Cancer risk factors in Poland: the PONS Study

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▌**Abstract**

Introduction: The burden of cancer in Eastern Europe is expected to increase, and in 2006, Polish males were ranked second in lifetime risk of lung cancer. The Polish-Norwegian Study (PONS) is a population study in the Kielce District, and the presented study describes the distribution of preventable causes of cancer according to gender, age, education, and urban/rural status.

Methods: PONS comprises individuals 45-64 years of age at baseline. A structured lifestyle interview was conducted, and the following risk factors were recorded: smoking, alcohol consumption and obesity. Binomial regression analysis was used to estimate age and gender adjusted prevalence ratios (PR) for the associated factors.

Results: A total of 3,862 adults were included in the analysis. Approximately 17% reported current tobacco smoking on a daily basis, 34% were former smokers, and 49% were non- smokers. Current smoking was more prevalent in males (20%) than females (15%), but there was no clear association with educational level or urban/rural status. Females also reported a lower frequency of alcohol consumption than males. Among males, 15% reported drinking alcohol more than once a week, as compared to 2% of the females. There was no clear association with urban/rural status, or with level of education. The total prevalence of obesity (BMI ≥30) was 30%; the prevalence of obesity class 2 (BMI ≥35) and class 3 (BMI ≥40) was 8% and 1.7%, respectively. Obesity increased by age, especially in females, and was less frequent among people with high education and people with urban residence.

Conclusions: The Kielce region of Poland is experiencing a significant burden of cancer risk factors, including obesity and tobacco smoking, but smoking may be a decreasing habit. It is necessary to increase the awareness of the population to the harmful effects of smoking and obesity to prevent cancer and other lifestyle related diseases.

▌**Keywords**

cross sectional study, population study, cancer risk factors, Poland

INTRODUCTION

The rate of premature deaths is much higher in Poland than in Western European countries, and there is a need for research that can form the basis for preventive measures. The Polish-Norwegian Study (PONS) in Poland represents one effort to this effect.

An underlying cause of the high rate of premature deaths in Poland is likely to be factors that are known to increase the risk of cancer. The most typical of these factors is tobacco smoking that not only causes cancer, but is an important cause of other lifestyle related diseases, perhaps especially cardiovascular diseases. Other prevalent factors important for cancer risk include alcohol consumption and obesity.

For certain cancers, especially stomach cancer and lung cancer, both the incidence and mortality in Poland are high compared to Western European countries, but other Central and Eastern European countries also appear to be in a situation quite similar to Poland [1-4].

In this cross-sectional analysis of the first collected data from the PONS study in Poland, the prevalence of various risk factors for causes are assessed, with emphasis on the prevalence of smoking, alcohol consumption and obesity.

MATERIALS AND METHODS

The PONS study is an open-ended prospective study with very broad research aims. The main purpose of the PONS project is to study lifestyle factors and biological factors in relation to the number of different diseases. The study has been described in more detail in another article in this issue of AAEM Journal. The present study is a preliminary report of the first 3,862 participants in the PONS study.

Briefly, the participants were invited to the study, and asked to respond to questions in a systematic interview, to participate in a clinical examination consisting of measurements of height, weight, hip and waist circumference, blood pressure, and spirometry. The blood sampling was followed by measurements of serum lipids, including total cholesterol, serum triglycerides and HDL cholesterol. The blood sampling was performed non-fasting, but the time since the last meal was recorded.

The questionnaire information was collected as a systematic interview, and the responses were entered on an electronic form, and after completion of the interview, the data were sent directly to a data server for processing and

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further management. Among a long range of questions, the participants were asked about smoking habits, how often they usually drink alcohol, and some questions about socio-economic circumstances.

STATISTICAL ANALYSIS

In relation to smoking, the proportion of current, regular smokers, the proportion of former smokers, and the proportion of never smokers was estimated. Also estimated was the consumption of alcohol reported by the participants, and the proportion of overweight and obese participants measured. For each factor , the prevalence ratios by age group, educational level and urban versus rural residence were estimated.

In a separate analysis, smoking status by age and birth cohort in males and females was estimated, and the prevalence of smoking at the age of 40 years in different birth cohorts determined.

The analyses were conducted in STATA, version 10.0.

RESULTS

A total of 3,862 males and females aged between 45-64 were included in these cross- sectional analyses. Current tobacco smoking was reported by approximately 17% of the study population, whereas 34% reported to be former smokers, and 49% never smokers. Current smoking (Figure 1) was more common in males (23%) than females (15%), but smoking patterns were not clearly associated with the level of education or with urban/rural residence (Tables 1, 2). The relatively lower proportion of current smokers in the oldest age group is likely to reflect the relatively high proportion of former smokers (Tables 1, 2).
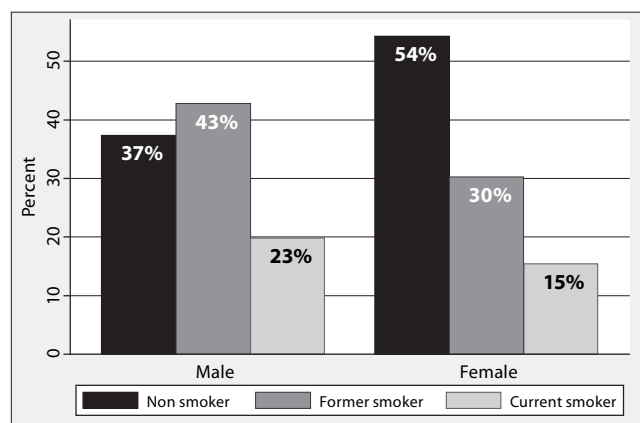

Figure 1. Daily smoking habits by sex in PONS

The prevalence of current smoking according to birth cohorts (Figures 2-4) were also studied. There was a consistent pattern showing that males in older cohorts were more likely to smoke than males in the younger cohorts (Figure 2). Among females, there was no clear pattern, and no indication that females in the PONS study have stopped smoking. Males in the older cohorts were more likely to start smoking at a young age, but there was also a similar tendency to stop smoking from the age of 30 years and onwards in all

Table 1. Crude and adjusted prevalence ratios for current smoking by age, educational level and urbanity in males and females who participated in the Pons study

	Men			Females		
	Prevalence Ratio			Prevalence Ratio		
Factor	Crude	Adj.	95% CI	Crude	Adj.	95% CI
Age (years)						
45-49	1.0	1.0	Ref.	1.0	1.0	Ref.
50-54	0.9	0.9	0.6-1.3	1.0	1.0	0.8-1.3
55-59	1.0	0.9	0.7-1.3	0.9	0.9	0.7-1.1
60-65	0.7	0.7	0.5-0.9	0.5	0.5	0.4-0.7
Higher education						
No	1.0	1.0	Ref.	1.0	1.0	Ref.
Yes	0.8	0.8	0.6-1.0	0.9	0.9	0.7-1.1
Urbanity						
rural	1.0	1.0	Ref.	1.0	1.0	Ref.
urban	0.9	1.0	0.8-1.3	1.0	1.1	0.9-1.4

Table 2. Crude and adjusted prevalence ratios for ever smoking by age, educational level and urbanity in males and females who participated in the Pons study

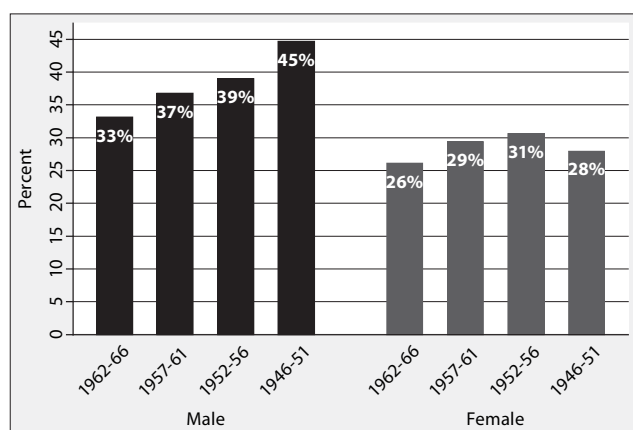|	Males			Females		
	Prevalence Ratio			Prevalence Ratio		
Factor	Crude	Adj	95% CI	Crude	Adj	95% CI
Age (years)						
45-49	1.0	1.0	Ref.	1.0	1.0	Ref.
50-54	1.0	1.0	0.9-1.1	1.2	1.2	1.0-1.3
55-59	1.0	1.0	0.9-1.2	1.2	1.2	1.0-1.4
60-65	1.1	1.1	0.9-1.3	1.1	1.0	0.9-1.2
Higher education						
No	1.0	1.0	Ref.	1.0	1.0	Ref.
Yes	0.9	0.9	0.8-0.9	1.0	1.0	0.9-1.1
Urbanity						
rural	1.0	1.0	Ref.	1.0	1.0	Ref.
urban	1.0	1.0	0.9-1.1	1.2	1.2	1.1-1.3

Figure 2. Current smoking at 40 years by year of birth

birth cohorts (Figure 3). There was a similar tendency for females as among males (Figure 4).

In relation to alcohol consumption, 15% of males reported drinking alcohol more often than once a week, whereas only 2% of females reported alcohol drinking more than once a week. For alcohol drinking, there were no clear differences related to urban/rural residence, and patterns of alcohol drinking were similar across the levels of education (Table 3).
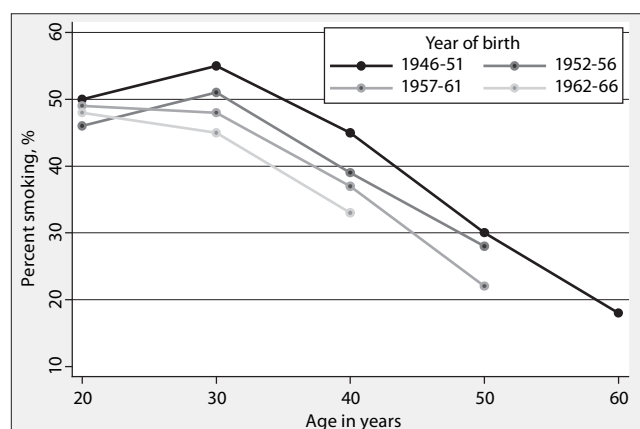
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Figure 3. Current smoking by age in different birth cohorts-Males
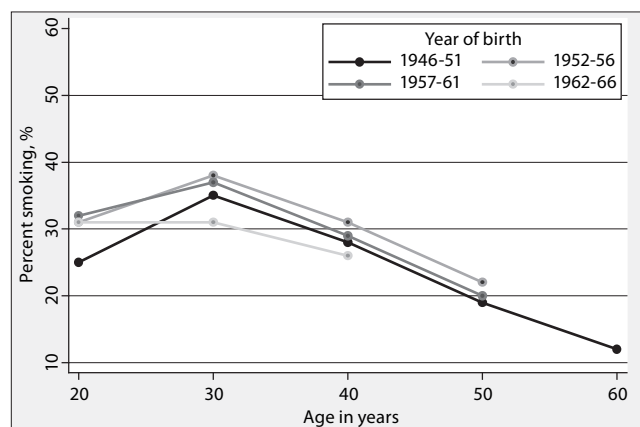

Figure 4. Current smoking by age in different birth cohorts-Females

Table 3. Crude and adjusted prevalence ratios for alcohol consumption (more than weekly) by age, educational level and urbanity in males and females who participated in the Pons study

Factor	Males Prevalence Ratio			Females Prevalence Ratio		
	Crude	Adj	95% CI	Crude	Adj	95% CI
Age (years)						
45-49	1.0	1.0	Ref.	1.0	1.0	Ref.
50-54	0.9	0.9	0.6-1.3	0.5	0.5	0.2-1.0
55-59	0.6	0.6	0.4-0.9	0.7	0.6	0.3-1.2
60-65	0.7	0.7	0.5-1.0	0.3	0.3	0.1-0.6
Higher education						
No	1.0	1.0	Ref.	1.0	1.0	Ref.
Yes	1.4	1.3	1.0-1.8	1.8	1.4	0.6-3.2
Urbanity						
rural	1.0	1.0	Ref.	1.0	1.0	Ref.
urban	1.1	1.0	0.8-1.4	1.9	2.1	1.0-4.3

The total prevalence of obesity (BMI≥30) was 35%. There was an increase in the prevalence of obesity with increasing age, and obesity was less frequent among people with a higher education and among people with urban residence (Table 4).

Table 4. Crude and adjusted prevalence ratios for obesity (BMI>30) by age, educational level and urbanity in men and females who participated in the Pons study

Factor	Males Prevalence Ratio			Females Prevalence Ratio		
	Crude	Adj	95% CI	Crude	Adj	95% CI
Age (years)						
45-49	1.0	1.0	Ref.	1.0	1.0	Ref.
50-54	1.0	1.0	0.7-1.3	1.5	1.5	1.2-2.0
55-59	1.1	1.1	0.8-1.4	1.7	1.7	1.3-2.2
60-65	1.2	1.2	0.9-1.6	2.0	2.2	1.7-2.8
Higher education						
No	1.0	1.0	Ref.	1.0	1.0	Ref.
Yes	0.73	0.8	0.6-0.9	0.6	0.7	0.6-0.8
Urbanity						
rural	1.0	1.0	Ref.	1.0	1.0	Ref.
urban	0.8	0.9	0-7-1.0	0.8	0.8	0.7-0.9

DISCUSSION

In this cross-sectional study of 3,862 males and females aged between 45 - 64 in Poland, the proportion of a number of factors associated with the risk of cancer were estimated. Among the main findings, there was a large proportion of males who were former smokers, and in the population as a whole, the prevalence of obesity was very high.

Compared with other population studies, the prevalence of obesity is high in the PONS population. The large proportion of former smokers suggests that comparatively more males have so far been recruited to the study than males who are daily smokers.

The studied population sample characterizes with quite specific distribution of risk factors, especially those shaping cancer morbidity [3], such as tobacco smoking and obesity. In considering tobacco smoking, the biggest, single cancer risk factor in Poland, the category of ever smokers in this sample (62.2% of males and 45.5% of females) is very similar to the general population age group of 45-64 years (in males, the percentage of ever smokers in 2009 averaged 58.7%, and 35.7% in females (GATS study data) [5]. On the other hand, the percentage of ex-smokers in this sample (42.8% males and 30.2% females), was higher and clearly contrasts with percentages of ex-smokers in the general population (21.8% males and 11.3% females). There seems to be an over-representation in the study sample of that part of the population part which quit smoking. This may indicate a particularly high health awareness of the first group that took in the PONS study. This, too, is a very interesting group of the population, which may help to understand the reasons and motives for giving up smoking.

The studied sample characterizes with a significantly high percentage of obesity that this is an etiological factor for higher cancer mortality. Obesity level in the studied sample (35% in both males and females) is higher than in general population in which 19% of males and 20% of females are obese [6]. It seems that this group might be an interesting subject of research on the causes of obesity in Poland. One hypothesis might be that these obese participants were actually those who quit smoking, and the over-represented group of ex-smokers is simultaneously the group with a BMI higher than 30 kg/m^2. However, this needs further

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investigation and multivariable analysis which will be conducted soon after the first phase of recruitment to the cohort is completed.

This is a preliminary cross-sectional analysis of the participants of an on-going cohort study in Poland. As observed from the results, more females than males have so far been recruited to the study; a very large proportion of the participants were obese or overweight; and many belonged to the category of ex-smokers. It is difficult to say how similar the analyzed sample is that entered the PONS study to the general population. However, the specific pattern of distribution risk factors in the population recruited in the first phase of the study makes the sample an interesting subject for a future follow-up study and further analyses.

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