



H N P D I S C U S S I O N P A P E R

Economics of Tobacco Control Paper No. 22

# Poland 1999 Global Youth Tobacco Survey: Economic Aspects

Hana Ross and Krzysztof Przewozniak

September 2004

Tobacco Free Initiative  
World Health Organization





**POLAND 1999 GLOBAL YOUTH TOBACCO SURVEY:**

**ECONOMIC ASPECTS**

**HANA ROSS AND KRZYSZTOF PRZEWOZNIK**

**September 2004**

## Health, Nutrition and Population (HNP) Discussion Paper

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## ECONOMICS OF TOBACCO CONTROL PAPER NO. 22

### Poland 1999 Global Youth Tobacco Survey: Economic Aspects

Hana Ross<sup>1</sup> and Krzysztof Przewozniak<sup>2</sup>

<sup>1</sup> University of Illinois at Chicago, Health Research and Policy Centers

<sup>2</sup> Cancer Center and Institute, Warsaw, Poland, Department of Cancer Epidemiology and Prevention

This report was commissioned by the Health, Nutrition and Population Unit in the Human Development Network, World Bank, using grant funds provided by the Office on Smoking and Health of the US Centers for Disease Control and Prevention.

**Abstract:** In 1999, Poland was one of the first countries to carry out the Global Youth Tobacco Survey (GYTS), supported by the US Centers for Disease Control and Prevention and World Health Organization, a standardized school-based survey of teenage smoking behavior, attitudes and knowledge. This report presents background information on smoking and tobacco control policies in Poland, and simple descriptive statistics of the GYTS survey data. It focuses on the relationship between smoking behavior, cigarette prices, and other factors that can be affected by policies intended to reduce smoking in order to reduce the associated burden of disease and premature death. Multiple regressions explore the factors that affect the decision to smoke, and the number of cigarettes that current smokers report smoking each month, and find that availability of pocket money, age, gender, living in a large town, advertising, counter-advertising and disease-specific information on the effects of smoking all appear to be statistically significant. The analysis does not include the data needed to estimate price elasticity, but the survey suggests clearly that higher cigarette taxes that raise real prices and certain tobacco control policies can reduce cigarette demand among teenage students in Poland.

**Keywords:** Poland, tobacco, smoking, youth smoking, tobacco tax, cigarettes, cigarette tax, economics of tobacco, economics of tobacco control, tobacco policy, tobacco control policy, smoking prevention, price elasticity, demand for cigarettes

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**Correspondence Details:** Hana Ross, Ph.D. University of Illinois at Chicago, Health Research and Policy Centres (M/C 275), 850 West Jackson Boulevard, Suite 400, Chicago, Illinois 60607-3025. Phone: (312) 413-5423, Fax: (312) 996-2703, Email: [hanaross@uic.edu](mailto:hanaross@uic.edu)  
Krzysztof Przewozniak, M.A., Maria Skłodowska-Curie Cancer Center and Institute of Oncology, Department of Cancer Epidemiology and Prevention, 5 Roentgena Street, 02-781 Warsaw, Poland. Phone: +48 22 644 48 06, Fax: +48 22 643 92 34, Email: [przewozniakk@coi.waw.pl](mailto:przewozniakk@coi.waw.pl)



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## FOREWORD

In 1999, the World Bank published “Curbing the Epidemic: governments and the economics of tobacco control”, which summarizes the trends in global tobacco use and the resulting immense and growing burden of disease and premature death. By 1999, there were already 4 million deaths from tobacco each year, and this huge number is projected to grow to 10 million per year by 2030, given present trends in tobacco consumption. Already about half of these deaths are in high-income countries, but recent and continued increases in tobacco use in the developing world is causing the tobacco-related burden to shift increasingly to low- and middle-income countries. By 2030, seven of every ten tobacco-attributable deaths will be in developing countries. “Curbing the Epidemic” also summarizes the evidence on the set of policies and interventions that have proved to be effective and cost-effective in reducing tobacco use, in countries around the world.

Tax increases that raise the price of tobacco products are the most powerful policy tool to reduce tobacco use, and the single most cost-effective intervention. They are also the most effective intervention to persuade young people to quit or not to start smoking. This is because young people, like others with low incomes, tend to be highly sensitive to price increases.

Why are these proven cost effective tobacco control measures –especially tax increases– not adopted or implemented more strongly by governments? Many governments hesitate to act decisively to reduce tobacco use, because they fear that tax increases and other tobacco control measures might harm the economy, by reducing the economic benefits their country gains from growing, processing, manufacturing, exporting and taxing tobacco. The argument that “tobacco contributes revenues, jobs and incomes” is a formidable barrier to tobacco control in many countries. Are these fears supported by the facts?

In fact, these fears turn out to be largely unfounded, when the data and evidence on the economics of tobacco and tobacco control are examined. The team of about 30 internationally recognized experts in economics, epidemiology and other relevant disciplines who contributed to the analysis presented in “Curbing the Epidemic” reviewed a large body of existing evidence, and concluded strongly that in most countries, tobacco control would not lead to a net loss of jobs and could, in many circumstances actually generate new jobs. Tax increases would increase (not decrease) total tax revenues, even if cigarette smuggling increased to some extent. Furthermore, the evidence show that cigarette smuggling is caused at least as much by general corruption as by high tobacco product tax and price differentials, and the team recommended strongly that governments not forego the benefits of tobacco tax increases because they feared the possible impact on smuggling, but rather act to deter, detect and punish smuggling.

Much of the evidence presented and summarized in “Curbing the Epidemic” was from high-income countries. But the main battleground against tobacco use is now in low- and middle-income countries. If needless disease and millions of premature deaths are to be prevented, then it is crucial that developing countries raise tobacco taxes, introduce comprehensive bans on all advertising and promotion of tobacco products, ban smoking in public places, inform their citizens well about the harm that tobacco causes and the benefits of quitting, and provide advice and support to help people who smoke and chew tobacco, to quit.

In talking to policy-makers in developing countries, it became clear that there was a great need for country-specific analytic work, to provide a basis for policy making, within a sound economic framework. So the World Bank and the Tobacco Free Initiative of the World Health Organization (as well as some of the WHO regional offices and several other organizations, acting in partnership or independently) began to commission and support analysis of the economics of tobacco and tobacco control in many countries around the world.

The report presented in this Economic of Tobacco Discussion Paper makes a valuable contribution to our understanding of the issues and likely economic impact of tobacco control in a specific country setting. Our hope is that the information, analysis and recommendations will prove helpful to policy makers, and help result in stronger policies to reduce the unnecessary harm caused by tobacco use.

*Joy de Beyer*

Tobacco Control Coordinator  
Health, Nutrition and Population  
World Bank

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# 1. BACKGROUND ON TOBACCO USE AND POLICIES IN POLAND

## 1.1 Introduction

Tobacco is one of the greatest public health challenges facing Europe. Globally,<sup>1</sup> tobacco use was responsible for 2.4 million deaths in 2000, 26% of all male deaths and 9% of all female deaths in the European region of WHO<sup>2</sup> (Shafey et al. 2003; see also Harkin et al. 1997). The problem is particularly severe in the Eastern Bloc countries. In 1995, these countries could attribute an estimated 700,000 deaths to tobacco-related diseases, a disproportionate share of the world total (WHO 1998). Even more alarming is that in contrast to higher-income countries, 70% to 75% of these deaths are occurring in middle age. Middle-aged men in Eastern Europe are twice as likely to die from a tobacco-related illness as middle-aged men in the western part of the region (Peto et al. 1994, 2003; Zatonski and Jha 2000). Regional differences in smoking-attributable mortality are also considered to be one of the major factors that may explain why overall premature mortality rates in middle-age men in Central and Eastern European countries, including Poland have been among the highest in the world, making male life expectancy much lower than in high-income countries (Chenet et al. 1996; Feachem 1994; McMichael and Zatonski 1996; Murray and Lopez 1994, 1996; Murray et al. 1993).

In Poland, by the early 1980s, lung cancer incidence among middle-aged men was among the highest in the world, and four to five times higher than it had been a generation before in Poland (Kubik et al. 1995; Zatonski 1995, 1996; Zatonski and Jha 2000). In 2000, 57,000 Polish men were estimated to die each year as a result of tobacco use, almost twice the number (32,000) two and half decades earlier (Peto et al. 1994, 2003). Each year, approximately 37,000 Polish men died prematurely from tobacco-related diseases. Female lung cancer mortality has been also steadily increasing since the 1970s and is currently rising at about 3% a year (Kubik et al. 1995; Zatonski 1995, 1996; Zatonski and Jha 2000). Between 1975 and 2000, the annual number of deaths among Polish women attributable to smoking has risen from 2,800 to 11,700, including almost 6,000 who die before 70 (Peto et al. 1994, 2003; Didkowska et al. 1999).

The epidemiology and biology of tobacco-related diseases are well known (Boyle et al. 2004; US DHHS 2004; Zatonski and Przewozniak 1992, 1999; Zatonski et al. 1996). It is also well known that dozens of diseases can be caused by smoking or passive smoking exposure. It is well documented that most smokers begin young— during their childhood and teen years (US DHHS 1994, 2001). But knowledge about smoking behavior, patterns, determinants and mechanisms of smoking among children and youth is quite limited. Global concern is growing about the magnitude of the tobacco epidemic among children and teenagers and the related health, psychological, socio-cultural and economic consequences (Baska et al 2004; GYTS 2002, 2003;

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<sup>1</sup> World-wide, there are an estimated 1.3 billion tobacco users (Forey et al. 2002; Shafey et al. 2003).

<sup>2</sup> Member states in the WHO European Region include Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, San Marino, Slovakia, Slovenia, Spain, Switzerland, Tajikistan, the Former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Ukraine, United Kingdom, Uzbekistan and Yugoslavia.

Przewozniak and Zatonski 2003a, 2004; Ross 2004; Sovinova and Csemy 2000; US CDCP 1997, 2000a; Warren et al. 2000).

Although detailed national epidemiological studies on the scale of the health consequences of smoking among children have not been conducted, clinical and regional epidemiological studies demonstrate similarities with international observations on the impact of smoking on children's health (King et al. 1996; US DHHS 1994). Each day about 500 children in Poland reach for their first cigarette, starting down the road to regular, nicotine-addicted smoking in their adult lives (Brzezinski et al. 1999; Zatonski et al. 1999). The percentage of schoolchildren who regularly smoke cigarettes (at least one cigarette a week) grew substantially in the 1990s, especially among 15-years old girls (from 16% in 1990 to 28% in 1998)(Mazur and Woynarowska 1999; Mazur et al. 2000; Wojnarowska and Mazur 2002). In addition, as recent national surveys of adult Poles show, over 60% of adults smoke daily in the presence of children and over 30% in the presence of pregnant women (Przewozniak and Zatonski 2004; Zatonski et al. 1999). This means that 4 million Polish children are also exposed to smoke from other peoples' cigarettes, known as passive smoking or second hand smoke exposure. Although smoking prevalence among pregnant women decreased in the last decade, 15-20% of women still smoke during pregnancy, risking harm to their babies (Przewozniak and Zatonski 2004). As a result, 100,000 Polish children are born every year following long-term exposure to toxic and carcinogenic tobacco-specific compounds. In conclusion, Polish epidemiological estimates suggest that involuntary passive smoking is probably a major risk factor for the health of Polish children at age 0 to 5 years and active smoking by children and youth is one of the most important lifestyle risk factors that can harm their health (Brzezinski et al. 1999; Zatonski et al. 1999).

Prominent members of the Polish public health community have been deeply concerned at the health effects of tobacco use for many decades, and have worked to bring the issue to the attention of the public and policy makers. Great progress has been made in changing public knowledge, as well as changing social attitudes and smoking behaviors, and in developing and implementing policies designed to reduce tobacco use (Zatonski 2003a,b). The results of these changes are also becoming evident in declining lung cancer incidence, especially among young and middle-aged adult men (Zatoński 1996; Zatonski and Boyle 1996; Zatonski and Jha 2000). Most smokers begin during their teenage years, so the behavior and attitudes of teenagers has an important influence on the future course of the tobacco epidemic.

This report analyses data collected on teenage smoking behavior in Poland in 1999, from an economic perspective. Poland was one of the first countries to carry out a youth survey under the Global Youth Tobacco Survey program of the US Centers for Disease Control and Prevention and the World Health Organization.

## **1.2 Socio-Economic Situation**

Tobacco use is not only detrimental to the health of the Polish people. It also represents a significant economic burden, in medical costs, productivity lost from increased illness and early death, and money spent on cigarettes instead of other things that could improve household well-being (Czart et al. 2001; HECOS 2000; Zatonski et al. 1998; Zatonski and Przewozniak 2002).

After the economic crisis in Poland in the early nineties ended, economic growth was relatively rapid, averaging 5% per year from 1993 to 1999. Growth decelerated to 4% in 1999 and 2000, and to 1% in 2001 and 2002. Poland managed to curb its high inflation rate during this time, and inflation declined steadily from 22% in 1995 to 10% in 2000 and 1% in 2002. The period of sustained growth helped reduce social problems, although many issues still remain to be addressed, such as high unemployment and the need for agricultural and industrial restructuring. Rural poverty needs particular attention. Further progress on economic and social reforms, together with improvements in environmental quality and management are still needed, as Poland enters the EU in 2004.

Table 1 presents the basic socio-economic indicators for Poland compared to upper middle-income countries, at the end of 1999, the year in which the survey on youth tobacco use was carried out.

**Table 1: Poland, socio-economic indicators in 1999**

<b>Basic socio-economic indicators</b>	<b>Poland</b>	<b>Upper middle-income countries</b>
Population (millions)	38.7	573
GNP per capita (US\$)	3,990	4,900
GNP (US\$ billions)	154.2	2,811
Average annual growth, 1993-99: population (%)	0.1	1.4
Average annual growth, 1993-99: labor force (%)	0.4	2.1
Poverty (% of population below national poverty line)	24	-
Urban population (% of total population)	65	76
Life expectancy at birth (years)	73	70
Infant mortality (per 1,000 live births)	10	27
Illiteracy (% of population age 15+)	0	10
Gross primary enrollment (% of school-age population)	96	100

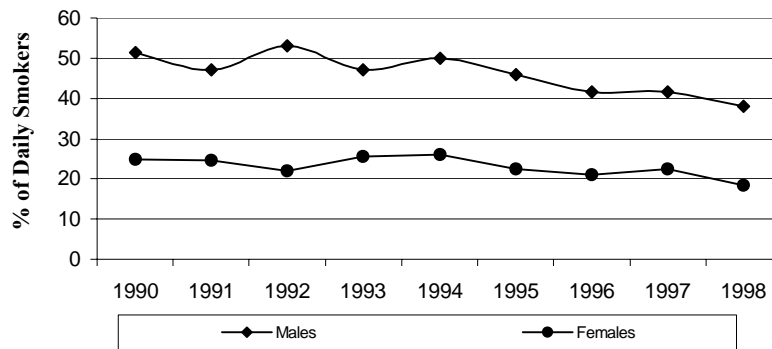
Source: World Bank. 2000. Poland at a Glance. <[www.worldbank.org/data/countrydata/countrydata.html](http://www.worldbank.org/data/countrydata/countrydata.html)>

### 1.3 Adult Smoking Prevalence in Poland

Smoking prevalence in Poland reached its highest point in 1982, when over 60% of Polish males and over 30% of Polish females were classified as daily smokers (Zatonski and Przewozniak 1992). In that year, the average number of cigarettes consumed daily was 19 for males and 15 for females, one of the highest consumption levels in the world. After 1982, the number of regular smokers in Poland started to decline and stabilized at the beginning of the 1990s at a 51% smoking rate among males and 29% among females (Przewozniak and Zatonski 1999a; Zatonski et al. 2000b).

The adult smoking prevalence between 1990 and 1998 is illustrated in Figure 1. The turning point seems to be in 1995, when the Law for the Protection of Public Health against the Effects of Tobacco Use was overwhelmingly approved by the Polish Parliament. A strong decline in smoking prevalence is evident among Polish adult men (about 10% decrease between 1994 and 1998), with a much smaller and slower decline in smoking among adult women. The decline in smoking prevalence in men was evident across all age and socioeconomic groups, whereas the decline in smoking among women was concentrated in young adult (aged 20-39) women. In 1998, a year before the Global Youth Tobacco Survey was conducted in Poland, the smoking prevalence among Polish men was about 40%; the corresponding figure for women was 20% (Czart et al. 2000a; Zatonski et al. 2000b). Still, nicotine dependence rates, measured by the FTND score, were higher in Poland than in European Union countries (Fagerström et al. 1996).

**Figure 1: Adult Smoking Trends in Poland, 1990-1998**



Source: Zatonski et al. 2000b

### 1.4 The Tobacco Industry

Poland drew the attention of transnational tobacco companies early in its transitional economic process. The companies saw the substantial opportunities offered by a large market of cigarette consumers virtually untouched by advertising and promotion. Threatened by increasingly restrictive tobacco policies and decreasing consumption in their own domestic markets, foreign tobacco companies readily invested in Poland's tobacco industry (Connolly 1995; Zatonski

2003b). For example, their expenditures for cigarette advertising in Poland increased 20 times between 1990 and 1997 (National Association of Tobacco Industry 1998). In Poland, they profited from the low production costs secured by inexpensive labor, capital, and raw tobacco. Their market activities were part of a global trend that emerged during the socioeconomic transition of the former socialistic countries of Central and Eastern Europe, including the Soviet Union republics (Gilmore and McKee 2004a, b, c). Five markets in this region (Russia, Poland, Hungary, Romania and the Ukraine), where BAT used to have no production facilities, now account for 12% of the BAT group sales volume (Gilmore and McKee 2004b).

This development of the transnational tobacco industry took place at a time when the Polish government had not yet established a comprehensive tobacco policy. Anti-tobacco legislation had not yet been implemented, little was being done to deter cigarette smuggling, and as part of privatization deals, the government had agreed to keep cigarette taxes very low for several years into the 1990s. As a result, Poland lost the opportunity to collect substantial tax revenues, while cigarette producers reaped large profits from the Polish market (Ciecierski 2002; Czart et al. 2000c).

## 1.5 Public Policy to Discourage Tobacco Use

### Cigarette Taxes

In 1993, two types of taxes were levied on tobacco products: value added taxes (22%) and excise taxes (Czart et al. 2000c). The excise tax was applied according to cigarette categories: foreign, king-size, domestic with filter, and domestic without filter.<sup>3</sup> Tax banderols for cigarette packaging (indicating that the manufacturer had paid the excise tax) were also introduced in the same year in order to reduce smuggling to the country.<sup>4</sup>

This excise tax scheme favored cigarettes using larger amounts of domestic tobacco leaf. Foreign brands were initially heavily taxed (32% as opposed to an average 10% on domestic brands). However after 1993, foreign cigarettes were subject to relatively low increases in excise tax duties. Between 1993 and 1997, excise taxes on domestic cigarettes increased 2.5 times faster than on international brands.

The 1995 Act stipulated that the government must implement a pricing policy designed to limit tobacco use (Zatonski 2003a,b). Tax increases after 1995 caused a steady increase in real cigarettes prices, with a surge in 1999, when a series of four excise tax hikes was implemented. This time the increase was proportional for all four cigarettes categories. A 10% increase took effect in January. Three more increases, each 5%, took effect in March, June, and September 1999. The result was a 27% tax rise compared to 1998 (Table 2).

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<sup>3</sup> Cigarettes manufactured in Poland but produced entirely from imported tobacco are considered foreign brands for levying the excise tax.

<sup>4</sup> See Joossens and Raw 1998, on smuggling in Europe, including Poland and other Central and Eastern European countries.

**Table 2: Excise taxes on cigarettes in 1998 and 1999, as % of retail price**

<b>Cigarette category</b>	<b>Jan. 1998</b>	<b>Jan. 1999</b>	<b>Mar. 1999</b>	<b>June 1999</b>	<b>Sept. 1999</b>
Foreign brands	76.5	84.2	88.4	92.8	97.4
King-size (longer than 70 mm)	65.5	72.1	75.7	79.4	83.4
Domestic with filter (70 mm)	51.5	56.7	59.5	62.5	65.6
Domestic without filter (70 mm)	50	55	57.8	60.6	63.7

*Source:* Polish Ministry of Finance, Department of Intermediary Taxation.

The government proposed to increase cigarette taxes further by 28%, 34%, and 33% in 2000, 2001, and 2002, respectively. The main purpose of these tax increases was to discourage cigarette consumption and to increase government revenue. Part of the additional government income was earmarked, through a 0.5% levy on the excise tax, for new anti-tobacco campaigns and other nationwide health promotion activities. Through these acts, the Polish government wanted to communicate effectively to the public the message of the negative health effects of smoking. Unfortunately, the planned tax increases were substantially limited by the new government since it considered, despite expert opinion, that higher taxes would increase smuggling of cigarettes to Poland from Eastern European countries and reduce the benefits to the public budget.

### **Restrictions on Smoking**

The strong Polish anti-tobacco and pro-health lobby has developed a number of tobacco-control policies that rank among the best in Eastern Europe (see: Zatonski 2003a,b). Non-smokers are protected by numerous restrictions on smoking in public places:

- Since 1992, smoking has been banned on public transport.
- The 1996 Tobacco Control and Health Protection Act forbids smoking in all health care establishments, schools and other educational facilities, and in closed spaces on the premises of institutions of employment and other public service buildings, with the exception of areas expressly set aside for smokers.
- Many local communities and cities (Krakow, Torun, Gdansk, Ciechanow, Legnica, and Rzeszow) have introduced more restrictive policies on smoking in public places and worksites than the ban (with the exception of smoking zones) that came into force as an effect of the 1996 Law and its 1999 amendment.

### **Youth Access Restrictions**

Young people under the age of 18 are not allowed to buy tobacco products under Polish law. The law also prohibits the sale of tobacco products at schools and in other teaching establishments as well as in sports facilities. It is forbidden to sell cigarettes through vending machines, to sell single cigarettes, or to sell cigarettes in packs with fewer than 20 cigarettes.

## **Advertising Restrictions and Compulsory Health Information**

A ban on tobacco advertising was first introduced in Polish TV and radio. The Law for the Protection of Public Health against the Effects of Tobacco Use (1996)<sup>5</sup> was the first general and comprehensive tobacco control legislation that incorporated this ban (Nasheim et al. 2003). It also prohibited newspapers and magazines for children and teenagers from advertising tobacco products or any products that look like tobacco products. The Law (amended in 1999 to change the partial advertising ban to a total ban) prohibits advertising and promotion of tobacco products and accessories on television, radio, in cinemas, in print media, as well as in health care establishments, movie theaters and other cultural and educational facilities, institutes of higher learning and sports facilities.

Poland's Ministry of Health approved one of the world's largest and most distinct health warning labels in 1993 for cigarette packs and tobacco advertisements (a small number of countries now mandate even larger, pictorial warnings)(Zatonski et al. 2000a):

- Each packet of cigarettes must contain at least two different health warnings, which must occupy at least 30% of both of the largest sides of a single cigarette package. (This policy was harmonized with EU requirements after Poland's accession to the European Union in 2004.)
- Tar and nicotine levels per cigarette must be listed on each pack. (The Ministry of Health and Social Welfare sets the maximum permissible levels of harmful substances in tobacco products and methods for determining these levels.)
- While still allowed, authorized tobacco advertisements had to contain a clear and legible warning about the adverse effects of smoking, occupying at least 20% of the total surface of the advertisement. (Until 1999, advertising was allowed in some print media and on billboards. After 1999, only restricted point of sale advertising was allowed.)

## **Other Tobacco Control Policies and Government Initiatives**

- Since 1996 it has been forbidden to produce or market smokeless tobacco products (excluding nasal snuff which is regulated by the Law amendment of 1999).
- Free treatment of smoking dependence is offered in public health care facilities.
- The Polish government has supported the establishment of the Polish Anti-Tobacco Society, medical associations and many NGOs that help to effectively implement tobacco control programs and policy in Poland. These institutions hold regular meetings and have actively participated in drafting the new progressive tobacco legislation. Since 2003, the Civil Society Coalition "Tobacco or Health" has led the NGO anti-tobacco movement.
- Health education campaigns are often organized jointly by governmental and non-governmental organizations (NGOs) with the support of the media. Some of these organizations include, the Maria Sklodowska-Curie Memorial Cancer Center and Institute of Oncology, the Health Promotion Foundation, the Polish Medical Society, and other medical institutions and organizations.

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<sup>5</sup> The bill was approved by Parliament in November 1995, signed into law by the President in January 1996 and came into force by May 1996.

## 2. DATA

### 2.1 Surveillance of Youth Smoking in Poland and the Global Youth Tobacco Survey

Many Polish studies on children and youth smoking behaviors and attitudes were not systematically conducted and were not based on national randomised samples. Their approach and design resulted from country-specific needs and could not be compared properly with study results from other countries (see: Lewicka et al. 1994; Marmon and Flak 2000; Wijatkowski et al. 1990).

The first nation-wide randomised studies on tobacco use among children and youth in Poland were conducted accordingly to international standards in the 1990s. The European School Survey Project on Alcohol and Drugs (ESPAD), conducted among 15-16 year old schoolchildren in 26 European countries, mainly focused on alcohol and drug problems and was carried out only on one occasion in Poland (in 1995)(ESPAD Collaborating Group 1995). This study used a big sample (N=8843) and was the first attempt to assess the extent to which young people had ever smoked, currently smoked, age of starting to smoke, and opinions on the harmfulness of tobacco use.

The most comprehensive and long-term research study has been the WHO Cross-National Study on Health Behaviour in School-Aged Children (HBSC) that was carried in 1990, and repeated in 1994, 1998, and again in 2002 (Kwiatkowska et al. 1998; Mazur and Woynarowska 1999; Mazur et al. 2000; Woynarowska et al. 2002). Until now, this is also the biggest survey on tobacco use among schoolchildren.<sup>6</sup> This survey was an attempt to evaluate smoking prevalence among Polish children and to identify behavioral and social factors that shape their attitudes toward smoking. However, the HBSC studied smoking as a component of general health behavior rather than as a specific topic. The analysis of smoking was limited to smoking prevalence, including experimentation and current smoking, number of cigarettes per week, recent attempts to stop smoking and social and lifestyle factors that are associated with smoking by children.

The first nation-wide study in Poland that was exclusively focused on tobacco use among children and their relationship to tobacco industry and tobacco control activities was conducted as part of the Global Youth Tobacco Survey (GYTS) in Poland in 1999 and repeated in 2003 within the collaborative research project of the World Health Organization (WHO) and the US Centers for Disease Control and Prevention (see: Przewozniak et al. 2000; Przewozniak and Zatonski 2003a,b; Przewozniak and Zatonski 2004). The GYTS is school-based study and employs a two-stage sample design to produce representative data on smoking among students aged 13 to 15. The first stage consists of a probabilistic selection of schools; the second stage consists of a random selection of classes from the participating schools. All students in the selected classes are eligible for the survey. The GYTS aims to track tobacco use among youth in countries around the world, using a common methodology and core questionnaire (Warren et al. 2000). It also makes it possible to recognize patterns and determinants of smoking among

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<sup>6</sup> Number of students who participated each year: 1990 – 4643, 1994 – 4527, 1998 – 4861, 2002 – 6383; in total – 20,414

children, including the role of their environment. However, the main goal of the GYTS was to enhance the capacity to design, implement and evaluate tobacco control and prevention for children and youth.

The survey data used in this paper were collected in Poland in December 1999 (see also: Przewozniak et al. 2000; Przewozniak and Zatonski 2003a,b). The survey was organized by the Department of Cancer Epidemiology and Prevention of the Cancer Center and Institute in Warsaw in collaboration with the Centre for Research on Public Opinion (TNS OBOP). It is a nation-wide, nationally representative study. The rural and urban samples were drawn separately. In some cases, students attended urban schools but lived in a rural area, but the opposite situation (an urban student attending a rural school) was rare. Out of the originally selected 65 schools in each sampling region (130 in total), 57 urban schools and 60 rural schools participated in the survey (i.e., 90%). The types of schools involved in the survey included gymnasiums, primary schools, technical secondary schools, regular lyceums, professional lyceums<sup>7</sup>, and technical colleges. Out of 3,855 eligible student participants, 3,294 (i.e., 85.4%) completed usable questionnaires. The overall response rate was 76.9% (90% x 85.4%).

## 2.2 Variables

Numerous variables were constructed from the data collected in the survey, and are discussed below. The missing observations on all created variables were captured by a series of dichotomous indicators, which assumed a value of one if the observation was missing, zero otherwise. Information coded in this manner allowed all observations to be retained in the analysis even when some data for a respondent were not available.

### Smoking Behavior

The most important set of variables described the smoking behavior of respondents. The variable Smoker indicates whether a respondent is a current smoker, being set to a value of 1 for those who smoked on at least one of the 30 days prior to the survey, zero otherwise.

The next three measures of smoking were continuous variables describing the smoking intensity of those who fit the definition of a current smoker. The first intensity variable was the average number of days during the last 30 days before the survey when the respondent smoked at least one cigarette. The second intensity variable represented the average number of cigarettes smoked in a day when the respondent smoked. The third intensity variable was constructed by multiplying the two previous measures, which gave the average cigarette consumption in the previous 30 days for a current smoker.

The survey also asked students what brand of cigarette they usually smoked. This information was coded in five dichotomous variables for brands listed in the questionnaire (Sobieski, L&M, Spike, Golden American, Marlboro), one dichotomous variable for all other brands, one

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<sup>7</sup> A “professional lyceum” is a 4-year high school that prepares students for a particular profession; for example, there are lyceums for economic accountants, dietary counselors, hotel personnel, agriculture and garden professionals. The “regular lyceums” offer a general (non-specialized) education.

dichotomous variable for smoking any of the foreign brands, and one dichotomous variable for those who did not have a favorite brand.

## **Socio-Economic Status**

The socio-economic status of respondents was described by another set of variables. The variable Age is continuous and indicates the age of a survey participant. The minimum age category in the questionnaire was 11 years old or under, which was recorded as 11. The maximum age category was 17 or over, which was recorded as 17. The average age of the sampled population was 14.1 ( $\pm 0.04$ ). The variable Male indicates the gender of a respondent, one for male and zero for female. In the sample, 46.2% ( $\pm 1.8$ ) of the respondents were male.

The type of school attended was captured in six dichotomous indicators. About 32% ( $\pm 1.6$ ) of the sample reported being in the first class of gymnasium, 37% ( $\pm 1.7$ ) attended class 8 of primary school, 5% ( $\pm 0.7$ ) were in the first class of technical secondary schools, 10% ( $\pm 1.1$ ) were in the first class of regular lyceums, 5% ( $\pm 0.8$ ) were in the first class of professional lyceums, and 11% ( $\pm 1.1$ ) were in the first class of technical colleges.

Students of most ages covered by the survey were found in all types of schools, but the majority of gymnasium students were 13 and 14 years old (average age was 13.1 ( $\pm 0.04$ )), 14 and 15 years old in class 8 of primary school (average age was 14.1 ( $\pm 0.04$ )), and 15 and 16 years old in technical secondary schools (average age was 14.9 ( $\pm 0.2$ )). The average age was 15.1 ( $\pm 0.1$ ) in the regular lyceums, 15.2 ( $\pm 0.1$ ) in professional lyceums and 15.2 ( $\pm 0.1$ ) in technical colleges.

Financial resources available to students were captured in a continuous variable expressing the amount of pocket money students received in a month (expressed in Polish zloty). On average, students disposed of PLN 26 ( $\pm$  PLN 1.2) per month. Parental education, which is also a proxy for family income, was coded separately for father and mother. The lowest education attainment was primary education (11% of fathers and 14% of mothers); the highest was university (16% of fathers and 18% of mothers). Mothers were, on average, slightly more educated than fathers.

Student place or residence was described by a set of dichotomous indicators for living in a rural area (58% ( $\pm 3.1$ )), a town with less than 100,000 people (19% ( $\pm 4.0$ )), a town with less than 500,000 people (13% ( $\pm 3.3$ )), and a town with over 500,000 inhabitants (10% ( $\pm 2.1$ )). Even though the survey was conducted separately in urban and rural schools, 22.6% of the respondents in the urban sample described themselves as living in a rural area, and 6.8% of the respondents in the rural schools sample described themselves as living in an urban area.

## **Cigarette Price**

Four measures of cigarette price were constructed from the survey based on responses to the question: "How much do you usually pay for a pack of 20 cigarettes?" About 23% of the sample answered this question.

The first price variable was created from answers to this question. A second variable was created as the average of individual responses calculated for each school. Two other average price

variables were constructed for each school, one that included only respondents who smoked the domestic brand Sobieski, another for respondents who smoked one of the listed foreign brands. The purpose of creating variables for the average Sobieski price and the average foreign brand price was to study cross-price elasticity – the effect of changes in prices of one type of cigarette on demand for the other type.

### **Exposure to Media Messages, Promotional Activities, and Prevention Efforts**

The exposure of students to media messages and advertising was described by a series of dichotomous variables for possession of cigarette promotional products, and for the previous month's observation of cigarette advertising on TV, on billboards, in the press, and at other events. Other promotional activities of tobacco companies were represented by whether participants have been offered a free cigarette by a company's agent in the past month.

The exposure to anti-smoking messages was measured by two dichotomous variables: seeing an anti-smoking advertisement during the month before the survey and seeing an anti-smoking advertisement during an event during the month before the survey. Both advertising and anti-smoking variables are potentially endogenous because smoking status (a dependent variable) can affect attention paid to both types of message.

Exposure to outside prevention efforts was measured by several dichotomous indicators: warning received from a family member, the danger of smoking taught in class, teen smoking discussed in class, and specific effects of smoking taught in class. Time since the last discussion on smoking during a lesson was captured by an index variable. The first dichotomous variable of this set may be endogenous if smokers attracted more warning messages due to their risky behavior.

### **Knowledge of Health Consequences**

Respondents' knowledge of the health consequences of smoking was measured by their stated beliefs regarding harmful health effects of smoking and of exposure to secondhand smoke. Because these beliefs are affected by a person's smoking status, the variables are endogenous in the cigarette demand equation.

## **3. BASIC DESCRIPTIVE STATISTICS**

Information on sampling weights, strata, and primary statistical units was not provided, so the data were analyzed with standard statistical methods, without weighting.

### **3.1 Smoking Prevalence and Intensity**

Smoking prevalence among teenage students in the 1999 GYTS survey in Poland is described in Table 3 (see also: Przewozniak and Zatonski 2003a). More than 64% of the students had

experimented with cigarettes and over 23% were current smokers (defined as smoking on at least one of the 30 days before the survey). These rates are lower than current smoking prevalence among the same age group in the US (34%) (US CDCP 2000a), France (35%) (US CDCP 2000b), Czech Republic (30%) (Sovinová and Csémy 2000; see also: Baska et al. 2004), Hungary (36%) (US CDCP 1997; see also: Baska et al. 2004), Ukraine (41%) (Ross 2004), and many other Eastern European countries (GYTS Collaborative Group 2002, 2003). However, Poles begin smoking earlier than, for example, students in Ukraine: nearly one-third of the Polish sample tried a cigarette before the age of 10 compared to less than one-fifth of the Ukraine sample.

Smoking and use of other tobacco products were twice as prevalent in urban schools than rural schools (see also: Przewozniak and Zatonski 2003a). However, students from rural areas started to smoke earlier than attendees of urban schools. Current cigarette use was more prevalent among males than females, but the gender gap was smaller than in Ukraine for example (Ross 2004). Females were also less likely to use other tobacco products and had started to experiment with smoking later in their lives than males.

**Table 3: Smoking prevalence among teenage students in Poland**

<b>Behavior described</b>	<b>Sample (%)</b>	<b>Urban (%)</b>	<b>Rural (%)</b>	<b>Male (%)</b>	<b>Female (%)</b>
Any cigarette experience	64.3 (±2.7)	69.8 (± 3.3)	58.7 (± 4.3)	70.0 (± 4.0)	58.6 (± 3.4)
Current cigarette use	23.3 (± 2.4)	29.3 (± 4.0)	16.9 (± 2.6)	25.9 (± 3.4)	19.7 (± 2.9)
Current use of tobacco other than cigarettes	9.7 (± 1.6)	13.1 (± 2.8)	6.2 (± 1.4)	12.4 (± 2.6)	6.8 (± 1.5)
Current use of any tobacco product	28.1 (± 2.5)	35.0 (± 4.0)	20.9 (± 2.8)	32.5 (± 3.8)	23.1 (± 2.9)
Tried cigarettes before age 10 (% of those who ever smoked)	31.4 (± 2.5)	26.6 (± 3.3)	37.3 (± 3.8)	35.7 (± 3.5)	25.4 (± 3.2)

Notes: The numbers in parentheses give the 95% confidence interval.

The extent of smoking among current cigarette smokers is shown in Table 4 (see also: Przewozniak and Zatonski 2003a). Over 42% of current smokers smoked daily (29%) or almost daily (13%). But the number of cigarettes smoked daily was usually less than a typical adult's daily cigarette consumption. Fewer than 12% of current smokers smoked a pack of cigarettes a day. Most smokers (34%) smoked between two and five cigarettes per day. The urban/rural and male/female differences in smoking intensity were noticeable: students in rural schools and females smoked significantly less. Fewer than 22% of current smokers said they were more likely to smoke if they drank alcohol or used other drugs, with more females and urban students saying this than males and rural students. More males and urban smokers than females and rural students show at least one of the accepted signs of nicotine addiction (craving a cigarette upon waking).

**Table 4: Behavior of current cigarette smokers**

<b>Behavior</b>	<b>Sample</b>	<b>Urban</b>	<b>Rural</b>	<b>Male</b>	<b>Female</b>
<b>Average number of smoking days in a month</b>	15.6 (± 1.2)	17.4 (± 1.4)	12.2 (± 1.7)	16.8 (± 1.5)	14.2 (± 1.8)
- 1 or 2 days/month (%)	20.5 (± 3.5)	16.1 (± 4.1)	28.4 (± 5.5)	13.9 (± 3.4)	27.8 (± 5.8)
- 3 to 5 days/month (%)	13.3 (± 2.9)	10.0 (± 3.5)	19.1 (± 5.1)	12.9 (± 4.5)	13.6 (± 4.0)
- 6 to 9 days/month (%)	10.7 (± 2.9)	10.9 (± 3.9)	10.3 (± 3.8)	13.2 (± 4.0)	7.9 (± 3.3)
- 10 to 19 days/month (%)	13.3 (± 2.6)	13.8 (± 3.6)	12.3 (± 3.6)	13.7 (± 4.0)	12.8 (± 4.5)
- 20 to 29 days/month (%)	13.4 (± 2.5)	16.0 (± 3.1)	8.7 (± 3.5)	15.0 (± 3.7)	11.5 (± 3.0)
- smokes each day (%)	29.0 (± 4.3)	33.3 (± 5.4)	21.3 (± 6.4)	31.4 (± 5.7)	26.4 (± 6.7)
<b>Average number of cigarettes usually smoked per day</b>	5.2 (± 0.7)	6.0 (± 0.9)	3.9 (± 0.6)	5.5 (± 0.9)	4.7 (± 0.7)
- less than 1 cigarette/smoking day (%)	18.5 (± 3.2)	13.7 (± 3.3)	27.1 (± 6.0)	16.8 (± 4.1)	20.6 (± 5.1)
- 1 cigarette/smoking day (%)	17.4 (± 3.3)	15.1 (± 4.0)	21.6 (± 5.6)	17.3 (± 4.6)	17.6 (± 4.4)
- 2 to 5 cigarettes/smoking day (%)	34.4 (± 4.7)	36.1 (± 6.2)	31.4 (± 7.4)	33.3 (± 5.4)	35.7 (± 6.2)
- 6 to 10 cigarettes/smoking day (%)	17.7 (± 3.7)	20.9 (± 5.1)	12.0 (± 3.8)	19.2 (± 4.7)	15.9 (± 4.8)
- 11 to 20 cigarettes/smoking day (%)	8.1 (± 3.0)	9.9 (± 4.3)	4.8 (± 2.5)	8.6 (± 3.8)	7.5 (± 3.2)
- over 20 cigarettes/smoking day (%)	3.9 (± 1.4)	4.4 (± 1.9)	3.2 (± 2.2)	4.9 (± 2.3)	2.8 (± 1.8)
<b>Smoking encouraged by alcohol/drugs</b>	21.6 (± 3.9)	27.5 (± 5.1)	9.8 (± 4.7)	16.8 (± 4.7)	24.1 (± 6.4)
<b>Addiction (desire to smoke in the morning)</b>	34.3 (± 4.3)	38.8 (± 6.1)	26.4 (± 4.7)	36.8 (± 6.5)	29.4 (± 5.1)

Notes: The numbers in parentheses represent a 95% confidence interval.

### 3.2 Consumption Localities and Sources of Cigarettes

Table 5 describes where students usually smoke (see also: Przewozniak and Zatonski 2003a). Unfortunately, many (39%) smoked in places not specified in the questionnaire. The most popular place among those listed in the questionnaire was at a social event, where more than 23% of respondents usually smoked. Next were public places (such as streets, parks, and shopping centers) and at home (11%). Public places were more popular among urban and male respondents. Social events were favored more by females and urban students.

**Table 5: Where students smoke (current and former smokers only)**

	Sample %	Urban %	Rural %	Male %	Female %
Home	10.6 (± 1.7)	9.1 (± 2.1)	12.8 (± 2.8)	11.2 (± 2.7)	10.1 (± 2.3)
School	6.6 (± 1.8)	8.9 (± 1.9)	3.4 (± 2.0)	8.0 (± 2.2)	5.1 (± 2.2)
Work	0.7 (± 0.5)	0.4 (± 0.6)	1.1 (± 0.8)	1.1 (± 0.7)	0.3 (± 0.5)
Friend's house	5.2 (± 1.4)	4.7 (± 1.9)	5.8 (± 2.0)	3.8 (± 1.4)	6.6 (± 2.2)
Social events	23.3 (± 2.9)	26.7 (± 4.1)	18.6 (± 4.2)	17.9 (± 3.4)	28.8 (± 4.5)
Public spaces (e.g., street, parks, store)	14.4 (± 2.3)	18.2 (± 3.5)	9.3 (± 2.4)	16.9 (± 3.2)	11.9 (± 3.2)
Other	39.3 (± 3.4)	32.0 (± 4.6)	49.1 (± 5.0)	41.3 (± 4.9)	37.2 (± 4.5)

Notes: The numbers in parentheses represent a 95% confidence interval.

Sources of cigarettes for current smokers are shown in Table 6 (see also: Przewozniak and Zatonski 2003a). The most common way of getting cigarettes was to buy them in stores or from street vendors (48% of smokers). As in many other countries, the law against youth under 18 buying cigarettes in Poland appears to be partially enforced only. The next two usual sources of cigarettes were borrowing or giving money to someone else to buy them (26% of smokers) indicating that youth access limits are easy to get around. The denial rate for store purchases was about one-third of attempts. Girls were more likely than boys to get their cigarettes from other people, but girls were more successful in buying cigarettes (i.e., girls had a lower denial rate).

**Table 6: How students usually get cigarettes (current smokers only)**

	Sample %	Urban %	Rural %	Male %	Female %
Buy in store/street vendor	48.1 (± 3.9)	54.3 (± 5.2)	37.9 (± 4.6)	51.8 (± 4.9)	43.7 (± 6.2)
Buy through someone else	12.8 (± 2.8)	10.4 (± 3.8)	16.8 (± 3.9)	15.0 (± 3.8)	10.2 (± 3.7)
Borrow	13.8 (± 2.2)	11.5 (± 2.3)	17.7 (± 4.3)	12.0 (± 3.1)	16.0 (± 3.5)
Steal	4.2 (± 1.7)	4.1 (± 2.1)	4.2 (± 2.7)	4.8 (± 2.5)	3.5 (± 1.8)
Gift from older person	9.0 (± 2.3)	8.1 (± 2.9)	10.4 (± 3.8)	5.4 (± 2.3)	13.2 (± 3.7)
Get cigarettes in some other way	11.9 (± 2.4)	11.4 (± 3.1)	12.7 (± 3.7)	10.9 (± 2.6)	13.1 (± 4.0)
Denied sale due to age (% current smokers who buy cigarettes)	31.0 (± 3.9)	30.2 (± 5.0)	32.1 (± 6.3)	36.5 (± 5.1)	24.5 (± 4.8)

Notes: The numbers in parentheses represent a 95% confidence interval.

### 3.3 Brand Choices and Prices Paid for Cigarettes

Table 7 summarizes how much students usually paid per pack. The average price paid per pack was PLN 4.5 (about US \$1.13). Rural areas either had cheaper cigarettes or rural students smoked cheaper brands. Girls paid slightly more for cigarettes than males. Students spent on average PLN 35 on cigarettes each month, PLN 3 more than the average pocket money reported.

**Table 7: Cigarette prices (current smokers who buy packs, Polish Zloty)**

Variable	Sample	Urban	Rural	Male	Female
<b>Average price paid per pack</b>	4.5 (± 0.16)	4.76 (± 0.17)	4.08 (± 0.29)	4.44 (± 0.23)	4.58 (± 0.19)
- less than PLN 3 per pack (%)	12.2 (± 2.5)	4.8 (± 1.6)	24.2 (± 5.3)	15.0 (± 3.8)	8.4 (± 3.0)
- PLN 3 to 4 per pack (%)	34.9 (± 4.2)	35.2 (± 5.8)	34.5 (± 5.7)	35.4 (± 5.7)	34.2 (± 7.5)
- PLN 5 to 6 per pack (%)	48.0 (± 4.8)	56.3 (± 6.5)	34.6 (± 5.0)	43.2 (± 6.3)	54.5 (± 7.6)
- PLN 7 to 8 per pack (%)	2.3 (± 1.2)	1.9 (± 1.4)	3.0 (± 2.1)	3.1 (± 1.9)	1.2 (± 1.2)
- PLN 9 to 10 per pack (%)	0.8 (± 0.7)	0.7 (± 0.8)	1.0 (± 1.2)	0.7 (± 0.8)	1.0 (± 1.1)
- over PLN 10 per pack (%)	1.8 (± 1.1)	1.2 (± 1.1)	2.9 (± 2.4)	2.7 (± 1.8)	0.6 (± 0.9)
<b>Amount spent on cigarettes last month</b>	35.2 (± 4.30)	37.75 (± 5.19)	30.47 (± 6.99)	32.89 (± 5.89)	35.26 (± 7.12)

Notes: The numbers in parentheses represent a 95% confidence interval.

The most popular cigarette brand among Polish youth was Marlboro, favored by 22% of smokers (Table 8). The second most popular brand was L&M, at 18%, with the domestic brand Sobieski third, smoked by 16% of smokers in the sample. Almost half of the current smokers preferred one of the listed foreign cigarette brands; nearly 23% did not have a brand preference. Rural smokers liked the domestic brand more and foreign brands less than urban smokers (reflected in the lower average cigarette price paid by rural students, as Sobieski is cheaper than the foreign brands). The average price reported by Sobieski smokers is PLN 4.2, while the average price reported by foreign brand smokers is PLN 5.1.

**Table 8: Cigarette brands (percent of current smokers)**

	<b>Sample</b>	<b>Urban</b>	<b>Rural</b>	<b>Male</b>	<b>Female</b>
Smokes Sobieski (%) (most popular local brand)	15.9 (± 3.4)	12.4 (± 3.5)	21.5 (± 6.4)	16.1 (± 4.6)	15.6 (± 4.5)
Smokes Marlboro (%)	22.3 (± 4.0)	25.5 (± 5.9)	17.2 (± 4.4)	20.6 (± 4.3)	24.2 (± 6.1)
Smokes L&M (%)	18.1 (± 3.9)	21.1 (± 5.4)	13.3 (± 5.2)	18.3 (± 4.7)	17.9 (± 5.3)
Smokes Spike (%)	3.0 (± 2.0)	3.1 (± 2.9)	2.9 (± 2.2)	2.1 (± 1.5)	3.9 (± 3.4)
Smokes Golden American (%)	4.1 (± 2.0)	2.6 (± 2.4)	6.5 (± 3.5)	5.4 (± 3.0)	2.7 (± 1.9)
Smokes one of the foreign brands (%)	47.0 (± 4.8)	51.9 (± 6.3)	39.1 (± 6.7)	46.4 (± 5.6)	48.7 (± 6.4)
Smokes other non-listed brands (%)	13.8 (± 3.0)	12.0 (± 4.1)	16.7 (± 4.3)	15.8 (± 4.3)	11.6 (± 3.8)
No brand preference (%)	22.9 (± 3.5)	23.4 (± 4.7)	22.0 (± 5.2)	21.8 (± 4.3)	24.1 (± 5.5)

Notes: The numbers in parentheses represent a 95% confidence interval.

Table 9 describes how Polish teenage students said they had reacted to the tax hikes that took place in 1999 in January (10%), March (5%), June (5%), and September (5%). The overall effect of these quarterly tax hikes amounted to a substantial 27% rise in excise taxes in 1999. More than half of the sample said they had changed their smoking behavior in response to the price increases, evidence of price sensitivity among Polish youth. The most common change reported was to quit smoking, reported by 26% of the sample. Far fewer Polish adult smokers (7%) reported that they had quit or tried to quit in response to the tax increases (Czart et al. 2000b,c). This indicates that price policy can be especially effective in reducing tobacco use among children and youth. Another 20% of the smokers in the GYTS sample said they had considered quitting, and less than a quarter of smokers said the price increases had no impact on their behavior at all.

More rural students reacted (67%) than urban (48%). If rural areas are less wealthy than urban areas (which is typically the case), it is possible to conclude that young people from lower income families are more sensitive to price increases than their peers from better-off families, and that the tax increase brought more health benefits to people who are economically less well off. Males reacted more strongly to the new taxes than females (60% of males compared to 52% of females said they changed their smoking behavior). More males than females cut down the number of cigarettes smoked or switched to a cheaper brand. More females, on the other hand, said they successfully quit.

**Table 9: Reaction to cigarette price rises (smokers who reported a reaction)**

Behavior	Sample %	Urban %	Rural %	Male %	Female %
<b>Demand reduced/altere</b>	55.8 (± 3.9)	47.9 (± 5.3)	66.9 (± 5.1)	59.6 (± 5.7)	51.6 (± 5.9)
Successfully quit smoking	26.0 (± 3.8)	16.8 (± 4.5)	38.8 (± 5.8)	24.6 (± 5.1)	27.7 (± 6.3)
Tried to quit smoking but still smoking now	10.2 (± 2.2)	9.5 (± 2.9)	11.3 (± 3.4)	12.0 (± 3.3)	8.2 (± 2.7)
Smoking fewer cigarettes	15.0 (± 2.8)	16.8 (± 3.6)	12.4 (± 4.1)	16.2 (± 4.1)	13.6 (± 3.1)
Smoking cheaper cigarettes	4.8 (± 1.7)	4.6 (± 2.0)	5.1 (± 3.1)	6.9 (± 2.7)	2.2 (± 1.7)
<b>Considered quitting</b>	20.4 (± 3.4)	21.3 (± 4.4)	19.2 (± 5.5)	20.6 (± 4.4)	20.2 (± 4.7)
<b>No impact</b>	23.6 (± 3.7)	31.0 (± 5.6)	13.2 (± 3.6)	19.8 (± 4.3)	28.2 (± 5.3)

Notes: The numbers in parentheses represent a 95% confidence interval.

### 3.4 Effect of Age on Cigarette Consumption

Table 10 analyzes the age structure of smoking prevalence and smoking intensity among Polish students. By the age of 17, nearly 85% of the respondents had experimented with smoking and about 64% of students were current smokers.

The prevalence of smoking and use of other tobacco products was surprisingly high in the two youngest age groups (11 and 12 year olds). However, the results for the youngest and the oldest age groups have to be viewed with caution because the relatively small number of respondents in those age categories resulted in a high standard error of the estimates. The survey was designed to sample 13-15 year olds, but because of the sampling design, also included some younger and older students.<sup>8</sup> Focusing attention on the most-represented age groups (ages 13, 14, 15), current smoking status, smoking intensity, and use of other tobacco products increased with age. The average price paid per cigarette pack also increased with age. This corresponds to the fact that older smokers were switching from the cheaper local brand to the more expensive foreign brands, particularly Marlboro. This finding is also consistent with the tighter income constraints among younger smokers. With respect to brand preferences, Marlboro was the most popular among most age groups. The 16 and 17 year olds had the highest smoking prevalence and were more likely to have an established brand preference.

<sup>8</sup> The sample included 147 11-12 year olds and 265 16-17 year olds.

**Table 10: Smoking behavior by age**

Behavior described	11 years or younger	12 years	13 years	14 years	15 years	16 years	17 years and older
<b>Any cigarette use (%)</b>	73.6 (±12.3)	82.1 (±11.5)	49.4 (± 6.2)	60.7 (± 4.3)	73.1 (± 2.9)	82.8 (± 4.3)	84.8 (±17.9)
<b>Current cigarette use (%)</b>	33.6 (± 15.8)	44.7 (±14.1)	9.4 (± 3.1)	17.8 (± 3.3)	30.5 (± 4.2)	48.1 (± 8.7)	63.7 (± 19.9)
<b>Current other tobacco use (%)</b>	25.8 (± 10.0)	17.1 (±8.5)	5.0 (± 1.8)	8.3 (± 2.1)	10.9 (± 3.3)	17.1 (± 6.0)	14.1 (± 12.4)
<b>Of current smokers only:</b>							
- smoking days per month	13.9 (± 2.9)	15.9 (± 5.6)	13.5 (± 3.8)	11.8 (± 2.3)	16.0 (± 1.6)	20.7 (± 2.2)	25.0 (± 3.9)
- cigarettes per day	7.0 (± 2.4)	6.3 (± 2.8)	3.3 (± 1.1)	4.0 (± 0.8)	4.8 (± 0.7)	7.9 (± 1.6)	9.7 (± 2.5)
- smokes Sobieski (%) (most popular local brand)	15.7 (± 11.5)	3.2 (±6.2)	21.3 (±7.7)	17.7 (± 6.8)	15.5 (± 4.4)	10.8 (± 5.4)	16.8 (±18.5)
- smokes Marlboro (%)	29.5 (± 12.8)	20.5 (±18.5)	16.1 (± 9.4)	20.5 (± 6.5)	20.7 (± 6.6)	28.1 (± 9.5)	47.6 (± 2.5)
- smokes L&M	15.8 (± 16.3)	11.2 (± 11.5)	12.4 (± 6.0)	14.4 (± 5.7)	21.7 (± 5.9)	22.2 (± 8.5)	5.2 (± 10.4)
- smokes Spike (%)	2.4 (± 4.9)	7.2 (± 9.8)	5.1 (± 4.1)	5.3 (± 4.4)	1.2 (± 1.2)	2.6 (± 2.5)	0.0 (± 0.0)
- smokes Golden American (%)	9.7 (± 7.9)	0.0 (± 0.0)	4.2 (± 4.1)	3.5 (± 2.4)	2.7 (± 2.2)	5.4 (± 2.4)	7.1 (± 5.3)
- smokes one of the foreign brands (%)	57.4 (± 17.8)	38.9 (±21.9)	37.7 (± 9.1)	43.6 (± 8.2)	46.4 (± 6.0)	58.3 (± 10.7)	59.9 (±32.4)
- smokes other non-listed brands (%)	5.9 (± 8.2)	6.7 (±9.8)	20.4 (±7.1)	17.9 (± 6.4)	11.9 (± 3.9)	11.0 (± 5.5)	6.3 (± 12.6)
- no brand preference (%)	21.1 (± 13.9)	51.2 (±23.9)	20.5 (±9.6)	20.7 (± 5.9)	26.2 (± 6.3)	19.9 (± 7.1)	17.0 (± 18.8)

Notes: The numbers in parentheses represent a 95% confidence interval.

### 3.5 Risk of Smoking Uptake and Prevention Efforts

The students' beliefs and intentions regarding their future smoking behavior are reported in Table 11 (see also: Przewozniak and Zatonski 2003a). More than 12% of current non-smokers could be classified as being at high-risk of starting to smoke because they said they would be willing to smoke if offered a cigarette by a friend, or they expected to be smoking within a year. This risk was about equally strong for males and females, but the urban population was more susceptible to smoking than the rural population. For females, this may be the result of perceived (and imitated) smoking patterns among adult women whose smoking prevalence is substantially higher in urban than rural areas. About 5% of current non-smokers expected to be smoking within five years. Psychologists and sociologists suggest that individuals at high risk for taking up smoking are particularly susceptible to prevention measures (Pierce et al. 1998a,b).

Students seemed to be well informed about the health consequences of smoking, and health concerns were the most frequently cited reason for quitting. About three-quarters of current smokers said they wanted to quit their habit and had already tried to do so. Over 85% of respondents said they believed that it was easy to stop smoking and a relatively high percentage

of them (70%) had succeeded. Eleven percent of students who had ever smoked said they had received professional help to quit, much higher than in the 3% figure in the Ukraine GYTS sample, and significantly higher than the 8% figure reported in the Russia GYTS (Ross, 2004; see also Baska et al. 2004 to look at differences in Central Europe).

Even though health concerns were the leading motive for quitting smoking (24%), saving money was the second most frequently cited reason (11%). This is further evidence that Polish youth are price sensitive. Responses to this question confirm findings in the literature regarding higher price sensitivity among males (who tend to smoke more intensively) than females (Chaloupka and Pacula 1999).

**Table 11: Attitudes toward future smoking and quitting**

	Sample %	Urban %	Rural %	Male %	Female %
Will smoke if offered a cigarette by a friend (% current non-smokers)	7.5 (± 1.2)	8.3 (± 1.7)	6.8 (± 1.5)	8.4 (± 1.9)	6.8 (± 1.4)
Expect to smoke within a year (current non-smokers only)	9.1 (± 1.4)	10.2 (± 2.1)	8.1 (± 1.8)	9.0 (± 1.9)	9.0 (± 1.8)
High risk smoking uptake (current non-smokers only)	12.3 (± 1.6)	13.7 (± 2.3)	11.1 (± 2.1)	12.4 (± 2.3)	12.2 (± 2.0)
Expect to smoke within 5 years (current non-smokers only)	5.2 (± 0.8)	4.3 (± 1.1)	6.0 (± 1.2)	5.9 (± 1.5)	4.5 (± 1.0)
Thinks smoking is harmful to health	90.1 (± 1.0)	90.0 (± 1.4)	90.3 (± 1.6)	87.3 (± 1.9)	92.9 (± 1.2)
Current desire to stop smoking (current smokers only)	75.5 (± 3.8)	74.9 (± 5.2)	76.7 (± 5.1)	77.1 (± 4.6)	75.0 (± 6.7)
Tried to quit during the past year (of those who smoked last year)	77.8 (± 2.6)	76.4 (± 3.3)	79.9 (± 4.1)	78.4 (± 3.7)	77.8 (± 4.1)
Thinks he/she can quit easily (current smokers only)	85.1 (± 3.0)	84.6 (± 4.3)	85.9 (± 4.0)	84.4 (± 3.5)	85.9 (± 3.8)
Successfully quit smoking (of those who ever smoked)	70.3 (± 3.0)	63.2 (± 4.6)	78.9 (± 3.1)	69.5 (± 4.2)	71.7 (± 4.1)
Quit smoking due to health concerns (of those who quit)	23.7 (± 2.9)	23.3 (± 3.6)	24.1 (± 4.4)	27.1 (± 3.8)	20.0 (± 3.9)
Quit smoking to save money (of those who quit)	10.8 (± 1.6)	9.8 (± 2.0)	11.7 (± 2.5)	14.4 (± 2.7)	6.9 (± 1.9)
Quit smoking due to family pressure (of those who quit)	7.1 (± 1.4)	6.7 (± 2.1)	7.5 (± 2.0)	7.6 (± 2.0)	6.6 (± 2.1)
Quit smoking due to peer pressure (of those who quit)	5.0 (± 1.3)	5.2 (± 1.8)	4.9 (± 1.8)	5.1 (± 1.9)	5.0 (± 1.6)
Received professional help to quit (of those who ever smoked)	10.9 (± 1.6)	10.5 (± 2.1)	11.5 (± 2.6)	10.2 (± 2.6)	10.8 (± 2.2)

Notes: The numbers in parentheses represent a 95% confidence interval.

Students' knowledge of the health consequences of smoking is described in Table 12. Overall, students seemed to be well informed about the general effects of smoking; over 90% of them believed that smoking is harmful, and nearly 86% were convinced of the harmful effect of secondhand smoke. However, looking at the strength of these beliefs, there are differences between smokers and non-smokers. Generally, fewer smokers believed in health risks associated with secondhand smoke, and if they did, they were less certain about it compared to non-smokers. Smokers also expressed less certainty about the harmful effects of smoking.

**Table 12: Perceived risk of smoking**

<b>Beliefs</b>	<b>Sample %</b>	<b>Smokers %</b>	<b>Non-smokers %</b>
<b>Smoking is harmful to your health (probably or definitely yes)</b>	90.5 (± 1.1)	89.2 (± 2.5)	90.9 (± 1.2)
- smoking is definitely harmful to your health	75.1 (± 1.4)	55.5 (± 3.5)	81.0 (± 1.4)
- smoking is probably harmful to your health	15.4 (± 1.2)	33.7 (± 3.4)	9.8 (± 1.1)
<b>Smoking is definitely not harmful to your health</b>	6.6 (± 1.0)	4.4 (± 1.9)	7.3 (± 1.2)
<b>Smoking is probably not harmful to your health</b>	2.9 (± 0.6)	6.4 (± 1.9)	1.9 (± 0.5)
<b>Secondhand smoke is harmful (probably or definitely yes)</b>	85.7 (± 1.4)	78.4 (± 3.1)	87.9 (± 1.4)
- secondhand smoke is definitely harmful	64.1 (± 2.3)	49.7 (± 4.8)	68.4 (± 2.2)
- secondhand smoke is probably harmful	21.6 (± 2.0)	28.7 (± 4.0)	19.4 (± 2.0)
<b>Secondhand smoke is definitely not harmful</b>	7.9 (± 1.2)	9.1 (± 2.6)	7.6 (± 1.2)
<b>Secondhand smoke is probably not harmful</b>	6.4 (± 0.8)	12.5 (± 2.5)	4.6 (± 0.8)

Notes: The numbers in parentheses represent a 95% confidence interval.

Tables 13, 14 and 15 analyze how advertising and school prevention programs affected knowledge of the health consequences of smoking (see also: Przewozniak and Zatonski 2003a). This analysis used an ordered Probit model, which estimated the effect of the listed independent variables on four categories capturing the strength of beliefs with respect to smoking and secondhand smoke. In tables 13 and 14, the coefficients indicate how significant the independent variables are for affecting the strength of beliefs about the harmfulness of smoking and secondhand smoke.

Table 13 summarizes results for health hazards of smoking. Those who thought that smoking is definitely not harmful belong to category one. Category two includes those who thought that smoking is probably not harmful, category three consists of students who thought that smoking is probably harmful, and category four contains those who thought that smoking is definitely harmful. The results indicate that counter-advertising at an event and teaching specific effects of

tobacco use in class may have improved the health knowledge among students. Smokers were particularly sensitive to information about specific effects of smoking.

**Table 13: The effect of advertising, counter-advertising and prevention efforts on perceived harm of smoking**

<b>Independent variable</b>	<b>Sample</b>	<b>Smokers</b>	<b>Non-smokers</b>
Anti-smoking advertising in media	0.108 (±0.143)	0.048 (±0.258)	0.044 (±0.192)
Anti-smoking advertising at events	0.102* (±0.120)	0.127 (±0.216)	0.140* (±0.157)
Cigarette brand names on TV	0.064 (±0.141)	-0.177 (±0.262)	0.175* (±0.179)
Cigarette billboard advertising	0.062 (±0.140)	0.110 (±0.268)	0.086 (±0.175)
Cigarette advertising in press	-0.058 (±0.162)	-0.144 (±0.307)	-0.044 (±0.207)
Cigarette advertising at events	-0.016 (±0.139)	0.018 (±0.250)	0.000 (±0.180)
Danger of smoking taught in class	0.085 (±0.125)	-0.003 (±0.235)	0.066 (±0.163)
Smoking discussed in class	-0.022 (±0.125)	-0.107 (±0.242)	-0.007 (±0.159)
Specific effects of tobacco use taught in class	0.117* (±0.121)	0.255** (±0.226)	0.020 (±0.157)
Recent discussion of smoking in class	0.004 (±0.043)	0.035 (±0.080)	0.005 (±0.055)

Notes: The numbers are ordered Probit coefficients with confidence interval in parentheses.

\*Variable significant at 10% level, two-tailed test.

\*\*Variable significant at 5% level, two-tailed test.

Table 14 demonstrates results for health hazards of secondhand smoke from the ordered Probit model. Those who thought that secondhand smoking is definitely not harmful belong to category one. Category two includes those who thought that secondhand smoke is probably not harmful, category three consists of students who thought that secondhand smoke is probably harmful, and category four contains those who thought that secondhand smoke is definitely harmful.

The results suggest that counter-advertising in media and, unexpectedly, cigarette advertising in the press, can have a positive effect on the knowledge of the health consequences of secondhand smoke. The positive effect of cigarette advertising may be the result of the compulsory health warning covering at least 20% of the total surface of the advertisement (Nasheim et al. 2003; see also Przewozniak and Zatonski 2002a, 2003b and Zatonski et al. 2000a for a discussion of the impact of health warnings on cigarette packs). Teaching in class about the danger of smoking and/or about the specific effects of tobacco use was also associated with a belief in the harm caused by secondhand smoke. Generally, student smokers had a clearer understanding of the health consequences of secondhand smoke after being exposed to cigarette advertising, counter-advertising, and school prevention policies.

**Table 14: The effect of advertising, counter-advertising, and prevention efforts on perceived harm of secondhand smoke**

<b>Independent variable</b>	<b>Sample</b>	<b>Smokers</b>	<b>Non-smokers</b>
Anti-smoking advertising in media	0.138** (±0.134)	0.280** (±0.249)	0.062 (±0.174)
Anti-smoking advertising at events	-0.067 (±0.113)	-0.029 (±0.213)	-0.053 (±0.141)
Cigarette brand names on TV	-0.103 (±0.133)	-0.180 (±0.252)	-0.127 (±0.166)
Cigarette billboard advertising	-0.040 (±0.130)	-0.059 (±0.261)	-0.012 (±0.158)
Cigarette advertising in press	0.140* (±0.146)	0.307** (±0.287)	0.063 (±0.180)
Cigarette advertising at events	0.010 (±0.129)	-0.092 (±0.245)	0.066 (±0.158)
Danger of smoking taught in class	0.153** (±0.115)	0.130 (±0.230)	0.147** (±0.142)
Smoking discussed in class	-0.073 (±0.115)	-0.145 (±0.234)	-0.073 (±0.141)
Specific effects of tobacco use taught in class	0.127** (±0.112)	0.237** (±0.219)	0.054 (±0.138)
Recent discussion of smoking in class	0.016 (±0.039)	0.008 (±0.078)	0.040* (±0.048)

Notes: The numbers are ordered Probit coefficients with confidence interval in parentheses.

\*Variable significant at 10% level, two-tailed test.

\*\*Variable significant at 5% level, two-tailed test.

The numbers reported in Table 15 summarize how advertising, counter-advertising, and prevention exposure change the probability of believing that smoking and secondhand smoke were “definitely harmful”. All the statistically significant marginal effects are positive and they suggest that anti-smoking advertising can improve knowledge about the health effects of smoking and secondhand smoke. Among the school prevention policies, the most effective for improving knowledge about health effects seemed to be teaching about the specific effects of tobacco use.

**Table 15: The effect of advertising, counter-advertising, and prevention efforts on certainty that smoking and secondhand smoke harm health**

Independent variable \ Type of smoking harm	Smoking	Secondhand smoke
Anti-smoking advertising in media	0.035	0.053**
Anti-smoking advertising at events	0.033*	-0.025
Cigarette brand names on TV	0.021	-0.038
Cigarette billboard advertising	0.020	-0.015
Cigarette advertising in press	-0.018	0.054*
Cigarette advertising at events	-0.005	0.004
Danger of smoking taught in class	0.027	0.057**
Smoking discussed in class	-0.007	-0.027
Specific effects of tobacco use taught in class	0.037*	0.047**
Recent discussion of smoking in class	-0.001	-0.006

Notes: The numbers represent marginal change in probabilities that students think that smoking or secondhand smoke exposure are “definitely harmful”.

\*Variable significant at 10% level, two-tailed test.

\*\*Variable significant at 5% level, two-tailed test.

Table 16 indicates that 69% of the students were taught at school about the health risks of smoking. However, discussion about teen smoking took place in only 44% of schools, and specific effects of smoking were taught in 40% of schools. Slightly higher percentages of students in rural schools than in urban schools reported each type of activity in school.

**Table 16: Prevention/information efforts in school (by school location)**

School prevention efforts	Sample %	Urban %	Rural %
Any kind of smoking prevention taught in class	69.0 (±1.6)	66.8 (± 2.4)	71.1 (± 2.2)
Danger of smoking taught in class this year	50.8 (± 2.8)	48.3 (± 4.2)	53.4 (± 7.7)
Teenage smoking discussed in class	43.6 (± 2.3)	42.5 (± 3.4)	44.8 (± 3.0)
Specific effects of smoking taught in class	40.3 (± 2.4)	39.2 (± 3.5)	41.5 (± 3.5)

Notes: The numbers in parentheses represent a 95% confidence interval.

Table 17 looks at school prevention efforts further, by school type, and provides additional information. Primary schools include smoking prevention in their curriculum more frequently

than all other school types for all measures of prevention efforts, followed by gymnasium schools. About two-thirds of all survey respondents attended either a primary school or a gymnasium. There is a clear pattern of less focus on smoking prevention in other school types, which are attended on average by older students (compared to primary schools or gymnasiums).

**Table 17: Prevention/information efforts in school, by school type**

<b>School prevention efforts</b>	<b>Gymnasium %</b>	<b>Primary School %</b>	<b>Technical Secondary %</b>	<b>Reg. Lyceum %</b>	<b>Profess. Lyceum %</b>	<b>Technical College %</b>
Any kind of smoking prevention taught in class	70.5 (±4.6)	75.7 (± 3.6)	66.6 (± 4.4)	63.0 (±8.6)	63.6 (± 1.2)	60.1 (± 8.7)
Danger of smoking taught in class this year	50.9 (± 4.6)	57.8 (± 4.5)	42.7 (± 6.9)	43.4 (± 6.3)	43.6 (± 12.4)	42.2 (± 7.2)
Teenage smoking discussed in class	42.8 (± 4.4)	48.9 (± 3.5)	38.7 (± 8.0)	40.0 (± 6.0)	35.7 (± 3.8)	38.4 (± 6.3)
<b>Specific effects of smoking taught in class</b>	40.3 (± 4.6)	43.9 (± 3.5)	34.3 (± 6.6)	37.1 (± 8.0)	30.0 (± 11.5)	39.6 (± 7.1)

Notes: The numbers in parentheses represent a 95% confidence interval.

### **3.6 Exposure to Advertising and to Environmental Smoke**

Table 18 provides evidence that the Law for the Protection of Public Health against the Effects of Tobacco Use (1996), which prohibited advertising and promotion of tobacco products on television had some loopholes and/or was not adequately enforced, as over 86% of the sample saw cigarette brand names on TV in the month before the survey (see also: Przewozniak and Zatonski 2003a).. Cigarette brands were commonly seen by teenagers on foreign TV channels or during some TV sporting events (Formula 1, motorcycle races). Before tobacco advertising and promotion were fully banned (by the 1999 Law amendment that came into force in 2000 for billboards and in 2001 for the whole press), most respondents had seen cigarette advertisements in the press, on billboards, and during social events during the month before the survey. Further, even though Poland's Ministry of Health had approved one of the world's largest and most distinct health warning labels for cigarette packs which national surveys show contributed to quit attempts by about 20% of Polish smokers (see: Przewozniak and Zatonski 2002a; Zatonski et al. 2000a), almost 19% of students who had bought cigarettes said they had bought packages without health warnings. This suggests that many children have access to black market cigarettes sold, for example, by street vendors.

Anti-tobacco advertising was seen nearly as much as pro-tobacco advertising, although the gap was a little wider for social events. This is evidence that the requirement that advertising carry prominent counter-advertising had a clear effect.

A quarter of the students (more urban than rural) said they owned a tobacco company promotional item. Almost half the students had received free cigarettes from a tobacco company representative, which provides evidence that this tactic for attracting smokers is quite common. (This practice was subsequently banned in Poland; see Nasheim et al. 2003 about effects of this policy both in Poland and Norway).

**Table 18: Last month's advertising exposure**

Type of exposure	Sample %	Urban %	Rural %
Anti-smoking advertising in media	88.2 (± 1.2)	86.5 (± 1.9)	89.9 (± 1.4)
Anti-smoking advertising at events (of those who go to events)	71.7 (± 2.1)	70.6 (± 3.2)	73.0 (± 2.5)
Bought cigarettes without health warning (% of students who bought cigarettes)	18.9 (± 3.0)	17.4 (± 4.4)	20.9 (± 3.9)
Cigarette advertising in press	90.1 (± 1.1)	91.0 (± 1.6)	89.1 (± 1.6)
Cigarette advertising on billboard	86.6 (± 1.4)	89.3 (± 2.1)	84.0 (± 2.0)
Cigarette brand names on TV (of those who watch TV)	86.5 (± 1.3)	85.0 (± 2.0)	87.9 (± 1.6)
Cigarette advertising at events (of those who go to events)	81.0 (± 1.6)	82.8 (± 2.0)	79.1 (± 2.6)
Own promotional item	25.3 (± 1.7)	30.0 (± 2.8)	20.5 (± 2.0)
Free cigarette from tobacco company	47.6 (± 2.0)	51.7 (± 2.9)	43.5 (± 2.7)

Notes: The numbers in parentheses represent a 95% confidence interval.

Table 19 demonstrates that over two-thirds of the sample was exposed to secondhand smoke (SHS) at home and outside the house (see also: Przewozniak and Zatonski 2003a). This result is consistent with other epidemiological data and indicates large scale passive smoke exposure by children, with potentially negative health effects (see: Brzezinski et al. 1999; Przewozniak and Zatonski 2004; Zatonski et al. 1999). The magnitude of SHS exposure is high despite youth awareness of the detrimental effect of environmental tobacco smoke. There was overwhelming majority support for the smoking ban in public places.

**Table 19: Secondhand smoke (last week's exposure and attitudes)**

Exposure/attitudes	Sample %	Urban %	Rural %
Home exposure	68.2 (± 1.9)	68.6 (± 2.5)	67.9 (± 2.8)
Exposure in other places	67.2 (± 2.1)	72.1 (± 3.3)	62.3 (± 2.5)
Believes secondhand smoke is definitely harmful	85.3 (± 1.4)	86.6 (± 1.9)	83.9 (± 2.0)
Supports cigarette ban in public places	80.6 (± 1.7)	76.5 (± 2.7)	84.6 (± 1.9)

Notes: The numbers in parentheses represent a 95% confidence interval.

The high SHS exposure means that, in many cases and environments, adults do not understand or do not want to accept the need for reducing SHS exposure among their own and other children. However, there are examples of multi-sectoral community-based interventions that effectively protect children from tobacco smoke pollution (Przewozniak and Zatonski 2004).

Table 20 shows that about ten percent of students who smoked and who believed that smoking causes specific diseases, did not think that he or she would get those diseases from smoking. This shows a failure to internalize the health consequences of smoking, and a way to reconcile knowledge of the harm that smoking causes with continuing to smoke. Most of the non-smokers could not imagine contracting the diseases listed, but presumably they ignored the conditional in the question “if you smoke” and answered that they were not susceptible (because they did not smoke).

**Table 20: Believe that diseases are caused by smoking but that they themselves are not at risk, by smoking status**

Type of smoking harm	Smokers %	Non-smokers %
Lung disease	10.5 (± 3.8)	89.5 (± 3.8)
Lung cancer	10.5 (± 3.8)	90.0 (± 3.8)
Arteriosclerosis and coronary heart disease	12.4 (± 4.4)	87.6 (± 4.4)
Stroke	10.6 (± 5.6)	89.5 (± 5.6)

Notes: The numbers in parentheses represent a 95% confidence interval. The sample is limited to those who said they believed that smoking is harmful.

## 4. MULTIPLE REGRESSION ANALYSIS OF DEMAND

### 4.1 Methodology and Model Specification

The descriptive statistics consider only simple relationships between smoking behavior and other factors in isolation from each other. Multiple regressions allow the effects to be estimated, while controlling for other relevant variables. The most important economic aspect is the effect of price on decisions to smoke, and on the quantity of cigarettes smoked.

The questionnaire obtained information from smokers on how much they usually paid for a pack of cigarettes. It is problematic to estimate a cigarette demand equation from cross-sectional data in a country where cigarette prices and taxes tend to be fairly uniform across the country, unlike in the USA for example, where states set very different cigarette tax rates resulting in large price differentials. The observed price variation in the Poland sample results mainly from:

- brand choices,
- sources of cigarettes (the black market versus the legitimate market), and
- other decisions related to the purchase (e.g., selection of the point of sale).

This makes price endogenous, instead of being exogenous or “given” and invariant with the decisions that the model seeks to explain.

A possible way to deal with price endogeneity is to estimate a simultaneous equations model. In a two-stage least square (2SLS) model, price is first estimated as a function of instrumental variables, (variables that are closely related to cigarette prices but are not included in the cigarette demand equation). The possible instruments for the price equation would include variables that affect the costs of producing and distributing different brands via different markets (legitimate versus black market) and tax levels. However, the necessary information for a reliable price equation was not accessible, making it impossible to estimate a simultaneous equation model.

Another way to deal with price endogeneity, which was applied in this analysis, is to create a new price variable: an average of all reported prices in each school. This price measure has three advantages:

- First, it could be assigned to respondents who did not provide price information, based on their school identification number. Replacing missing responses by the school average price improved the precision of the estimates and eliminated potential bias that could arise if the missing observations were systematic with respect to the reported price.
- Second, the average price was also assigned to non-smokers who were not asked to provide price information. Being able to associate non-smokers with price information was essential for estimating the effect of price on smoking participation.
- Third, this technique partially alleviated price endogeneity because it may have reflected some regional differences in distribution and production costs, and local cigarette price promotions.

The same problem of endogeneity was encountered with variables representing tobacco control policies in Poland. Most of the policies are also uniform across the country. However,

prevention activities do vary across schools, and these variables yield meaningful estimates of their effects on student smoking behavior, attitudes and knowledge.

The smoking status of parents and friends can play an important role in a youth's decision to smoke. However, these variables were not included in the demand equation as they captured part of the price effect. The full impact of price on youth smoking was the result of both the direct effect on the youth's smoking as well as the indirect effect that results from price increases reducing peer smoking, parents' and other adult smoking, in turn reducing availability of cigarettes from social sources, ability to take cigarettes from parents' packs, etc. Thus the smoking status of parents or peers reflects the effect of price to some degree, and should not be included in the demand equation.

Because some of the dependent variables had only a limited range, corresponding econometric methods had to be employed. This study used a two-part model developed by Cragg (1971), the method frequently used in studies of cigarette demand. The propensity to smoke and the intensity of the smoking habit were modeled separately. In the first step, a smoking participation equation is estimated using a Probit specification. In the second step, an ordinary least squares (OLS) regression seeks to explain cigarette consumption of smokers, with consumption expressed in natural logarithms, to transform the variable into one with a distribution closer to a normal distribution. STATA statistical software was used to compute the results.

There are two versions of the model. The first includes only exogenous independent variables (variables that are not correlated with smoking status or smoking intensity) and price. The second version expands the first by a set of potentially endogenous independent variables of interest. Each version has two parts: the participation equation (Probit) and the conditional demand equation (OLS).

**Version 1, part 1:**

Smoking status = a function of age, sex, type of school attended, father's education, mother's education, amount of pocket money, living in a town (three different sizes), whether the school has taught smoking prevention, school average price.

**Version 1, part 2:**

Log (number of cigarettes consumed in a month) = a function of age, sex, type of school attended, father's education, mother's education, amount of pocket money, living in a town (three different sizes), whether the school has taught smoking prevention, school average price.

**Version 2, part 1:**

Smoking status = a function of age, sex, type of school attended, father's education, mother's education, amount of pocket money, living in a town (three different sizes), whether the school has taught smoking prevention, school average price, advertising exposure, anti-smoking advertising exposure, promotional exposure, knowledge of health consequences of smoking, warning received from a family member.

### **Version 2, part 2:**

Log (number of cigarettes consumed in a month) = a function of age, sex, type of school attended, father's education, mother's education, amount of pocket money, living in a town (three different sizes), whether the school has taught smoking prevention, school average price, advertising exposure, anti-smoking advertising exposure, promotional exposure, knowledge of health consequences of smoking, warning received from a family member.

Both parts of the model control for missing information on the included variables by creating a set of dichotomous indicators for those who did not answer a particular question. Individuals with missing information on smoking status and cigarette price were excluded from the first part of the model, and non-smokers and those with missing information on smoking intensity or average price were left out of the second part of the model.

A cross price effect model was estimated in order to assess whether the price difference between the local brand and an average foreign brand affected the brand choice among students. First, the model estimated the probability of smoking the domestic brand (Sobieski) and the probability of smoking any of the foreign cigarettes brands (L&M, Spike, Golden American, and Marlboro) as a function of exogenous dependent variables and prices of both cigarette brands or sets of brands. Second, the monthly cigarette consumption of two groups of smokers (those smoking the local brand, Sobieski, and a group smoking any of the foreign brands) was regressed on the same set of independent variables. The effect of these variables was also tested in a model including only Sobieski smokers and in a model including only foreign brand smokers.

## **4.2 Regression Results**

Table 21 presents results of both versions of the regression analysis. The first two columns of coefficients show results for the model controlling only for exogenous variables and price; the last two columns of the table contain results for the model with potentially endogenous variables added. The dependent variable in the first part of the models is respondent smoking status. A measure of smoking intensity (a logarithmic transformation of the number of cigarettes a smoker consumes in a month) is the dependent variable in the second part of the models. All respondents are included in the first part of the model, but only smokers are in the second part.

The reported results indicate the marginal effects of independent variables on the dependent variable. The numbers in parentheses are 95% robust confidence intervals.

The results shown in Table 21 confirm that both smoking participation and smoking intensity among Polish students increased with age and were greater for males than females. Smoking participation was lower among gymnasium students than among those who attended class 8 of primary school (all variables for school type are compared with primary schools). Students in technical secondary schools and professional lyceums showed higher smoking participation and smoking intensity than students in class 8 of primary schools. The same is true for students at technical colleges, but the results are less statistically significant.

The model next tested the effect of parents' education. The education of parents might affect smoking habits of their children in two main ways:

- Better-educated parents might provide more information on health hazards of smoking and are less likely themselves to smoke, providing positive role models and less access to cigarettes at home.
- Education serves as a proxy for family income level.

Most of the coefficients for the parental education variables were not statistically significant, indicating no difference between each educational category and the base comparator category of mother/father has primary education, in their children's smoking behavior. The only statistically significant result was detected for mother's college education, which was associated with less probability of the student smoking. This signals a more important role of mother's education in youth smoking decision.

The more pocket money students reported, the more likely they were to smoke, but it had no significant effect on smoking intensity.

**Table 21: Cigarette demand equation**

Variables	Model	1st model version		2nd model version	
		1st part	2nd part	1st part	2nd part
Age		0.040** (±0.020)	0.145* (±0.161)	0.045** (±0.020)	0.151* (±0.160)
Male		0.065** (±0.033)	0.552** (±0.338)	0.061** (±0.033)	0.627** (±0.332)
Class 1 gymnasium		-0.048** (±0.044)	-0.021 (±0.485)	-0.043* (±0.044)	-0.099 (±0.474)
Class 1 technical. secondary school		0.188** (±0.092)	0.865** (±0.578)	0.176** (±0.094)	0.803** (±0.566)
Class 1 regular lyceum		-0.024 (±0.054)	-0.048 (±0.572)	-0.025 (±0.053)	-0.017 (±0.558)
Class 1 professional lyceum		0.138** (±0.088)	0.822** (±0.621)	0.110** (±0.086)	0.734** (±0.602)
Class 1 technical college		0.055* (±0.060)	0.390 (±0.510)	0.047* (±0.060)	0.418* (±0.500)
Father has technical secondary education		0.030 (±0.032)	-0.223 (±0.626)	0.042 (±0.063)	-0.230 (±0.610)
Father has college education		-0.0003 (±0.064)	-0.139 (±0.668)	0.001 (±0.064)	-0.312 (±0.654)
Father has university education		0.043 (±0.081)	-0.183 (±0.732)	0.046 (±0.081)	-0.397 (±0.714)
Mother has technical secondary education		-0.040 (±0.056)	0.056 (±0.586)	-0.032 (±0.056)	0.104 (±0.584)
Mother has college education		-0.054* (±0.057)	0.154 (±0.586)	-0.048* (±0.057)	0.308 (±0.578)

<b>Mother has university education</b>	-0.025 (±0.067)	-0.012 (±0.670)	-0.020 (±0.066)	0.269 (±0.664)
<b>Pocket money/month</b>	0.001** (±0.0004)	0.002 (±0.004)	0.001** (±0.0004)	0.0004 (±0.004)
<b>Lives in town with 100,000 people or less</b>	0.031 (±0.045)	0.532** (±0.428)	0.011 (±0.044)	0.450** (±0.420)
<b>Lives in town with 101,000 - 500,000 people</b>	0.081** (±0.057)	0.725** (±0.488)	0.067** (±0.056)	0.581** (±0.482)
<b>Lives in town with more than 500,000 people</b>	0.110** (±0.065)	0.685** (±0.492)	0.100** (±0.065)	0.606** (±0.482)
<b>Prevention taught at school</b>	-0.021 (±0.036)	0.191 (±0.354)	-0.021 (±0.035)	0.152 (±0.346)
<b>Anti-smoking advertising in media</b>	-	-	-0.050** (±0.053)	-0.281 (±0.450)
<b>Anti-smoking advertising at event</b>	-	-	0.020 (±0.047)	0.258 (±0.428)
<b>Owns promotional item</b>	-	-	0.053** (±0.037)	0.753** (±0.330)
<b>Cigarette brand names on TV</b>	-	-	-0.053** (±0.051)	-0.004 (±0.430)
<b>Billboard advertising</b>	-	-	-0.005 (±0.049)	-0.031 (±0.468)
<b>Saw press advertising</b>	-	-	-0.049* (±0.059)	0.072 (±0.506)
<b>Saw event advertising</b>	-	-	0.016 (±0.042)	-0.335* (±0.388)
<b>Free promotional cigarette offer</b>	-	-	0.060** (±0.032)	0.141 (±0.326)
<b>Believes smoking is harmful</b>	-	-	0.044* (±0.049)	-0.033 (±0.518)
<b>Believes secondhand smoke is harmful</b>	-	-	-0.139** (±0.053)	-0.308 (±0.396)
<b>Family discusses cigarette harm</b>	-	-	0.034** (±0.032)	0.855** (±0.336)
<b>Average school price</b>	0.002 (±0.019)	0.004 (±0.216)	-0.006 (±0.019)	-0.045 (±0.212)
<b>Directly reported price</b>	-	-0.082 (±0.117)	-	-0.084 (±0.117)

\*Variable significant at 10% level, two-tailed test.

\*\*Variable significant at 5% level, two-tailed test.

Generally, the larger the town in which students lived, the more likely they were to be a smoker, and town size was also associated with heavier smoking intensity (towns under 100,000 people

did not show smoking participation statistically different from rural areas but smoking intensity was greater).

School prevention efforts were controlled for by one dichotomous variable that took the value 1 if the student said they had been taught about the danger of smoking during the current school year. The reason for selecting just one out of the three available school prevention variables was to avoid multicollinearity, which would have resulted in large standard errors and instability of coefficients. The coefficient on this variable is not statistically significant, but has a positive sign instead of the expected negative sign. Because of the policy importance of this subject, a separate set of models (Table 23) analyzes this issue in more detail.

The next variables were included only in the second version of the model because of their potential endogeneity, therefore all their coefficient must be interpreted with caution.

The statistically significant result for anti-smoking advertising exposure suggests that it reduces smoking participation. The exposure to cigarette advertising has unexpected results: the statistically significant coefficients were negative, indicating that seeing advertising was associated with lower smoking participation and intensity.

Possession of a tobacco company promotional item was associated with higher smoking participation and greater smoking intensity. Students who had received free promotional cigarettes were more likely to be smokers, although in order to be sure that there is causality, self-selectivity among smokers in accepting free cigarettes would have to be investigated, as well as possibility selectivity by representatives of tobacco companies.

Beliefs regarding the health effects of smoking produced mixed results. Believing that smoking is harmful was associated with higher smoking participation, (but lower intensity although not statistically significant). Believing that secondhand smoke harms health was linked to lower smoking participation. However, the descriptive statistics results indicated that smokers were less certain about the harmful effects of smoking than non-smokers (Table 12) and that about 10% of smokers believed that they personally were not at risk from smoking (Table 20).

The results indicating a positive effect of family discussions about cigarette harm may reflect selective attention to those who smoked, or youth's revolt against the older generation.

The variables for cigarette prices were not statistically significant in any of the regressions. Since the data were collected at a single point in time, they cannot capture the quitting and reduction in number of cigarettes that students reported about in their answers to the questions about how they had reacted to the earlier price increases. Panel or time series data capturing changes in cigarette prices and in cigarette demand are needed to estimate price elasticity reliably. However, the variable for reported price paid does have the expected negative sign, suggesting that the higher the price paid, the fewer cigarettes smoked over the month.

Because the cigarette prices reported by students primarily reflected their cigarette brand choice, an attempt was made to estimate cross-price elasticity between local and foreign cigarette brands. The results are reported in Table 22. Sobieski represents the local brands; L&M, Spike, Golden

American, and Marlboro are foreign cigarettes. However, this analysis offers only one statistically significant result: the negative coefficient on the Sobieski price on smoking intensity among all smokers. The result suggests that those who smoked Sobieski were more sensitive to cigarette prices than students who smoked foreign cigarette brands. This is consistent with the fact that Sobieski smokers paid much less for their cigarettes (an average of PLN 4.19 per pack) than the average price paid by students who chose foreign brands (PLN 5.10).

**Table 22: Cross-price effect models, price coefficients**

Price measure	Smokes Sobieski	Smokes foreign brand	Smoking intensity - all	Smoking intensity - Sobieski smokers	Smoking intensity - foreign brand smokers
Average Sobieski price	-0.006 (±0.045)	0.006 (±0.045)	-0.161** (±0.194)	-0.104 (±0.572)	-0.089 (±0.220)
Average foreign brand price	0.004 (±0.073)	-0.004 (±0.073)	0.138 (±0.382)	0.204 (±0.724)	0.136 (±0.520)

\*\*Variable significant at 5% level, one-tailed test.

The effects of various school policies were analyzed separately, and the results are presented in Table 23. The first model version (including only exogenous variables) was employed in this analysis, but the model was slightly modified by omitting school type variables. Results of this model modification represent the effects of prevention efforts irrespective of the school where they were taught.

**Table 23: Effect of various school prevention policies on youth smoking**

School policies	Models with individual policies		Model with all policies	
	1st part	2 <sup>nd</sup> part	1st part	2 <sup>nd</sup> part
Danger of smoking taught in class this year	-0.024 (±0.035)	0.183 (±0.355)	-0.022 (±0.042)	0.345 (±0.421)
Teenage smoking discussed in class	-0.015 (±0.034)	-0.123 (±0.346)	0.002 (±0.042)	-0.251 (±0.422)
Specific effects of smoking taught in class	-0.038** (±0.033)	0.014 (±0.346)	-0.043** (±0.040)	0.024 (±0.394)
Index for recent discussion on smoking and health	0.012* (±0.013)	-0.023 (±0.131)	0.021** (±0.015)	-0.035 (±0.142)

\*Variable significant at 10% level, two-tailed test. \*\*Variable significant at 5% level, two-tailed test.

The list of dichotomous variables in the first column of Table 23 capture the existence of a particular smoking prevention at each respondent's school. The next two columns show marginal effects from four modified models, each including one policy at a time. Including only one school policy in the model prevents multicollinearity and avoids unstable coefficients and high confidence intervals. The results from models with individual policies indicate a statistically significant relationship for teaching about specific effects of smoking and lower smoking

participation. This suggests that the type of prevention messages conveyed to students matter and that more specific information is more effective than general warnings. The index variable measuring how recently smoking was discussed in class had an unexpected positive association with smoking participation.

The last two columns of Table 23 show results when all school prevention variables are included in each equation. These results confirmed the findings from the four separate equations reported in the left part of the table: teaching specific effects of smoking was associated with lower smoking participation (and was statistically significant), and the index of recent discussion of smoking in class was associated with higher smoking participation.

School prevention efforts did not seem to affect smoking intensity among current smokers—none of the coefficients were statistically significant.

The model of cigarette demand analyzed the income effect using a continuous variable for the amount of pocket money a respondent usually received in a month. This variable had a positive effect on both smoking participation and smoking intensity, but only the results in the first part of the model (smoking participation) were significant. Table 24 looks at the result of including a set of variables, one for each “income bracket” of pocket money as reported in the survey, to determine whether the coding of the variable affected the results (the coding converted individual brackets into their mid-points thus creating a quasi-continuous variable). The reported numbers represent marginal effects of each level of pocket money category compared to students reporting zero pocket money.

**Table 24: Effect of individual categories of pocket money on youth smoking**

Categories of Pocket Money	1 <sup>st</sup> model version		2 <sup>nd</sup> model version	
	1st part	2nd part	1st part	2nd part
Less than PLN 5	0.046 (±0.071)	-0.677** (±0.672)	0.053 (±0.073)	-0.597* (±0.649)
PLN 5 to 20	0.098** (±0.053)	0.257 (±0.506)	0.076** (±0.053)	0.189 (±0.500)
PLN 21 to 40	0.127** (±0.067)	0.655** (±0.556)	0.083** (±0.065)	0.505* (±0.546)
PLN 41 to 80	0.190** (±0.080)	1.018** (±0.584)	0.149** (±0.080)	0.808** (±0.575)
PLN 81 to 120	0.240** (±0.107)	0.620* (±0.686)	0.178** (±0.105)	0.576* (±0.670)
Over PLN 120	0.281** (±0.109)	1.475** (±0.672)	0.182** (±0.109)	1.184** (±0.667)

\*Variable significant at 10% level, two-tailed test. \*\*Variable significant at 5% level, two-tailed test.

The results confirmed the positive effect of disposable income on smoking participation. All results from the first part of the model are statistically significant with the exception of the

lowest pocket money bracket, and the size of the coefficient increases monotonically with pocket money – the more pocket money students had, the more likely there were to smoke. Most of the pocket money categories are also statistically significant for smoking intensity, and most had the expected positive sign. The marginal effect of pocket money on smoking intensity also tends to increase with “income” – generally, the more pocket money smokers had, the more they smoked.

## 5. SUMMARY AND DISCUSSION

The survey showed that while teenage students in Poland smoked less than their peers in many other European countries, they started smoking experimentation early. Both smoking participation and smoking intensity were higher among older male students in urban areas, although the gender gap in smoking behavior was narrower than in Ukraine, for example. Most of the younger smokers in the sample consumed an average of three to five cigarettes a day, and smoked on about half the days in the month, but older students smoked more heavily and on more days. Smoking among females was associated more with social events than among males: over 35% of females usually smoked during social events or at a friend’s house compared to 22% of males. Females also associated smoking more with alcohol drinking and drug taking than males.

Nearly half of the smokers bought their cigarettes in stores or from street vendors, despite the Polish law forbidding persons under 18 from purchasing cigarettes. This is evidence of inadequate enforcement of the law and of the lack of effectiveness of the tobacco industry campaign that officially aimed to limit access of minors to cigarettes at points of sale (see: Przewozniak and Zatonski 2003b). However, in over 30% of attempted cigarette transactions, sales persons refused to sell cigarettes to an underage person. Studies of youth access restrictions in the United States have found that enforcement is difficult, and typically requires considerable resources to carry out periodic store checks and the existence of sanctions for shopkeepers who do not comply (Pierce et al. 1998a; US DDHS 1994). Even so, young people have many other sources for getting cigarettes.

Students in urban areas and females generally paid more for their cigarettes than males and students in rural areas. Furthermore, smokers reported spending larger amounts on cigarettes than the average pocket money reported.

Foreign cigarette brands were very popular among Polish students. Almost 50% of the sample selected one of the listed foreign brands as their favorite. Marlboro was the most popular foreign brand (22%) and its popularity increased with student age. There was not much of a price incentive to smoke local brands, as the difference between the average price of Sobieski (local brand) and the listed foreign brands was only PLN 0.9 (about US \$0.23).

It is striking that over one-third of the current smokers were already addicted to cigarettes. Three-quarters of current smokers said they would like to quit, and believed that it was easy to do so. Professional help to quit smoking had been used by 11% of current or former smokers.

Improving access to this service and making it more youth specific may improve the success rate of those who want to quit.

Enforcement is an important issue for the cigarette-advertising ban on TV. The fact that 86% of respondents saw a cigarette brand name on TV in the month before taking the survey suggests that this law was not effectively enforced. Moreover, studies of the effects of tobacco advertising bans in other countries suggest that partial bans are ineffective, as they allow tobacco companies to shift promotional resources to media unaffected by bans (Saffer 2000; Saffer and Chaloupka 2000). In fact, in late 1999, Poland amended the Tobacco Law to impose a complete ban on cigarette advertising to take effect fully in 2001. Results of the 2003 Poland GYTS show that enforcement of a total ban on tobacco advertisement reduced the percent of pupils who saw pro-tobacco messages on TV from 86% to 67% -- children still see cigarette brands in Formula 1, WRC or motorcycle races broadcast on TV (Przewozniak and Zatonski 2003a,b). At present, this percentage exposure to TV cigarette advertising is the lowest of all European countries that participated in the GYTS (Baska et al. 2004; GYTS 2002).

About half of the respondents surveyed had received free cigarettes from industry representatives during the month before the survey. The regression analysis associates free cigarettes with a higher probability of being a smoker. The November 1999 amendment to the Law on Tobacco Use banned free cigarette distribution, but whether the industry is in compliance is unknown – the practice was clearly still common practice during 1999. There is some evidence that anti-smoking messages communicated through mass media reduce smoking participation among Polish students and improve their knowledge of the health consequences of smoking (to compare data from the 1999 and 2003 Poland GYTS see: Przewozniak and Zatonski 2003a, 2004).

Almost 70% of the survey respondents were taught smoking prevention as part of their school curriculum. Results of the regression analysis suggest that students were particularly receptive to anti-smoking messages that detailed specific effects of tobacco use. This information also seems to be the most effective in improving knowledge of health consequences of smoking, and may have a much bigger impact in countries such as Poland, where public information on smoking consequences has been available widely only for a few years. The survey indicated that over 12% of current teenage non-smokers in Poland were at risk of beginning to smoke in the near future, since they said they would be willing to smoke a cigarette offered by a friend or expected to be smoking with one year. Therefore, school prevention efforts can play a significant role in reducing the number of future smokers in Poland. Given the presence of potential cigarette consumers at all school types, school prevention efforts should not be limited to primary schools or gymnasiums, but should be present throughout the educational system. There is also an urgent need to reduce smoking prevalence among Polish teachers (20% are current smokers) and emphasize strict enforcement of the smoking ban on school premises (Przewozniak and Zatonski 2002b).

Even though the price data were not adequate for use in the regression analysis to estimate price elasticity of demand, the survey responses suggested that Polish youth are price sensitive. Table 11, which analyzes reasons for quitting smoking, indicates that even though health was the most frequently cited motive for quitting, saving money was important to 11% of those who quit.

The most important evidence of price sensitivity is provided in Table 9, which assesses the reaction of Polish youth to four consecutive cigarette tax increases in 1999, the year of the survey. Nearly 56% of the sample said they had changed their smoking behavior in response to the new cigarette prices. More than one-quarter (26%) of respondents quit smoking and 15% of them reduced smoking intensity, evidence of both participation and conditional demand price elasticity among Polish youth. It is interesting to compare these results with a previous study of Polish cigarette demand analyzing the same reaction among adults over 18 years old to the first two tax increases in 1999. A survey found that 33% of adults (compared to 56% of the students in the GYTS) said they had reduced or altered their cigarette consumption, and 7% of the adult sample said they quit or tried to quit smoking, compared to 36% of the student sample (Czart et al. 2000b,c). This comparison suggests that Polish youth are more price sensitive than Polish adults, confirming the consensus among health economists with respect to the US cigarette market.

Even though the analysis does not provide the exact estimates of price elasticity, it offers clear evidence that higher cigarette taxes that raise real prices and certain tobacco control policies can reduce cigarette demand among teenage students in Poland<sup>9</sup>.

The survey results clearly indicate some challenges for children and youth tobacco control policy in Poland. Looking at changes in youth smoking prevalence in the last decade, special emphasis should be put on girls, especially girls living in urban areas, in order to create counter-tobacco messages about the “glamour” of smoking and smoking as a weight control tool (Mazur and Woynarowska 1999; Przewozniak and Zatonski 2004). It is both important to prevent the harm that tobacco use among girls causes to their own health and, if they continue smoking in adulthood, to reduce exposure of their children to passive smoking. Tobacco control issues should become an element of school education, especially for higher grades, for example on hygiene or biology lessons. Tobacco control programs for teenagers should not only aim to prevent children from smoking through health education and raising their awareness on the harmfulness of smoking but also help them (especially older children and youth) in smoking cessation. There is now more evidence that young smokers can become addicted to nicotine and they require different cessation programs from those offered to adults (Kessler 1995; US DHHS 2001). Youth-oriented and population-based smoking cessation campaign are also an option. These might be based on the experiences of the Great Polish Smoke-Out, one of the most effective cessation programs.<sup>10</sup> These programs should be focused on the entire environment of children, including their peers, siblings, children’s role models, teachers, health professionals, youth media and, last but not least, parents and grandparents, to change or, at least, control their smoking behaviors. In comparison with other European countries, Poland has good conditions to effectively implement these programs: a strong anti-smoking climate, quite effective tobacco control policies and positive changes in smoking behaviors and patterns among adults (Boyle et al. 2000; Fagerström et al. 2001; Jaworski et al. 2000). Exposure to tobacco smoke, including especially passive smoking should be eliminated from or substantially limited in all places where children live or stay. This concerns smoke-free schools (indoor and outdoor), cinemas, theatres,

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<sup>9</sup> See also Chaloupka et al. 2000, Chaloupka and Warner 1999, and World Bank 1999 for a summary of the evidence of the impact of tax and price policy on smoking behavior.

<sup>10</sup> As an result of this campaign, 2.8 million adult smokers quit smoking for good (Jaworski et al. 2000).

pubs and bars, dancing clubs, sport and leisure places, and more difficult but possible to implement, smoke-free homes<sup>11</sup>. To avoid increased smokeless tobacco use among youth, producing and selling all types of smokeless tobacco products should be totally banned again. More restrictive administrative and social control to enforce bans on tobacco products sale to minors (in Poland, those under 18 years) and of tobacco advertising, promotion and sponsorship are proposed. Social control on smoking by minors, especially in public places, is also recommended. Enforcement of tobacco control policy and programs should be monitored annually. There is also an urgent need to monitor and counteract new tobacco industry strategies that target older adolescents and young adults (Przewozniak 2003; Przewozniak and Zatonski 2003b). As Polish studies prove, big health warnings on cigarette packs (30% on each side of cigarette pack) impact smoking behavior among teenagers and young adults (Przewozniak and Zatonski 2002; Zatonski et al. 2000a). Therefore, it is recommended to introduce new bigger health warnings on cigarette packs (40% on front side and 30% on the back side) as proposed by Directive of the European Parliament and of the Council.<sup>12</sup> Warnings in the form of color photographs or other illustrations seem to be perceived better by children and youth and have a larger impact on their smoking. Furthermore, as the World Bank's experts recommend, tax and price increases on tobacco products is one of the most cost-effective tools for preventing and reducing smoking among youth and young adults and should become a constant element of government tobacco control policy (World Bank 1999).

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<sup>11</sup> The WHO/US EPA project on protecting children's health from exposure to passive smoking, that is being implemented in two Polish communities, shows that, as a result of the program, smoking restrictions were introduced in 63% of homes in the Ciechanow community and the percentage of smoke-free homes increased there from 40% to 56% (see: Przewozniak and Zatonski 2004).

<sup>12</sup> Directive 2001/37/EC of 5 June 2001

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The editors for the Economics of Tobacco Control papers are: Joy de Beyer ([jdebeyer@worldbank.org](mailto:jdebeyer@worldbank.org)), Anne-Marie Perucic ([perucica@who.int](mailto:perucica@who.int)) and Ayda Yurekli ([ayurekli@worldbank.org](mailto:ayurekli@worldbank.org)).



**THE WORLD BANK**

1818 H Street, NW  
Washington, DC USA 20433  
Telephone: 202 477 1234  
Facsimile: 202 477 6391  
Internet: [www.worldbank.org](http://www.worldbank.org)  
E-mail: [feedback@worldbank.org](mailto:feedback@worldbank.org)



**WORLD HEALTH ORGANIZATION**

Avenue Appia 20 1211  
Geneva 27, Switzerland  
Telephone: 41 22 791 2126  
Facsimile: 41 22 791 4832  
Internet: [www.who.int](http://www.who.int)  
E-mail: [tfi@who.int](mailto:tfi@who.int)