

Cigarette smoking in Poland in 2019: the continuing decline in smoking prevalence

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ABSTRACT

The aim of the study: To present comprehensive national estimates of prevalence of cigarette smoking by sociodemographic characteristics in Poland in 2019 and to analyse the changes in smoking prevalence in the Polish population after 2014.

Material and methods: A cross-sectional survey on a representative sample of adult Polish population was conducted on 4–11 July 2019 by the Public Opinion Research Center (Centrum Badań Opinii Społecznej). A total of 1016 adults (42.4% men and 57.6% women) aged 20 years and older were included in the analysis. Data for smoking prevalence were analysed according to gender, age groups, birth cohorts, place of residence and education. Statistical analysis was done using Statistica 13.1 and assumed a significance level of $p < 0.05$.

Results: Of the total sample population, 21.8% of Polish adults declared they are daily smokers (in the general population this would translate to 6.8 million Poles, including 3.9 million men and 2.9 million women), 27.8% that they are ex-smokers and 50.4% that they never smoked tobacco. More men than women declared they are daily smokers (26.9% vs 18.1%) and ex-smokers (36.2% vs 21.5%), and women were more likely to declare they are never smokers than men (60.3% vs 36.9%).

Conclusions: Poland has experienced a decrease in smoking prevalence since 1976 in men and since 1982 in women. In 2019 the most important factor shaping smoking prevalence in Poland was education. Sex differences in smoking rates have been converging since late 1970s. Those with lower levels of education, as well as middle-aged men and women (45–64 years old) were found to have the highest levels of daily smoking and should be offered targeted support promoting smoking cessation. There is an urgent need to bring back and strengthen a national tobacco control strategy in Poland. This should include systematic annual surveys of smoking behaviours on a representative sample of Polish population using a standardised methodology.

KEY WORDS: tobacco, cigarettes, smoking prevalence, Poland.

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INTRODUCTION

Tobacco smoking is one of the leading avoidable causes of premature mortality worldwide. According to the World Health Organization (WHO) there are 1.3 billion tobacco users in the world and each year tobacco causes over 8 million of deaths [1]. However, large differences

exist in smoking prevalence between countries. In the WHO European region there are countries with relatively low age-standardised rates of current cigarette smoking, such as Iceland (11.0%), Sweden (12.4%) or Norway (14.6%) and those with some of the highest smoking prevalence in the world, including Serbia (36.2%),

Bulgaria (35.8%) and Greece (35.6%) [2]. In Poland, cigarette consumption decreased from around 3,000 cigarettes per annum per capita in 1980 (one of the highest levels ever recorded globally) to under 1,300 cigarettes in 2019 [3-5]. Peto *et al.* estimated 85,000 deaths attributable to tobacco in Poland for 2015 [6]. The latest estimation done by Samet and Buran for Poland in 2017 showed around 80,000 deaths attributable to smoking [7].

Poland has been monitoring cigarette smoking prevalence since 1974, which makes it one of the countries with the longest systematic observation periods of smoking prevalence in Europe [4,8]. The MPOWER policy package, developed in 2008 to assist countries in implementing the provisions of the WHO Framework Convention on Tobacco Control, includes monitoring tobacco use as its first core component [9]. It advises that countries develop a system of obtaining good quality, nationally representative and population-based periodic data on key indicators of tobacco use for youth and adults. Effective surveillance and monitoring can help determine the size and nature of the tobacco epidemic and plan effective strategies and policies. Accurately measuring the number of smokers in a country allows to predict and map the long-term public health consequences of tobacco use in the population and their impact on the health indicators. For example, Poland's historical reduction in smoking rates led to a decrease in lung cancer mortality among Polish young and middle-aged men and women (who have shorter delay time

in comparison with older age groups) and cardiovascular mortality in all ages and in both sexes [4, 10-12].

The aim of this study is to assess comprehensive national estimates of cigarette smoking prevalence by sociodemographic characteristics in Poland in 2019 and to analyse the changes in exposition to cigarette smoking in the Polish population after 2014.

MATERIAL AND METHODS

The data analysed in this study comes from a cross sectional study with multitask approach "Actual problems and events" ("Aktualne problemy i wydarzenia") conducted by the Public Opinion Research Center (Centrum Badań Opinii Społecznej) on 4-11 July 2019 on a representative sample of 1077 adult Polish population aged 18 years or older [13]. Face-to-face interviews were carried out using the computer-assisted personal interviewing (CAPI) technique [14]. A random sample was selected from the register of personal identity numbers containing information on every Polish citizen registered in Poland. The sampling frame included stratification according to territorial localization, size of the place of residence, gender and age. The sampling frame ensured that the study sample corresponded with the structure of the general Polish population in 2019.

The analysis in this article includes respondents aged 20 years and older (1016 respondents) who responded to the question about smoking behaviours. Occasional smokers (48 respondents) and those below 20 years of age (13 respondents) were excluded from the analysis. The analysis focused on daily smokers instead of occasional smokers, as the latter are a heterogenous and small group for which further analysis and stratification would not yield significant results. Detailed socio-demographic characteristics of the study population are presented in Table 1.

The questionnaire included two questions concerning cigarette smoking: (1) "Do you smoke cigarettes? We refer to traditional cigarettes, not electronic cigarettes", with multiple choice answers: (a) "Yes, regularly", (b) "Yes, but only in exceptional situations, occasionally", (c) "No"; (2) "Have you smoked cigarettes in the past?", with multiple choice answers: "Yes" or "No". Based on the responses to these questions the study population was divided into three categories of smoking status: daily smokers, ex-smokers and never smokers. The number of smokers, ex-smokers and never smokers in the general Polish population was extrapolated using data on the population of Poland aged 20 years and older on 31.12.2019 provided by the National Statistical Office. Data were analysed according to gender, age groups (≥ 20 years, 20-44 years, 45-64 years, ≥ 65 years,), birth cohort (born before 1940, born between 1940 and 1959, born between 1960 and 1980, born after 1980), place of residence (urban or rural) and education (1) prima-

TABLE 1. Descriptive characteristics of the study population

Characteristics	Percentage	n
Overall	100	1016
Gender		
Men	42.4	431
Women	57.6	585
Age		
20-44 years	37.6	382
45-64 years	33.3	338
65 years and older	29.1	296
Residence		
Urban	61.0	620
Rural	39.0	396
Education		
Primary and gymnasium	15.2	154
Vocational	25.4	258
Secondary	34.1	347
Higher/academic	25.3	257

n – sample size

ry and incomplete, (2) vocational, (3) secondary and (4) higher/academic.

The distribution of variables concerning smoking behaviours for men and women was delivered by frequencies and proportions with 95% confidence intervals calculated using the Clopper-Pearson method for binomial confidence intervals. Association between socio-demographic factor and smoking was assessed using adjusted logistic regression models after stratifying for gender. The strength of the association was measured by the odds ratio (OR) with 95% confidence intervals. Despite the very small size, the birth cohort < 1940 was adopted as a reference group to reflect the observed changes in smoking behaviours over the years in the Polish population. Statistical analysis was done using Statistica 13.1 and assumes significance level $p < 0.05$.

RESULTS

Of the total sample population aged 20 years and older 21.8% were daily smokers, 27.8% were ex-smokers and 50.4% never smoked tobacco. Men were more likely than women to be daily smokers (26.9% vs 18.1%) and ex-smokers (36.2% vs 21.5%). Sixty percent (60.3%) of women and 36.9% of men were never smokers (Table 2).

Tables 3 and 4 present smoking prevalence by socio-demographic factors in both sexes. In men, the highest percentage of daily smokers was found in the 45-64 age group (30.4%) and the lowest in the oldest age group (22.0% of men aged 65 years and older). The older the age group, the lower the proportion of ex-smokers and the higher the proportion of never smokers among men. The percentage of daily smokers was the highest in the 1960-1980 birth cohort (32.0%), and the lowest in the oldest birth cohort of men born before 1940 (14.0%), while there were more than 50% ex-smokers among men born before 1960 and fewer than 20% among those born after 1980. The study found the highest percentage of daily smokers in men with primary education (49.2%), and the lowest smoking prevalence in men with higher education (8.3%). In men with higher education there was also the highest percentage of ex-smokers (39.5%) and never smokers (52.1%) (Table 3).

In women the highest prevalence of daily smoking was also found in the 45-64 age group (28.3%) and the lowest in the oldest (65+) age group (11.6%). The lowest percentage of ex-smokers was in the youngest age group of women (16.2%, 20-44 years old) in comparison with middle-aged women (25.7%, 45-64 years old) and the oldest ones (23.8%, 65 years and older). There was a higher percentage of never smoking women in the 20-44 age group (69.4%) and among those aged 65 and older (64.6%), than in the 45-64 age group (46.0%). The highest percentage of daily smokers was found in women born between 1960 and 1980 (23.5%), the highest percentage of ex-smokers among women born before 1960 and, the highest percentage of never smokers among women born before 1940 (75.0%) and after 1980 (70.4%). The lowest percentage of daily smokers was found in women with the lowest (primary education) and the highest (higher education) level of education (12.4% and 13.4%). The highest smoking prevalence was found in women with vocational education (28.8%). Most ex-smokers could be found among women with vocational and secondary education (25.3% and 24.4%), in comparison with 14.8% among those with higher education. The study found the highest percentage of never smokers among women with higher education (71.8%) (Table 4).

Urban or rural residence did not differentiate significantly smoking behaviours in the study in both men and women (Tables 3 and 4). Analysis showed the lowest odds of daily smoking in men aged 65 and older, in comparison with the youngest age group (20-44 years). In women there were higher odds of daily smoking in the 45-64 age group compared to the 20-44 age group. In women, there were higher odds of daily smoking among those with vocational education compared to primary education (lowest level of education). The odds of daily smoking were lower in women aged 65 years and older, born after 1980, and with secondary education (Tables 3 and 4).

DISCUSSION

In 2019 in both sexes the most important factor affecting smoking prevalence in Poland was education. The lower the education level, the higher the prevalence

TABLE 2. Smoking prevalence in Poland in 2019

Characteristics	Total			Men			Women		
	<i>n</i>	% (95% CI)	<i>N</i>	<i>n</i>	% (95% CI)	<i>N</i>	<i>n</i>	% (95% CI)	<i>N</i>
Daily smokers	222	21.8 (19.4-24.5)	6,848,420	116	26.9 (22.8-31.3)	3,936,984	106	18.1 (15.1-21.5)	2,911,436
Ex-smokers	282	27.8 (25.1-30.6)	8,756,434	156	36.2 (31.6-40.9)	5,298,098	126	21.5 (18.3-25.1)	3,458,336
Never smokers	512	50.4 (47.3-53.5)	15,099,973	159	36.9 (32.3-41.6)	5,400,547	353	60.3 (56.3-64.3)	9,699,426

n – sample size, *CI* – confidence interval, *N* – estimated number in general Polish population

TABLE 3. Tobacco smoking by sociodemographic factors in men ($n = 431$)

Parameter	Daily smokers ($n = 116$)				Ex-smokers ($n = 156$)				Never smokers ($n = 159$)		p -value
	n	%	OR*	95% CI	n	%	OR**	95% CI	n	%	
Age											
20-44 years	46	28.1	Ref 1		34	20.4	Ref 1		85	51.5	< 0.001
45-64 years	45	30.4	1.19	0.73-1.94	56	40.2	1.68	0.93-3.04	42	29.4	
65 and older	25	22.0	0.56	0.32-0.98	66	51.7	2.12	1.16-3.88	32	26.3	
Birth cohort											
< 1940	2	14.0	Ref 1		9	52.8	Ref 1		5	33.2	0.001
1940-1959	34	23.8	2.18	0.47-10.09	76	53.1	0.50	0.10-2.42	33	23.1	
1960-1980	48	32.0	1.51	0.90-2.53	47	31.3	0.44	0.25-0.77	55	36.7	
> 1980	32	26.2	0.74	0.44-1.24	24	19.7	0.72	0.37-1.39	66	54.1	
Level of education											
Primary	32	49.2	Ref 1		22	33.8	Ref 1		11	16.9	< 0.001
Vocational	46	32.9	0.54	0.31-0.93	52	37.1	1.75	0.90-3.40	42	30.0	
Secondary	31	24.2	0.63	0.37-1.08	42	30.2	1.20	0.65-2.21	57	45.6	
Higher	7	8.3	0.51	0.32-0.81	40	39.5	4.22	1.67-10.66	49	52.1	
Place of residence											
Urban	64	24.9	0.77	0.50-1.19	101	39.3	1.45	0.89-2.36	92	35.8	> 0.05
Rural	52	28.8			55	29.0			67	42.2	

n – sample size, OR – odds ratio, CI – confidence interval, Ref – referenced group, OR* daily smokers vs ex-smokers and never smokers, OR** ex-smokers vs daily smokers

of smoking in men. Almost half of all men with primary education (49.2%) were daily smokers, as was one in three men with vocational education (32.9%), and one in four men with secondary education (24.2%). Men with the highest education level had the lowest smoking prevalence (8.3%) – this is the first demographic group to reach a level of smoking recommended by the WHO [15]. Education was important in determining smoking prevalence among women in Poland as well, but the pattern of smoking according to education was different than in men. The lowest prevalence of daily smoking was observed among women with the highest (13.4%) and lowest (12.4%) levels of education. In the group of women with secondary education 18.0% smoked daily. The highest prevalence of daily smoking was found in women with vocational education (28.8%). This study therefore adds to the body of research showing that in the Polish population both men and women with primary and vocational education are at the highest risk of smoking and, in result, poor health. These groups have also been found to engage in heavier smoking behaviours, in particular men [16]. This study indicates that education inequalities are a key risk factor shaping access to good health in Poland.

The second important factor linked with cigarette smoking is age and the birth cohort. The highest prevalence of smoking in both sexes was observed in the 45-64 age group. Interestingly, the prevalence of smoking in this age group is very similar in men and women (30.4% vs 28.3%, male-to-female smoking prevalence ratio 1.07). However, the most striking differences in smoking prevalence among men and women were found in the 20-44 age group, in which 28.1% of men compared to 14.4% of women smoked cigarettes daily (ratio 1.95). We observed a similar difference between sexes in the oldest age group (65 and older) in which 22% of men and 11.6% of women were daily smokers (ratio 1.90). The finding that the highest prevalence of smoking persists in the middle-aged population should inform the planning of tobacco control activities and development of targeted cessation programmes in Poland.

In past studies, place of residence (urban or rural) was identified as an important factor determining smoking prevalence in Poland, as smoking rates among women in urban areas were found to be higher than in rural areas [4]. In this study the place of residence was not significantly associated with smoking prevalence.

TABLE 4. Tobacco smoking by sociodemographic factors in women ($n = 585$)

Parameter	Daily smokers ($n = 106$)				Ex-smokers ($n = 126$)				Never smokers ($n = 353$)		p -value
	n	%	OR*	95% CI	n	%	OR**	95% CI	n	%	
Age											
20-44 years	31	14.4	Ref 1		34	16.2	Ref 1		152	69.4	0.001
45-64 years	54	28.3	2.30	1.40-3.76	52	25.7	0.88	0.47-1.63	89	46.0	
65 and older	21	11.6	0.36	0.21-0.63	40	23.8	1.98	1.03-3.79	112	64.6	
Birth cohort											
< 1940	0	0	Ref 1		6	25.0	Ref 1		18	75.0	0.03
1940-1959	35	17.9	10.77	0.64-181.33	52	26.5	0.11	0.01-2.08	109	55.6	
1960-1980	46	23.5	1.41	0.86-2.31	43	21.9	0.63	0.35-1.14	107	54.6	
> 1980	25	14.8	0.55	0.32-0.94	25	14.8	1.07	0.54-2.14	119	70.4	
Level of education											
Primary	11	12.4	Ref 1		17	19.1	Ref 1		61	68.5	< 0.001
Vocational	34	28.8	2.94	1.40-6.20	29	25.3	0.28	0.13-0.61	55	45.9	
Secondary	39	18.0	0.53	0.32-0.91	53	24.4	2.01	1.15-3.52	125	57.6	
Higher	22	13.4	0.73	0.41-1.29	27	14.8	1.56	0.87-2.80	112	71.8	
Place of residence											
Urban	70	20.2	1.26	0.81-1.96	81	21.6	0.3	0.54-1.59	212	58.2	> 0.05
Rural	36	16.2			45	20.3			141	63.5	

n – sample size, OR – odds ratio, CI – confidence interval, Ref – referenced group, OR* daily smokers vs ex-smokers and never smokers, OR** ex-smokers vs daily smokers

Historically, the most important factor determining smoking prevalence was sex. Smoking rates in the 20th century were several times higher among men than women [4]. This study found that smoking prevalence remains higher among men than women in Poland, but that the ratio of male-to-female smoking prevalence (1.5) is significantly lower compared to the years 1960-1980 (in 1974 the ratio was 3.3) [4]. This finding places Poland alongside most Central and Western European countries where ratio of male-to-female smoking prevalence is around 2 or less (i.e. 2.1 in Latvia, 1.5 in Slovakia, 1.4 in Italy, 1.2 in Netherlands, 1.0 in Norway), in contrast to many Eastern European countries, where ratios are much higher – 4 in Ukraine and far more, 10.3 in Georgia, 34.7 in Armenia, and more than 100 in Azerbaijan [2]. Generally, in Asian countries prevalence of smoking in women is very low, far lower than prevalence of smoking among men. Thus contrary to European countries, male-to-female smoking prevalence ratios in these countries, are very high, for example in China smoking prevalence among women is around 2% and among men 53%, and the ratio is 26.5 [17, 18].

Results from another study conducted in 2019 in Poland by Kantar Public for the Chief Sanitary Inspector

[19] on a representative nationwide sample of around 1000 individuals aged 15+ showed that the percentage of daily smokers was 21.0% (24.4% men and 18.0% women), the percentage of ex-smokers was 10.7%, and of never smokers was 67.0%. These results correspond with the findings of this study and the ratio of male-to-female smoking prevalence was comparable. A higher proportion of daily smokers was found among men than women in both studies. The Kantar study also showed that education level is the strongest factor associated with daily smoking. Lower education level (compared to higher education) in both men and women was significantly associated with daily smoking (OR 3.03, 95% CI 1.75-5.26, $p < 0.001$). However, it must be underlined that there were some differences in study population according to age (in our study the population was 20 years and older, in the Kantar study it was 15 years and older; in addition both studies selected different age groups for analysis), methodology (i.e. different questions about smoking were used in the questionnaires), data analysis and presentation (i.e. the Kantar study analysed daily smoking by socioeconomic factors in both sexes together), thus comparing results from these studies should be done with caution. Nevertheless, results from both

studies correspond to findings from most other European countries where education has also been identified as a strong predictor of smoking status [20], and where sex is no longer the most important factor determining smoking behaviours [2].

Our study confirms the ongoing pattern of decreasing smoking prevalence in Poland that has been observed for the past decades. It must be mentioned that smoking in Poland concerns almost exclusively cigarettes, which constitutes 99% of tobacco use [4]. The decline in cigarette smoking prevalence in Poland began in the male population in 1976 and in women in 1982 [4]. The findings of this study contrast with several recent publications suggesting that the decrease in smoking prevalence in Poland has stopped after 2014 [21,22]. These discrepancies might be partially explained by the fact that annual surveys on smoking behaviours in Poland are conducted on relatively small samples of population (approx. 1000 respondents), with a relatively high standard error, or using different sampling methods. Additionally, some recent publications have been conflating conventional cigarettes with nicotine delivery devices (so called e-cigarettes, nicotine vaporisers) [21].

The Global Burden Disease (GBD) Tobacco Collaborators in 2017 published an analysis of worldwide trends of changes in estimates of smoking prevalence and its health consequences between 1990 and 2015 [23] based on mathematical models following the overall GBD 2015 comparative risk assessment framework [24]. They found that in 1990 the level of tobacco smoking in Poland was one of the highest in Europe. Among European countries, Poland was found in 2015 in the middle of the ranking list of smoking prevalence (26.7% of daily smokers in men and 19.3% in women). The GBD analysis showed that Poland had one of the fastest smoking prevalence declines in Europe between 1990 and 2015 [4, 23, 25, 26].

The MPOWER strategy to reduce global tobacco use underlines that countries need specific data of tobacco use to plan tobacco control strategies and effective interventions. Population surveys should use representative, random, and efficiently large sample. Questionnaire surveys should be repeated at regular time periods, using the same methodology (questions, data analysis and reporting techniques) to enable comparability of data across different years. This “golden standard” requires that appropriate data collecting systems are established and maintained, and that they use standardized and scientifically valid data collection methods and analysis practices. Only with such a system in place can a country conduct an accurate impact assessment of tobacco smoking in the population, develop appropriate tobacco control interventions activities, and correctly assess their effectiveness over time.

It is worth underlining that Poland was among the countries pioneering golden standards in the monitoring of smoking prevalence already in 1970s [27]. However,

the regular surveys on tobacco smoking behaviours carried out since 1982 by the Department of Epidemiology and Prevention in Cancer Center and Institute of Oncology in Warsaw have been discontinued in 2014, and in recent years there has been no systematic monitoring of smoking rates in Poland that would be based on homogeneous criteria for sampling frame and questionnaire.

The lack of a homogeneous definition of individual smoking behaviours makes it difficult to compare results across surveys. For example, in the WOBASZ study (2003-2014) [28] a current smoker was defined as a person who regularly smoked at least 1 cigarette a day, an occasional smoker as someone who smokes less than 1 cigarette per day, and an ex-smoker as a person who smoked in the past, stopped smoking and did not smoke during the survey, and a non-smoker as a person who has never smoked. On the other hand, in the 6-year follow-up of the PURE Poland Study [29], current smokers were defined as those who had smoked in their lifetime at least 100 cigarettes and currently smoke cigarettes every day or occasionally, while never smokers as those who had never smoked or smoked fewer than 100 cigarettes in their lifetime.

The decreasing trend of smoking prevalence in Poland and examples of effective tobacco control programmes from other European countries are a good illustration of how progress can be made in combatting smoking and, in result, smoking-related diseases. After introducing a set of strong regulations in the 1990s Poland was acknowledged as a leader of tobacco control in Europe [30]. However, more recent years brought some adverse changes that could affect smoking rates in Poland. In 2015 the national tobacco control programme was discontinued [4]. The government suspended the annual increase of tax on tobacco products. These examples of unfavourable decisions constitute a serious threat to public health, and risk exacerbating the burden of tobacco-related diseases in Poland.

It is necessary for Poland to reintroduce systematic annual surveys on smoking behaviours carried out on a representative sample the population, and using a standard questionnaires that would enable the precise definition of regular smokers, occasional smokers, ex-smokers and never smokers. Such surveys should include an assessment of the number of cigarettes smoked per day, the age of smoking initiation, the reasons for smoking cessation and the time of stopping smoking for good. The high-quality, in-depth data obtained from such studies would make it possible to develop personalized and more effective prevention programmes.

CONCLUSIONS

In 2019 the most important factor shaping smoking prevalence in Poland was education, while differences in smoking between men and women have been decreasing. Middle-aged men and women should be the group of special attention in planning tobacco control strategies.

Prevalence of cigarette smoking has been decreasing in Poland in both men and women for several decades, however around 6.8 million Poles (3.9 million of men, 2.9 million of women) are still daily smokers. Only systematic and good quality surveys can lead to monitoring effective prevention policies. The decreasing trend of smoking prevalence in Poland and examples of effective tobacco control programmes from other European countries show that gains could be made. However, continuing this positive trend in Poland would require the immediate reintroduction of a comprehensive national tobacco control strategy and updating Poland's tobacco control legislation to reflect golden standard practices from around the world, including a complete ban on smoking in public places, plain packaging, and meaningful increases in cigarette taxation.

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DISCLOSURE

The authors report no conflict of interest.

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AUTHORS' CONTRIBUTIONS

WZ prepared the concept of the paper. KPZ and KJK analysed data. WZ, KPZ, KJK and MZ interpreted data and wrote the draft manuscript. All authors took part in preparation the final version of the manuscript.