ORIGINAL ARTICLE

Tobacco smoking in Poland in the years from 2003 to 2014

Multi-centre National Population Health Examination Survey (WOBASZ)

Maria Polakowska[1*], Dorota Kaleta[2*], Walerian Piotrowski[1], Roman Topór-Mądry[3], Aleksandra Puch-Walczak[4], Arkadiusz Niklas[5], Wojciech Bielecki[2], Krystyna Kozakiewicz[6], Andrzej Pająk[3], Andrzej Tykarski[5], Tomasz Zdrojewski[4], Wojciech Drygas[1,2]; on behalf of WOBASZ Investigators

1 Department of Epidemiology, Cardiovascular Disease Prevention and Health Promotion, Institute of Cardiology, Warsaw, Poland
2 Department of Social and Preventive Medicine, Medical University of Lodz, Łódź, Poland
3 Department of Epidemiology and Population Studies, Institute of Public Health, Jagiellonian University Medical College, Kraków, Poland
4 Department of Arterial Hypertension and Diabetology, Medical University of Gdańsk, Gdańsk, Poland
5 Department of Hypertension, Angiology and Internal Medicine, Poznan University of Medical Sciences, Poznań, Poland
6 3rd Department of Cardiology, Medical University of Silesia, Katowice, Poland

KEY WORDS

smoking cessation, tobacco smoking, WOBASZ, WOBASZ II

ABSTRACT

INTRODUCTION The reduction of tobacco smoking remains a challenge for public health.

OBJECTIVES The main purpose of this study was to evaluate changes in the prevalence and patterns of tobacco use in the adult population of Poles in the years from 2003 to 2014. Furthermore, changes in the smoking addiction, the declared reasons for smoking, as well as readiness and motivation to stop smoking were assessed.

PATIENTS AND METHODS Based on data from the Polish studies WOBASZ and WOBASZ II, the analysis included 14 576 participants from the first study (6906 men and 7670 women) and 5696 participants from the second study (2578 men and 3118 women), aged between 20 and 74 years.

RESULTS According to the WOBASZ II study, 30% of men and 21% of women in Poland smoked, the rates being 9% and 4% lower for men and women, respectively, in comparison with the WOBASZ study ($P < 0.001$). The average number of cigarettes smoked daily per smoker significantly decreased during the follow-up period among men (from 17.9 to 15.8 cigarettes per day) and women (from 13.7 to 12.1 cigarettes per day). The percentage of men who never smoked increased from 29.8% to 36.1% ($P < 0.0001$), while the proportion of women who never smoked did not change. However, the percentage of those expressing unwillingness to quit smoking nearly doubled in WOBASZ II in comparison with WOBASZ.

CONCLUSIONS Although the smoking rates in Poland have declined over the past decade, smoking remains prevalent among men and women. Therefore, it is necessary to optimize tobacco control in Poland, including fiscal policy, counseling and tobacco addiction treatment, as well as promotional and educational activities, with a special emphasis on the female population.

Correspondence to:
Maria Polakowska, MD, Zakład Epidemiologii, Prewencji Chorób Układu Krążenia i Promocji Zdrowia, Instytut Kardiologii, ul. Alpejska 40, 04-628 Warszawa, Poland, phone: + 48 22 481 565 56, e-mail: mpolakowska@ikard.pl
Received: October 6, 2016.
Revision accepted: January 17, 2017.
Published online: January 17, 2017.
Conflict of interest: none declared.
Pol Arch Intern Med. 2017; 127 (2): 91-99
doi:10.20452/pamw.3896

* MK and DK contributed equally to this work.

INTRODUCTION The health consequences of tobacco smoke exposure have been long known.[1,2] Tobacco smoking is one of the main risk factors for death and diseases such as cancer, coronary artery disease, stroke, and noncancerous respiratory diseases,[3-5] as well as one of the most important threats to modern civilization. This results both from the spread of this phenomenon and from the losses it causes to the societies and economies of individual countries.[6] According to the World Health Organization (WHO), the number of deaths caused by smoking-related diseases exceeded 100 million in the 20th century.[7,8] As regards Poland, every year approx. 70 000 deaths

are caused by smoking.[9,10] In 2004 tobacco smoking accounted for 47% of all deaths caused by tumors among men, and it was the main cause of lung cancer among men aged 30 years or older. Among women in the same age group, 13% of tumor deaths and 73% of all deaths due to lung cancer were also related to tobacco use.[9,10] The treatment of patients with tobacco-related diseases generates a significant part of the cost of health care services in Poland and imposes a considerable burden on the organization of the health care system. Long-term, expensive diagnostic procedures and treatment of diseases related to the use of tobacco products account for around 18 billion PLN (6.4 billion USD) annually. Losses in work productivity and employment, including disability and disability benefits, caused by the use of tobacco products are estimated to exceed 15 billion PLN (5.3 billion USD) every year.[7,11]

The reduction of tobacco consumption and of associated costs is one of the biggest challenges for public health. Regular monitoring of various aspects of tobacco epidemic can provide reliable and effective tools to fight this threat at the systemic level. Data from epidemiological studies are the basis for a reasonable health policy.

The main purpose of this study was to evaluate changes in the prevalence of tobacco smoking among the adult population of Poles in the period between 2003 and 2014. Furthermore, changes in the smoking habits, the declared reasons for smoking, as well as readiness and motivation to stop smoking were assessed.

PATIENTS AND METHODS The results were obtained from the Polish Nationwide Studies of Health Assessment, WOBASZ and WOBASZ II, which were repeated cross-sectional surveys. The first WOBASZ study was conducted between 2003 and 2005, and the second (WOBASZ II)—between 2013 and 2014. The methods, including the rules of sampling, the tools used, the research protocol, and the principles of project implementation, were described in detail previously.[12,13] The survey data were collected in direct interviews by adequately trained interviewers. The first and second studies covered 14 769 and 6170 respondents, respectively. The total participation rate was 74.6% for WOBASZ and 46.4% for WOBASZ II. After deleting incomplete records, the analysis included a sample of 14 576 participants (6906 men and 7670 women) from the first study and 5696 participants (2578 men and 3118 women) from the second study, all aged between 20 and 74 years. The information collected in the studies comprised the respondents' socio-demographic data and smoking characteristics such as the age of starting smoking, reasons for smoking, number of cigarettes smoked daily, intention to quit smoking, and motivations to stop smoking among smokers.

Participants in the survey were divided according to their smoking status into the following groups: regular smokers, occasional smokers, former smokers, and nonsmokers. A smoker was defined as a person who at the time regularly smoked at least 1 cigarette a day; an occasional smoker was defined as a person who smoked less than 1 cigarette a day; a former smoker was a person who had smoked in the past, stopped smoking, and did not smoke at the time of the survey; and a nonsmoker was a person who had never smoked cigarettes. Cigarette count was considered as the number of cigarettes smoked per person per day. The reasons for tobacco smoking were classified on the basis of the questionnaire into the following categories: social smoking, for pleasure, "it calms me down," out of habit, other, hard to say. The possible categories for answers to assess the willingness to quit smoking were as follows: yes, no, undecided. For more in-depth analyses, the respondents were classified into 5 age groups: between 20 and 34, 35 and 44, 45 and 54, 55 and 64, and 65 and 74 years.

In the presentation of the results, the following descriptive statistics were used: rates of the occurrence of individual phenomena in the age groups, age standardized rates according to the structure of the Polish population as of December 31, 2013, crude means and age-adjusted means. For the purpose of comparing the rates between the studies and between age groups, the χ^2 test was used. The differentiation of standardized rates was analyzed by setting 95% confidence intervals. The Wilcoxon test was used to compare the age of starting smoking and the numbers of smoked cigarettes between the age groups. The smoking status was differentiated between the studies based on the significance of the odds ratio.

All the analyses were carried out separately for men and women, using the statistical SAS version 9.2 (SAS Institute, Cary, North Carolina, United States). A P value of less than 0.05 was considered statistically significant.

RESULTS In the WOBASZ and WOBASZ II studies, men declared themselves as regular smokers more often than women (TABLE 1). In the WOBASZ survey, regular smoking was declared by 39.0% of men and 23.8% of women. As regards WOBASZ II, the prevalence of regular tobacco smoking was 29.9% among men and 20.5% among women. Over a decade, the percentage of adult smokers aged between 20 and 74 years significantly declined in Poland, both for men and women (P <0.001). An increase in the proportion of never-smoking men was also observed, from 29.8% to 36.1% (P <0.0001).

In both surveys, smoking differed widely between age groups for men and women (TABLE 2). During the follow-up, there was a significant decrease in the proportion of smoking men in every age group, and there were significantly fewer smoking women in the age group of 35 to 44 years. In both surveys, the most frequent smokers were middle-aged men and women. The lowest number of smoking people in both studies, for men and women alike, was found in the group

TABLE 1 Distribution of the smoking status (%) in WOBASZ II vs WOBASZ studies

Smoking status	Men					Women				
	WOBASZ, n = 6906		WOBASZ II, n = 2578		OR	WOBASZ, n = 7670		WOBASZ II, n = 118		OR
	n	% (95% CI)	n	% (95% CI)	*P* value	n	% (95% CI)	n	% (95% CI)	*P* value
never smoker	2058	29.8 (28.7–30.9)	930	36.1 (34.2–37.9)	1.33 <0.0001	4386	57.2 (56.1–58.3)	1823	58.5 (56.8–60.2)	1.05 0.2216
former smoker	1910	27.7 (26.6–28.7)	799	31.0 (29.2–32.8)	1.17 0.0014	1175	15.3 (14.5–16.1)	574	18.4 (17.0–19.8)	1.25 <0.0001
occasionally smoker	247	3.6 (3.2–4.0)	78	3.0 (2.3–3.7)	0.83 0.1894	285	3.7 (3.3–4.1)	82	2.6 (2.0–3.2)	0.69 0.0048
regularly smoker	2691	39.0 (37.8–40.1)	771	29.9 (28.1–31.7)	0.67 <0.0001	1824	23.8 (22.8–24.7)	639	20.5 (19.1–21.9)	0.83 0.0002

Abbreviations: CI, confidence interval; n, number of patients; OR, odds ratio

TABLE 2 Prevalence of smokers (%) in age groups in WOBASZ II vs WOBASZ studies

Age group, y	Men					Women				
	WOBASZ		WOBASZ II		OR	WOBASZ		WOBASZ II		OR
	n	% (95% CI)	n	% (95% CI)	*P* value	n	% (95% CI)	n	% (95% CI)	*P* value
20–34	751	39.5 (37.0–41.4)	205	31.7 (27.9–35.1)	0.71 0.0415	480	21.8 (19.9–23.3)	131	18.1 (15.3–20.9)	0.80 0.3568
35–44	560	45.0 (42.0–47.6)	158	30.4 (26.4–34.3)	0.53 0.0211	492	35.1 (32.4–37.4)	110	18.3 (15.2–21.4)	0.42 <0.0001
45–54	769	45.6 (42.8–47.6)	180	35.9 (31.7–40.1)	0.67 0.0182	593	32.5 (28.7–36.3)	174	26.3 (19.8–32.8)	0.75 0.1203
55–64	399	36.3 (33.4–39.0)	170	29.6 (25.9–33.3)	0.74 0.1233	207	17.2 (12.1–22.3)	183	25.0 (21.9–28.1)	1.6 0.0585
65–74	212	22.7 (20.0–25.4)	58	17.5 (13.4–21.6)	0.72 0.3937	52	5.2 (3.8–6.6)	41	10.3 (7.3–13.3)	2.09 0.3524
75–84	–	–	24	15.9 (10.1–21.7)		–	–	7	3.0 (0.8–5.2)	–
SR 20–74	2691	39.2 (36.8–41.6)	771	29.9 (26.3–34.1)	0.66 <0.05	1824	23.9 (21.3–25.9)	639	20.5 (16.5–23.7)	0.82 >0.05

Abbreviations: SR, standardized frequency for age; others, see TABLE 1

of oldest participants aged between 65 and 74 years. The tendency to quit smoking can be assessed to have increased as the participants from a selected age group in the first study moved to the next age group in the second study. Over 10 years, the percentage of smoking participants in the group aged between 35 and 44 years in the first study and in the group aged between 45 and 54 years in the second study decreased by about 9%. As for the other groups, an increasing tendency for men to quit smoking with age could be observed, whereas the opposite was true for women: there was an increase in the percentage of smoking women in the age groups between 55 and 64 years and 65 and 74 years. The distribution of motivations for smoking shows that over 10 years the percentage of women declaring the reason for smoking as "for pleasure" rose by 11% (for men a marked increase was also observed but it was smaller).

On average, men smoked more cigarettes per day than women (TABLE 3). The average number of cigarettes smoked daily per smoker significantly decreased in the follow-up period both for men (17.9–15.8 cigarettes/day) and for women (13.7–12.1 cigarettes/day). Among men smokers, the most cigarettes were smoked in the age group between 35 and 54 years. Among smoking women, in the first study the most cigarettes were smoked in the age group between 45 and 54 years, whereas in the second survey it concerned the oldest group under analysis, aged between 65 and 74 years ($P > 0.0005$). The lowest average number of consumed cigarettes per smoker was observed in the youngest age group (20–34 years) in both studies for men and women alike.

The average age of starting regular smoking increased in the second study in comparison with the first study by about 2 years among men (18 vs 20 years) and also by about 2 years among women (20 vs 22 years; $P < 0.05$). Data are presented in TABLE 4.

The most frequently declared reason for current tobacco smoking by men and women in both studies was the force of habit (TABLE 5), followed by the calming effect of smoking, "for pleasure".

TABLE 3 The average of smoked cigarettes per day in smokers in WOBASZ II vs WOBASZ studies

Age group, y	Men			Women		
	WOBASZ mean values (95% CI) median (range)	WOBASZ II mean values (95% CI) median (range)	*P* value	WOBASZ mean values (95% CI) median (range)	WOBASZ II mean values (95% CI) median (range)	*P* value
20–34	15.4 (14.9–15.8) 15 (1–50)	12.8 (11.9–13.8) 10 (2–45)	<0.05	12.0 (11.4–12.5) 10 (1–30)	10.4 (9.4–11.4) 10 (1–30)	0.05
35–44	19.6 (19.0–20.3) 20 (2–50)	17.1 (15.8–18.5) 20 (2–60)	<0.05	14.1 (13.5–14.7) 15 (1–40)	12.5 (11.3–13.8) 10 (1–30)	>0.05
45–54	19.4 (18.8–19.9) 20 (2–60)	17.6 (16.3–18.8) 20 (1–60)	0.05	14.5 (13.9–15.0) 15 (1–40)	12.7 (11.6–13.7) 10 (1–40)	<0.05
55–64	18.3 (17.4–19.2) 20 (1–80)	16.8 (15.4–18.2) 20 (1–60)	>0.05	14.2 (13.2–15.2) 15 (1–40)	12.2 (11.2–13.1) 10 (1–30)	<0.05
65–74	15.7 (14.5–16.8) 15 (1–50)	14.4 (12.1–16.6) 15 (1–40)	>0.05	13.6 11.4–15.8) 10 (3–40)	13.8 (10.9–16.6) 10 (4–40)	>0.05
total	17.9 (17.5–18.1) 20 (1–80)	15.8 (15.2–16.4) 15 (1–60)	<0.05	13.7 (13.4–14.0) 13 (1–40)	12.1 (11.6–12.6) 10 (1–40)	<0.05

Abbreviations: see TABLE 1

TABLE 4 The average age of smokers at the beginning of regular smoking in WOBASZ II vs WOBASZ studies

Age	Men		*P* value	Women		*P* value
	WOBASZ, n = 2692 mean age (SD) (95% CI) median (range)	WOBASZ II, n = 761 mean age (SD) (95% CI) median (range)		WOBASZ, n = 1825 mean age (SD) (95% CI) median (range)	WOBASZ II, n = 634 mean age (SD) (95% CI) median (range)	
age of starting smoking	18.3 (3.7) (18.1–18.4) 18 (6–65)	19.7 (5.1) (19.3–20.0) 19 (7–65)	<0.05	20.3 (5.0) (20.1–20.5) 19 (7–58)	21.9 (6.4) (21.4–22.4) 20 (12–63)	<0.05

Abbreviations: see TABLE 1

A large number of smokers, both men and women, declared the will to stop smoking (TABLE 6). The willingness to quit smoking was declared by more than 70% of the respondents. However, this percentage decreased by almost 10% in both groups in comparison with the period from 2003 to 2005. At the same time, the percentage of those expressing unwillingness to quit smoking nearly doubled in WOBASZ II compared with WOBASZ.

The most common reason (around 40% of the participants) for quitting smoking among smokers in both studies for men and women alike was the fear of illness (TABLE 7). The second most frequent reason for stopping smoking was the financial aspect (over 20% of participants in both studies). However, it must be noted that in the case of both the "fear of illness" and "financial aspects" the proportion of those motivations in the reasons for quitting smoking showed no change during the follow-up period. Other reasons proved to be far less important. Doctor's orders as a reason for quitting smoking was only indicated by 3% of the men and women surveyed in both studies.

Study strengths and limitations WOBASZ and WOBASZ II were descriptive, cross-sectional, population-based, epidemiological studies. Their strengths included a wide range, a large sample size, and the representativeness of the obtained data for Poland's adult population. The age distributions in the randomly selected survey samples of WOBASZ and WOBASZ II were not significantly different. Moreover, the same questionnaire was used for both studies. Such a selection of research tools allowed obtaining fully comparable data.

The studies also had some limitations. The participation rates for WOBASZ and WOBASZ II ranged from around 75% to 47%, which is a result comparable to other epidemiological studies conducted earlier in Poland and ensures the credibility and reliability of obtained data.[14] However, the results of the studies are only based on a survey questionnaire, which can lead to underestimation or overestimation of the findings. The analysis used no objective methods for verifying the tobacco smoking status of the respondents. However, it should be emphasized that such a study would require specialized equipment, appropriate logistic preparation and considerable financial resources. Survey methods are relatively inexpensive and allow for a relatively easy data collection and for examination of a large number of respondents, while proving to be reliable tools in most epidemiological studies.[15,16]

TABLE 5 Declaration of the smoking reasons (% of smokers) in WOBASZ II vs WOBASZ studies

Reason of smoking	Men					Women				
	WOBASZ		WOBASZ II		OR	WOBASZ		WOBASZ II		OR
	n	% (95% CI)	n	% (95% CI)	*P* value	n	% (95% CI)	n	% (95% CI)	*P* value
social smoking	53	2.0 (1.5–2.5)	31	4.0 (2.6–5.4)	2.04 <0.05	51	2.8 (2.0–3.6)	22	3.4 (2.0–4.8)	1.22 >0.05
for pleasure	210	7.8 (6.8–8.8)	117	15.2 (12.7–17.7)	2.12 <0.05	201	11.0 (9.6–12.4)	143	22.4 (19.2–25.6)	2.34 <0.05
it calms me down	579	21.5 (19.9–23.0)	189	24.5 (21.5–27.5)	1.18 >0.05	553	30.3 (28.2–32.4)	164	25.7 (22.3–29.1)	0.80 >0.05
out of habit	1715	63.7 (61.9–65.5)	358	46.4 (42.9–49.9)	0.49 <0.05	924	50.6 (48.3–52.9)	248	38.9 (35.1–42.7)	0.62 <0.05
other	41	1.5 (1.0–2.0)	9	1.2 (0.4–2.0)	0.80 >0.05	25	1.4 (0.9–1.9)	10	1.6 (0.6–2.6)	1.15 >0.05
hard to say	93	3.5 (2.8–4.2)	67	8.7 (6.7–10.7)	2.63 <0.05	71	3.9 (3.9–4.8)	50	7.9 (5.8–10.0)	2.11 <0.05

Abbreviations: see TABLE 1

TABLE 6 Declaration to stop smoking (% of smokers) in WOBASZ II vs WOBASZ studies

Declaration to stop smoking	Men					Women				
	WOBASZ		WOBASZ II		OR	WOBASZ		WOBASZ II		OR
	n	% (95% CI)	n	% (95% CI)	*P* value	n	% (95% CI)	n	% (95% CI)	*P* value
yes	2290	85.2 (83.9–86.5)	576	74.7 (71.6–77.8)	0.51 <0.05	1515	83.0 (81.3–84.7)	480	75.1 (71.7–78.4)	0.62 <0.05
no	178	6.6 (5.7–7.5)	90	11.7 (9.4–14.0)	1.88 <0.05	135	7.4 (6.2–8.6)	73	11.4 (8.9–13.9)	1.61 <0.05
I haven't decided	221	8.2 (7.2–9.2)	105	13.6 (11.2–16.0)	1.76 <0.05	175	9.6 (8.2–10.9)	86	13.5 (10.8–16.1)	1.47 >0.05

Abbreviations: see TABLE 1

DISCUSSION The prevalence of tobacco smoking and its intensity vary in the world according to the development phase of the tobacco epidemic in a given region.[17-22] The countries characterized by the highest prevalence of tobacco smoking among men also included the countries of Central and East Asia as well as of central and eastern Europe (above 50%). Inhabitants of Africa, North and South America, and northern, western, and southern Europe smoked much less (10%–20%).[7] The prevalence of tobacco smoking among men in Europe in such countries as Russia, Ukraine, Latvia, Bulgaria, and Greece was 50% or higher, while the lowest prevalence was observed among men in Sweden and England (below 20%). Women in Poland, Russia, Bulgaria, and Greece smoked most often (above 30%). The lowest number of smoking women was observed in Sweden, Romania, and Lithuania (below 20%).[18,19]

The differences in the prevalence of tobacco smoking between countries and between men and women within individual countries can be conditioned by culture, customs, the types of commonly used products containing nicotine, but also by the range and effectiveness of implemented tobacco consumption control policies. In most European countries, as in Poland, men are more frequent smokers. The differences between the proportions of smoking men and women are minor in the countries of northern and western Europe, whereas they are larger in central and eastern Europe.

Poland belongs to a group of countries with a high prevalence of smoking, both among men and women.[23] In the POLSCREEN (2002–2005) study,[24] among the population of people aged 35 years or older reporting to a doctor, the prevalence of smoking compared to the WOBASZ study was lower—27.3% for men and 14.3% for women. Similarly, a lower percentage of smoking women (16.7%) was recorded in the "Taking care of heart" study.[25] In contrast, the NATPOL 2011 survey, which included a population of similar age to that in WOBASZ (18–79 years), indicated a comparable number of smoking men (31.5%) and more female smokers (27.5%) than WOBASZ.[26] Comparable results were also obtained in the Polish part of the Global Adult Tobacco Survey (GATS) study conducted from 2009 to 2010, which covered a population aged 15 years or older, where

TABLE 7 Declaration of the reason to stop smoking (% of smokers) in WOBASZ II vs WOBASZ studies

Reason to stop smoking	Men					Women				
	WOBASZ		WOBASZ II		OR	WOBASZ		WOBASZ II		OR
	n	% (95% CI)	n	% (95% CI)	*P* value	n	% (95% CI)	n	% (95% CI)	*P* value
current complaints	122	6.4 (5.3–7.5)	49	8.5 (6.2–10.8)	1.36 >0.05	69	5.5 (4.2–6.8)	33	6.9 (4.6–9.2)	1.27 >0.05
fear of illness	812	42.4 (40.2–44.6)	216	37.5 (33.5–41.5)	0.82 >0.05	531	42.1 (39.4–44.8)	207	43.1 (38.7–47.5)	1.04 >0.05
medical recommendations	64	3.3 (2.5–4.1)	19	3.3 (1.8–4.8)	1.00 >0.05	39	3.1 (2.1–4.1)	16	3.3 (1.7–4.9)	1.07 >0.05
friends' insistence	5	0.3 (0.1–0.5)	0	0	–	4	0.3 (0–0.6)	0	0	–
family's wish	96	5.0 (4.0–6.0)	51	8.9 (6.6–11.2)	1.86 <0.05	75	6.0 (4.7–7.3)	23	4.8 (2.9–6.7)	0.79 >0.05
financial aspects	443	23.1 (21.2–25.0)	145	25.2 (21.7–28.7)	1.12 >0.05	301	23.9 (21.5–26.3)	116	24.2 (20.4–28.0)	1.02 >0.05
firm resolution	315	16.4 (14.7–18.1)	76	13.2 (10.4–16.0)	0.78 >0.05	196	15.6 (13.6–17.6)	71	14.8 (11.6–18.0)	0.94 >0.05
other	59	3.1 (2.3–3.9)	20	3.5 (2.0–5.0)	1.13 >0.05	45	3.6 (2.6–4.6)	14	2.9 (1.4–4.4)	0.80 >0.05

Abbreviations: see **TABLE 1**

smoking men constituted 37.3% and smoking women—28.2%.[27]

The WOBASZ study showed a decrease in the prevalence of smoking both for men and women, but the decrease was much steeper among men than among women. According to the NATPOL study,[26] in the period from 2001 to 2011 a similar decrease in the prevalence of smoking was found—by 12% for men and 3% for women.

In the majority of the world's most advanced economies, the number of smokers is on the decrease.[7] According to the WHO,[28] in the period from 2000 to 2010 the prevalence of smoking among men and women decreased in 125 countries (72%) and 156 countries (88%), respectively. If such trends persist, in 2025 there will be an estimated 1.1 billion smokers in the world. According to the WOBASZ II study, in Poland smoking mostly concerns the middle-aged population. Similar results were obtained in the NATPOL 2011 study[26] as well as in other Polish studies.[14,29]

In the GATS study conducted in Poland in the years from 2009 to 2010,[27] most men and women smoked in the age group between 30 and 39 years (above 30%). Similarly, the survey showed the lowest prevalence of smoking among people below 20 years of age. At the same time, the high prevalence of tobacco smoking among women of childbearing age, in the age group between 20 and 40 years, is alarming. Therefore, the high proportion of smokers in this group can also significantly influence the health of future generations.

The world populations are characterized by significant differences in tobacco smoking intensity measured by the number of cigarettes smoked per smoker. Greece, Ireland, Italy, France, Switzerland, and countries of eastern Europe, including Russia, are the European countries with high consumption of cigarettes, where people smoke above 20 cigarettes a day. People in Sweden, Estonia, and the Netherlands smoked the lowest amount of cigarettes (below 20 a day).[19,21,30] The POLSCREEN study[24] reported an average of 16 cigarettes smoked daily by men and 13 by women, which is consistent with the results of the WOBASZ II survey. Similar values were obtained in other Polish studies.[14,29,31] Interesting findings included the relationship between the number of smoked cigarettes and age, as well as a decrease in cigarette consumption over the period of 10 years.

Beginner smokers usually smoke a small number of cigarettes daily, increasing this number with the duration of the habit and their increasing addiction to nicotine, whereas people of older age (around 60 years) favor reduction and cessation of smoking, which is consistent with findings from other studies.[32,33] The most common interpretation of this relationship is that with age the health of participants worsens and the incidence of symptoms (including symptoms of tobacco-related diseases) increases, which may encourage smokers to reduce their tobacco consumption.[33,34] The reduction in the number of cigarettes smoked by men observed in the older age groups in the WOBASZ and WOBASZ II studies is promising, but we cannot exclude that it is partly associated with the rapidly growing interest in and prevalence of e-cigarettes available on the Polish market since 2008.[35-37] This may reduce the number of traditional cigarettes smoked. According to the study on the use of e-cigarettes from 27 European countries among

the population of 15 years of age and older, e-cigarettes are used by 20.3% (in Poland 31%) of smokers, most often among the young (15–24 years). So far only several studies on e-cigarette use in Poland have been conducted. Mostly, those are studies related to the youth. In Poland, over the last few years, a nearly 5-fold increase in the frequency of e-cigarette use was observed among teens, mostly among boys. It is not absolutely certain, but young people seem to be more willing to use e-cigarettes than traditional cigarettes.[35-37]

The current prevalence of tobacco smoking and the state of the tobacco epidemic in the population is a result of different processes such as initiation, continuation, and quitting tobacco smoking. The average age of smoking initiation depends on the country, income, education, or age of the respondents.[38] Smokers from Spain, Denmark, Portugal, and England reach for cigarettes at the youngest age (before 17 years old), while smokers from Greece, Estonia, and Lithuania begin to smoke at the oldest age (19 years old).[30]

In Poland, in the GATS study, the average age of initiation of regular smoking was 18.4 (SD, 3.6) years for men and 20.0 (SD, 4.7) years for women (P <0.01).[39] In 2010 in other countries, the average age of smoking initiation among women was 17.1 years in Sweden, 17.9 years in Ireland, 18.1 years in France, 18.6 years in Italy, and 19.6 years in the Czech Republic. Sweden had the highest percentage of women who started smoking at a very young age, 29.3% declared starting smoking between 14 and 15 years of age and 12.0% started smoking before the age of 14. The Czech Republic was characterized by the lowest percentage of early smoking initiation—13.7% of the respondents started smoking at the age between 14 and 15 years and 1.4% started smoking at the age of less than 14 years old. The highest percentage of women declared starting smoking between 16 and 17 years of age in all countries but Sweden. According to the GATS study,[19] women also began smoking at a later age than men. Men become smokers when they are younger than 17 in Ukraine and England, and when they are older than 20 in China, India, and Vietnam. Women start smoking when they are younger than 17 in England, and when they are more than 20 in most of other countries. The differences in respondents' age of smoking initiation in various countries may reflect the phases of the tobacco smoking epidemic in individual countries and the differences in the tobacco control measures.

According to the WOBASZ II study, most of the respondents began smoking at around 20. Women started smoking later than men, and, importantly, the age of regular smoking initiation in both groups has increased. However, the lack of change in the percentage of women who never smoke is worth noting.[40] The emancipation of women and their higher earnings, thus increased purchasing power with regard to goods, including tobacco products, might have had an impact on smoking patterns among women.[41] Moreover, it could be also due to easy access to tobacco products, low prices, advertising, and promotion, which constitute the front line action of the tobacco industry to maintain and increase the number of their customers.[42,43] Aggressive marketing may also be responsible for the increase in the percentage of women declaring the "for pleasure" category as the reason for smoking. It could also be a reason for the lack of interest in quitting tobacco smoking. It is difficult to unambiguously answer the question why women did not change their health behavior. Increasing addiction of smokers (**TABLE 6**) and the minor proportion of doctor's orders among the reasons for quitting smoking are attributable to low efficacy of educational activities and insufficient involvement of medical professionals in the diagnostic and therapeutic process. As emphasized by Zhu et al,[44] the so called "minimal intervention"—doctors recommending their patients to quit smoking at any visit—is the easiest approach that may significantly increase the rates of smoking cessation. This intervention is crucial for public health and it is important to maximize its effectiveness by offering professional help in quitting smoking (for example, medicines or behavioral support), which in turn increases the percentage of successful attempts to quit smoking.[45,46] The scope of assistance in smoking cessation and in the maintenance of tobacco abstinence must be expanded to increase the percentage of nonsmoking people in Poland.

The results of the WOBASZ and WOBASZ II studies also demonstrated a limited efficiency of fiscal policy and price control in reducing tobacco use. The financial aspects were indicated by about 25% of smokers as the reason for quitting smoking, but this percentage showed no change in 10 years. Surprisingly, no change occurred despite the fact that an increased excise tax on tobacco products leading to their higher prices is considered to be one of the most effective tools used to limit the spread and use of tobacco products.[47] In response to growth in taxation, new cheap brands of cigarettes were created. Moreover, recent years have been characterized by an increase in the sales of other types of tobacco. In addition, in the past decade, despite the rise in prices, the availability of cigarettes in Poland increased due to the upward trend of household income.[48]

Other implemented measures designed to limit the tobacco epidemic in Poland also face a number of difficulties. Firstly, cigarette smoking is firmly anchored in popular culture as well as in moral standards. Smoking is often closely related to the conditions of spending free time as well as to selected professions. Secondly, contrary to the general belief, the population lacks sufficient knowledge on the topic of health consequences of tobacco use.[49] Moreover, doctors have inadequate training to provide counseling and treat addiction related to tobacco smoking. They lack the time, and the procedures are not

well evaluated in terms of the cost and are underfinanced. Also teachers are not regularly trained in the direction of conducting tobacco control education. Other difficulties include the intensive advertising and promotion carried out by tobacco companies, as well as early tobacco initiation and high social tolerance for tobacco smoking among youth.

Regulations related to the control of tobacco product use represent an important element of the strategy to reduce the health and the socio-economic consequences of tobacco smoking. However, good legislation in health care will not suffice to improve the health situation in the country unless it causes changes in the social behavior of the citizens. It must be stressed that such actions should be supported by information and educational campaigns.

In conclusion, the current knowledge on cigarette smoking and the results presented in this paper should support the antitobacco strategy. The prevalence of tobacco smoking in Poland, despite its downward trend, is still high. Significant smoking differentiation was observed depending on age. Most smokers were middle-aged people. During the follow-up, the number of cigarettes smoked daily per smoker decreased. The rising tendency to quit smoking among men and women is favorable, but the follow-up showed a downward trend. The later start of smoking is also favorable. The current activities in the field of tobacco use control in Poland need strengthening in a few areas, including tobacco use monitoring, support in tobacco cessation, fiscal policy, as well as education and alerting the citizens to the hazards associated with the smoking habit.[50]

Acknowledgments The authors express special thanks to the whole research team and collaborating persons from the field centers in 16 provinces and to all participants of the WOBASZ and WOBASZ II studies.

The WOBASZ II project was financed from the financial resources at the disposal of the Minister of Health within the framework of the health program entitled: National Program of Equalization the Accessibility to Cardiovascular Disease Prevention and Treatment for 2010–2012 POLKARD – goal: Analyses and epidemiology – "Monitoring of the epidemiological situation in Poland in the field of cardiovascular diseases".

Contribution statement MP conceived the idea for the study. MP and DK contributed to the interpretation of the data, co-drafted the manuscript, and intellectually contributed to the development of the final manuscript. AP, RT-M, and TZ critically revised the manuscript. WP contributed to data analysis and interpretation. All authors edited and approved the final version of the manuscript.

REFERENCES

1 U.S. Department of Health and Human Services. How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-Attributable Disease: A Report of the Surgeon General. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2010.

2 U.S. Department of Health and Human Services. The Health Consequences of Smoking: 50 Years of Progress. A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014.

3 ITC Project, World Health Organization, World Heart Federation. Cardiovascular harms from tobacco use and secondhand smoke: Global gaps in awareness and implications for action. Waterloo, Ontario, Canada and Geneva, Switzerland, 2012.

4 World Health Organization. WHO global report: mortality attributable to tobacco. Geneva, World Health Organization, 2012.

5 Hart RG, Kuan HNg. Stroke prevention in asymptomatic carotid artery disease: revascularization of carotid stenosis is not the solution. Pol Arch Med Wewn. 2015; 125: 363-369.

6 Maciosek MV, Xu X, Butani AL, et al. Smoking-atribute medical expenditures by age, sex, and smoking status estimated using a relative risk approach. Prev Med. 2015; 77: 162-167.

7 Eriksen M, Mackay J, Schluger NW, et al. The Tobacco Atlas (5th edititon). Atlanta, Georgia, USA: American Cancer Society; 2015.

8 World Health Organization. WHO global report on trends in prevalence of tobacco smoking 2015. Geneva: World Health Organization, 2015.

9 World Health Organization. The current status of the tobacco epidemic in Poland. Copenhagen: World Health Organization, 2009.

10 Oberg M, Jaakkola MS, Woodward A, et al. Worldwide burden of disease from exposure to second-hand smoke: a retrospective analysis of data from 192 countries. Lancet. 2011; 377: 139-146.

11 Niewada M, Filipiak K. [An Analysis of Health Costs: The economic consequences of nicotine addiction]. Pol Przegl Kardiol. 2000; 2: 367-371. Polish.

12 Rywik S, Kupść W, Piotrowski W, et al. Multi-center All Polish Health Survey- WOBASZ Project Methodological Assumption and logistics: Polish Population Review. 2005; 27: 37-50.

13 Drygas W, Niklas AA, Piwońska A, et al. Multi-center National Population Heath Examination Survey (WOBASZ II study): assumptions, methods and implementation. Kardiol Pol. 2016; 74: 681-690.

14 Kaleta D, Makowiec- Dąbrowska T, Dziankowska-Zahorszczyk E, et al. Prevalence and sociodemographic correlates of daily cigarette smoking in Poland: results from the Global Adult Tobacco Survey (2009-2010). IJOMEH. 2012; 25: 12.

15 Connor Gorber S, Schofield-Hurwitz S, Hardt J, et al. The accuracy of self-reported smoking: a systematic review of the relationship between self-reported and cotinine-assessed smoking status. Nicotine Tob Res. 2009; 1: 12-24.

16 Wong SL, Shields M, Leatherdale S, et al. Assessment of validity of self-reported smoking status. Methodological insights. Health Rep. 2012; 23: 47-53.

17 Thun M, Peto R, Boreham J, et al. Stages of the cigarette epidemic on entering its second century. Tob Control. 2012; 21: 96-101.

18 Zatoński W, Przewoźniak K, Sułkowska U, et al. Tobacco smoking in countries of the European Union. Ann Agic Environ Med. 2012; 19: 181-192.

19 Giovino GA, Mirza SA, Sarnet JM, et al. Tobacco use in billion individuals from 16 countries: an analysis of nationally representative cross-sectional household surveys. Lancet. 2012; 380: 668-679.

20 Sreeramareddy CT, Pradhan PMS. Prevalence and social determinants of smoking in 15 countries from North Africa, Central and Western Asia, Latin America and Caribbean: secondary data analyses of demographic and health surveys. PLoS One. 2015; 10: e0130104.

21 Ng M, Freeman MK, Fleming TD, et al. Smoking prevalence and cigarette consumption in 187 countries, 1980–2012. JAMA. 2014; 311: 183-192.

22 White V, Hill D, Siahpush M, et al. How has the prevalence of cigarette smoking changed among Australian adults? Trends in smoking prevalence between 1980 and 2001. Tob Control. 2003; 12: SII67-SII74.

23 Polakowska M, Piotrowski W, Tykarski A, et al. Tobacco smoking In Polish population. Results from the WOBASZ Project. Pol Popul Rev. 2005; 27: 64-69.

24 Podolec P, Kopeć G. [The prevalence of tobacco smoking among adult Poles- results of the POLSCREEN study. In: Cieśliński A, Pająk A, Podolec P, Rynkiewicz A. eds. Nationwide Program of the Coronary Artery Disease Prevention POLSCREEN]. Poznań, Poland; Termedia; 2006: 69-79. Polish.

25 Fijałkowska A, Maciejeski T, Stępińska J e al. [Report from project Taking care of heart]. Institute of Mother and Child. 2015: 18-19. Polish.

26 Kopeć G, Jankowski P, Pająk A, et al. [Epidemiology and prevention of cardiovascular diseases]. Kraków, Poland: Medycyna Praktyczna; 2015. Polish.

27 Kaleta D, Korytkowski P, Makowiec-Dąbrowska T. [Cigarette smoking among economically active population]. Med Pr. 2013; 64: 359-371. Polish.

28 Bilano V, Gilmour S, Moffiet T, et al. Global trends and projections for tobacco use, 1990-2025: an analysis of smoking indicators from the WHO Comprehensive Information Systems for Tobacco Control. Lancet. 2015; 385: 966-976.

29 Jóźwiak P, Wierzejska E, Szmagaj A, et al. [Risk factors for smoking in persons over 45]. Przegl Lek. 2014; 71: 609-615. Polish.

30 Attitudes of Europeans Towards Tobacco and Electronic Cigarettes. Report. Special Eurobarometer. 2015: 10-80.

31 Czapiński J, Panek T. [Social diagnosis 2013,conditions and quality of life of Poles. Report]. Warszawa: Rada Monitoringu Społecznego; 2013: 208-209, 238-241. Polish.

32 Fernández E, Carné J, Schiaffino A, et al. Determinants of quitting smoking in Catalonia, Spain. Gac Sanit. 1999; 13: 353-360.

33 Hyland A, Borland R, Li Q, et al. Individual-level predictors of cessation behaviours among participants in the International Tobacco Control (ITC) Four Country Survey. Tob Control. 2006; 15: iii83-iii94.

34 Augustson EM, Wanke KL, Rogers S, et al. Predictors of sustained smoking cessation: a prospective analysis of chronic smokers from the alpha-tocopherol Beta-carotene cancer prevention study. Am J Public Health. 2008; 98: 549-555.

35 Vardavas CI, Filippidis FT, Agaku IT. Determinants and prevalence of e-cigarette use throughout the European Union: a secondary analysis of 26 566 youth and adults from 27 countries. Tob Control. 2015; 4: 442-448.

36 Goniewicz ML, Gawron M, Nadolska J, et al. Rise in electronic cigarette use among adolescents in Poland. J Adolesc Health. 2014; 55: 713-715.

37 Kaleta D, Wojtysiak P, Polańska K. Use of electronic cigarettes among secondary and high school students from a socially disadvantaged rural area inPoland. BMC Public Health. 2016; 16: 703-713.

38 Giovino GA, Biener L, Hartman AM, et al. Monitoring the tobacco use epidemic I. Overview: optimizing measurement to facilitate change. Prev Med. 2009; 48: 4-10.

39 Global adult tobacco survey (GATS) Poland 2009–2010. Ministry of Health, Poland 2010.

40 Fronczak A, Polańska K, Makowiec-Dąbrowska T, et al. [Smoking among women-strategies for fighting the tobacco epidemic]. Przegl Lek. 2012; 69: 1103-1107. Polish.

41 Haglund M. Women and tobacco: a fatal attraction. Bull World Health Organ. 2010, 88: 563.

42 World Health Organization. WHO Report on the Global tobacco Epidemic, 2013. Enforcing Bans on Tobacco Advertising, Promotion and Sponsorship. 2013, Geneva, WHO.

43 Kaleta D, Usidame B, Szosland-Fałtyn A, et al. Use of flavoured cigarettes in Poland: data from the global adult tobacco survey (2009–2010). BMC Public Health. 2014; 6: 127.

44 Zhu SH, Lee M, Zhuang YL, et al. Interventions to increase smoking cessation at the population level: How much progress has been made in the last two decades? Tob Control. 2012; 21: 110-118.

45 Hamilton F, Greaves F, Majeed A, et al. Effectiveness of providing financial incentives to healthcare professionals for smoking cessation activities: systematic review. Tob Control. 2013; 22: 3-8.

46 Perkins KA, Scott J. Sex differences in long-term smoking cessation rates due to nicotine patch. Nicotine Tob Res. 2008; 10: 1245-1250.

47 World Health Organization. WHO Report on Global Tobacco Epidemic, 2015: Raising taxes on tobacco. World Health Organization, Geneva 2015.

48 Ciecierski CC, Cherukupalli R, Weresa MA. The Economics of Tobacco and Tobacco Taxation in Poland. Paris: International Union Against Tuberculosis and Lung Disease, 2011.

49 Gupta B, Kumar N. A cross-country comparison of knowledge, attitudes and practices about tobacco use: findings from the global adult tobacco survey. Asian Pac J Cancer Prev. 2014;15: 5035-5042.

50 Kawecka-Jaszcz K, Jankowski P, Podolec P, et al. [Guidlines by Polish Forum for Prevention for Tobacco Smoking]. In: Podolec P, ed. Manual of Polish Forum for Prevention. Kraków, Poland: Medycyna Praktyczna; 2010: 153-196. Polish.