

Changes in smoking prevalence and exposure to environmental tobacco smoke among adults in Łódź, Poland

Adam Fronczak¹, Kinga Polańska², Elżbieta Dziańkowska-Zaborszczyk³,
Leokadia Bąk-Romaniszyn⁴, Przemysław Korytkowski⁵, Andrzej Wojtyła^{6,7}, Dorota Kaleta³

¹ Department of Biopharmacy, Medical University, Łódź, Poland

² Department of Environmental Epidemiology, Nofer Institute of Occupational Medicine, Łódź, Poland

³ Department of Preventive Medicine, Medical University, Łódź, Poland

⁴ Department of Nutrition in Digestive Tract Diseases, Medical University, Łódź, Poland

⁵ Faculty of Computer Science and Information Technology, West Pomeranian University of Technology, Szczecin, Poland

⁶ Department of Mother and Child Health, University of Medical Sciences, Poznań, Poland

⁷ Department of Hygiene, Chair of Social Medicine, University of Medical Sciences, Poznań, Poland

Fronczak A, Polańska K, Dziańkowska-Zaborszczyk E, Bąk-Romaniszyn L, Korytkowski P, Wojtyła A, Kaleta D. Changes in smoking prevalence and exposure to environmental tobacco smoke among adults in Łódź, Poland. *Ann Agric Environ Med.* 2012; 19(4): 754-761.

Abstract

Comprehensive monitoring informs the stakeholders about the level of tobacco epidemic and helps to allocate tobacco control resources where they are most needed and will be most effective. The aim of the paper was to evaluate the prevalence of daily cigarette smoking and environmental tobacco smoke (ETS) exposure among adult citizens of Łódź area in Poland between year 2001 and 2010 by selected characteristics.

Material and methods. For the purpose of the presented analysis, data were used from 3 cross-sectional studies on randomly-selected 3,874 adults from the Łódź area, conducted in 2001, 2005 and 2010. Changes in the rates between the surveys were assessed by odds ratio.

Results. Smoking prevalence remained stable but high between 2001-2010. There was an inverse relationship between smoking prevalence and educational level for both genders (p for trend ≤ 0.01) in each survey. For men in all surveys, the prevalence of current daily tobacco smoking decreased with increased income (p for trend ≤ 0.01), and also for women in the 2009-2010 survey (p for trend = 0.03). The statistically significant changes for the comparison of 2001 and 2005 surveys were observed for exposure to ETS ($p < 0.001$). Percentages of men and women who declared exposure to environmental tobacco smoke at least one hour per day decreased significantly. Furthermore, the proportion of people who declared exposure to ETS decreased with the increasing age of participants (p for trend ≤ 0.005), level of education for men in both surveys, and for women in the 2001 survey (p for trend ≤ 0.003), and income for both men and women in the 2001 survey (p for trend < 0.001).

Conclusion. Established, long-term tobacco surveillance systems of smoking and ETS exposure, based on nationally and locally representative samples, are necessary in Poland.

Key words

smoking, environmental tobacco smoke, adults

INTRODUCTION

Regardless of the well-documented health consequences of active and passive smoking, and global or local anti-smoking activities, tobacco is still the single most preventable cause of death in the world today [1, 2, 3, 4, 5, 6]. Tobacco continues to kill nearly 6 million people each year, including more than 600,000 non-smokers who die from exposure to tobacco smoke. Based on epidemiological data, a third to half of the world's 1 billion smokers die of a tobacco-related disease [7, 8].

For many years in Poland, the nicotine dependence epidemic kills thousands of people of productive age every year, and permanently disables or hampers the early

development of a much larger number of individuals [7, 9, 10, 11]. The treatment of tobacco-related diseases accounts for a substantial proportion of expenditure on health. Nine to ten million regular tobacco-smokers define the footprint of the problem, while the powerful social, traditional and economic factors that determine its persistence also underpin its complexity. For an effective anti-smoking intervention, accurate monitoring of tobacco use, and exposure to environmental tobacco smoke (ETS) is one of the most important and urgent tasks and also one of the hardest to implement because of the complexity of the issue. Monitoring programmes need to provide information on the tobacco epidemic. These include surveys on the prevalence of tobacco use and consumption level, and also the exposure to ETS by age group, gender, income and other socio-demographic characteristics, both nationally and by regions. Comprehensive monitoring informs the stakeholders and the civil society about the level of the tobacco epidemic in a specific country or region, and helps to allocate tobacco

Address for correspondence: Adam Fronczak, Department of Biopharmacy, Medical University, Muszyńskiego 1, 90-151 Łódź, Poland.
E-mail: adamum@op.pl

Received: 2 August 2012; accepted: 5 November 2012

control resources where they are mostly needed and will be most effective. Additionally, monitoring shows whether policies are working and how they should be tailored to the needs of different countries and different groups of countries.

The aim of the presented study was to evaluate the prevalence of daily cigarette smoking and environmental tobacco smoke (ETS) exposure among adult citizens of the area of Łódź between the years 2001-2010 by selected socio-demographic characteristics.

MATERIALS AND METHODS

Study design and population. For the purpose of current analysis we utilized data from three cross-sectional studies on randomly selected 3,874 adults from Łódź area. Data on 2,701 respondents from a study on health, chronic disease risk factors and health behaviors including prevalence of current daily cigarette smoking and environmental tobacco smoke (ETS) exposure of inhabitants of Łódź, were collected between the years 2001-2005 by the Department of Social and Preventive Medicine at the Medical University in Łódź. In both studies, the sampling and the overall methodological approach used in the study design and completion were comparable. Both surveys used similar questions. Due to lack of continuation of the study on health, chronic disease risk factors and health behaviours, data on 1,173 respondents from the Łódź area derived from the Global Adult Tobacco Survey (GLATS), 2009-2010, were also included in analysis.

In 2001, the study sample was randomly selected, based on health insurance registration, among adult residents of Łódź who were aged 18 years and over. Methods were standardized according to the World Health Organization (WHO) guidance for Countrywide Integrated Noncommunicable Diseases Intervention (CINDI) Programme [12]. A total of 4,000 personal invitations were sent by post [13]. Repeated invitations were mailed to non-respondents. The participation rate was 65%. The data were collected by means of a common core questionnaire administered by interviews, followed by a doctor's visit [14]. Finally, 1,708 records of 942 male and 766 female respondents were focused on. Further investigation was developed and implemented by the same research team, based on the procedure described above.

The next study was completed in 2005. Similar to the 2001 investigation, the procedures were carried out by trained interviewers and nurses in selected out-patient clinics, and consisted of the following parts: a comprehensive questionnaire interview as well as physical examination. The mean participation rate for 2005 survey was 64% in men and 69% in women. Analysis was performed in 993 adults: 478 men and 515 women. Finally, data was utilized from the Global Adult Tobacco Survey (GATS), implemented in Poland between November 2009 – March 2010 [16]. GATS is a representative, national survey of households [16]. The GATS Poland sample design provides cross-sectional estimates for the country as a whole, as well as estimates by the degree of urbanization and gender [17]. The sample selection was based on data obtained from the Central Statistical Office. Questionnaires were administered at respondents' homes during face-to-face interviews [18]. The total survey response rate was 65.1%. Data was focused on from 1,173 subjects: 588 men and 585 women from the central region of Poland that also covers the Łódź area.

Questionnaire. In the 2001 and 2005 surveys, all the questions were multiple choice (no open questions). Questionnaire data were coded and entered into the same file with the sample data. The questionnaire included the following groups of information: personal data, family status, education, income, employment; frequency of doctor's visits; medical history on chronic diseases diagnosed by a specialist in the last 12 months prior to the survey. Additionally, the detailed information about lifestyle and habits, including active and passive smoking were collected. The GATS questionnaire consisted of household and individual questions and allowed the collection of a broad range of data on tobacco consumption and related issues [16, 17]. The household questionnaire covered questions concerning all adult residents in order to randomly select an eligible respondent to complete the individual questionnaire. The individual questionnaire consisted of 9 sections, including background characteristics of respondents, information about tobacco smoking, smokeless tobacco use, cessation, secondhand smoke and other important aspects related to tobacco use. In the analysis of daily tobacco smoke change, similar questions allowing for direct comparisons were used. Due to substantial differences in ETS measurement in GATS, data from 2001-2005 allowed for an accurate assessment.

Variables. Outcome measures were the prevalence of current daily cigarette smoking in 2001, 2005 and 2010, and exposure to tobacco smoke in public and private indoor areas between 2001-2005. The smoking status and ETS exposure was determined based on the questionnaire data. The subjects were classified as never-smoker, former and current smoker, including daily and occasionally smoking. A daily smoker was defined as a person who smokes regularly, at least 1 cigarette a day; an occasional smoker was considered a person who smokes less than 1 cigarette per day; a former smoker was a person who used to smoke, but quit and does not smoke presently; and a never-smoker was a person who had never smoked. Information on exposure to tobacco smoke in public and private indoor areas was obtained based on the question 'How many hours a day do you stay in indoor premises where someone smokes tobacco?' Level of ETS exposure was analyzed in 4 categories as follows: do not dwell in such areas (0 hours per day), less than 1 hour per day, 1-5 hours per day, more than 5 hours per day.

Respondents were categorized into 5 age groups: 18-24, 25-34, 35-44, 45-54, 55-64 years old. The respondents were also divided into 3 categories according to their highest education attainment: primary and vocational, secondary, or higher education. The measure of economic activity classified subjects as: currently with a permanent job – employed, currently with no permanent job – unemployed, and pupils, students, persons occupied with housekeeping, retired, pensioners due to disability – economically non-active. Data on monthly household net income *per capita* in Polish currency – zloty (PLN), were also taken into consideration. Level of income was categorized as a low when the income was under 1,000 PLN *per capita* per month, medium from 1,000-1,500 PLN and high when it exceeded 1,500 PLN *per capita* per month.

Statistical analysis. Data were analyzed separately for men and women. Changes in the rates between the surveys were assessed by odds ratio. Logistic regression analysis

was performed and the χ^2 test for p for trend calculation. All p values were two-sided and $p < 0.05$ was set as the level of statistical significance. Statistical analysis was carried out with the use of the STATISTICA 9.0 and PQSTAT package.

RESULTS

Socio-demographic characteristics of the study population. Table 1 shows socio-demographic characteristics of the population included in the 2001 and 2005 surveys, separately for men and women. Within each gender, there were no major differences between the surveys regarding the age of participants. In the 2005 survey, there were more men and women with primary/vocational educational level, compared to the survey conducted in 2001 (for men 61% vs. 43%, for women 40% vs. 30%; $p < 0.05$). Additionally, there were fewer men and women who indicated employment (for men 51% vs. 60%, for women 44% vs. 57%, $p < 0.05$), and more men in the lower income category (50% vs. 39%, $p < 0.05$) in 2005, compared to the 2001 survey. In the 2005 study, more men and women indicated that they were not exposed to ETS, compared to such a declaration noted in the 2001 survey (for men 83% vs. 35% for women 78% vs. 47%; $p < 0.05$). Table 2

shows socio-demographic characteristics of respondents in 2009/2010 survey.

Prevalence of current daily smoking. Prevalence of current daily smoking among men and women between 2001-2005 is presented in Table 3. Table 2 shows data on daily smoking in the 2009-2010 survey. The overall prevalence between 2001 and 2010 remains stable and high. In 2001-2005, the prevalence of smoking declined only in women with primary/vocational education (from 32% in 2001 to 23% in 2005, $p < 0.05$). For other variables in the surveyed period, including 2010, there were no statistically significant changes. There was an inverse relationship between smoking prevalence and educational level for both genders in the 2001 and 2009-2010 surveys, and for men in the 2005 survey (p for trend ≤ 0.01). In addition, in all surveys, the prevalence of current daily tobacco smoking decreased with increasing income for men (p for trend ≤ 0.01), and for women in the 2009-2010 survey (p for trend = 0.03).

Prevalence of exposure to environmental tobacco smoke. The percentages of men and women who declared exposure to environmental tobacco smoke for at least one hour per day decreased significantly in 2005, compared to 2001 (for

Table 1. Characteristics of respondents in the first and second surveys (2001-2005)

Variable	Men		Women	
	2001 survey N=942	2005 survey N=478	2001 survey N=766	2005 survey N=515
	N (%) (95%CI)	N (%) (95%CI)	N (%) (95%CI)	N (%) (95%CI)
Age (years)				
18-24	165 (17.5) (15.1-19.9)	59 (12.3) (9.4-15.2)	140 (18.3) (15.6-21.0)	70 (13.6) (10.6-16.6)
25-34	152 (16.1) (13.8-18.4)	99 (20.7) (17.1-24.3)	147 (19.2) (16.4-22.0)	124 (24.1) (20.4-27.8)
35-44	173 (18.4) (15.9-20.9)	105 (22.0) (18.3-25.7)	166 (21.7) (18.8-24.6)	97 (18.8) (15.4-22.2)
45-54	231 (24.5) (21.8-27.2)	130 (27.2) (23.2-31.2)	159 (20.8) (17.9-23.7)	138 (26.8) (23.0-30.6)
55-64	221 (23.5) (20.8-26.2)	85 (17.8) (14.4-21.2)	154 (20.1) (17.3-22.9)	86 (16.7) (13.5-19.9)
Education				
Primary / Vocational	403 (42.8) (39.6-46.0)	293 (61.3) (56.9-65.7) ^a	226 (29.5) (26.3-32.7)	204 (39.6) (35.4-43.8) ^a
Secondary	411 (43.6) (40.4-46.8)	132 (27.6) (23.6-31.6) ^a	407 (53.1) (49.6-56.6)	241 (46.8) (42.5-51.1)
High	128 (13.6) (11.4-15.8)	53 (11.1) (8.3-13.9)	133 (17.4) (14.7-20.1)	70 (13.6) (10.6-16.6)
Employment				
Employed	563 (59.8) (56.7-62.9)	243 (50.8) (46.3-55.3) ^a	438 (57.2) (53.7-60.7)	225 (43.7) (39.4-48.0) ^a
Unemployed	153 (16.2) (13.8-18.6)	71 (14.9) (11.7-18.1)	105 (13.7) (11.3-16.1)	81 (15.7) (12.6-18.8)
Economically not active	226 (24.0) (21.3-26.7)	164 (34.3) (30.0-38.6) ^a	223 (29.1) (25.9-32.3)	209 (40.6) (36.6-44.8) ^a
Income				
low	361 (38.8) (35.2-41.4)	238 (49.8) (45.3-54.3) ^a	341 (44.5) (41.0-48.0)	261 (50.7) (46.4-55.0)
medium	440 (46.7) (43.5-49.9)	143 (29.9) (25.8-34.0) ^a	329 (43.0) (39.5-46.5)	183 (35.5) (31.4-39.6)
high	141 (15.0) (12.7-17.3)	97 (20.3) (16.7-23.9)	96 (12.5) (10.2-14.8)	71 (13.8) (10.8-16.8)
Smoking status				
Never smokers	370 (39.3) (36.2-42.4)	146 (30.5) (26.4-34.6) ^a	440 (57.4) (53.9-60.9)	289 (56.1) (51.85-60.4)
Former smokers	147 (15.6) (13.3-17.9)	114 (23.8) (20.0-27.6) ^a	106 (13.8) (11.4-16.2)	94 (18.3) (15.0-21.6)
Current occasional smokers	56 (5.9) (4.4-7.4)	14 (2.9) (1.4-4.4)	43 (5.6) (4.0-7.2)	22 (4.3) (2.5-6.1)
Current daily smokers	369 (39.1) (36.0-42.2)	204 (42.6) (38.2-47.0)	177 (23.2) (20.2-26.2)	110 (21.3) (17.8-24.8)
Interest in quitting smoking				
Yes	322 (87.3) (83.9-90.7)	166 (81.4) (76.1-86.7)	144 (81.4) (75.7-87.1)	89 (80.9) (73.6-88.2)
No	11 (3.0) (1.3-4.7)	11 (5.4) (2.3-8.5)	11 (6.2) (2.6-9.8)	11 (10.0) (4.4-15.6)
I do not know	36 (9.8) (6.8-12.8)	27 (13.2) (8.6-17.8)	22 (12.4) (7.5-12.3)	10 (9.1) (3.7-14.5)
Quitting attempts				
Yes	307 (83.2) (79.2-87.0)	154 (75.5) (69.6-81.4)	132 (74.6) (68.2-81.0)	86 (78.2) (70.5-85.9)
No	62 (16.8) (13.0-20.6)	50 (24.5) (18.6-30.4)	45 (25.4) (19.0-31.8)	24 (21.8) (14.1-29.5)
Exposure to ETS				
No	331 (35.1) (32.1-38.1)	398 (83.3) (79.9-86.6) ^a	361 (47.1) (43.6-50.6)	401 (77.9) (74.3-81.5) ^a
< 1 h/day	237 (25.2) (22.4-28.0)	23 (4.8) (2.9-6.7) ^a	153 (20.0) (17.2-22.8)	33 (6.4) (2.3-8.5) ^a
1- 5 hs/day	135 (14.3) (12.6-17.2)	41 (8.6) (6.1-11.1) ^a	100 (13.1) (10.7-15.5)	52 (10.1) (7.5-12.7) ^a
> 5 hs/day	239 (25.4) (22.6-28.6)	16 (3.4) (1.8-5.0) ^a	152 (19.8) ^a (17.0-22.6)	29 (5.6) (3.6-7.6)

^a <0.05 (for 2001 survey vs. 2005 survey); ETS – environmental tobacco smoke

Table 2. Characteristics of respondents and prevalence of daily smoking among men and women by selected characteristics (2009/2010)

Variables	Characteristics of the respondents in 2009/2010 survey		Prevalence of daily smoking among respondents in 2009/2010 survey		Prevalence of daily smoking OR 2010/2001		Prevalence of daily smoking OR 2010/2005	
	Men N (%) (95%CI)	Women N (%) (95%CI)	Men N (%) (95%CI)	Women N (%) (95%CI)	Men (95%CI)	Women (95%CI)	Men (95%CI)	Women (95%CI)
Total	588	585	237 (40.3) (36.3-44.3)	128 (21.9) (18.5-25.3)	1.05 (0.85-1.29)	1.48 (0.87-1.89)	0.91 (0.71-1.16)	1.64 (0.97-4.36)
Age (years)								
18-24	62 (10.5) (8.0-13.0)	68 (11.6) (9.0-14.2)	21 (33.9) (22.1-45.7)	8 (11.7) (4.1-19.3)	0.97 (0.52-1.81)	0.53 (0.46-2.31)	1.00 (0.47-2.14)	0.70 (0.50-4.13)
25-34	166 (28.3) (24.6-31.9)	145 (24.8) (21.3-28.3)	65 (33.2) (31.8-46.6)	31 (21.4) (14.7-28.1)	0.93 (0.59-1.47)	1.87 (0.98-3.25)	0.99 (0.59-1.65)	0.99 (0.87-3.99)
35-44	132 (22.4) (19.0-25.8)	125 (21.4) (18.1-24.7)	55 (41.7) (33.3-30.1)	25 (20.0) (13.0-27.0)	0.98 (0.62-1.55)	1.49 (1.79-2.95)	0.85 (0.50-1.43)	1.79 (0.68-3.36)
45-54	119 (20.2) (17.0-23.4)	121 (20.7) (17.4-24.0)	60 (50.4) (41.4-59.4)	39 (32.2) (23.9-40.5)	1.16 (0.74-1.81)	0.90 (0.54-1.49)	0.93 (0.56-1.53)	0.85 (0.48-1.52)
55-64	109 (18.5) (15.4-21.6)	126 (21.5) (18.2-24.8)	36 (33.0) (24.2-41.8)	25 (19.8) (12.8-26.8)	1.09 (0.66-1.78)	0.68 (0.26-1.86)	0.95 (0.52-1.74)	0.72 (0.59-5.33)
p for trend			0.7	0.2				
Education								
Primary / Vocational	275 (46.8) (42.8-50.8)	182 (31.1) (27.3-34.9)	134 (48.7) (42.8-54.6)	39 (21.4) (15.4-27.4)	1.02 (0.74-1.41)	0.89 (0.65-1.51)	0.96 (0.69-1.33)	0.86 (0.79-2.44)
Secondary	250 (42.5) (38.5-46.5)	311 (53.2) (49.2-57.2)	83 (33.2) (27.4-39.0)	78 (25.1) (20.3-29.9)	0.89 (0.64-1.24)	0.76 (0.40-1.18)	0.84 (0.54-1.31)	0.89 (0.63-2.80)
High	63 (10.7) (8.2-13.2)	92 (15.7) (12.8-18.6)	20 (31.8) (20.3-42.3)	11 (12.0) (5.4-18.6)	1.66 (0.84-3.28)	1.00 (0.47-1.18)	2.27 (0.92-5.60)	0.78 (0.52-2.65)
p for trend			<0.001	0.01				
Employment								
Employed	461 (78.4) (75.1-81.7)	361 (61.2) (57.3-65.1)	189 (41.0) (36.5-45.5)	87 (24.1) (19.7-28.5)	1.15 (0.89-1.48)	1.19 (0.74-1.41)	0.90 (0.66-1.23)	0.82 (0.58-2.05)
Unemployed	32 (5.4) (3.6-7.2)	27 (4.6) (2.9-6.3)	17 (53.1) (35.8-70.4)	4 (14.8) (1.4-28.2)	0.98 (0.46-2.09)	0.42 (0.13-1.34)	0.62 (0.26-1.45)	0.64 (0.53-8.33)
Economically not active	95 (16.2) (13.2-19.2)	197 (33.9) (30.0-37.7)	31 (32.6) (23.2-42.0)	37 (18.8) (13.3-24.3)	0.98 (0.58-1.64)	0.92 (0.39-0.97)	1.04 (0.61-1.80)	1.92 (0.87-4.36)
Income								
low	105 (17.9) (14.8-21.0)	158 (27.0) (23.4-30.6)	51 (48.9) (39.3-58.5)	31 (19.6) (13.4-25.8)	1.54 (1.03-2.32)	0.82 (0.74-1.85)	1.12 (0.73-1.73)	0.91 (0.83-2.15)
medium	141 (24.0) (20.5-27.5)	158 (27.0) (23.4-30.6)	62 (44.0) (35.8-52.2)	25 (15.8) (10.1-21.5)	0.75 (0.40-1.29)	0.54 (0.25-1.97)	2.01 (0.86-4.67)	0.71 (0.25-2.01)
high	342 (58.2) (54.2-62.2)	269 (46.0) (42.0-50.0)	124 (36.3) (31.2-41.4)	72 (26.8) (21.5-32.1)	0.57 (0.08-4.10)	0.94 (0.72-1.23)	1.19 (0.68-2.10)	1.24 (0.95-4.36)
p for trend			0.01	0.03				

OR – odds ratio
95% – CI – confidence interval

Table 3. Prevalence of daily smoking among men and women by selected characteristics (2001-2005)

Variables	Men			Women		
	2001 survey	2005 survey	OR 2005/2001	2001 survey	2005 survey	OR 2005/2001
	N (%) (95%CI)	N (%) (95%CI)	(95%CI)	N (%) (95%CI)	N (%) (95%CI)	(95%CI)
Total	369 (39.2) (36.1-42.3)	204 (42.7) (38.3-47.1)	1.02 (0.56-1.56)	177 (23.1) (20.1-26.1)	110 (21.4) (17.9-24.9)	0.91 (0.59-1.72)
Age (years)						
18-24	57 (34.5) (27.2-41.7)	20 (33.9) (21.8-46.0)	0.97 (0.52-1.83)	28 (20.0) (13.4-26.6)	10 (14.3) (6.1-22.5)	0.67 (0.30-1.47)
25-34	62 (40.8) (33.0-48.6)	39 (39.4) (29.8-49.0)	0.94 (0.56-1.59)	27 (18.4) (12.1-24.7)	20 (16.1) (9.6-22.6)	0.85 (0.45-1.62)
35-44	73 (42.2) (34.8-49.6)	48 (45.7) (36.2-55.2)	1.15 (0.71-1.88)	53 (31.9) (24.8-39.0)	32 (33.0) (23.63-42.4)	1.05 (0.61-1.80)
45-54	108(46.7) (40.3-53.1)	68 (52.3) (43.7-60.9)	1.25 (0.81-1.92)	46 (28.9) (21.9-35.9)	37 (26.8) (19.4-34.2)	0.90 (0.54-1.50)
55-64	69 (31.2) (25.7-37.3)	29 (34.1) (24.0-44.2)	1.14 (0.67-1.94)	23 (14.9) (9.3-20.5)	11 (12.8) (5.7-19.9)	0.84 (0.38-1.82)
p for trend	0.8	0.4		0.9	0.5	
Education						
Primary / Vocational	194 (48.1) (43.2-53.00)	146 (49.8) (44.1-55.5)	1.07 (0.79-1.45)	73 (32.3) (26.2-38.4)	48 (23.5) (17.7-29.3)	0.64(0.42-0.99) ^a
Secondary	147 (35.8) (31.2-40.4)	49 (37.1) (28.9-45.3)	1.06 (0.71-1.59)	88 (21.6) (17.2-25.2)	50 (20.7) (15.6-25.8)	0.95 (0.64-1.40)
High	28 (21.9) (14.7-29.1)	9 (17.0) (6.9-27.1)	0.73 (0.32-1.69)	16 (12.0) (6.5-17.5)	12 (17.1) (8.3-25.9)	1.51 (0.67-3.42)
p for trend	<0.001	<0.001		<0.001	0.2	
Employment						
Employed	212 (37.7) (33.7-41.7)	106 (43.6) (37.4-49.8)	1.28 (0.94-1.74)	101 (23.1) (19.2-27.0)	59 (26.2) (20.5-31.9)	1.19 (0.82-1.72)
Unemployed	82 (53.6) (45.7-61.5)	46 (64.8%) (53.7-75.9)	1.59 (0.89-2.86)	33 (31.4) 22.5-40.3)	24 (29.6) (19.7-39.5)	0.92 (0.49-1.73)
Economically not active	75 (33.2) (27.1-39.3)	52 (31.7%) (24.6-38.8)	0.93 (0.61-1.44)	43 (19.3) (14.1-24.5)	27 (12.9) (8.4-17.4)	0.62 (0.37-1.05)
Income						
low	166 (46.0) (40.9-51.4)	117 (49.2) (42.8-55.6)	1.14 (0.82-1.58)	84 (24.6) (20.2-29.2)	56 (21.5) (16.5-26.5)	0.84 (0.57-1.23)
medium	158 (35.9) (31.4-40.4)	57 (39.9) (31.9-47.9)	1.18 (0.80-1.74)	75 (22.8) (18.3-27.3)	37 (20.2) (14.4-26.0)	0.86 (0.55-1.34)
high	45 (31.9) (24.2-39.6)	30 (30.9) (21.7-40.1)	0.96 (0.55-1.67)	18 (18.7) (10.9-26.5)	17 (23.9) (14.0-33.8)	1.36 (0.64-2.90)
p for trend	<0.001	0.002		0.2	0.9	

OR – odds ratio; 95% – CI – confidence interval; ^a p<0.05

men from 65% in the 2001 survey to 17% in the 2005 survey, p<0.001; for women from 53% in 2001 to 22.1% in 2005, p<0.001) (Tab. 4). Statistically significant changes for the comparison of two analyzed surveys were observed for the categories: age, educational, employment, and income. For all of those categories, significantly less exposure to ETS was observed in 2005, compared to the 2001 survey.

For both genders in each survey there was an inverse relationship between exposure to ETS and the age of participants (p for trend ≤0.005). The highest proportion of people who declared exposure to ETS was observed for the younger age groups, and the lowest for the people aged over 54. Furthermore, the proportion of people who declared exposure to ETS decreased with an increasing level

Table 4. Prevalence of exposure to environmental tobacco smoke one hour per day or longer among males and females by selected characteristics (2001-2005)

Variables	Men			Women		
	2001 survey	2005 survey	OR 2001/2005	2001 survey	2005 survey	OR 2001/2005
	N (%) (95%CI)	N (%) (95%CI)	(95%CI)	N (%) (95%CI)	N (%) (95%CI)	(95%CI)
Total	611 (64.9) (61.9-67.9)	80 (16.7) (13.2-20.0)	0.17 (0.05-0.22) ^b	405 (52.9) (49.4-56.4)	114 (22.1) (18.5-25.7)	0.27 (0.18-0.54) ^b
Age (years)						
18-24	131 (79.4) (73.2-85.6)	18 (30.5) (18.8-42.2)	0.11 (0.06-0.22) ^b	98 (70.0) (62.4-77.6)	28 (40.0) (28.5-51.5)	0.29 (0.16-0.52) ^b
25-34	107 (70.4) (63.1-77.7)	18 (18.2) (10.6-25.8)	0.09 (0.05-0.17) ^b	75 (51.0) (42.9-59.1)	29 (23.4) (15.9-30.9)	0.29 (0.17-0.50) ^b
35-44	111 (64.2) (55.3-73.1)	15 (14.3) (7.6-21.0)	0.09 (0.05-0.18) ^b	106 (63.8) (56.5-71.1)	17 (17.5) (9.9-25.1)	0.12 (0.07-0.22) ^b
45-54	146 (63.2) (55.4-71.0)	19 (14.6) (8.5-20.7)	0.10 (0.06-0.17) ^b	76 (47.8) (40.0-55.6)	28 (20.3) (13.6-27.0)	0.28 (0.17-0.47) ^b
55-64	116 (52.4) (43.3-61.5)	10 (11.8) (4.9-18.7)	0.12 (0.06-0.25) ^b	50 (32.5) (25.1-39.9)	12 (14.0) (6.7-21.3)	0.34 (0.16-0.68) ^a
p for trend	<0.001	0.005		<0.001	<0.001	
Education						
Primary / Vocational	279 (69.2) (64.7-73.7)	37 (12.6) (8.8-16.4)	0.06 (0.04-0.96) ^b	130 (57.5) (51.1-63.9)	43 (21.1) (15.6-26.7)	0.20 (0.13-0.30) ^b
Secondary	271 (65.9) (61.1-70.5)	29 (22.0) (14.9-29.1)	0.15 (0.09-0.23) ^b	228 (56.0) (51.2-60.8)	63 (26.1) (20.6-31.6)	0.28 (0.20-0.39) ^b
High	61 (47.7) (39.0-56.4)	14 (26.4) (14.6-38.3)	0.39 (0.19-0.80) ^a	47 (35.3) (27.2-43.4)	8 (11.4) (4.0-18.8)	0.24 (0.10-0.54) ^b
p for trend	<0.001	0.003		<0.001	0.4	
Employment						
Employed	357 (63.4) (55.8-71.0)	48 (16.4) (11.7-21.1)	0.14 (0.10-0.20) ^b	236 (53.9) (49.2-58.6)	50 (22.2) (16.8-27.6)	0.24 (0.17-0.35) ^b
Unemployed	103 (67.3) (59.9-74.7)	9 (12.7) (5.0-20.4)	0.07 (0.03-0.15) ^b	61 (58.1) (48.7-67.5)	17 (21.0) (12.1-29.9)	0.19 (0.10-0.37) ^b
Economically not active	151 (66.8) (60.7-72.9)	23 (14.0) (8.7-19.3)	0.08 (0.05-0.14) ^b	108 (48.4) (41.8-55.0)	47 (22.5) (16.8-28.2)	0.31 (0.20-0.47) ^b
Income						
low	268 (74.2%) (69.7-28.7)	33 (13.9%) (9.5-18.3)	0.06 (0.04-0.09) ^b	215 (63.0%) (57.9-68.1)	61 (23.4%) (18.3-28.5)	0.18 (0.12-0.26) ^b
medium	271 (61.6%) (57.1-66.1)	27 (18.9%) (12.5-25.3)	0.15 (0.09-0.23) ^b	151 (45.9%) (40.5-51.3)	41 (22.4%) (16.4-28.4)	0.34 (0.23-0.51) ^b
high	72 (51.1%) (42.8-59.4)	20 (20.6%) (12.6-28.6)	0.25 (0.14-0.45) ^b	39 (40.6%) (30.8-50.4)	12 (16.9%) (8.2-25.6)	0.31 (0.20-0.47) ^a
p for trend	<0.001	0.1		<0.001	0.3	

OR – odds ratio; 95% – CI – confidence interval; ^a p<0.05; ^b p<0.001

of education for men in both surveys, and for women in the 2001 survey (p for trend ≤ 0.003). For the income variable, an inverse trend was observed for men and women in the 2001 survey (p for trend < 0.001). No such relationship was observed for the survey conducted in 2005.

DISCUSSION

Two main findings were observed based on present study. Firstly, the prevalence of current daily smoking was high and approximately the same at all analyzed points in time, including the 2009-2010 survey for both genders. Secondly, the percentages of men and women who declared exposure to environmental tobacco smoke for at least one hour per day decreased significantly in 2005, compared to 2001. This pattern was observed for the age, education, employment and income categories.

In the presented study, current daily smoking was represented by about 40% of men and more than 20% of women. Based on the Health Status of the Polish Population, the prevalence of smoking for men was 41% in 1996, and 34% in 2004, and 19% for women in both surveys [15]. In the study by Kaleta et al. on economically active individuals, the current smoking status was reported by 43% of men and 35% of women in 2001 [19]. Based on the World Health Organization (WHO) report on smoking in Poland, smoking was found among 38% of men and 26% of women [20]. Also, in a study of economically-active adults from the Łódź and Lublin districts of Poland, about 40% of men and 28% of women smoked at least one cigarette per day in 2005 [21]. Almost the same percentage of male smokers was observed in Hungary (41%) and Germany (37%). The largest proportions of male smokers were recorded in Ukraine (62%) and the Russian Federation (61%), and the lowest in Sweden (14%) and Ireland (24%) [20]. Among females, similar percentages of smokers were observed in Ireland (24%) and in Denmark (23%), and a higher percentage in Germany (31%), [20]. The differences between male and female patterns are noteworthy, and current studies indicate that these differences remain unchanged, and 21% of women report tobacco smoking on a daily basis [22]. This indicates that women should be the target group for intensive antismoking interventions [23].

As shown in the presented study, other epidemiological data confirm that there are lower percentages of smokers in the more educated categories and in the higher income groups [10, 19]. This also indicates that the target group for antismoking activities should be the people with lower socio-economic gradient. Unfortunately, it was only among women with a lower educational level that the percentages of daily smoker decreased between the 2001-2005 surveys. In other categories, such positive changes were not observed and the prevalence of daily smoking was on the same level. This can also be explained by the short periods of time for observation between two surveys, and insufficient tobacco control interventions. It should be emphasized that the prevalence of current daily cigarette smoking is influenced by smoking initiation and smoking cessation figures.

The data on tobacco-smoking incidence among children and young people at the time of the study implementation were alarming. Study results from 2003 indicated that: 64% of boys and 53% of girls aged 13-15 years had attempted to smoke; 30% of boys and 21% of girls had tried their first

cigarette before they were 10 years old; 25% of boys and 21% of girls had smoked in the previous month. Approximately 80% of those who had smoked in the previous month admitted to having smoked tobacco on a daily basis. Thus, for the majority, experimenting with smoking had also become the way to regular smoking or even tobacco dependence. Although the majority of the adolescents expressed a wish to give up smoking (53%), and had even attempted to do so (62%), 16% of the boys who smoked and 8% of the girls who did so, smoked cigarettes in the morning immediately on waking up, which is assumed to be a symptom of tobacco dependence [10].

During the period prior to the study and at the time of the study, some activities to reduce the tobacco attributable disease burden were undertaken. The Polish Act on the Protection of Health against the Consequences of the Use of Tobacco and Tobacco Products and the Act on Excise Duty Tax, at the time of their introduction in 1995, was among the most comprehensive regulations of its kind in Europe [10, 24, 25]. Smoking in hospitals and other health care settings was banned and treatment of tobacco dependence was declared to be free. In 1999, 2000 and 2004, this legislation was amended with new regulations, including a 0.5% levy on tobacco prices from the excise tax for tobacco products, more restrictive regulations to protect people from environmental tobacco smoke exposure in public places and worksites, and new health warnings adequate for European Union requirements. Furthermore, in September 1997, the Council of Ministers, in implementation of the Act, approved the first edition of the Programme for Limiting the Health Consequences of Tobacco Smoking for 1997-2000, followed in July 2002 by the second edition spanning the period 2002-2006. The Programme provides for awareness-raising activities, restricts the demand for tobacco products, and provides for the training of medical professionals and support to individuals with tobacco dependence, etc. Nevertheless, the National Health Fund (NHF) secured the funds for cessation by contracting health care professionals who provide them. The total expenditure on the treatment provided by anti-smoking clinics was 86,000 PLN (21,000 EUR) in 2005 [10, 23]. Expenditure on the basic activities reached the level of 9,000 PLN (2,250 EUR) in 2005, and the health programmes, provided care to only 6,000 individuals in 2005. Expenditure on the specialist activities amounted to 230,000 PLN (57,500 EUR) in 2005 [10]. Unfortunately, the NHF did not provide reimbursement for tobacco dependence treatment, and this situation remains unchanged to this day. Apart from the inadequate funds for cessation services, limited professional resources could substantially prevent effective reduction of smoking prevalence during studied period. Health promotion tasks in the regions were and are carried out by regional public health centres, which report to provincial and regional sanitary and epidemiological stations operating as part of the Sanitary Inspectorate activities. At the lower administrative levels, health care and health promotion are carried out by relevant units of the first- and second-level local administrations. However, shortages in budgetary and other resources limit regular local tobacco control activities. Furthermore, in May 2003, the WHO adopted the WHO Framework Convention on Tobacco Control in order to galvanize action at the global and country level against the tobacco epidemic. Poland signed on 14 June 2004. However, it did not impact tobacco consumption in 2005, mainly because

FCTC was ratified by the Polish government in September 2006 [26]. But substantial change was also not observed in the 2009-2010 survey. Despite several legal regulations on tobacco control and smoking cessation activities in Poland, those initiatives were insufficient to substantially decrease smoking prevalence among the studied population.

Positive changes between the two surveys were observed regarding the exposure to ETS. According to the report, The Current Status of the Tobacco Epidemic in Poland, 29% of women and 20% of men smoke involuntarily at home, and 19% of adults are exposed to tobacco smoke at the workplace – 24% of men and 14% of women [10]. This could be the result of restrictions related to the exposure to ETS in public places, mostly workplaces. Also, enforcement of the legislation, especially those related to the workplace, and changes in awareness of health consequences of exposure to passive smoking among employees and workers, could be responsible for such positive trends. The smoking ban in healthcare settings, educational buildings, as well as public facilities is, quoting the Act, ‘a key tool to reduce ETS exposure’, although the exception of areas designated for smokers has not fully protected the general population from involuntary exposure [24]. Different methodological approach for ETS exposure assessment in the GATS survey did not allow for direct comparison with the results from the 2001 and 2005 surveys (Tab. 5) [16, 17]. The GATS survey assessed ETS exposure among smokers and non-smokers, and separately for different places (home, workplace, public places), which is an advantage compared with the surveys conducted in 2001 and 2005. On the other hand, the presented study does not take into account the duration of exposure. In the GATS survey, the exposure of all subjects – smokers and non-smokers – at home, for men 45%, for women 44%, and at the workplace – for men 41%, for women 25%, was lower than noted in the 2001 survey – for men 65%, for women 53%, and higher than for 2005 – for men 17%, for women 22% [17].

The presented study could have had several limitations. The first main concern is the potential for selection bias. Given the sampling method and incomplete response rate, there is the possibility that the sample selected may not be fully representative for the Łódź population. It is important to notice that in both surveys (2001-2005) the sampling and the overall

methodological approach used were identical, therefore the data should be directly comparable. Unfortunately, due to limited funding for surveys at subnational level, the study on health, chronic disease risk factors and health behaviours of the residents of Łódź was not continued further, and more recent data from the project are unavailable. For that reason, analysis of the data for the presented study was based on data from GATS. GATS provides probably the most recent and the most extensive data on the smoking epidemic in Poland. However, it differs from previous studies in sampling design and some aspects of methodology, and as a result, direct comparisons between surveys should be treated with relevant caution.

The second concern, taking into account the design of the study (a cross-sectional survey), was the inability to validate the smoking status or the ETS exposure by biomarker measurement, such as cotinine level. Thus, there is always the possibility that underestimation could have occurred, but as such should have remained stable over the time period difference between the two surveys. For evaluation of the exposure to ETS, based on the presented study, it was not possible to distinguish between the exposure at home, work or public places; all these places of exposure were analyzed together. In addition, such exposure was analyzed together for smokers and non-smokers. Taking into account that only changes in ETS exposure level were surveyed, and not the health consequences of such exposure, such a limitation should not be so important.

CONCLUSIONS

The monitoring of tobacco use and associated matters is vital for tobacco control policies. The identified patterns of behaviour related to tobacco-smoking and the characteristics of the highest risk groups permit a fine-tuned definition of the directions for future activity, with the aim of concentrating on the most effective means and measures of intervention. The presented study was based on responses to the cross-sectional surveys conducted between 2001-2010 on smoking, and in 2001 and 2005 regarding ETS. In the surveyed years, changes in clean indoor air laws and associated social norms have taken place. Afterwards, practices such as regulating indoor smoking, in the longer perspective, may also have worked well to stimulate smoking cessation [27, 28]. The presented results can serve as a framework for monitoring and evaluating changes in smoking prevalence and environmental tobacco exposure as a result of implemented tobacco measures. Data on ETS are valuable, especially because ETS issues are poorly reported in Polish literature. Thus, such an analysis is an important step towards covering a lot of loopholes in the surveys, especially at subnational level, and strengthening tobacco control at the local level. Established, long term tobacco surveillance systems of smoking and ETS exposure based on nationally and locally representative samples are needed in Poland.

The tobacco control measures need to be continued and intensified to reduce the prevalence of tobacco smoking and exposure to environmental tobacco smoke among adult Poles. The MPOWER measures proposed by the WHO may provide practical assistance with country-level implementation of effective policies, in order to reduce the demand for tobacco [29].

Table 5. Percentages of adult ≥ 15 years old exposed to environmental tobacco smoke at home and at work, based on GATS Poland 2009-2010 (Source: *Global Adult Tobacco Survey*, Poland 2009-2010)

Variables	Adults exposure to tobacco smoke at home		Adults exposed to tobacco smoke at work	
	Overall	Non-smokers	Overall	Non-smokers
Overall				
Gender				
Men	44.9%	24.9%	41.3%	33.8%
Women	43.6%	30.4%	24.9%	19.5%
Age (years)				
15-19	46.0%	41.4%	47.3%	–
20-29	46.0%	30.6%	30.4%	25.1%
30-39	43.6%	27.0%	34.8%	26.8%
40-49	46.1%	22.6%	31.8%	23.9%
50-59	50.6%	25.0%	37.0%	30.0%
≥ 60	36.3%	27.0%	39.3%	36.2%
Education				
Primary	45.3%	35.2%	43.6%	42.0%
Vocational	53.4%	30.7%	47.0%	38.1%
Secondary	43.1%	27.2%	31.6%	25.8%
High	31.3%	17.3%	23.9%	19.7%

REFERENCES

- Lubin JH, Alavanja MC, Caporaso N, Brown LM, Brownson RC, Field RW, et al. Cigarette smoking and cancer risk: modelling total exposure and intensity. *Am J Epidemiol.* 2007; 166(4): 479-89.
- Lubin J, Virtamo J, Weinstein S, Albanes D. Cigarette Smoking and Cancer: Intensity Patterns in the Alpha-Tocopherol, Beta-Carotene Cancer Prevention Study in Finnish Men. *Am J Epidemiol.* 2008; 167(8): 970-5. DOI: 10.1093/aje/kwm392.
- US Department of Health and Human Services: The Health Consequences of Smoking: A Report of the Surgeon General. DC, Washington May 27, 2004. <http://www.surgeongeneral.gov/library/reports/smokingconsequences/index.html> (access:7.09.2012)
- U.S. Department of Health and Human Services. Children and Secondhand Smoke Exposure. Excerpts from The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2007.
- 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, 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, 2010.
- U.S. Department of Health and Human Services. Preventing Tobacco Use Among Youth and Young Adults: 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, 2012.
- Shafey O, Eriksen M, Ross H, Mackay J. Tobacco Atlas, American Cancer Society, 2009.
- World Health Organization (WHO). WHO report on the global tobacco epidemic, 2011: warning about the dangers of tobacco. Geneva: WHO; 2011.
- World Health Organization. European Tobacco Control Report. WHO; Copenhagen 2007.
- World Health Organization (WHO). The current status of the tobacco epidemic in Poland. WHO, Copenhagen, 2009.
- World Health Organization (WHO). WHO global report: mortality attributable to tobacco. Geneva: WHO; 2012.
- Leparski E, Nussel E. Protocol and guidelines for monitoring and evaluation procedures. CINDI – Countrywide Integrated Noncommunicable Diseases Intervention Programme. Berlin, Heidelberg, New York, London, Paris, Tokyo: Springer-Verlag; 1987.
- Stelmach W, Kaczmarczyk-Chalas K, Bielecki W, Drygas W. The impact of income, education and health on lifestyle in a large urban population of Poland (CINDI programme). *Int J Occup Med Environ Health.* 2004; 17: 393-401.
- World Health Organization (WHO). Countrywide Integrated Noncommunicable Diseases Intervention (CINDI) Programme. Protocol and Guidelines. WHO Regional Office for Europe. Copenhagen, 1995.
- Health status of Polish population in 2004. In Polish STAN ZDROWIA LUDNOŚCI POLSKI W 2004 R. Central Statistical Office, Warsaw 2006 http://www.stat.gov.pl/cps/rde/xbcr/gus/stan_zdrowia_2004.pdf (access: 07.09.2012).
- Kaleta D, Kozieł A, Miśkiewicz P. Global Adult Tobacco Survey in Poland – the aim and current experiences. *Med Pr.* 2009; 60(3): 197-200.
- Ministry of Health of Poland. Global Adult Tobacco Survey. Poland 2009-2010. Warsaw 2010.
- Kaleta D, Makowiec-Dąbrowska T, Dzikowska-Zaborszczyk E, Fronczak A. Prevalence and socio-demographic correlates of daily cigarette smoking in Poland: Results from the Global Adult Tobacco Survey (2009-2010). *Int J Occup Med Environ Health.* 2012; 25(2): 126-136.
- Kaleta D, Polańska K, Jegier A. Smoking predictors among economically active individuals. *Int J Occup Med Environ Health.* 2007; 20(4): 357-363.
- World Health Organization (WHO). The World Health Report 2002: Reducing Risks, Promoting Healthy Life. Geneva, WHO, 2002.
- Kaleta D, Makowiec-Dąbrowska T, Polańska K, Dzikowska-Zaborszczyk E, Drygas W. Tobacco smoking and other negative lifestyle behaviors among economically active individuals. *Med Pr.* 2009; 60(1): 7-14. (in Polish).
- Kaleta D, Makowiec-Dąbrowska T, Dzikowska-Zaborszczyk E, Fronczak A. Determinants of heavy smoking: Results from the Global Adult Tobacco Survey in Poland (2009-2010). *Int J Occup Med Environ Health.* 2012 Mar; 25(1): 66-79.
- Kaleta D, Usidame B, Polańska K. Tobacco advertisements targeted on women: creating an awareness among women. *Cent Eur J Public Health.* 2011; 19(2): 73-78.
- Kaleta D, Polańska K, Wojtyśiak P, Kozieł A, Kwaśniewska M, Miśkiewicz P, et al. Effective protection from exposure to environmental tobacco smoke in Poland: The World Health Organization perspective. *Int J Occup Med Environ Health.* 2010; 23(2): 123-131.
- Act on the Protection of Health against the Consequences of the Use of Tobacco and Tobacco Products. *Law Gazette* 1995; 10: 55 (in Polish).
- World Health Organization (WHO). Guidelines for implementation of the WHO FCTC. Geneva: WHO; 2011.
- Aveyard P, Raw M. Improving smoking cessation approaches at the individual level. *Tob Control.* 2012; 21: 252-257 doi:10.1136/tobaccocontrol-2011-050348.
- Zhu SH, Lee M, Zhuang YL, Gamst A, Wolfson T. 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.
- Fronczak A, Polańska K, Usidame B, Kaleta D. Comprehensive tobacco control measures—the overview of the strategies recommended by WHO. *Cent Eur J Public Health.* 2012; 20(1): 81-86.