be useful targets for more intense tobacco control efforts [51]. A complete ban on smoking in public places and worksites, including bars and restaurants, has still not been implemented in Poland [25]. Promising interventions include the national truth campaign and other counter-industry media campaigns which, unfortunately, are infrequent in the Polish mass-media [49, 52]. The development and implementation of effective programmes and policies focused on reducing smoking initiation among all young adults should also include enforcement of a comprehensive tobacco control economic policy, progressive tax and price policy for tobacco products, and control of cigarette smuggling. Moreover, pictorial health warnings on cigarette packs are strongly recommended. The evidence indicates that comprehensive warnings are effective among the youth and may help to prevent smoking initiation. Pictorial health warnings that elicit strong emotional reactions are significantly more effective than text only messages [53, 25].

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