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

Economics of Tobacco Control Paper No. 20

The Ukraine (Kiev) 1999 Global Youth Tobacco Survey: Economic Issues

Hana Ross

July 2004

Tobacco Free Initiative
World Health Organization

THE UKRAINE (KIEV) 1999 GLOBAL YOUTH TOBACCO SURVEY: ECONOMIC ISSUES

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Health, Nutrition and Population (HNP) Discussion Paper

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Health, Nutrition and Population (HNP) Discussion Paper

ECONOMICS OF TOBACCO CONTROL PAPER NO. 20

The Ukraine (Kiev) 1999 Global Youth Tobacco Survey: Economic Aspects

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Abstract: The Global Youth Tobacco Survey (GYTS), supported by the US Centers for Disease Prevention and Control and the World Health Organization, was carried out in Kiev, in the Ukraine in 1999, one of the first of many countries to implement this standardized school-based survey of teenage smoking behavior, attitudes and knowledge. This report presents background information on smoking and tobacco control policies in Ukraine. It presents simple descriptive statistics of the GYTS survey data, focusing especially 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 price appears to be a significant determinant, along with age, gender, and efforts by schools to ensure that students are well informed about the effects that smoking has on health.

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

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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-incomes countries. If needless disease and millions of premature deaths are to be prevented, then it is crucial that developing counties 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.

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ACKNOWLEDGEMENTS

This analysis was supported by funding provided to the World Bank by the US Centers for Disease Control and Prevention, Office on Smoking and Health. I am grateful to the Alcohol and Drug Information Center, particularly to its director Dr. Konstantin Krasovsky, for providing access to the Ukrainian Global Youth Tobacco Survey data, for making available valuable information about the tobacco control environment in Ukraine, and for reviewing two drafts of the paper. I am also grateful to the World Bank for publishing the report as an HNP Discussion Paper.

1. INTRODUCTION AND BACKGROUND

There is growing alarm around the world about the negative impact that tobacco has on the lives of children and adolescents. The World Health Organization (WHO) estimated that in 2000, nearly 5 million people died worldwide from tobacco-related illness, and that this annual toll continues to grow. The prevalence of smoking in Ukraine is one of the highest in Europe, contributing to a growing burden of non-communicable diseases.

This report analyses data collected on teenage smoking behavior in Ukraine in 1999, from an economic perspective. Ukraine 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.

1.1 Socio-Economic Situation

The socio-economic situation in Ukraine as of 1999 is described by the set of indicators shown in Table 1. The indicator average values for low-income countries and lower-middle-income countries are reported as points of reference.

Table 1: Socio-economic indicators in 1999

Basic socio-economic indicators	Ukraine	Low-income countries	Lower-middle income
Population (millions)	50.0	2,417	886
GNP per capita (US$)	750	410	1,740
GNP (US$ billions)	37.5	988	1,541
Average annual growth, 1993-99: population (%)	-0.7	1.9	1.1
Average annual growth, 1993-99: labor force (%)	-0.4	2.3	1.5
Poverty (% of population below national poverty line)	27	-	-
Urban population (% of total population)	68	31	58
Life expectancy at birth (years)	67	60	68
Infant mortality (per 1,000 live births)	14	77	35
Illiteracy (% of population age 15+)	0	39	14
Gross primary enrollment (% of school-age population)	87	96	102

Source: World Bank. 2000. Ukraine at a Glance. <www.worldbank.org/data/countrydata/aag/ukr_aag.pdf>

The economy was in crisis during the 1990s. The economy-wide breakdown of the state-managed system of production and distribution resulted in a prolonged economic depression. While after the mid-1990s the government was able to stabilize the economy,

there were few incentives for private enterprise to flourish. By the end of 1999, official GDP in real terms was only 40% of its 1990 level and the poverty incidence had risen sharply. Since 2000, the government has pursued a far-reaching economic and institutional reform program that has helped achieve strong economic growth.

Key health indicators in Ukraine are relatively good considering Ukraine's income level, but smoking takes a severe toll on adult health. According to WHO estimates, the annual number of smoking-related deaths in Ukraine exceeds 100,000. In 1998 Ukraine had the highest cancer mortality rate for the age group 0-64 (117 per 100,000 inhabitants), and the third highest mortality rate from bronchitis, emphysema, and asthma in Europe (56 per 100,000 inhabitants). It also has the fourth highest death rate among men attributable to smoking of the European countries. In 1999, about 111,000 deaths were attributable to tobacco use (18% of all deaths), including 97,122 men (26% of male deaths) and 13,598 women (4% of female deaths). Smoking is estimated to be the cause of 37% of male deaths in middle age (35 to 69 years), and of about half (47%) of all male deaths from cancer.

1.2 Smoking Prevalence in Ukraine

There were several surveys in Ukraine in the 1990s that provided data for estimates of smoking prevalence and other smoking behavior in the country.

Adults:

- WHO estimated smoking prevalence in Ukraine in 1997 at 30%, which placed it in the middle of the list of European countries.
- The 1996 UN national representative survey found that 23% of Ukrainian women aged 18 to 30 smoked.
- The survey data for 1977 to 1999 provided by the Institute of Cardiology in Ukraine indicated that smoking prevalence among the urban population decreased in the 1980s to 1990s, especially among young adult men, but rose again at the end of the period.
- A nationally representative survey in 2000 estimated 58% smoking prevalence among males 15 years and older, and 14% among women over 15 years. The overall daily smoking prevalence of the adult population was 34% in 2000.

Youth:

- The ESPAD survey (a nationally representative survey in 1995 among 6,680 respondents 15 years of age) found that smoking prevalence among boys in the Ukraine was higher than all 21 other European countries surveyed: 41% of Ukrainian boys had smoked more than 40 cigarettes during their lifetime and 51% had smoked during the 30 days prior to the survey. Despite a large gender gap, girls in the Ukraine also had relatively high prevalence according to the ESPAD survey: 18% had smoked more than 40 cigarettes during their lifetime, and 28% had smoked during the 30 days prior to the survey.
- A more recent survey indicated a favorable trend in Kiev, where the last 30 days' smoking prevalence among 15 year olds decreased from 51% in 1995 to 41% in 1998.

1.3 Public Policy on Tobacco Products[1]

1.3.1 Cigarette Taxes

There are four types of taxes imposed on cigarettes in Ukraine:

- Excise tax
- Import duty
- Value added tax (VAT)
- Pension insurance tax.

Excise Tax and Import Duty

In January 1993, Ukraine introduced an *ad valorem* excise tax on tobacco products, equal to 70% of the manufacturers' price. This tax was lowered over the following years in response to pressure from companies that invested in joint ventures in the industry, and a large differential was introduced between filtered and unfiltered cigarettes, making unfiltered (mostly domestically produced) cigarettes considerably cheaper. Decreases in late 1993 and in 1994 brought the tax down to only 40% of the wholesale price for cigarettes with filters and 10% of the wholesale price of cigarettes without filters. Despite modest increases in output levels, total tax revenues fell precipitously. Widespread evasion of tax also undermined revenues. A stamp on cigarette packs indicated payment of the excise tax. However, small shops often used tax-stamped packs for display purposes, but sold packs without stamps, evading the tax.

Initially, there were different taxes on domestic and imported cigarettes. Depending on the country of origin, imported cigarettes were classified as privileged (and exempt from certain duties) or non-privileged (subject to import duties). In December 1993, an import duty of 150% of the customs value was set. In December 1995, the exemptions ended, and import duties were set at 6 ECU per 1,000 cigarettes, effectively lowering the duty.

In 1996, the tax basis for domestic cigarettes was changed to a specific tax, and differentials between domestic and imported cigarettes ended. In February 1996, the rate was lowered to only 2 ECU per 1,000 filtered cigarettes and only ECU 0.5 for unfiltered cigarettes (raised to 1 ECU in 1997). In September 1997 the government proposed to Parliament an increase in the rate for filtered cigarettes to ECU 3.0 per 1,000 cigarettes. After initially refusing this proposal, Parliament decided in 1998 to eliminate the tax difference between filtered and unfiltered cigarettes and set the rate at ECU 2.5 per 1,000 cigarettes (about US $2.9 per 1,000 cigarettes), later changing the rates to ECU 3 for filtered and ECU 2.3 for unfiltered cigarettes.

However, when the local currency value fell sharply in 1999, the euro-based tax was considered too high and in November 1999 the tax base was changed to the local currency, the hryvna (UAH). The taxes were set at UAH 10 per 1,000 filtered cigarettes, and UAH 7 per 1,000 unfiltered cigarettes, equivalent to the previous tax rate in euros at

[1] Information in this section is based on the publication *Tobacco or Health in Ukraine* (ADIC-Ukraine 1999), unless noted otherwise.

the currency exchange rate prevailing in the summer of 1999. By the end of 1999, however, the tax was equal to only US $1.8 per 1,000 cigarettes.

Value Added Tax
The value added tax (VAT) for cigarettes is equal to VAT for all other goods and represents 20% of the final price with already-levied excise and import taxes.

Pension Insurance Tax
In July 1999 an additional tax for pension insurance was introduced. It is equal to 5% of the wholesale price.

1.3.2 Government Revenue from Taxes

In 1999, cigarette taxes contributed only 1.6 percent of total government revenues despite substantial increases in the tax over the previous three years. In 1996, the revenue from tobacco taxation totaled UAH 54 million (about US $30 million), and in 1997 it rose to UAH 129 million (about US $70 million), largely because of the tax rate increase. In 1998, the revenue from tobacco taxes further increased to UAH 286.7 million (about US $90 million) and UAH 519 million (about US $130 million) in 1999. In 1999, total government revenues were 33 billion UAH.

The excise tobacco tax revenue decreased to UAH 446 million (about US $80 million) in 2000 despite an increase in production volume. This decrease is thought to be at least partly because of a rise in cigarette smuggling from Russia. Cigarette manufacturers are also thought to evade paying taxes by exporting to Russia and Belarus. The cigarettes are secretly returned to the Ukraine immediately, or leave the country on paper only.

1.3.3 Restrictions on Smoking

- Smoking is banned on all public transport (trains, subway, buses, etc.), in cinemas, theaters, covered sport arenas, school buildings and in some workplaces and government offices.
- Smoking is restricted to designated areas on domestic and international air flights.
- Smoking is banned in all treatment and prevention institutions.

There is little enforcement of these laws, and compliance is patchy.

1.3.4 Youth Access Restrictions

Under the current law, anyone under 18 years of age is prohibited from buying and selling tobacco. Further, it is unlawful to sell tobacco in children's, educational, health and sport settings, as well as other places identified by local authorities. Unfortunately, there is no enforcement of these regulations. Youth access to vending machines is not an issue, as they do not exist in Ukraine.

1.3.5 Advertising Restrictions and Compulsory Heath Information

During the first part of the 1990s, tobacco advertising was banned in Ukraine, but the law was not well enforced. In 1996, as a result of lobbying efforts by the tobacco industry, a new general advertising bill was introduced into Parliament that proposed limiting tobacco advertising. At the last minute, Parliament amended this bill to one that enforced a total advertising ban, but the tobacco lobby managed to persuade the President of the Ukraine to issue a veto. Finally, a compromise was reached in 1996, in which tobacco advertising was banned on radio, TV and in cinemas, but allowed in print media and on billboards. Furthermore, tobacco companies were forbidden to distribute free cigarettes to promote their product.

Despite the restrictions, there remains a significant amount of tobacco advertising in Ukraine. Besides the allowable ads on billboards and in the press, there is also indirect advertising on promotional items such as T-shirts, plastic bags, and cafe umbrellas, which violate advertising law by not carrying health warnings. Despite the ban on television tobacco advertising, the tobacco companies have found ways of gaining television exposure. For example, one TV channel has a special youth musical program called *Camel Rock,* and leading TV channels are among the "information sponsors" of a Philip Morris competition. In response, the governmental Coordinating Board on Tobacco Control and the State Consumer Protection Committee have supported some anti-smoking advertising.

The law requires all permitted tobacco advertising to include a health warning covering at least 5% of the advertisement area (Corrao et al., 2000). Cigarette packs must have a health warning on them, which is usually printed on one side of the pack in small letters (1 x 1 mm or 2 x 2 mm, sometimes in contrasting colors such as black and white, sometimes not).

1.3.6 Limits on Nicotine and Tar Content

The Ministry of Health issued an order in July 1997 that set maximum permissible levels for the tar and nicotine content of cigarettes. The tar content of filtered cigarettes sold in Ukraine must not exceed 15 mg per cigarette; non-filtered cigarettes must not exceed 22 mg per cigarette. The nicotine content limits are 1.3 mg per filtered cigarette and 1.5 mg per non-filtered cigarette. These levels are an improvement on the earlier 1991 standards, adopted from the former Soviet Union, of maximum levels of 25 mg of tar and 1.5 mg of nicotine per cigarette.

1.3.7 Available Cessation Programs

- Smoking cessation programs are not available in primary health care facilities. Private institutions and non-governmental organizations (NGOs) provide most of the programs.
- Nicotine replacement therapy is available only in the form of chewing gum, which is not accessible to most of the population due to its cost. (The price of 30 pieces of gum

with 2 mg of nicotine each is about US $5, while the price of a pack of local cigarettes is about US $0.40).

1.3.8 Other Tobacco Control Policies and Government Initiatives

- Anyone who wants to sell tobacco products must buy a license. Tobacco products may not be sold in premises that are not adapted for trade, the grounds of preschools, schools and medical institutions, sports grounds, or in hotels (Corrao et al., 2000).
- In 1997 the government established the Coordinating Board on Tobacco Control. The Board chose a group of experts who, in 1998, prepared a National Program of Counteraction to Tobacco Use and proposed allocating a portion of tobacco taxes for the program's implementation. The Board also prepared a new version of the advertising law, which is based on European Union directives on tobacco advertising and sponsorship.

1.4 The Effects of Smuggling

The economic effect of taxes on both cigarette consumption and government revenue is largely distorted by the effects of smuggling. Cigarettes smuggled into the Ukraine come primarily from Russia, Cyprus, Belgium, Holland, and Turkey. These cigarettes avoid both the excise tax and the import duty, which gives them a considerable price advantage over legal cigarettes.

The tobacco industry estimates that in the late 1990s smuggling represented about 30% of consumption (based on 75 billion cigarettes consumed per year). Some estimates claim that in 1996 up to 97% of imported cigarettes in Ukraine were smuggled. The government's estimate of the extent of smuggling (based on consumption of 65 billion cigarettes per year) is much lower: that 20% of total cigarette consumption is from illegal sources. Local experts on tobacco consider this an upper bound for estimated smuggling.

Smuggling of unfiltered cigarettes from Russia, in particular, greatly increased in 1999 because of the increased excise tax imposed on domestic unfiltered cigarettes. The result was a considerable difference in excise tax rates between the two countries. The subsequent cut in excise tobacco taxes in Ukraine at the end of 1999 did not bring the expected reduction of smuggling from Russia, but it did substantially decrease government revenue from tobacco in 2000 (by about US $40 million).

In 1996, the Duncan-Kiev tobacco importing company issued a report that stated that: "All smuggling to Ukraine is undertaken with full support of the five international tobacco companies [Philip Morris, RJ Reynolds, Reemtsma, British American Tobacco (BAT) and Rothmans]. They could stop 90% of smuggling … if they wished to, because they know exactly their clients involved in smuggling." (Quoted in ADIC-Ukraine, 2002).

2. DATA

2.1 The GYTS Survey

The World Health Organization (WHO) and the US Centers for Disease Control and Prevention developed the Global Youth Tobacco Survey (GYTS) project to track tobacco use among youth in countries across the world, using a common methodology and core questionnaire. The GYTS is school-based and employs a two-stage sample design to produce representative data on smoking among students aged 11 to 17, with a particular focus on the 13-15 age group. The first stage consists of a probabilistic selection of schools; the second stage takes a random selection of classes from participating schools.

The survey in Kiev city, Ukraine was conducted in spring 1999. All regular schools containing forms 8, 9, or 10 and professional/technical schools (course 1 or 2) were included in the sampling frame. Schools were selected with probability proportional to school enrollment size. One hundred schools were selected for the survey. Participating classes from each school were chosen randomly based on equal probability sampling. All students in the selected classes were eligible to participate in the survey.

The school response rate was 100%. Of 5,104 eligible student participants, 4,156 (i.e., 81.4%) completed usable questionnaires. This student response rate is relatively low compared to the other 13 countries participating in the same survey in 1999. The overall response rate was 81.4% (100% * 81.4%). An additional 55 respondents were taken out of the final data set because they said they were in a professional/technical school, but their questionnaires came from regular schools.

2.2 Data Variables

Numerous variables were constructed from the data collected in the survey and are described below. The missing observations on all variables of interest were represented by a series of dichotomous indicators, which were set to a value of one if the observation was missing, zero otherwise. This allowed all observations to be kept in the analysis even when some data for a respondent were not available.

Smoking Behavior

The most important set of variables describes the smoking behavior of respondents. The variable "Smoker" captures current smoking participation. It was set to 1 for respondents who smoked on at least one day during the 30 days prior to the survey, zero otherwise. Of the sampled population, 41.1% (± 3.0) were current smokers using this definition.

Three continuous variables describe smoking intensity of current smokers. The first intensity variable was the average number of days during the 30 days before the survey on which the respondent smoked at least one cigarette (on average, 16.9 days (± 0.8) days in a month). The second intensity variable captures the average number of cigarettes

smoked in a day on which the respondent smoked (on average, 5.5 (± 0.6) cigarettes per day). The third intensity variable was constructed by multiplying the two previous measures, to give the average cigarette consumption in 30 days for a current smoker who reported both smoking days and number of cigarettes consumed during those days (average monthly consumption was 119.4 (± 11.1) cigarettes).

There were 210 students who did not answer the question regarding number of smoking days, but who gave number of cigarettes smoked in a day (for a day on which they smoked), and 39 students who missed the question on number of cigarettes, but reported days they smoked. In addition, 87 students reported zero smoking days last month, but a positive number of cigarettes smoked during a smoking day, and 54 students reported zero cigarettes but some smoking days. Due to these inconsistencies and missing information, a second dichotomous indicator of current smoking participation was created. The variable Smoker1 was defined as one for those who smoked at least one day or some cigarettes during the last 30 days, zero otherwise. According to this definition, 44.5% (± 3.0) of the samples were smokers.

The variable Smoker is used throughout the analysis unless the use of the broader definition (Smoker1) is specifically stated.

It may be helpful to future surveys to know which respondents tend to be inconsistent in their answers. In this survey, two-thirds were male and belonged either to the youngest group (age 11 and less, or 12) or the oldest (age 17 and more). The highest inconsistency was detected among students of professional schools, the lowest among students of regular schools. Those students who did not report number of smoking days (either skipped the question or reported zero smoking days) smoked on average 3.9 (± 1.2) cigarettes a day, compared to the sample mean 5.5 (± 0.6).

The survey also asked the brand of cigarette that students usually smoked. This information was converted into five dichotomous variables for brands listed in the questionnaire (Prima, L&M, Lucky Strike, Camel, Marlboro), one dichotomous variable for all other brands and one dichotomous variable for those who said they did not have a favorite brand.

Socio-economic status

The socio-economic status of respondents was described by another set of variables. A continuous variable was constructed for the age of survey participants. The minimum age in the sample was 11 years old or under, which was recorded as 11. The maximum age of a respondent was 17 or over, which was recorded as the age of 17. The average age of the sampled population was 14.8 (± 0.1). The variable Male indicated respondent gender, taking a value of one for males and zero for females. There were 53.2% (± 3.6) males in the sample.

The type of school attended was captured by three dichotomous variables for students of regular schools, technical colleges, and professional schools. About 83% (± 2.4) of the

surveyed population reported being in regular schools, 10% (± 4.6) attended professional schools, and 7% (± 4.0) were in technical colleges. Additional indicators classified students from each school type according to form (grade) or course they were attending. Regular school students attended forms 8, 9, or 10, and professional school students and technical college students attended either course 1 or 2. Students from the whole age spectrum covered by the survey were found in all forms in regular schools, but most students in form 8 were 13 and 14 years old, most students in form 9 were 14 and 15 years old, and most students in form 10 were 15 and 16 years old. The average age for forms 8, 9, and 10 was 13.7 (± 0.04), 14.6 (± 0.05), and 15.6 (± 0.04) respectively.

Technical colleges were also attended by the whole age spectrum of students, but the majority were 15 to 17 years old with an average age 15.7 (± 0.2) in course 1 and 16.6 (± 0.2) in course 2. Professional schools reported having students 12 years and older, but the majority were older than 14. The average age was 15.7 (± 0.3) in course 1 and 16.2 (± 0.3) in course 2.

Cigarette Price

Two measures of cigarette price were constructed from the survey based on responses to the question: "What is the price of the cigarettes that you usually smoke?" Only those who bought cigarettes provided this information.

The first cigarette price measure is the exact response to this question. The second measure is a school-based average of the individual responses. Creating the school price average presented three advantages. First, it solved the problem of missing responses among smokers, which could have affected the precision of estimates and biased the results if the missing observations were systematic with respect to the reported price. Second, assigning the average price to all students, including non-smokers, was essential for estimating the effect of price on smoking participation. Third, a price measure constructed in this fashion partly alleviates the problem of endogeneity discussed below (see **Methods**).

Exposure to Media Message, 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 a cigarette promotional product, and for last month's observation of cigarette advertising on TV and billboards, in the press and at events. Students were also asked whether a cigarette company agent had offered them a free cigarette during the past month.

Exposure to anti-smoking messages was measured by two dichotomous variables: seeing anti-smoking advertising in the media and/or during an event during the previous month. Both advertising and anti-smoking advertising variables are potentially endogenous because smoking status (a dependent variable) can affect attention paid to both types of message.

Knowledge of Health Consequences

The respondents' knowledge of the health consequences of smoking was measured by asking whether they believed that smokers have shorter lives, that smoking has harmful health effects, and that secondhand smoke can be harmful. Because these beliefs are typically affected by people's smoking status, the variables are endogenous in the cigarette demand equation.

Prevention exposure was measured by several dichotomous variables (a warning received from a health worker, a warning received from a family member, the danger of smoking taught in class, teen smoking discussed in class, specific effects of smoking taught in class) and by one index variable capturing time passed since the last discussion on smoking during a lesson. The first two dichotomous indicators may be endogenous if smokers attracted more warning messages due to their risky behavior. Variables describing school prevention efforts are highly correlated, so another dichotomous variable for the existence of any kind of school smoking prevention was created.

3. METHODS

Because the GYTS data were collected by a survey with a complex sample design, appropriate statistical techniques had to be employed to obtain accurate results. For example, it was necessary to use sampling weights to calculate point estimates such as means or percentage prevalence. The sampling weights reflect the likelihood of sampling each student and reduce bias in estimates by compensating for differing patterns of non-response. Weighting the data improves the accuracy of inferences drawn from the sample population.

STATA statistical software was used to process the data. An ordered Probit model was employed to analyze how knowledge of health consequences of smoking was affected by advertising and school prevention programs. This method estimates the effect of several variables of interest on four escalating categories illustrating the strength of beliefs with respect to both smoking and secondhand smoke.

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 from a single country where cigarettes price tend to be fairly uniform across the country. Because there is a uniform cigarette tax in Ukraine for foreign and domestic brands, as well as uniform tobacco control policies, most of the price variation results 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).

In this case, price is endogenous. (Ideally, to estimate a demand curve, data are needed on changes in behavior in response to exogenous price changes-- changes that occur independently of consumers' decisions.)

A possible way to deal with price endogeneity is to estimate a simultaneous equations model. The two stage least square (2SLS) model estimates price as a function of instrumental variables, where these variables are not included in the cigarette demand equation. The possible instruments for the price equation include variables that affect the costs of producing and distributing different brands via different markets (legitimate versus black market). In addition, it would be necessary to identify whether or not each person's choice is from the black market or from the legitimate market. This information was inaccessible for the purpose of this study. In this situation, it was impossible to estimate a simultaneous equation model.

Another way to deal with price endogeneity, which was used 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's average price improved the precision of the estimates and eliminated potential bias in the results 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 (the decision to smoke or not).
- Third, this technique partially alleviated price endogeneity.

A cigarette demand equation would ideally control for a wide variety of influences that relate to smoking, such as individual or household income. There was no information about income in the data, nor on parental education, which is often used as a proxy for income. Fortunately, missing income and education information in the cigarette demand equation does not bias the estimates for the variables of interest (such as price) as long as they are not correlated.

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 because they capture part of the price effect. The full impact of price on youth smoking is the result of both the direct effect on youth smoking as well as the indirect effect that results from price increases reducing smoking among peers, parents and other adults, and availability (reduced availability from social sources, less ability to steal from parents, stores, etc.). Thus the smoking status of parents and peers captures part of the effect of price.

Some of the dependent variables had only a limited range, so appropriate econometric methods had to be employed. This study used a two-part model developed by Cragg (1971), which is the method frequently used in studies on cigarette demand. The propensity to smoke and the intensity of the smoking habit were modeled separately. In the first step, a smoking participation equation was estimated using a Probit specification. The OLS technique was used in the second step, in which the natural logarithm of various measures of daily cigarette consumption were estimated only for those who are defined as smokers. Confidence intervals of all estimates were adjusted for clustering, taking care of the possibility that observations were correlated within schools and classes. STATA statistical software computed 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 on the first by a set of potentially endogenous independent variables of interest. It also replaces individual school prevention policies with a single indicator for the existence of any kind of prevention effort at school. The reason for this substitution is the presence of multicollinearity among school prevention policies. Under this approach, the individual effect of school policies can be evaluated in the first model version, and the effect of these policies as a whole can be assessed in the second version of the model.

Each version has two parts: a participation equation (Probit) that estimates the probability that a respondent will be a smoker, and a conditional demand equation (OLS), that explores the factors that affect how much they smoke.

Type of school attended by a respondent is an independent variable that should be controlled for in the equation. However, a high correlation between school type and age may cause instability of coefficients and produce high standard errors of the estimates. Therefore, the demand equation was estimated twice: once with the age variable and once without the age variable, but with variables for type of school and grade attended, which are proxies for age.

Version 1, part 1:
Smoking status = a function of: age (or the type of school and grade), sex, danger of smoking taught in class, teens smoking discussed in class, specific effects of smoking taught in class, index of recent discussion of smoking during a lesson, price.

Version 1, part 2:
Log (number of cigarettes consumed in a month) = a function of: age (or the type of school and grade), sex, danger of smoking taught in class, teens' smoking discussed in class, specific effects of smoking taught in class, index of recent discussion of smoking during a lesson, price.

Version 2, part 1:
Smoking status = a function of: age (or the type of school and grade), sex, existence of any school prevention effort, price, advertising exposure, anti-smoking advertising

exposure, knowledge of health consequences of smoking, warning received from a health worker, warning received from a family member.

Version 2, part 2:
Log (number of cigarettes consumed in a month) = a function of: age (or the type of school and grade), sex, existence of any school prevention effort, price, advertising exposure, anti-smoking advertising exposure, knowledge of health consequences of smoking, warning received from a health worker, warning received from a family member.

The logarithmic transformation of the dependent variable in the second part of the model is necessary to convert the skewed distribution of the cigarette consumption variable to a distribution resembling more closely the normal distribution. 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. A sensitivity analysis was performed on the results from the first part of the model using the broader definition of smoker (variable Smoker1).

An attempt was made to estimate cross-price elasticity between domestic brands (represented by Prima) and foreign cigarettes brands (represented by L&M, Lucky Strike, Camel, and Marlboro). This analysis assessed if prices of foreign cigarette brands affected those who smoked the local brand, Prima, and if the price of Prima changed smoking behavior of those who smoked foreign brands. Unfortunately, the results of this model were considerably distorted by the presence of high correlation between the price of the domestic brand and the average price for the foreign brands (correlation is 0.48, which is relatively high given only 100 observations (schools) for each price). For this reason, it was impossible to obtain meaningful estimates of the cross-price elasticities from this model specification.

4. DATA ANALYSIS

4.1 Basic Descriptive Statistics

Smoking prevalence among teenage students in Ukraine is described in Table 2. More than three-quarters of all students had already experimented with cigarettes and nearly one-fifth of the sample did so before the age of 10. Current cigarette use (defined as smoking on at least one of the 30 days before the survey) is relatively high (41%) compared with smoking prevalence among the same age group in the US, for example at 34% (CDC 2000b), France at 35% (CDC 2000a), Czech Republic at 30% (Sovinova and Csemy 2000), or Hungary at 36% (CDC 1997). The smoking prevalence is even higher when the broader definition of smoker is used (either reporting smoking days or number of cigarettes smoked in the last 30 days before the survey), at almost 45%.

About one-third of respondents who had experimented with smoking can be considered established smokers (smoked more than 100 cigarettes in their lifetime). Smoking and

use of other tobacco products was more prevalent among males; almost half currently used some form of tobacco product. The most striking gender differences were age of first cigarette experience (29% of males and 8% of females had tried a cigarette before the age of 10), and being an established smoker (41% of males, 21% of females).

Table 2: Smoking prevalence among teenage students in Ukraine

Behavior described	Sample % prevalence	Male % prevalence	Female % prevalence
Any cigarette experience	77.3 (± 2.3)	84.0 (± 2.4)	69.1 (± 3.5)
Current cigarette use	41.1 (± 3.0)	46.8 (± 4.1)	33.8 (± 3.5)
Current cigarette use (broader definition)	44.5 (± 3.0)	50.8 (± 4.1)	36.7 (± 3.4)
Current use of tobacco other than cigarettes	8.0 (± 1.1)	9.9 (± 1.6)	5.6 (± 1.3)
Current use of any tobacco product (narrower definition)	43.6 (± 3.0)	49.3 (± 4.0)	36.2 (± 3.6)
Tried cigarettes before age of 10 (of those who ever smoked)	18.7 (± 2.0)	28.6 (± 2.8)	7.8 (± 1.2)
Smoked more than 100 cigarettes in life (of those who ever tried smoking)	32.8 (± 2.8)	41.2 (± 3.5)	20.7 (± 3.1)

Notes: The numbers in parentheses represent 95% robust confidence interval. The "broader definition" of smoking includes respondents who did not say how many days during the past 30 they had smoked, but did provide information on the average number of cigarettes smoked on the days on which they had smoked.

Smoking intensity, correlation with alcohol use, and addiction are analyzed in Table 3. About half of current smokers smoked daily (28%), or almost daily (21%). The numbers of cigarettes smoked in one day were below typical adult levels. Less than 11% of the sample smoked a pack a day, and most (40%) smoked 2-5 cigarettes per day. Average monthly cigarette consumption was 119 cigarettes. (Note that monthly consumption does not correspond to the multiple of smoking days and daily cigarette consumption because of inconsistencies in respondents' answers.) The male/female difference in smoking intensity was again notable, particularly in monthly cigarette consumption: smoking intensity among females was just over half the level among males.

Forty-three percent of current smokers tended to smoke more if they were drinking or using other drugs. This was more strongly the case for females than males. Males seemed to be more addicted to cigarettes than females, as 47% of them desired a cigarette right after they woke compared to 30% of smoking females.

Table 3: Behavior of current cigarette smokers

Behavior	Sample	Male	Female
Number of smoking days in a month	16.9 (± 0.8)	19.1 (± 0.9)	13.3 (± 1.2)
- smokes 1-2 days/month (%)	16.5 (± 2.1)	10.7 (± 1.2)	25.4 (± 2.0)
- smokes 3-5 days/month (%)	11.7 (± 1.8)	9.0 (± 1.1)	15.8 (± 1.3)
- smokes 6-9 days/month (%)	9.87 (± 1.5)	10.1 (± 1.0)	9.5 (± 1.2)
- smokes 10-19 days/month (%)	13.6 (± 1.9)	12.9 (± 1.3)	14.7 (± 1.3)
- smokes 20-29 days/month (%)	20.8 (± 2.1)	23.4 (± 1.4)	16.8 (± 1.6)
- smokes each day (%)	27.6 (± 3.3)	33.9 (± 2.1)	17.9 (± 1.8)
Number of cigarettes per day	5.5 (± 0.6)	6.4 (± 0.8)	4.0 (± 0.4)
- smokes usually 1 cigarette/smoking day (%)	26.7 (± 2.3)	19.3 (± 2.9)	38.8 (± 4.1)
- smokes usually 2-5 cigarettes/smoking day (%)	39.9 (± 3.0)	39.2 (± 4.0)	41.0 (± 3.8)
- smokes usually 6-10 cigarettes/smoking day (%)	22.5 (± 2.6)	27.2 (± 3.2)	14.7 (± 2.9)
- smokes usually 11-20 cigarettes/smoking day (%)	7.9 (± 1.8)	10.4 (± 2.6)	3.9 (± 1.6)
- usually more than 20 cigarettes/smoking day (%)	3.0 (± 1.6)	4.0 (± 2.4)	1.5 (± 1.2)
Total number of cigarettes per month	119.4 (± 11.1)	142.4 (± 14.4)	80.4 (± 13.9)
Smoking encouraged by alcohol/drugs	43.0 (± 3.6)	39.6 (± 3.8)	49.6 (± 5.5)
Addiction (desire to smoke in the morning)	39.8 (± 3.4)	46.7 (± 4.6)	29.9 (± 4.5)

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

4.2 Consumption Localities and Sources of Cigarettes

Table 4 describes where students usually consumed their cigarettes. Most (39%) smoked in public places such as streets, parks, and shopping centers. The second most popular place was at a social event (21%). Streets and other public places were more popular among males, and social events were favored more by females. About 11% of males smoked at school compared to less than 5% of females, and about 7% of all respondents smoked at home.

Table 4: Where students smoke (current and former smokers only)

Usual place for smoking	Sample %	Male %	Female %
Home	7.2 (± 1.1)	7.3 (± 1.6)	6.7 (± 1.7)
School	8.4 (± 1.9)	11.3 (± 2.8)	4.6 (± 2.0)
Work	1.1 (± 0.5)	1.3 (± 0.7)	0.6 (± 0.5)
Friend's house	4.4 (± 0.9)	2.8 (± 1.0)	6.8 (± 1.7)
Social events	20.9 (± 2.4)	15.8 (± 2.6)	27.3 (± 3.8)
Public spaces (e.g., street, park, store)	38.7 (± 3.1)	41.7 (± 3.5)	35.2 (± 4.4)
Other	19.4 (± 2.5)	19.8 (± 2.8)	18.9 (± 3.9)

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

Sources of cigarettes for current smokers are illustrated in Table 5. The most common way of getting cigarettes was to buy them in stores or from street vendors (76% of smokers in the sample). Females relied more on borrowing and gifts than males (16% of females; 8% of males). An unsuccessful attempt to buy cigarettes was an almost unknown experience: only 8% of males and 5% of females were refused a cigarette purchase in the last month due to their age.

Table 5: How students get cigarettes (current smokers only)

Usual means of getting cigarettes	Sample %	Male %	Female %
Buy in store	38.8 (± 3.8)	38.9 (± 4.5)	38.9 (± 3.4)
Buy from street vendor	37.7 (± 3.5)	41.4 (± 4.2)	32.8 (± 5.0)
Buy through someone else	7.6 (± 1.5)	6.7 (± 1.8)	8.0 (± 2.1)
Borrow	6.7 (± 1.3)	4.8 (± 1.6)	9.7 (± 2.2)
Steal	1.7 (± 0.7)	1.6 (± 0.9)	2.0 (± 1.2)
Gift from older person	3.9 (± 1.3)	3.0 (± 1.2)	5.5 (± 2.7)
Get cigarettes in some other way	3.6 (± 0.9)	3.6 (± 1.2)	3.1 (± 1.5)
Not denied sale at stores due to age	93.5 (± 1.5)	92.1 (± 1.8)	95.2 (± 1.8)

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

4.3 Brand Choices and Prices Paid for Cigarettes

Table 6 summarizes how much students usually paid for a pack of cigarettes and their favorite brands. The average price paid for a pack of cigarettes was UAH 2.26 (US $0.57). Females paid on average more for their cigarettes than males. The majority of males paid UAH 1-2 for a pack; the majority of females paid UAH 2-3. Twice as many females as males were in the group of consumers who bought the most expensive cigarettes. This may suggest less price sensitivity among females than males.

Table 6: Usual prices paid and brands smoked (current smokers only)

Variable name	Sample	Male	Female
How much usually pay for a pack of cigarette (of those who buy cigarettes)	2.26 (± 0.10)	2.09 (± 0.11)	2.54 (± 0.12)
less than UAH 1 per pack (%)	5.6 (± 2.1)	7.1 (± 3.1)	3.4 (± 1.7)
UAH 1 ≤ usual price < UAH 2 per pack (%)	42.7 (± 3.2)	50.0 (± 3.6)	31.5 (± 4.3)
UAH 2 ≤ usual price < UAH 3 per pack (%)	30.0 (± 2.7)	26.6 (± 3.6)	35.3 (± 4.0)
UAH 3 ≤ usual price < UAH 4 per pack (%)	12.9 (± 2.3)	9.9 (± 2.1)	17.4 (± 3.8)
- UAH more than 4 per pack (%)	8.8 (± 2.1)	6.5 (± 1.9)	12.5 (± 3.7)
Smokes Prima: filtered or non-filtered (%)	15.0 (± 2.5)	20.2 (± 3.6)	6.8 (± 2.0)
Smokes L&M (%)	22.7 (± 2.6)	24.8 (± 3.1)	19.4 (± 4.0)
Smokes Lucky Strike (%)	5.2 (± 1.8)	6.5 (± 2.8)	3.0 (± 1.2)
Smokes Camel (%)	2.3 (± 0.9)	2.9 (± 1.3)	1.2 (± 1.0)
Smokes Marlboro (%)	9.3 (± 1.7)	8.6 (± 2.1)	10.5 (± 3.0)
Smokes one of the foreign brands (%)	39.5 (± 3.2)	42.8 (± 5.2)	34.1 (± 4.6)
Smokes other non-listed brands (%)	26.5 (± 2.7)	20.5 (± 3.1)	36.0 (± 5.1)
No brand preference (%)	19.1 (± 2.2)	16.5 (± 2.5)	23.1 (± 4.6)

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

Of the five listed cigarette brands, the most popular was L&M, with nearly 23% of smokers selecting it. The second most popular brand was Prima, a local non-filtered brand, which is the most popular brand among adults. There was a strong male dominance among fans of this brand. The second most popular cigarette brand among

females was Marlboro. Nearly 40% of current smokers preferred one of the listed foreign brands.

The price information in Table 7 suggests that many of those who preferred other non-listed brands smoked foreign brands (the average price for the group smoking one of the listed foreign brands was quite similar to those who reported smoking other non-listed brands). Based on the same logic, it can be assumed that the majority of those who did not have a preferred brand smoked domestic cigarettes. If these assumptions are correct, two-thirds of Ukraine students preferred foreign cigarette brands despite their higher prices. Making a brand selection was more important for males (only 16.5% of them did not have a brand preference) than for females (over 23% of them did not have a brand preference).

Table 7 shows average prices paid for cigarettes by respondents who preferred certain brands (second column). The third column lists minimum retail prices (including all applicable taxes: excise, import, VAT) of corresponding brands as declared by the Ministry of Economy in Ukraine. Minimum retail prices are not set for domestic brands or foreign cigarettes manufactured in Ukraine (such as L&M).

Table 7: Cigarette prices of preferred brands (current smokers only)

Usual cigarette brand smoked	Price of cigarettes usually smoked (UAH)	Minimum price of imported cigarettes set by the government	% respondents smoking the brand
Prima - filtered or non-filtered	1.58 (± 0.09)	0.6, 2.1[2]	15.0 (± 2.5)
L&M	2.03 (±0.07)	1.93 - 2.06	22.7 (± 2.6)
Lucky Strike	2.55 (± 0.24)	2.57	5.2 (± 1.8)
Camel	2.60 (±0.30)	3.16	2.3 (± 0.9)
Marlboro	3.32 (± 0.15)	3.16 - 3.28	9.3 (± 1.7)
One of the foreign brands	2.41 (± 0.08)	-	39.5 (± 3.2)
Other non-listed brands	2.60 (± 0.17)	-	26.5 (± 2.7)
No brand preference	1.87 (± 0.11)	-	19.1 (± 2.2)

Notes: The numbers in parentheses represent 95% robust confidence interval. All prices are in hryvnas (UAH). In April 1999: UAH 1 = US $0.25.

The numbers for Prima in the third column represent two average market prices: the first is price of Prima without filters, the second is price with filters. Given the price reported

[2] Average market price for non-filtered (in 1999) and filtered (in 2000), including all taxes.

by smokers of Prima, it can be assumed that the majority of Prima teenage smokers preferred the filtered version of the brand.

There were two minimum prices reported for L&M and Marlboro brands. The "light" version of L&M was more expensive than the regular version, and Marlboro 100 was more expensive than the regular Marlboro. It was impossible to distinguish whether respondents bought imported or domestic L&M as both existed in Ukraine in 1999. Because domestically produced cigarettes are not subject to import duties (UAH 0.4 per pack), the origin of L&M can significantly affect price. Given the reported price of L&M smokers, it can be assumed that the majority of L&M buyers purchased the imported version.

In the case of the three foreign brands that are imported only (Marlboro, Lucky Strike, and Camel), some smokers must have paid less than the minimum price set by the government. A possible explanation is that the cigarettes had been smuggled, and therefore available at a lower price.

4.4 The Effect of Age and Type of School on Cigarette Consumption

Table 8 analyzes the age structure of smoking prevalence and smoking intensity among Ukrainian students. The estimates suggest that by the age of 17 more than 90% of the respondents had tried smoking and nearly 60% were already established smokers. The smoking prevalence among the oldest age group was extremely high—nearly 67% of this group could be classified as current smokers. Apart from the 11 and 12 years olds, the measures of smoking prevalence and intensity increase with age.

The youngest age group exceeded the oldest one in two measures of smoking prevalence, the percentage of established smokers defined as those who had consumed over 100 cigarettes in life, and the prevalence of use of other tobacco products. The oldest and the youngest age groups were almost equal in terms of smoking intensity, and they smoked on more days than the middle age groups. However, it is necessary to exercise caution, since there were relatively small numbers of respondents in the youngest age groups and hence high standard errors of the estimates.

The most popular brand among the youngest respondents was L&M, the cheapest foreign brand. The local brand Prima was also very popular among the youngest and oldest age group. The youngest group did not tend to select the more expensive western cigarette brands such as Lucky Strike or Camel. The finding corresponds to expected larger income constraints among younger smokers. As far as other brand preferences, Marlboro was the most popular among the oldest age group. The youngest and the oldest groups, the groups with the largest smoking prevalence, had the most established brand preferences.

Table 8: Smoking behavior by age

Behavior described	11 years or younger	12 years	13 years	14 years	15 years	16 years	17 years and older
Any cigarette experience (%)	74.1 (±18.1)	72.1 (±19.7)	70.0 (± 5.0)	70.5 (± 3.6)	78.0 (± 3.2)	83.8 (± 3.8)	91.9 (± 3.0)
Smoked more than 100 cigarettes in life (of those who ever smoked) (%)	61.0 (± 26.2)	40.8 (±15.3)	17.5 (± 5.6)	18.3 (± 3.0)	32.7 (± 4.6)	45.2 (± 5.0)	58.0 (± 8.6)
Current cigarette use (%)	45.9 (± 20.9)	49.7 (±17.8)	23.0 (± 6.5)	28.1 (± 3.5)	43.4 (± 3.9)	54.1 (± 5.1)	66.6 (± 8.6)
Current use of tobacco other than cigarettes (%)	17.3 (± 18.3)	14.5 (±10.8)	3.0 (± 2.2)	6.8 (± 1.5)	8.2 (± 2.1)	10.5 (± 2.1)	10.6 (± 3.7)
Number of smoking days in a month (of current smokers)	21.1 (± 6.0)	17.5 (± 5.2)	12.4 (± 2.7)	12.0 (± 1.3)	16.6 (± 1.2)	19.2 (± 1.4)	22.3 (± 1.4)
Number of cigarettes per day (of current smokers)	8.1 (± 4.5)	5.7 (± 3.0)	3.7 (± 0.7)	4.4 (± 1.5)	5.4 (± 0.8)	5.9 (± 0.6)	7.4 (± 1.0)
How much paid for a pack of cigarettes (of those who buy cigarettes)	1.68 (± 0.50)	2.54 (±0.51)	2.35 (±0.23)	2.21 (±0.18)	2.30 (±0.13)	2.33 (±0.13)	1.96 (±0.24)
Or current smokers only: - smokes Prima (%)	25.8 (± 25.1)	14.4 (±19.0)	12.8 (±10.2)	11.6 (± 3.6)	13.7 (± 3.0)	16.4 (± 5.8)	20.74 (±12.0)
- smokes L&M (%)	29.6 (± 30.7)	24.8 (±22.4)	12.0 (± 7.6)	22.0 (± 6.0)	22.3 (± 4.1)	26.1 (± 5.9)	21.5 (± 6.5)
- smokes Lucky Strike (%)	0.0 (± 0.0)	0.0 (± 0.0)	2.0 (± 3.0)	5.0 (± 3.1)	6.0 (± 2.1)	3.0 (± 1.4)	2.3 (± 2.3)
- smokes Camel (%)	0.0 (± 0.0)	0.0 (± 0.0)	0.0 (± 0.0)	3.2 (± 1.4)	1.6 (± 1.3)	2.0 (± 1.4)	1.8 (± 2.8)
- smokes Marlboro (%)	0.0 (± 0.0)	12.9 (±15.9)	10.3 (± 6.0)	6.2 (± 3.4)	9.0 (± 2.6)	9.8 (± 3.0)	13.0 (± 8.7)
- smokes one of the foreign brands (%)	29.6 (± 30.7)	37.8 (±23.3)	24.4 (± 9.2)	36.4 (± 5.9)	38.9 (± 4.7)	40.9 (± 6.2)	38.7 (±12.2)
- smokes other non-listed brands (%)	26.7 (± 25.9)	29.8 (±22.6)	35.8 (±11.8)	28.6 (± 5.5)	27.6 (± 4.9)	25.3 (± 3.8)	21.9 (± 8.0)
- no brand preference (%)	17.8 (± 25.0)	18.1 (±17.1)	27.0 (±11.5)	23.4 (± 4.3)	19.7 (± 3.4)	17.3 (± 4.1)	18.6 (± 9.6)

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

Table 9 analyzes smoking according to the type of school attended. It is necessary to keep in mind that the differences in smoking behavior between schools were also affected by age and gender composition, both important determinants of smoking in this sample. The youngest respondents were in regular school (14.5 years) and the oldest were in technical colleges (16.1 years). Regular school and technical colleges had students of both genders represented nearly proportionally, and professional schools were dominated by males (83% of all students).

Table 9: Smoking behavior by school type

Behavior described	Regular school	Professional school	Technical college
Current cigarette use (%)	36.0 (± 3.1)	71.8 (± 7.1)	56.8 (± 6.1)
Current use of tobacco other than cigarettes (%)	7.4 (± 1.2)	10.8 (± 3.2)	10.3 (± 4.0)
Of current smokers only: - number of smoking days in a month	14.9 (± 0.9)	23.1 (± 1.6)	19.9 (± 2.5)
- number of cigarettes per day	4.5 (± 0.3)	8.9 (± 2.1)	6.3 (± 0.7)
- buy in store (%)	39.5 (± 4.3)	35.5 (± 10.2)	38.5 (± 11.2)
- buy from street vendor (%)	35.1 (± 4.1)	44.2 (± 9.4)	47.3 (± 11.3)
- buy through someone else (%)	7.9 (± 1.6)	8.8 (± 4.0)	3.1 (± 1.7)
- borrow (%)	7.6 (± 1.6)	4.9 (± 3.4)	2.7 (± 1.6)
- steal (%)	1.8 (± 0.9)	1.5 (± 1.5)	1.0 (± 1.4)
- gift from older person (%)	4.4 (± 1.7)	2.0 (± 1.2)	3.7 (± 2.4)
- get cigarettes in some other way (%)	3.6 (± 1.1)	2.9 (± 2.1)	3.6 (± 2.4)
Of current smokers only: - smokes Prima (%)	11.6 (± 2.0)	25.9 (± 11.4)	19.6 (± 6.5)
- smokes L&M (%)	21.4 (± 3.1)	27.4 (± 4.0)	24.5 (± 10.9)
- smokes Lucky Strike (%)	4.5 (± 1.4)	3.0 (± 1.7)	3.2 (± 2.4)
- smokes Camel (%)	2.2 (± 0.9)	2.2 (± 1.7)	0.5 (± 0.8)
- smokes Marlboro (%)	9.4 (± 2.0)	7.6 (± 4.8)	10.3 (± 8.0)
- smokes one of the foreign brands (%)	38.0 (± 2.4)	46.0 (± 12.9)	38.5 (± 12.2)
-current desire to stop smoking (%)	74.8 (± 2.5)	83.4 (± 7.8)	79.0 (± 9.6)
-tried to quit during the past year (%)	75.5 (± 2.8)	80.7 (± 8.2)	76.9 (± 8.2)
- successfully quit smoking (%)	59.1 (± 2.9)	33.2 (± 9.4)	38.1 (± 9.8)
How much paid for a pack of cigarettes (of those who buy cigarettes)	2.39 (± 0.10)	1.79 (± 0.22)	2.11 (± 0.17)

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

Age tended to increase smoking participation and smoking intensity in technical colleges, and gender performed the same role for professional schools. Given that professional schools also had a relatively high average age (15.9 years), we would expect them to have the highest smoking prevalence and intensity. This expectation is confirmed in Table 9. Professional schools exceeded the other two school types in all indicators.

It is interesting that stores were the more popular venue for buying cigarettes among younger students in regular schools, while street vendors played a more important role for older smokers in technical and professional schools. Borrowing cigarettes was more frequent among regular school students, probably reflecting lower smoking intensity.

The foreign brand L&M was the most popular brand in all types of schools, followed by the local brand Prima. Foreign brands were the most popular in professional schools. The more clearly established brand preferences existed among students with the highest smoking participation and smoking intensity (students in professional schools). Students of regular schools paid the highest price for their cigarettes; professional school students paid the lowest. It seems that older students with higher smoking intensity and longer smoking history had the incentive to look for cheaper cigarettes, which probably resulted in cheaper sources of cigarettes over time.

The highest desire to quit smoking was among professional school students, but students of regular school were most successful in quitting smoking.

4.5 Smoking Uptake, Cessation Efforts, and Risk of Smoking

Students' beliefs and ambitions regarding their future smoking behavior are reported in Table 10. More than one-third of current non-smokers could be defined as being at high risk for beginning to smoke because they said they would be willing to smoke if offered a cigarette by a friend. Twenty-eight percent of current non-smokers expected to be smoking in the next year, and nearly 8% of the remaining non-smokers wanted to join them within five years. These results indicate that over one-third of current teenage non-smokers in Ukraine are very susceptible to taking up the smoking habit.

More than 3 out of 4 current smokers said they would like to quit and had tried to do so during the past year. The majority of respondents believed that it is easy to stop smoking, and in fact half the respondents who had ever smoked said they had quit. Health concerns were the most frequently cited reason for quitting. Very few had used professional help to quit, and about one quarter said that a health worker had warned them about the hazards of smoking. The cost of cigarettes seemed to play a minimal role in the decision to quit.

Table 10: Attitudes toward future smoking and quitting

Behavior described	Sample %	Male %	Female %
Will smoke if offered a cigarette from a friend (non-smokers only)	35.5 (± 2.6)	39.2 (± 3.6)	30.4 (± 3.3)
Expect to smoke within a year (non-smokers only)	28.2 (± 2.1)	31.4 (± 3.0)	23.8 (± 3.0)
Expect to smoke within 5 years (non-smokers who will not smoke next year)	7.8 (± 1.0)	10.5 (± 1.6)	4.8 (± 1.2)
Current desire to stop smoking (current smokers only)	77.3 (± 2.6)	79.0 (± 3.8)	73.6 (± 3.1)
Tried to quit during the past year (current smokers only)	76.7 (± 2.5)	77.6 (± 3.2)	75.0 (± 3.5)
Thinks he/she can quit easily (current smokers only)	89.6 (± 1.4)	88.1 (± 2.1)	92.2 (± 2.0)
Successfully quit smoking (current and former smokers)	54.2 (± 2.7)	52.0 (± 4.0)	56.2 (± 4.0)
Quit smoking due to health concerns (of those who quit)	59.7 (± 2.6)	64.6 (± 3.4)	52.5 (± 4.1)
Quit smoking to save money (of those who quit)	3.6 (± 1.0)	4.4 (± 1.5)	2.3 (± 1.1)
Quit smoking due to family pressure (of those who quit)	5.0 (± 1.1)	5.0 (± 1.6)	4.9 (± 1.6)
Quit smoking due to peer pressure (of those who quit)	2.0 (± 0.7)	1.1 (± 0.6)	3.3 (± 1.3)
Professional help to quit received (current and former smokers)	3.0 (± 1.0)	3.7 (± 1.5)	1.9 (± 0.9)
Informed of smoking hazards by health worker	27.2 (± 2.2)	28.3 (± 2.8)	25.7 (± 3.1)

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

Students' knowledge of the health consequences of smoking is described in Table 11. Overall, students seem to be well informed about the general effects of smoking. Over 95% believed that smoking is harmful, nearly 89% were aware of the shorter life span facing smokers, and over 84% were convinced of the harmful effect of secondhand smoke. However, there were (small) differences between smokers and non-smokers in the strengths of these beliefs. Fewer smokers believed in the health risks of smoking and if they did, they were less certain about it than non-smokers. More than 16% of smokers did not think that smokers have shorter life spans (compared to 8% of non-smokers), and nearly 17% of them did not believe in the harm of secondhand smoke (compared to 15% of non-smokers). Unfortunately, the survey did not provide information on knowledge of specific consequences of smoking such as increased risk of cancer or heart diseases.

Table 11: Perceived risks of smoking

Beliefs	Sample %	Smokers %	Non-smokers %
Smokers have shorter lives (probably/definitely)	88.7 (± 1.2)	83.6 (± 2.3)	92.3 (± 1.5)
- smokers definitely have shorter lives	50.6 (± 2.1)	40.1 (± 3.0)	57.9 (± 2.8)
- smokers probably have shorter lives	38.1 (± 1.8)	43.5 (± 2.4)	34.4 (± 2.6)
- smokers definitely don't have shorter lives	4.7 (± 0.8)	5.9 (± 1.5)	3.8 (± 0.9)
- smokers probably don't have shorter lives	6.6 (± 0.8)	10.5 (± 1.7)	3.9 (± 1.0)
Smoking is harmful to health (probably/definitely)	95.2 (± 0.9)	94.7 (± 1.2)	95.6 (± 1.1)
- smoking is probably harmful to your health	23.7 (± 2.0)	35.6 (± 2.9)	15.3 (± 1.9)
- smoking is definitely harmful to your health	71.6 (± 2.1)	59.1 (± 3.1)	80.3 (± 2.2)
- smoking is definitely not harmful to your health	3.3 (± 0.8)	2.5 (± 1.0)	3.8 (± 1.1)
- smoking is probably not harmful to your health	1.5 (± 0.4)	2.8 (± 0.8)	0.6 (± 0.4)
Secondhand smoke is harmful (probably/definitely)	84.5 (± 1.3)	83.3 (± 2.5)	85.5 (± 1.7)
- secondhand smoke is probably harmful	33.4 (± 1.5)	38.3 (± 2.6)	29.9 (± 2.1)
- secondhand smoke is definitely harmful	51.2 (± 2.0)	45.0 (± 2.8)	55.6 (± 2.5)
- secondhand smoke is definitely not harmful	6.6 (± 1.0)	6.5 (± 1.5)	6.7 (± 1.2)
- secondhand smoke is probably not harmful	8.8 (± 1.2)	10.2 (± 2.0)	7.8 (± 1.2)

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

Tables 12 and 13 analyze how knowledge of the health consequences of smoking was affected by advertising and school prevention programs. This analysis was conducted using an ordered Probit model, which estimated the effect of the listed independent variables on four escalating categories illustrating the strength of beliefs with respect to smoking and secondhand smoke. The listed numbers are ordered Probit coefficients with confidence intervals in parentheses.

Table 12 summarizes the results for health hazards of smoking. Those who thought that smoking is definitely not harmful are in category one. Category two is 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 most consistent result of this analysis (it holds for the whole sample as well as for smokers and non-smokers separately) is the positive association of billboard advertising

with stronger beliefs in the negative consequences of smoking. This may be the result of compulsory health warnings covering at least 5% of the billboard area. Seeing other types of cigarette advertising apart from billboards generally weakened the belief in the negative consequences of smoking, even though only some of these results are statistically significant. Counter-advertising at an event may have improved health knowledge among smokers.

The results for school prevention efforts were mixed. The statistically significant results suggest that the more recently smoking was discussed in class, the better the health knowledge was among the students. Teaching about the danger of smoking may also have improved heath knowledge regarding smoking. The efforts of health care workers did not seem to have the anticipated consequences with respect to health beliefs.

Table 12: Effect of advertising, counter-advertising, and prevention efforts on perceived harm of smoking

Independent variable	Full Sample	Smokers	Non-smokers
Anti-smoking advertising in media	0.060 (±0.163)	0.081 (±0.184)	-0.002 (±0.167)
Anti-smoking advertising at events	-0.059 (±0.170)	0.179** (±0.160)	-0.071 (±0.176)
Cigarette brand names on TV	-0.060 (±0.100)	-0.041 (±0.126)	-0.026 (±0.141)
Saw many billboard advertisements	0.152** (±0.113)	0.150** (±0.113)	0.179** (±0.158)
Cigarette advertising in press	-0.147* (±0.115)	-0.011 (±0.188)	-0.271** (±0.214)
Cigarette advertising at events	-0.001 (±0.123)	-0.142* (±0.153)	0.005 (±0.156)
Danger of smoking taught in class	0.070 (±0.146)	0.026 (±0.203)	0.199** (±0.186)
Smoking discussed in class	0.053 (±0.150)	-0.025 (±0.229)	0.076 (±0.211)
Specific effects of tobacco use taught in class	-0.033 (±0.107)	0.096 (±0.161)	-0.184** (±0.166)
Recent discussion of smoking in class	0.039** (±0.033)	0.019 (±0.034)	0.017 (±0.034)
Health worker informed of smoking hazard	-0.114** (±0.112)	-0.095 (±0.119)	-0.104* (±0.125)

Notes: *Variable significant at 10% level, two-tailed test. **Variable significant at 5% level, two-tailed test. The numbers are ordered Probit coefficients with confidence interval in parentheses.

Table 13 displays the results for health hazards of secondhand smoke from the ordered Probit model. Those who thought that secondhand smoke is definitely not harmful to the health of others are included in 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 to the health of others.

Table 13: The effect of advertising, counter-advertising, and prevention effort on perceived harm of secondhand smoke

Independent variable	Full sample	Smokers	Non-smokers
Anti-smoking advertising in media	-0.013 (±0.103)	-0.014 (±0.145)	-0.014 (±0.127)
Anti-smoking advertising at events	0.025 (±0.113)	0.104 (±0.169)	-0.017 (±0.142)
Cigarette brand names on TV	-0.059 (±0.082)	-0.015 (±0.125)	-0.103* (±0.116)
Saw many billboard advertisements	0.110** (±0.082)	0.193** (±0.124)	0.076 (±0.113)
Cigarette advertising in press	0.087 (±0.121)	0.181** (±0.174)	0.049 (±0.162)
Cigarette advertising at events	-0.109** (±0.101)	-0.143* (±0.153)	-0.077 (±0.135)
Danger of smoking taught in class	-0.018 (±0.103)	-0.007 (±0.179)	0.016 (±0.153)
Smoking discussed in class	0.034 (±0.120)	-0.009 (±0.177)	-0.029 (±0.136)
Specific effects of tobacco use taught in class	0.031 (±0.092)	0.093 (±0.141)	0.017 (±0.142)
Recent discussion of smoking in class	0.022** (±0.021)	0.010 (±0.033)	0.016 (±0.037)
Health worker informed of smoking hazard	0.024 (±0.087)	0.024 (±0.117)	0.103 (±0.135)

Notes: *Variable significant at 10% level, two-tailed test. **Variable significant at 5% level, two-tailed test. The numbers are ordered Probit coefficients with confidence interval in parentheses.

Exposure to billboards and cigarette advertising in the press also seemed to have a positive effect on knowledge of the health consequences of secondhand smoke, and this effect was stronger for smokers. Billboard and print media cigarette advertising are legal in Ukraine, but are subject to placement of compulsory health warnings, which may be the reason for their positive effect on health knowledge. Promotion of cigarettes on TV and during an event is not legal but occurs nevertheless. Ads in these venues do not carry health warnings and diminish the perception of negative consequences of secondhand smoke.

The statistically significant result for school prevention policies suggests that recent discussion of the health consequences of smoking in class improved the health knowledge about secondhand smoke.

In order to develop a successful youth anti-smoking policy, it is important to know what smoking represents for young people and what role it plays in their lives. Table 14 presents the results of this analysis for the whole sample and by smoking status. The majority of students viewed smoking as a harmful habit that is difficult to quit. There are more smokers in this group than non-smokers, possibly reflecting the struggle of smokers to quit their habit. The second most frequently cited role of smoking was fashion, more so for smokers than for non-smokers. Only a small percentage of students saw the prime role of smoking as providing joy or giving people confidence. Less than 2% of the respondents saw the primary role of smoking as a symbol of belonging to a group.

Table 14: What smoking means to young people

Smoking is for me:	Sample %	Smokers %	Non-smokers %
Harmful habit which is difficult to quit	59.9 (± 2.2)	62.0 (± 2.8)	58.5 (± 2.7)
Something that people enjoy	4.1 (± 0.7)	6.2 (± 1.3)	2.6 (± 0.7)
Just a fashion which is easy to refuse	13.8 (± 1.2)	14.9 (± 1.7)	13.0 (± 1.6)
A way to feel more confident, mature	5.0 (± 0.9)	4.0 (± 0.9)	5.7 (± 1.2)
Symbol of belonging to a special group	1.7 (± 0.5)	1.6 (± 0.7)	1.8 (± 0.7)
Other	15.5 (± 1.6)	11.3 (± 2.0)	18.4 (± 1.8)

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

Table 15 indicates that over 70% of the students were informed at school about the health risks of smoking. However, discussions took place in only 45% percent of all schools and in only one-third of professional schools. Generally, more prevention effort occurred in regular schools than in the other two school types.

Table 15: Information efforts in schools, by school type

School prevention efforts	Sample %	Regular school %	Professional school %	Technical college %
Any kind of smoking prevention taught in class	71.0 (± 3.4)	72.4 (± 4.0)	62.9 (± 7.0)	65.8 (± 8.8)
Danger of smoking taught in class	62.4 (± 4.6)	63.7 (± 5.5)	56.2 (± 7.4)	57.0 (± 7.9)
Smoking discussed in class	45.1 (± 4.7)	46.9 (± 5.6)	33.9 (± 7.1)	40.1 (± 7.7)
Specific effects of tobacco use taught in class	53.9 (± 4.2)	55.2 (± 5.0)	45.9 (± 8.5)	50.4 (± 9.0)

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

Table 16 analyzes the effect of smoking prevention efforts on perceived smoking prevalence in different types of schools. This analysis was conducted using an ordered

Probit model which estimated the effect of the listed independent variables on four increasing degrees of perceived smoking prevalence at school. The degrees of smoking prevalence were defined as follows:

- just a few students smoke
- about one-third smoke
- about half smoke
- most adolescents in my school smoke

The listed numbers are ordered Probit coefficients with confidence intervals in parentheses. Four out of six statistically significant results suggest that the school prevention efforts were positively correlated with perceptions of smoking prevalence. This might suggest that the information efforts have a negative effect on smoking prevalence, or that schools where smoking is perceived to be more prevalent are more likely to make the effort to discuss smoking with students. Schools that teach about the danger of smoking and had recent discussions on smoking and health were associated with lower perceived prevalence.

Table 16
The effect of school prevention efforts on perceived smoking prevalence at school

School prevention	All students	Regular school students	Professional school students	Technical college students
Danger of smoking taught in class	-0.040 (±0.14)	-0.015 (±0.15)	-0.228* (±0.26)	-0.415** (±0.39)
Smoking discussed in class	0.046 (±0.11)	0.019 (±0.12)	0.289* (±0.33)	0.381* (±0.44)
Specific effects of tobacco use taught in class	-0.024 (±0.11)	-0.035 (±0.11)	-0.198 (±0.44)	0.240 (±0.64)
Recent discussion of smoking and health in class	-0.025** (±0.02)	-0.0003 (±0.02)	-0.047 (±0.07)	-0.083** (±0.07)

Notes: *Variable significant at 10% level, two-tailed test. **Variable significant at 5% level, two-tailed test. The numbers are ordered Probit coefficients with confidence interval in parentheses.

4.6 Advertising Exposure

Table 17 demonstrates that the cigarette advertising ban on TV was not very effective. Over 90% of the sample had seen cigarette brand names on TV in the month before the taking the survey. It is a paradox that the forbidden medium was the one where cigarette ads were noticed most. Anti-smoking advertising was observed by only two-thirds of the sample, less than the pro-tobacco advertising.

One-quarter of the students owned a tobacco company promotional item. Distribution of free cigarette samples is forbidden in the Ukraine, and only 8% of the students said they had received free cigarettes, compared to 17% of students in the Russia GYTS and nearly half of all students in the Poland GYTS.

Table 16: Advertising exposure

Type of exposure	Sample %
Anti-smoking advertising in media	78.7 (± 1.8)
Cigarette advertising in press	87.4 (± 1.2)
Cigarette brand names on TV	90.5 (± 0.9)
Anti-smoking advertising at events (of those who go to events)	73.1 (± 1.6)
Cigarette advertising at events (of those who go to events)	84.1 (± 1.3)
Owns promotional item	26.1 (± 1.4)
Free cigarette from tobacco company	8.1 (± 1.1)

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

4.7 Exposure to Secondhand Smoke

Table 17 demonstrates that half of the sample was exposed to secondhand smoke at home and nearly three-quarters were exposed in other places. Fifty percent of respondents did not realize that this exposure was detrimental to their health. Sixty-four percent of students said they would support a ban on smoking in public places.

Table 17: Secondhand smoke (exposure and attitudes)

Exposure/attitudes	Sample %
Home exposure	49.9 (± 2.0)
Exposure in other places	74.2 (± 1.4)
Believes secondhand smoke is definitely harmful	50.3 (± 2.1)
Supports cigarette ban in public places	64.2 (± 2.1)

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

4.8 Cigarette Demand Equation

Table 18 presents results from the first version of the model, which controls only for exogenous variables and price. The left side of the table shows results for the model controlling for age. The right side provides results for the model controlling for school types. The dependent variable for the first part of the model is a respondent's smoking status; the dependent variable for the second part of the model is the number of cigarettes a smoker consumed in a month (expressed in logarithmic form). All respondents are included in the first part of the model; only smokers enter the second part. The reported numbers represent marginal effects of independent variables on the dependent variable. The numbers in parentheses are 95% robust confidence intervals.

The results reveal that smoking participation as well as smoking intensity among Ukrainian students increased with age. This trend is confirmed in the model controlling for school type instead of age, where students in higher forms (grades) and in other school types (with higher average age of students) had higher smoking participation and smoked more cigarettes compared to form 8 students in a regular school. Males exceeded females in both measures of smoking.

The two coefficients for school efforts to inform students about smoking that are statistically significant suggest that teaching about the danger of smoking and/or discussing teenage smoking in class can lower smoking intensity among young smokers. Because there may be correlation among school prevention variables, a single variable to capture these efforts is included in the second version of the model.

Higher prices were associated with lower smoking participation and smoking intensity, and this was statistically significant in three cases. The effect on smoking participation is significant only in the model controlling for age rather than school type. The price elasticity of participation is much smaller than the price elasticity in the conditional demand equation, suggesting that the effect of price is more important in determining how much a young person will smoke, than whether they will smoke. The effect of price on smoking quantity might be inflated by the fact that high intensity smokers were more motivated to search for cheaper cigarettes. The coefficient on price in the smoking participation equation is similar to some of the recent estimates from the US (Chaloupka et al. 1997; Chaloupka et al. 1998; Saffer and Chaloupka 2000).

Table 18: Cigarette demand equation - 1st model version

Variables \ Model	Controlling for age		Controlling for school type	
	1st part	2nd part	1st part	2nd part
Age	0.098** (±0.059)	0.339** (±0.108)	-	-
Regular school: form 9	-	-	0.094** (±0.210)	0.605** (±0.296)
Regular school: form 10	-	-	0.209** (±0.193)	0.895** (±0.319)
Professional school: course 1	-	-	0.375** (±0.346)	1.289** (±0.412)
Professional school: course 2	-	-	0.405** (±0.283)	1.471** (±0.343)
Technical college: course 1	-	-	0.243** (±0.259)	0.947** (±0.505)
Technical college: course 2	-	-	0.327** (±0.403)	1.564** (±0.389)
Male	0.119** (±0.114)	0.864** (±0.235)	0.105** (±0.108)	0.825** (±0.225)
Danger of smoking taught in class	-0.025 (±0.137)	-0.224* (±0.268)	-0.036 (±0.133)	-0.198 (±0.261)
Teenage smoking discussed in class	-0.004 (±0.123)	-0.169 (±0.226)	-0.005 (±0.124)	-0.201* (±0.227)
Specific effects of smoking taught	-0.020 (±0.135)	-0.119 (±0.267)	-0.016 (±0.142)	-0.077 (±0.268)
Recent discussion of smoking and health in class	0.005 (±0.030)	0.016 (±0.048)	0.008 (±0.029)	0.021 (±0.049)
Average school price	-0.089* (±0.248)	-0.805** (±0.308)	-0.051 (±0.259)	-0.627** (±0.326)
Price elasticity	-0.507	-1.834	-0.289	-1.428

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

Table 19 presents results from the second version of the model, which controls for both exogenous and potentially endogenous variables. In the second version, a single dichotomous variable is used to capture school prevention efforts, because high correlation among the group of these variables is a potential source of instability in the results and large confidence intervals.

The left side of the table shows results for the model controlling for age, the right side for the model controlling for school types. The dependent variable for the first part of the model is, again, smoking status; the dependent variable for the second part is the number of cigarettes consumed in a month, expressed in logarithmic form. All respondents are included in the first part of the model, but only smokers enter the second part.

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

The results confirmed the previous findings with respect to age (older students smoked more and with higher intensity), school grade/type (higher grades smoke more cigarettes), and gender (male students exceed female students in both smoking participation and smoking intensity).

The result for school information/prevention efforts does not suffer from an endogeneity problem and makes clear that students in schools with an anti-smoking curriculum were less likely to smoke, and if they were smokers, smoked fewer cigarettes than smokers in other schools, controlling for the factors included in the equation.

The results for anti-smoking advertising exposure were mixed: it had a negative effect on smoking intensity but a positive effect on smoking participation. The exposure to cigarette adverting also brought mixed results, but the statistically significant marginal effects were negative (the case of billboard exposure). As mentioned earlier, the advertising variables are potentially endogenous and the results must be interpreted with caution. It is reasonable to expect that smokers paid more attention to both counter- and pro-cigarette advertising, which would affect the results in the smoking participation equation. The results from the second part of the model, which included only smokers, are easier to interpret. In this case it is possible to conclude that seeing anti-smoking advertising was associated with smoking fewer cigarettes, and that seeing billboard advertising was associated with higher smoking intensity among smokers.

Possessing a tobacco company promotional item was associated with higher smoking participation and greater smoking intensity, though only the results for smoking intensity are statistically significant. Having received free promotional cigarettes is related to higher smoking participation and greater smoking intensity, but only results for smoking participation are statistically significant.

Statistically significant results for variables representing beliefs about the health effects of smoking to smokers themselves are associated with lower cigarette demand. Beliefs about the more concrete health consequences (such as “smokers die earlier”) were much more strongly associated with lower smoking prevalence and lower smoking intensity than more ambiguous and vague statements (such as “harm health”). Awareness of harmful effects of secondhand smoke was associated with higher smoking intensity among smokers. Perhaps the more students smoked the more they were reminded of negative consequences to other people’s health.

The results pointing to a positive relationship between prevention efforts by health workers and smoking status may reflect selective attention of health professionals to those who smoked. The same might be true for the prevention messages in the family. In addition, the positive effects of discussions of smoking harm in a family could reflect the younger generation’s revolt against the older generation.

Table 19: Cigarette demand equation - 2nd model version

Variables \ Model	Controlling for age		Controlling for school type	
	1st part	2nd part	1st part	2nd part
Age	0.094** (±0.058)	0.327** (±0.080)	-	-
Regular school: form 9	-	-	0.089** (±0.208)	0.585** (±0.302)
Regular school: form 10	-	-	0.200** (±0.191)	0.864** (±0.313)
Professional school: course 1	-	-	0.339** (±0.367)	1.243** (±0.384)
Professional school: course 2	-	-	0.391** (±0.273)	1.444** (±0.351)
Technical college: course 1	-	-	0.228** (±0.271)	0.850** (±0.513)
Technical college: course 2	-	-	0.305** (±0.399)	1.529** (±0.351)
Male	0.088** (±0.115)	0.776** (±0.224)	0.076** (±0.111)	0.744** (±0.214)
Any prevention taught at school	-0.049** (±0.108)	-0.178* (±0.209)	-0.043** (±0.111)	-0.144 (±0.201)
Saw media anti-smoking advertising	0.022 (±0.120)	-0.217 (±0.274)	0.019 (±0.121)	-0.245* (±0.267)
Saw event anti-smoking advertising	0.043* (±0.120)	-0.220* (±0.262)	0.045* (±0.120)	-0.226* (±0.256)
Possess promotional item	0.026 (±0.112)	0.296** (±0.226)	0.028 (±0.110)	0.317** (±0.220)
Saw TV advertising	0.00002 (±0.097)	-0.088 (±0.187)	-0.003 (±0.100)	-0.063 (±0.184)
Saw billboard advertising	0.006 (±0.092)	0.166* (±0.171)	0.007 (±0.090)	0.180** (±0.168)
Saw press advertising	-0.004 (±0.135)	-0.192 (±0.254)	-0.0004 (±0.135)	-0.149 (±0.246)
Saw event advertising	-0.025 (±0.120)	0.128 (±0.262)	-0.027 (±0.120)	0.127 (±0.256)
Free promotional cigarette offer	0.136** (±0.203)	0.145 (±0.328)	0.131** (±0.204)	0.136 (±0.324)
Believes smokers die earlier	-0.201** (±0.187)	-0.350** (±0.238)	-0.195** (±0.184)	-0.333** (±0.236)
Believes smoking is harmful	0.062 (±0.230)	-0.365* (±0.414)	0.059 (±0.229)	-0.406** (±0.405)
Believes secondhand smoke is harmful	-0.032 (±0.160)	0.232* (±0.277)	-0.032 (±0.161)	0.241* (±0.278)
Informed by health worker of harmful effects of smoking	0.038* (±0.103)	0.157 (±0.209)	0.037* (±0.100)	0.154 (±0.204)
Family has discussed cigarette harm	0.198** (±0.111)	0.548** (±0.266)	0.199** (±0.111)	0.516** (±0.273)
Average school price	-0.087* (±0.241)	-0.792** (±0.314)	-0.055 (±0.255)	-0.625** (±0.345)
Price elasticity	-0.496	-1.803	-0.314	-1.423

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

The estimates of the price effect in the second version of the model are similar to those from the first version: higher prices are associated with a lower probability of smoking

and fewer cigarettes smoked per month among smokers. However, the same caveat about price endogeneity applies to these results as well.

The results of all models were subjected to a sensitivity analysis. This analysis involved re-estimating all Probit regressions with the dependent variable Smoker1, which was based on the broader definition of smoker. The analysis revealed that using the alternative definition of smoker did not change the signs or significance of the variables of interest. However, school prevention efforts (included as a single variable for any type of school prevention) and price were estimated to have slightly stronger negative effects on the decision to become a smoker. The price elasticities based on models using the broader definition of smoker are slightly higher than in the models that used the common definition of a smoker, and are as follows:

- -0.542 (1st version) and -0.553 (2nd version) in the models controlling for age
- -0.297 (1st version) and -0.323 (2nd version) in the models controlling for school type

5. SUMMARY AND DISCUSSION

Both smoking participation and smoking intensity were higher among male students. Smoking seemed to be more of a social practice for females than for males, with 33% of females usually smoking during social events or at a friend's house compared to 18% percent of males. Females also associated smoking more with drinking alcohol and taking drugs than males.

Females seemed to be less sensitive to cigarette prices than males, and they paid more for their cigarettes and smoked brands that were more expensive. This lesser price sensitivity among females may reflect their lower cigarette consumption of about half of the amount that males smoked in a month.

Foreign cigarettes brands were very popular among Ukrainian students despite their higher prices. However, the difference between the cheapest foreign brand (L&M) and the most popular local brand was only about UAH 0.4 (about ten US cents). L&M was the most popular of all listed brands. Its popularity and price advantage over the other listed foreign brands (because it is produced in Ukraine and therefore not subject to import duties) indicated that foreign brand smokers were sensitive to cigarette prices. Another indication of price sensitivity was evident in the analysis of the price paid by students of different schools. Students of regular schools paid the highest prices for their cigarettes, while older students in professional schools paid the lowest. The professional school students with higher smoking intensity and longer smoking history probably were more motivated to look for cheaper cigarettes, or cheaper sources of cigarettes.

Despite the regulation prohibiting anyone under age 18 from buying tobacco, more than three-quarters of student smokers (who were primarily younger than 17 years) had no problem in buying their cigarettes from stores or street vendors. Only 6.5% of these buyers were ever refused a cigarette purchase due to their age. This is evidence of

inadequate enforcement of the law. However, the fundamental flaw of this law is that it puts the burden of compliance on the cigarette buyer, not the seller. In this case, the sales person has no incentive to refrain from selling tobacco to teenagers. Even where sellers are liable for fines if they sell to minors, the experience is that substantial enforcement efforts are needed to ensure high compliance.

Enforcement and loopholes are important issues with respect to the ban on cigarette advertising on TV. The fact that 90% of respondents saw a cigarette brand name on TV in the month before taking the survey probably reflects the fact noted earlier that cigarette companies are not prevented from sponsoring programs that include their brand names in the titles. Moreover, the evidence from studying tobacco advertising bans in other countries suggests that partial bans are ineffective as they allow tobacco companies to shift promotional resources to media unaffected by the ban (Saffer and Chaloupka 2000). The analysis of beliefs about the effects of smoking on health suggests that exposure to cigarette advertising without health warnings diminished perceived negative health consequences of smoking. In light of this evidence, a complete ban on cigarette advertising would be the most effective way of limiting the exposure of Ukrainian young people to tobacco promotional messages. Alternatively, Ukraine could consider requiring anti-smoking counter-advertising whenever cigarette brand names are shown or mentioned on TV.

It is striking that over one-third of the smokers (and nearly half the male smokers) were already addicted to cigarettes. Over three-quarters of current smokers said they would like to quit their habit and most of them believed that doing so was easy. However, only half the smokers had succeeded in this endeavor. Professional help to quit was either non-existent or not utilized. Health workers could play a much greater role in youth smoking prevention: more than two-thirds of them did not provide information on the hazards of smoking, a practice that is associated with lower cigarette demand.

Even though the results of the regression analysis must be interpreted with caution given the endogenous nature of the price variable, it provides some interesting findings. First, there is evidence that higher prices are associated with lower cigarette use, affecting both the decision to smoke and smoking intensity. The magnitude of this effect is difficult to judge, particularly in the second part of the model, because the price measure is partly dependent on the respondent's smoking intensity. This dependency may bias the price elasticity estimates upwards in the equation that models the number of cigarettes smoked per month.

The magnitude of the price effect on smoking participation is less distorted by price endogeneity due to the construction of the price variable, which assigns the average price reported by smokers in each school to all respondents at that school. Price constructed in this fashion is probably a good estimate of what a non-smoker would pay for a pack of cigarettes if he or she were a smoker. The estimated price elasticity of participation suggests that a 1% increase in cigarette price would decrease smoking participation by 0.5% - a result comparable to some recent estimates of smoking participation elasticity in

the US (Chaloupka and Pacula 1998; Chaloupka and Wechsler 1997; DeCicca et al. 1998).

The second interesting finding from the regression analysis is that school prevention efforts do appear to have a significant effect in reducing both smoking participation and smoking intensity in the Ukraine. Unlike in the US, where the evidence suggests that many of these preventive programs have a relatively weak impact, information may have a much bigger impact in countries with an initial low awareness of smoking consequences, such as Ukraine. However, there may be "confounding factors" - factors such as socio-economic status, are not included in the analysis, but correlated both with the probability of smoking and with the likelihood that the school attended will provide anti-smoking education and discussion. If so, the results would overstate the impact of school prevention efforts.

The analysis revealed that there is less prevention effort in professional and technical schools than in regular schools. Given that more than one-third of current teenage non-smokers in Ukraine are at risk of smoking uptake, it would be worth experimenting with continuing prevention efforts at professional and technical schools at least on the same level as in regular schools. Teaching about the danger of smoking and discussing reasons for teenage smoking in class appear to reduce smoking intensity. Teaching about the danger of smoking and recent discussions about the effects of smoking on health in class is correlated with lower smoking prevalence among students, after controlling for other relevant variables.

The type of prevention messages may also play an important role. Information linking smoking to specific consequences such as "shorter life" is associated with both lower smoking participation and lower smoking intensity. Nearly 15% of smokers considered smoking a matter of fashion. Promotion of a fashionable alternative may redirect young people's attention to healthier habits (Charlton and Bates 2000).

The majority of health care workers are not yet involved in smoking prevention programs. They can be a good source of targeted prevention messages. Unlike the well-spread knowledge of health hazards of direct cigarette consumption, only half the students were fully convinced that secondhand smoke is also detrimental to health.

The analysis provides some evidence that higher cigarette prices and stronger tobacco control policies could reduce cigarette demand among teenage students in Ukraine. Price simulations based on the estimates of participation price elasticity indicate that a 100% increase in cigarette excise tax in Ukraine (from the 1999 level of UAH 0.2 per pack to UAH 0.4 per pack) would lead to an 8.85% increase in cigarette prices and consequently to an average 4.4 percentage point decrease in smoking participation among Ukrainian teenagers. This would reduce the current smoking prevalence among youth from 41% to 37%. This estimate is based on a short-term reaction to a price change. It can be expected that the long-term effects of this price increase would be even larger (Chaloupka 1991).

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