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Smoking in Russia: Estimating the Benefits of Reduced Prevalence

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Table of contents

Executive summary

This study attempts to estimate the economic burden of tobacco smoking in Russia and hence to identify in money terms the economic benefits of smoking reduction in Russia.

The Russian smoking situation is located and analysed in the context of tobacco situation in Europe where using a base year of 2000 the percentage of regular daily smokers varied from 21% to close to 40% with the lowest rate observed in Sweden – just under 19%. In the same year the Russian Federation along with other former USSR republics had a total smoking prevalence rate of nearly 35%. The European situation is very different if male and female smoking prevalence rates are analyzed separately. The heaviest male smokers are found in Russia – more than 62%, whereas Sweden exhibits an especially low rate of just under 17%. Conversely, with a prevalence rate of only 12.6%, Russian women are among the least heavy smokers in the European region. The highest female smoking prevalence rates (22-36%) are observed in countries in the middle of Europe. Smoking prevalence among Swedish women is 21 %, well above minimum European rates.

The Russian Federation stands out with a steep, upward trend in smoking prevalence since 1991 and the trend suggests further increase in the future, whereas the average indicators of the EU and other CIS show downward trends, especially Sweden, where the smoking prevalence rate has dropped from 33% in 1980 to 19% in 2000 and to 16% in 2004.

In Russia smoking kills 332 thousand people a year, or 15% of all deaths. 240 thousand (231 thousand males + 9 thousand females) or 72% of them are still in middle age when they die. Men in Russia smoke more and are more severely affected by smoking hazard than women. One fourth of all deaths at all ages and one third at middle age are associated with tobacco smoking. For women, smoking causes 3% of all annual deaths. Significantly less – 3.5 thousand women vs. 47 thousand men (by a factor of 13) yearly die from lung cancer caused by smoking.

Smoking generates various financial and economic effects for society: increased health care expenditures, higher mortality, increased absenteeism from work and lower productivity by smokers, as well as implications for non-smokers via environmental tobacco smoke. In this report we have assessed in money terms the economic gain to Russian society if smoking prevalence rates for men in Russia were at the same levels as in Sweden.

Using a conservative estimate for smoking attributed health care expenditures (SAE) the estimated total sum spent yearly in Russia on the treatment of diseases that are caused by use of tobacco was found to be 3.4 billion USD, or 0.6% of GDP. At Swedish smoking prevalence rates SAE would be only 5% of current health expenditures or just over 1.5 billion USD. In other words reducing Russian smoking rates for men to Swedish levels would generate annual health care expenditure savings of nearly 1.9 billion USD.

A major gain from reduced smoking is the reduction in premature death among smokers. If Swedish male prevalence rates were reproduced in Russia 169 thousand people that currently die yearly from smoking caused illnesses would survive. This clearly is a benefit both directly for those who live longer and for society that cannot be measured in money terms. However, adopting a utilitarian approach to societal benefit means that the 169 thousand people would be in good health and working, producing on average 4106 US dollars per head of output. In other words reducing smoking prevalence among Russian men to Swedish rates would imply

an economic benefit in terms of output gain equivalent to 693 million USD every year or 0.12% of GDP.

Putting these sums together implies that Russia would gain or save *at least* 2.57 billion USD or 0.43% of GDP a year if the smoking prevalence rates among men in Russia were reduced to the levels observed in Sweden in 2000. This is a conservative estimate of potential measurable benefits since it has not been possible to make reliable estimates of other important benefits of reduced smoking – most notably passive smoking.

1. Introduction

The overall objective of this study is to attempt an estimate of the economic burden of tobacco smoking and hence to identify the economic benefits of smoking reduction in Russia. In the process it is hoped that the study will help to initiate a debate on tobacco reduction strategies.

Tobacco smoke contains nicotine, a stimulant which temporarily improves alertness and memory, but also creates a strong physical and psychological chemical dependence (addiction). Medical research has determined that smoking is a major contributing factor towards many health problems, particularly lung cancer, emphysema, and cardiovascular disease. Many countries regulate or restrict tobacco sales and advertising, and many countries and municipalities now ban smoking in a variety of public venues due to the health impact on non-smokers of breathing second-hand smoke.

The nicotine contained in tobacco is addictive, but it is not carcinogenic in itself. It is the cigarette smoke that contains about 4,000 chemical agents, including over 100 toxic and 60 carcinogens. In addition, many of these substances, such as carbon monoxide, tar, arsenic, and lead, are generally poisonous and toxic to the human body.

There is a growing number of Russians who acknowledge the harmful effects of smoking. Andrei Demin, president of the Russian Association of Public Health, has raised the issue of mortality due to smoking in Interfax (MosNews, 31.05.2004). In 2004 Russian parliament passed legislation banning smoking in public places (workplaces, enclosed sports facilities and government offices). One of the leading Russian newspapers “Pravda” on November 5 2005 reported that almost one-fifth of Russian children under 10 are smokers. In 2006 the legislative assembly in Russia’s Vladimir region introduced rules that would impose a fine on parents of children who are found smoking or drinking alcohol. On 23 October 2006 *Newsweek* featured tobacco smoking in Russia and described smokers as the dinosaurs of the modern world and thereby contributing to the debate on the harm done by tobacco smoking in Russia. The public interest in the issue can be seen also from the great number of Russian ‘stop nicotine’ and ‘no tobacco’ websites, offering instructions, medicine and other support in smoking cessation. However, the fight against the habit has yet to become a priority for the authorities, which currently appear to be too busy with other welfare policies to be concerned about the harm tobacco has on an the average Russian.

Russia is still not on the list of 76 countries that has ratified the World Health Organization (WHO) Framework Convention on Tobacco Control that came into effect March 6 2005. The document gives the signatory countries three years to increase the severity of warnings about the harmful effects of tobacco placed on cigarette packs, and five years to ban advertisements and sponsorship of tobacco products. In addition, participants of the Convention must raise taxes on tobacco products, intensify the fight against the smuggling of cigarettes and take appropriate measures to decrease the threat of second-hand smoke in public places.

In Russia, smoking has long been a national tradition, but anti-tobacco attitudes continue to grow among business circles, public organizations and private citizens. The biggest Russian air carrier Aeroflot has been trying to ban smoking on all its flights for more than two years. Passengers protest, but have to comply. In Moscow there are a few restaurants and cafes, where smoking is not allowed in premises.

According to the assessment of World Health Organization (WHO), Russia has one of the highest rates of smoking prevalence in the world and the highest in European Region.

In this report we have aimed to estimate the economic costs of cigarette smoking for Russian society. Given all the negative consequences of smoking on health and increased mortality, the preferred alternative would be total quit and no smoking at all. But there is no country in the Western world where smoking does not exist and hence the smoking prevalence rate is 0%. Moreover, even prohibition is unlikely to achieve anything like a zero prevalence rate. Therefore we have been more realistic and have assessed the economic gain if smoking prevalence in Russia was lower – similar to some country that has attained comparatively low rates, i.e., that is manageable to attain. One example of such a country is Sweden where alternative (smokeless/snus) tobacco products are available leading to lesser use of cigarettes and as a consequence lower mortality from cancer and other illnesses caused by carcinogenic smoke. Sweden has successfully brought down smoking prevalence levels from average and high in 1980s to the lowest in Europe, and the trend continues downwards. Following a 'benchmarking' approach the Russian situation will be compared with Swedish experience. Though, it has to be noted that total tobacco consumption in Sweden is as high as that of other Western countries, but the type of tobacco consumed is very different, i.e., smokeless tobacco vs. cigarettes (Rodu, 2004).

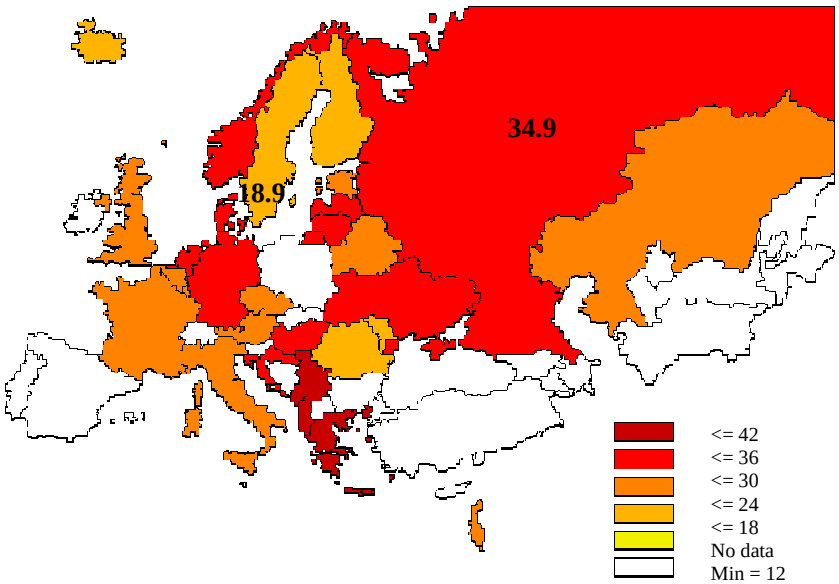
The report is structured as follows: in the first and second sections we characterize the structure and dynamics of smoking consumption patterns in Europe and Russia respectively. The third section examines the methodology used to identify smoking attributable mortality in Russia. In the fourth paragraph we offer estimates of the monetary value the main direct and indirect benefits for Russia if male smoking levels were reduced to Swedish levels. The final section considers some measurement issues and offers some conclusions.

1. Smoking patterns in Europe

The geography of smoking prevalence in Europe is illustrated in Figure 1.1. The percentage of regular daily smokers in Europe varies significantly – from very low levels in Romania (21%), Finland and Iceland (23%) to close to 40% in Serbia and Montenegro (2000[1]). Though, nowhere in Europe is the total smoking prevalence as low as in Sweden – 18.9%. The 'heaviest smoking' populations are observed in the Mediterranean, esp. Greece and its neighbourhood, followed by middle-Northern Europe: Germany-Netherlands-Denmark and Norway. The rates towards the West are somewhat lower (no information on Spain and Portugal). The Russian Federation along with other former USSR republics shows a total smoking prevalence rate of 34.9%, slightly higher than the European Region and EU average (30%). Smoking is only a bit more common in the new EU member states than 'old' members (31.5% compared to 30%).

[1] Year 2000 data are used because data are available for most European countries, for later years international comparison is difficult because data is missing for many countries.

Figure 1.1. Percentage of regular daily smokers in the population, age 15+, 2000

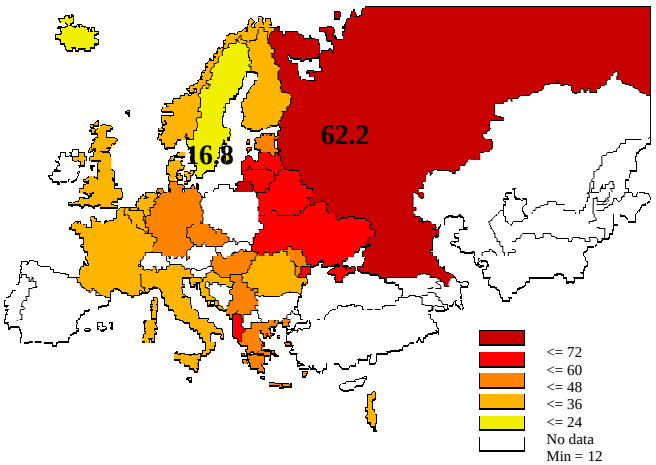


European Region	30.16
EU	29.57
EU-15	29.17
New EU member countries	31.53

Source: WHO/Europe, European HFA Database, June 2006

The situation is very different if male and female smoking prevalence rates are analyzed separately (Figures 1.2 and 1.3). There the geography is even more specific. The heaviest male smokers are found in Russia – 62.2%, followed by other ex-USSR republics (except Estonia) with prevalence rates between 48 and 60 percent; prevalence rates in the rest of Europe range between 24 and 48 percent, with Sweden exhibiting an especially low rate of only 16.8%.

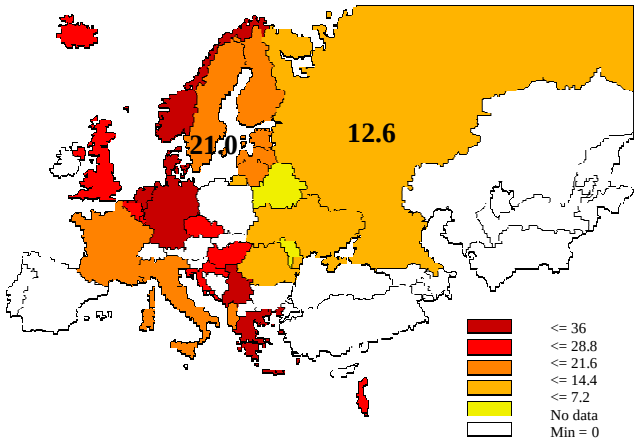
Figure 1.2. Percentage of regular daily smokers in the population, age 15+, male, 2000



Source: WHO/Europe, European HFA Database, June 2006

Conversely, with a prevalence rate of only 12.6%, Russian women are among the least heavy smokers in the European Region. The highest female smoking prevalence rates (22-36%) are observed in countries in the middle of Europe as a string from the North (Norway) to the South (Greece) going through Germany and touching UK. Smoking prevalence among Swedish women is not any more at the minimum European rates. Moreover, the rate is much higher for women than for men (21.0 vs. 16.8%), making Sweden now the only country in Europe where women smoke more than men.

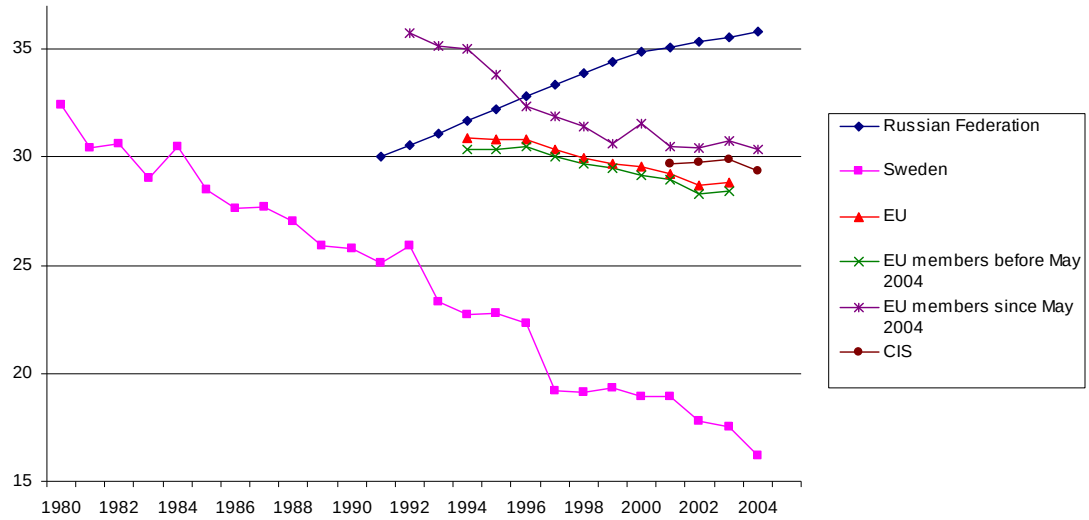
Figure 1.3. Percentage of regular daily smokers in the population, age 15+, female, 2000



Source: WHO/Europe, European HFA Database, June 2006

In terms of dynamics (Figure 1.4) the Russian Federation stands out with a steep, steady upward trend since 1991 (the first data included in WHO database) – from 30% the prevalence rate has grown to 36%, and the trend suggests further increase in the future, whereas all the average indicators of EU (common, old and new) and CIS show downward trends, especially Sweden, where the smoking prevalence rate has dropped from 33% in 1980 to 18.9% in 2000 and to 16% in 2004.

Figure 1.4. Percentage of regular daily smokers in the population, age 15+



Source: WHO/Europe, European HFA Database, June 2006

The most recent data show that smoking rates in Sweden have continued downwards, and in 2004 only 15% of men and 17.5% of women were smokers (Statistical Bureau VECA). Even more, in the Stockholm region 12% of men and 13% of women were smokers, but in the 16-24 age group statistics report 10.6% male smokers. Instead snus consumption has become more popular substituting for cigarettes.

2. Smoking patterns in the Russian Federation

In Russia, smoking prevalence has historically been high for men and relatively low for women. The latest available data on smoking habits in the Russian Federation comes from the New Russia Barometer survey conducted by University of Aberdeen (http://www.abdn.ac.uk/cspp). Among other questions on political and economic characteristics and attitudes the 1996 and 2004 surveys included a number of short questions on health and health behaviour. This is the only source of information on age-specific smoking prevalence rates in Russia. The results are shown in Table 2.1.

Among men, smoking is very common in those aged under 55 with a prevalence rate in 2004 as high as 74% for men in the prime age group of 35-44. On the other hand men in the 55+ age group appear to smoke less resulting in an average smoking prevalence rate of 64% for men in 2004. Moreover both the average rate and its distribution among age groups appears to have remained stable as between 1996 and 2004. For women the smoking prevalence rate is much mover – only 15%[2], which is in fact one of the lowest levels in European region. Very few older women smoke, only 1% aged 65+, and some 8% in the pre-pension age 55-64. Smoking levels in the younger age groups, 18-34, are comparatively high (though not as high as for men) and have increased slightly over recent years. The increased young-age-specific smoking prevalence rates for women may be because it has become more socially acceptable for women to smoke. Assuming that young women continue smoking at higher rates than in earlier generations, this would lead to an increase in female smoking prevalence over time.

Table 2.1. Prevalence of smoking by sex and age group in Russian Federation in 1996 and 2004 (percentages)

Age group (years)	Men		Women	
	1996 (n = 731)	2004 (n = 727)	1996 (n = 868)	2004 (n = 864)
18–24	65	63	27	28
24–34	73	69	28	31
35–44	71	74	14	17
45–54	64	66	12	12
55–64	49	55	5	8
65+	41	46	5	1
All ages*	**63**	**64**	**14**	**15**
*Not standardised for age.				

Source: New Russia Barometer, surveys of 1996 and 2004; Bobak, Gilmore, McKee, Rose, Marmot "Changes in smoking prevalence in Russia, 1996-2004"

[2] Similar results obtained by Living Conditions, Lifestyles and Health project, researching eight CIS countries, survey conducted in fall 2001. It reports the total smoking prevalence rate in Russia to be 35.1%, 60.4% for males and 15.5% for females.

As compared with 1996 the smoking prevalence rate has increased by 1 percentage point for both men and women (from 63% to 64% and from 14% to 15% respectively). For men, the levels have decreased slightly for the younger age groups, 18-34, but increased for all older age groups. For women, nearly all age specific smoking prevalence rates have increased.

Table 2.2. Prevalence of smoking by education, material deprivation and settlement in Russian Federation in 2004 (percentages), directly standardized for age

	Men		**Women**	
	1996	**2004**	**1996**	**2004**
All*	**61**	**63%**	**15**	**16%**
Education				
Primary	65%	73%	16%	12%
Secondary	60%	63%	15%	17%
University	51%	40%	10%	17%
Deprivation**				
Least	56%	61%	11%	18%
Medium	57%	61%	12%	15%
Most	70%	68%	18%	14%
Settlement***				
Moscow	62%	47%	30%	21%
>0.5 M	58%	56%	20%	17%
<0.5M	62%	62%	13%	18%
Towns	64%	61%	13%	13%
Villages	63%	71%	8%	14%

Source: New Russia Barometer, surveys of 1996 and 2004; Bobak, Gilmore, McKee, Rose, Marmot "Changes in smoking prevalence in Russia, 1996-2004"

*Prevalence rates differ from table 2.1 because here age standardized rates are shown

** Material deprivation was measured by three questions on frequency of not having enough money for food, clothes/shoes, and paying bills. Subjects were classified into three groups, based on tertiles of the deprivation scale.

*** Settlement size was categorised by population size: villages; towns of < 100 000; cities 100 000–500 000; cities >500 000, and Moscow.

Education levels have interesting effects on Russian smoking habits. For men in both 1996 and 2004 there is inverse relationship between the level of education and the smoking prevalence rate, and the inverse relationship is more pronounced in 2004 than in 1996 because of the increase in smoking among least educated men and the decrease among men with higher education. For women, the surveys indicate a completely different situation. As between 2004 and 1996 the incidence of smoking among the least educated women fell but for women with university education there was a sharp increase in prevalence from 10 to 17%. This resulted in a reversal of the 'normal' inverse relationship between education levels and smoking for women in 2004.

In 1996 the most deprived people (men and women) were the heaviest smokers, but the trends for both men and women suggest that in recent years better off people have started smoking more and for women this has reversed the previous negative correlation between material welfare and the prevalence. This may again indicate a change in social habits where tobacco consumption has become more acceptable.

Also with respect to settlement size the situation for men and women is very different – the rate of women-smokers increases but men-smokers decreases with settlement size, although the difference for women was more pronounced and for men less pronounced in 1996 than in 2004.

The differences between the smoking prevalence patterns of men and women in Russia are noteworthy as the data indicate completely very different relationships with respect to such social indicators as education, material welfare and the level of urbanization. This is to be taken into account when designing policies for smoking reduction and prevention.

There are also significant gender differences in the more detailed aspects of smoking behaviour. Women start smoking later than men. Nearly 40% of all males who smoke or have ever smoked in Russia started this habit before the age of 16 (see Table 2.3), but only 14% of women started smoking at such a young age. Half of the total of 'ever smoked' population in Russia starts smoking between age 16 and 20, whereas 1/3 of all women smokers started in adult life (after 20). In total, 82% of smokers start before the age of 20, and the mean age of starting is 18. This age is similar to other countries in the CIS region[3], but the total smoking prevalence rate is one of the highest for men and the highest for women within CIS.

The number of cigarettes smoked a day is an indication of how 'serious' the habit is and hence of how strong an effect on health it would have. The LLH survey suggests that males are heavier smokers than females – more than half of men smoke between 10 and 20 cigarettes a day, but some 20% smoke more than a pack of cigarettes daily, while some 70% of women smokers smoke less than 10 cigarettes and only 5% say they smoke more than a package a day. Survey results would underestimate the number of cigarettes smoked as people, especially women, have a tendency to hide smoking, but nevertheless the evidence is very strong that in Russia not only there are more men smokers, but also they are more addicted to it.

Another indicator of addiction to smoking is the time of the day when people light up the first cigarette (see Table 2.3) – smoking right after getting up in the morning indicates addiction to nicotine whereas smoking later in the day would rather indicate a social habit. Following the logic that the earlier one starts, the more cigarettes one can consume, those smoking in the morning are the likely to be the heaviest smokers ie 'real' smokers, while those who first smoke in the evening are likely to smoke only a few cigarettes a day. In Russia 85% of the smokers light the first cigarette within first hour after getting up, and all together 92% before lunch. This would then say that these 92% of smokers or 32% of the population as a whole are 'committed' smokers[4]. Also, 92% of men and 65% of women start smoking within first hour after getting up. Men are therefore more likely to be nicotine dependent.

[3] LLH Comparative health report, includes eight CIS countries – Armenia, Belarus, Georgia, Kazahstan, Kyrgyzstan, Moldova, Russia, and Ukraine. A survey of in total 18 500 respondents in the region, 4000 of which in Russia.

[4] Smoking prevelance is about 35% and if 92% light up befor lunch then 32% = 92%x35% is the population share of committed smokers

Table 2.3. Indications of smoking habits, by gender in 2001

	Overall	Men	Women
When started smoking (%), current and former smokers			
<16 years	31.7	38.1	13.8
16-20 years	50.1	47.9	56.1
>20 years	18.2	14.0	30.0
Mean age when started smoking	18	17	20
Number of cigarettes smoked daily (%), current smokers			
One or two	6.4	2.4	18.7
Up to 10	32.6	24.6	56.6
Between 10 and 20	44.1	52.2	19.8
More than 20	16.9	20.8	4.9
Time when the first cigarette is smoked (%), current smokers			
First 30 minutes after getting up	50.9	56.5	33.7
First hour after getting up	33.7	34.3	32.0
Before mid-day meal	6.9	4.7	13.5
After day meal or in the evening	8.6	4.6	20.8

Source: LLH Comparative Health Report, pp.19-20

3. Mortality from smoking

The reason why smoking is so bad is its negative effect on health and mortality. Smoking has been causally associated with increased mortality from several diseases, especially cancer and cardio vascular diseases. There is growing evidence of the harm caused by both active and passive smoking. The World Health Organization (WHO) has estimated 4.2 million deaths a year from tobacco in the world (2000). Passive smoking at home, in the workplace, and in public places in general also kills, although at a lower level.

The greatest difficulty for estimating mortality caused by smoking is actually determining whether a particular death can be attributed to tobacco smoking. Smoking is not directly recorded as a 'cause of death'. Thus in order to estimate the incidence of tobacco related deaths in particular country in one particular year the main method is to take the national mortality rates from various categories of disease and to attribute certain proportions of those diseases to tobacco. These attributable proportions vary from one category to another, specific to age, sex and country. The proportions are usually highest for lung cancer, upper aerodigestive cancer and chronic obstructive pulmonary disease (COPD); lower for vascular disease and zero for cirrhosis and non-medical causes of death.

For most countries, including Russia, large nationally representative studies of smoking and mortality are not available to provide reliable information on tobacco smoking attributable proportions as the causes of death. While the national mortality statistics register quite specifically includes information on the cause of death, but no register contains information if the particular person has been a tobacco smoker and for how many years. Also, tobacco use as such can not be primary cause of death in any register; consequently it is not accounted for, causing difficulties to estimate smoking effects on health and mortality.

Typically, the proportions are therefore estimated indirectly, using estimates from countries where detailed studies have been undertaken and calibrating them for use for the particular

country under investigation. In 1985 the American Cancer Society performed second Cancer Prevention Study (CPS-II), a study of smoking and mortality among more than one million Americans, and this has been used by Peto et al[5] to develop a method to extrapolate ratios to other populations. This method and the particular study have been most often used for estimating smoking attributed deaths[6]. CPS-II is used as a reference population also because so far it is the only really large and reliable study that fully identifies the effects of smoking.

Based on the same methodology the American Cancer Society, WHO, and International Union Against Cancer have together produced a reference book containing statistical data on developed countries on tobacco use and associated effects on mortality and lifespan. Deaths attributable to smoking are estimated using the same methodology for all countries and are therefore comparable. WHO usually uses these estimates for references, and we shall refer to them here.

In Russia 2.2 million people die every year, and using the above methodology it can be inferred that smoking kills 332 thousand people yearly (Tables 3.1 and 3.2), or 15% of all deaths. 240 thousand (231 thousand males + 9 thousand females) or 72% of them are still in middle age when they die (age 35-69). Men in Russia smoke more and are consequently more affected by smoking hazard than women. One fourth of all deaths at all ages and one third at middle age are associated with tobacco smoking. 94% of all male deaths from lung cancer and 70% of upper aerodigestive cancer are attributed to smoking.

Table 3.1. Male smoking−attributed deaths (Sm.) and total deaths (Total), Russian Federation, 2000

		All causes	**All cancer**	**Lung cancer**	**Upper aero-digestive ca.**	**Other cancer**	**COPD**	**Other respiratory**	**Vascular disease**	**Cirrhosis & other liver**	**Other medical**	**Non-medical**
0-34	Sm.	-	-	-	-	-	-	-	-	-	-	-
	Total	124173	3282	147	73	3062	274	4221	9270	1088	28063	77975
35-69	Sm.	231306	56390	33210	10472	12708	16545	10544	114685	-	33142	-
	Total	699439	107779	35007	14238	58534	19875	24796	298979	14026	77369	156623
		(33%)	(52%)	(95%)	(74%)	(22%)	(83%)	(43%)	(38%)		(43%)	
70+	Sm.	71904	20685	13644	2671	4370	13714	647	33546	-	3312	-
	Total	356163	51792	14933	4376	32483	18695	4370	236913	2225	26757	15411
		(20%)	(40%)	(91%)	(61%)	(13%)	(73%)	(15%)	(14%)		(12%)	
Any age	Sm.	303210	77075	46854	13143	17078	30259	11191	148231	-	36454	-
	Total	1179775	162853	50087	18687	94079	38844	33386	545162	17339	132182	250009
		(26%)	(47%)	(94%)	(70%)	(18%)	(78%)	(34%)	(27%)		(28%)	

No deaths before age 35, and none from liver cirrhosis or non−medical causes, were attributed to smoking
Source: Tobacco control country profiles, American Cancer Society, Inc., WHO, and International Union Against Cancer

[5] Mortality from tobacco in developed countries: indirect estimation from national vital statistics, R.Peto, AD Lopez, J.Borenham, C.Heath

[6] The way it works: lung cancer mortality is taken as an indirect indicator of the accumulated hazards of smoking. A set of age-, gender- and smoking- specific cause mortality rates for the particular country are constructed using rate ratios from the CPS-II and taking lung cancer mortality as reference indicator.

Table 3.2. Female smoking−attributed deaths (Sm.) and total deaths (Total), Russian Federation, 2000

		All causes	**All cancer**	**Lung cancer**	**Upper aero-digestive ca.**	**Other cancer**	**COPD**	**Other respiratory**	**Vascular disease**	**Cirrhosis & other liver**	**Other medical**	**Non-medical**
0-34	Sm.	-	-	-	-	-	-	-	-	-	-	-
	Total	39282	3123	81	43	2999	131	2221	2646	493	13899	16769
35-69	Sm.	9062	1708	1293	161	254	1064	169	5141	-	980	-
	Total	311351	68517	4011	1471	63035	4802	5574	153562	8376	31351	39169
		(3%)	(2%)	(32%)	(11%)	(0%)	(22%)	(3%)	(3%)		(3%)	
70+	Sm.	20126	2994	2201	384	409	4382	96	11292	-	1362	-
	Total	694924	60832	4693	2066	54073	13108	4075	530003	3027	71110	12769
		(3%)	(5%)	(47%)	(19%)	(1%)	(33%)	(2%)	(2%)		(2%)	
Any age	Sm.	29188	4706	3494	545	663	5446	265	16433	-	2342	-
	Total	1045557	132472	8785	3580	120107	18041	11870	686211	11896	116360	68707
		(3%)	(4%)	(40%)	(15%)	(1%)	(30%)	(2%)	(2%)		(2%)	

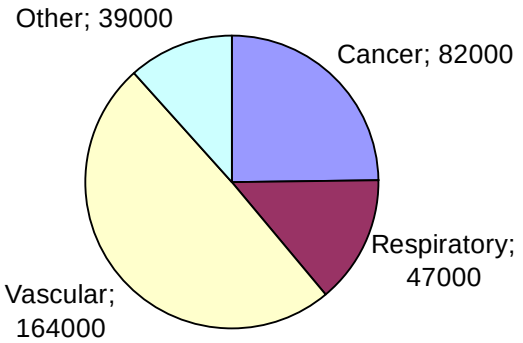
To be conservative, no deaths before age 35, and none from liver cirrhosis or non−medical causes, were attributed to smoking
Source: Tobacco control country profiles, American Cancer Society, Inc., WHO, and International Union Against Cancer

For women, smoking causes 3% of all annual deaths (or 29 thousand), but is responsible for 40% of deaths from lung cancer and 30% from COPD. Significantly less – 3.5 thousand women vs. 47 thousand men (by a factor of 13) yearly die from lung cancer caused by smoking.

In 2000 smoking caused about as many deaths as all non-medical causes (which include murders, suicide, drowning, road and other accidents) put together: 332,000 vs. 319,000; and quite remarkably it killed by some 50 thousand more men than all non-medical causes together.

Even though relatively smoking is the main cause of different types of cancer and commonly it is considered the prime risk, smoking actually causes even more deaths from other diseases (Figure 3.1). 49% or 164 thousands of the 332 thousand yearly smoking-attributed deaths occur due to vascular diseases (heart disease and stroke, and others), and cancer is the second most important cause of death (82 000 cases).

Figure 3.1. Smoking attributed deaths by causes, male and female, Russia, 2000 (rounded)



Source: Tobacco control country profiles, American Cancer Society, Inc., WHO, and International Union Against Cancer

Smoking also causes 47 000 deaths yearly from respiratory diseases and 39 000 from other diseases. None of the non-medical causes are attributed to smoking in this estimate, although potentially could be. These estimates can be regarded as conservative in the sense that no deaths before age 35 are associated with tobacco assuming that the habit only has effect if accumulated over years.

Based on the same estimates and age specific smoking-attributable death rates it is possible to estimate how many years of life on average a smoker loses due to his habit or alternatively how much longer he/she would have lived if he/she did not smoke (Table 3.3)[7]. Both for males and females the average loss of life expectancy from smoking for those killed by the habit in middle age (35-69) is about 22 years. As noted earlier there are virtually no deaths and therefore no years of life lost before 35. But many of those killed by the habit in old age (70+) might not have lived much longer anyway given that the average age of death is below 80.

Table 3.3. Average number of years lost per death from smoking, 2000

Country/country group	Age range (years)			
	0 - 34	35 - 69	70+	All ages
All developed countries	-	22	8	15
EU-15	-	23	8	14
EU-25	-	22	8	14
Russian Federation	-	***19***	*8*	*16*
Sweden	-	22	8	12

Source: Tobacco control country profiles, American Cancer Society, Inc., WHO, and International Union Against Cancer

The years lost per death from smoking in Russian Federation (19 years; and same true for other CIS countries (not indicated in the table)) is in fact smaller than in Western Europe and all developed countries taken together, but this positive indicator may be misinterpreted. The life expectancy in Russia is only 65 years (59 for men and 72 for women) compared to 79 years (76 and 82 for men and women respectively) in EU-15 or 68 years (64; 72) in developed countries[8], so the life-years lost from smoking are virtually less. For all ages taken together there are 16 mean years lost per death from smoking, whereas in Sweden it is 12, and 15 for all developed countries.

4. The costs of smoking

The benefits of smoking reduction or alternatively the costs of tobacco related diseases can be useful evidence to support tobacco control, but they are complicated to estimate due to its cumulative impact. There are multiple level – direct and indirect – effects from active and passive smoking. The economic burden of smoking consists of four major components:

[7] Years lost per death from smoking are defined and estimated as loss in life expectancy of smokers in comparison to non-smokers in the respective country.

[8] The life expectancy indicated here is the total rate for smokers and non-smokers, but it shows the general tendency.

Direct costs. The direct costs of smoking are the health care expenditures for treatment of smoking related disease. All types of health care services are to be included: hospitalisation, ambulatory care, nursing home care, prescription drugs, and home health care etc.
Indirect cost of lost productivity from smoking related illness. Smokers with smoking related illnesses miss days of work and are unable to perform their usual activities, therefore causing indirect costs via loss of productivity due to higher morbidity.
Indirect cost of premature deaths caused by smoking related disease. Adopting a utilitarian measure of social welfare, the more individuals there are the more welfare there is in the society, every life lost is an indirect cost to the society and the foregone production not produced by smokers who die prematurely is a measure of the social loss.
Indirect cost of health effects to non-smokers or passive smoking effects.
Other costs, such as fires, for example. Careless smoking and dropping of cigarette-ends cause forest fires and property damage. Smoking and associated use of matches and lighters in the forest during times of high fire danger is an important fire risk factor. In fact, nearly all forest fires are associated with careless use of fire, and, of course, smokers are those that light fire most. It is estimated that 25% of residential fires are caused by smokers in US.
The benefit may be reflected in the lift one gets from lighting up a cigarette, relief from stress and so on. Biological and psychological addiction may explain why some people continue to smoke, but there must be at least some of the above benefits that contribute to its starting. We do not attempt to quantify the benefits of smoking in this paper. At best, that would be a highly complex undertaking and is not the focus here.

4.1 Direct costs

Health care expenditures for treatment of diseases caused by cigarette smoking are the most obvious cost to the society. Above the diseases that any person can have smokers have specific smoking caused illnesses provoked by inhalation of cancerous smoke and nicotine. The estimation of those costs are not entirely straight forward and their estimation in the published literature has been done by very different methods, but often result in a similar magnitude of the burden. With one exception, the studies find the annual medical costs of smoking constitute approximately 6-8% of American health care expenditures (Table 4.1). The exception, a study of 1998, found much larger attributable expenditures. The lower estimates may reflect the limitation of analysis to costs associated with the principal smoking-related diseases. The higher estimate derives from analysis of smoking-attributable differences in all medical costs. However, the finding from the most recent study, also considering all medical costs, fell in the 6–8% range. The estimates from UK yield similar rates – 6%, and in Asia (Taiwan and Hong Kong) it is in range of 5-8%.

Table 4.1. Estimates of smoking attributed medical expenditures as a percentage of total health expenditures.

Country	**Authors**	**Year**	**% of total health care expenditures**
United States	Luce and Schweitzer	1976	7.8%
United States	Office of Technology Assessment	1985	6.0%
United States	Rice, Hodgson, Sinsheimer, et al	1984	6.8%
United States	Bartlett, Miller, Rice, et al	1993	7.1%
United States	Miller, Zhang, Rice, et al	1993	11.8%
United States	Miller, Ernst, and Collin	1993	6.5%
Taiwan	Yang, Fann, Wen and Cheng	2001	6.8%
United Kingdom	Balfour, Bates et al, Royal College of Physicians, UK	1998	6.0%
Hong Kong	McGhee, Ho, Lapsey et al	1998	7.0% (inpatient), 5% (outpatient)
Mean SAE			*7%*

In this report for the Russian Federation we adopt an average conservative smoking attributable medical expenditures rate (SAE). The mean rate of medical expenses that are associated with smoking following from above mentioned studies is 7%. Assuming a linear relationship between smoking prevalence rate in society and the expenditures on smoking-caused deceases we have adjusted the rate for Russia to be 11%[9].

Even though 11% is a very conservative estimate (with the aim not to overstate the expenses), the total sum spent yearly in Russia on the treatment of diseases that are caused by use of tobacco is 3.4 billion USD, or 0.6% of GDP (Table 4.2).

Suppose, in Russia the rate of smoking prevalence was reduced to the rate observed in the Swedish male population, i.e., 16.8% (because the female smoking prevalence rate in Sweden exceeds that of men, and it is higher than among Russian women, we consider a benchmarking exercise in which male smoking rates are targeted). Following the same logic of a linear relationship between smoking prevalence and health care costs, the SAE would be only 5% of the health expenditures prevalent currently and would constitute 1.565 billion USD. We can estimate that yearly medical expenses would therefore be by 1.877 billion USD lower than currently.

[9] The smoking prevalence rate in US in the respective years was in the area of 21.5-22% (Source: Centre for Disease control and prevention), in Taiwan 24% (Wen, Levy, Cheng, 2001), in Hong Kong 22% (McGhee, Ho, Lapsey 2006). In Russia, the smoking prevalence rate is 35%, so the respective SAE for Russia is in the area of 11%.

Table 4.2. Smoking attributable medical expenses, Russia, year 2005

In Russia, current	
Gross Domestic Product (GDP), billion USD	590.40
Total health expenditures, billion USD (5.3% of GDP)	31.291
Smoking attributable medical expenditures, % of total health expenditures	11%
SAE, billion USD	3.442
In Russia, at Swedish rates	
Smoking attributable medical expenditures, % of total health expenditures	5%
SAE, billion USD	1.565
Difference in yearly SAE, billion USD	-1,877

Source: Calculations based on European health for all database (HFA-DB)

4.2 Indirect cost of lost productivity from smoking related illness

Higher morbidity is another risk that is associated with smoking (and passive smoking). Apart from requiring more frequent visits to doctors and hospital treatment that implies costs to the individual as well as costs to the society, morbidity also implies absence from work, so the smokers being ill, caused by use of tobacco, not only imply costs of treatment, but they also do not produce any output. Such data are not directly counted so usually are omitted from calculations.

On average, each employee in Russia is absent from work due to illness for 9.6 days a year (WHO) or approximately 4% of the working time. This would mean that at 100% good health output would be 4% higher. Use of tobacco is likely to be associated with more frequent absence from work, though, the precise share of smokers' absence over non-smokers has not been estimated for Russia and consequently we have not been able to estimate this component of smoking costs[10].

4.3 Indirect cost of premature deaths caused by smoking related diseases

We have used the smoking attributable deaths (SAD) calculations for Russia based on Peto-Lopez smoking impact ratio estimation method, obtained from "Mortality from smoking in developed countries 1950-2000" for year 2000. The smoking prevalence rates are obtained from the WHO database. For economic assessment GDP data for year 2005 are used.

The idea is to measure the economic gains if the very high levels for smoking in Russia would be reduced to the lowest levels observed in Europe – Sweden. In order to avoid misinterpretation and be consistent in the idea of reduction, we focus on male smokers, as women in Russia smoke significantly less than in Sweden. Thus Sweden provides a potential benchmark for smoking among Russian men but not for women.

We have estimated the economic gains that would result if the smoking among Russian men would be reduced to Swedish male prevalence rates. The estimates have been made based on Russian smoking prevalence data for 2000 data.

[10] Research in Canada reports that non-smokers are absent 1.8 fewer days annually than smoking employees (11.7 days vs. 13.5 days in 1994). These proportions cannot be directly transferred to Russian data because it may be highly influenced by prevailing labour legislation.

Table 4.3. Economic gains in terms of output from reducing smoking in Russia.

2000									If Russia had Swedish smoking prevalence rates**						
	Population (mid-year)	Smokers	%	Deaths	Death non-sm	SAD	SAD %	Risk of dieing from smoking	Smokers	SAD (yearly)	Deaths yearly	SAD%	Lifes saved (yearly)	Gained output as % of from smoking reduction yearly (bn)*	output
Russia															
Total	145189152	50671014	34,9	2225332	1892934	332398	15	0,66	27634128	130543	2023477	6	201855	0,829	0,140
Men	67990336	42289989	62,2	1179775	876565	303210	26	0,72	11422376	81896	958461	9	221314	0,909	0,154
incl. Men 35-69	29391000	18281202	62,2	699439	468133	231306	33	1,27	4937688	62475	530608	12	168831	0,693	0,117
Women	77198816	9727051	12,6	1045557	1016369	29188	3	0,30	16211751	48647	1065016	5	-19459	-0,080	-0,014
Sweden															
Total	8872294	1676864	18,9	93518	85331	8187	9	0,49							
Men	4386522	736936	16,8	45710	41032	4678	10	0,63							
Women	4485772	942012	21,0	47808	44299	3509	7	0,37							

* If all saved lives worked

** Data for 2000 used for Russia and Sweden, for calculating output gain 2004 data used (GDP per head: 4106 USD, GDP 590 bn USD)

The population in Russia is 145 million (mid-year 2000, [WHO]), 68 million men and 77 million women. 62.2% of the men or 42 million of them are smokers. There are 2.2 million deaths occurring every year, and 1.2 million of them are men and according to the WHO of these 26% (303 thousands) can be attributed to smoking[11]. As only smokers can die from smoking, i.e., the SAD only occur among the population that smoke[12] this implies that 0.7% of all male smokers die every year from diseases caused by tobacco (303 thousand deaths among 42 million smokers). This can be interpreted as the risk of dying in a given year that is higher for smokers than for non-smokers, so, for every 1000 smokers that would switch from being a smoker to being a non-smoker, 7 more people would survive (assuming no accumulated hazards), and if there was no smoking among men in Russia, in total 303 thousand people would not die yearly from smoking. Interestingly, for women smokers the risk of dying from tobacco is significantly smaller – 'only' 3 of every 1000 female smokers die in a particular year from smoking hazards. A similar situation is observed in Sweden – smoking appears to be more hazardous to men than to women. This is most likely associated with the fact that smoking intensity is higher for men than for women.

17 years is the mean age of starting smoking for males. Male average age of death in Russia is 59 years (Gavrilova, 2003, New York Times, 10.05.2006), so the average period that a smoker smokes in his life is 42 years. For 42 years a person is in the pool of people that are exposed to risk of dying from tobacco.

Realistically, smoking will never fall to zero but a good benchmark for smoking reduction might be a prevalence rate that corresponds to the lowest in Europe – namely the 16.8% of the male population who are smokers in Sweden. If this situation there reproduced in Russia there would be 11 million males smokers in Russia, and 82 thousand SAD yearly (if the risk of dying would be the same). This implies that on average such a reduction in smoking prevalence would every year save 221 thousand lives in the age group35-69.

[11] This is an WHO estimate based on inferences that use the CPS-II study.

[12] The influence of passive smoking is ignored here

To make estimates of economic gain from this smoking reduction scenario, we will only consider middle age men (35-69), those that form part of workforce[13]. There are 29 million men of such age in Russia, and there are 18 million smokers among them[14], leading to 231 thousands deaths every year. The share of SAD in the total number of deaths is 33%, so 1/3 of all deaths at this age occur due to diseases caused by smoking. 1.27% of all smoking males at this age die from tobacco. At the Swedish male smoking prevalence rates (16.8%) 62.5 thousand smoking attributed deaths would occur, saving as much as 169 thousand lives.

Now presume that all the men of working age that do not die from smoking (the 169 thousand people) are in good health and are working and producing the average 2004 Russian output of 4106 US dollars per head (The World Bank). This would create extra total output of 693 million USD per year. This extra output would be a direct consequence of lower smoking rates and would imply an economic gain in terms of produced output equivalent to 693 million USD every year or 0.12% of GDP.

4.4 Indirect costs on health of non-smokers

Passive smoking occurs when the smoke from one person's burning tobacco product (or the smoker's exhalation) is involuntary inhaled by others. Thus smoking generates health risks for family members, especially for children and the unborn, colleagues in the workplace and everyone else having to spend time near smokers, for example in restaurants, bars and streets. Passive smoking is one of the key issues leading to smoking bans in workplaces, smoke-free restaurants, and public places.

Estimating the impact (and hence the economic costs) of passive smoking is even more difficult for smokers. Just as for smokers the smoking attributable fraction of non-smokers illnesses is not known directly. The estimation of environmental tobacco smoke (ETS) risks is difficult as the time spent near smokers and the intensity has to be evaluated, and for those exposed to second hand smoke the health problems over and above those not exposed have to be evaluated.

Stoddard and Gray (1997) have estimated that passive smoking was responsible for 19% of all expenditures for childhood respiratory conditions in the US. In Hong Kong, it has been estimated that the cost per child of general practitioner consultations was 14% higher for children living with one smoker at home and 25% higher where there were two or more smokers. Jamrozik (2005) has estimated that in UK the prevalence of passive smoking at home is 13% and at work in the general workforce it is 11%. Various studies, varying considerably in size and design, have examined the association between passive smoking and risk of stroke, and all have found a positive relationship of different magnitude. Many studies have estimated that the passive smoking risk on chronic obstructive pulmonary disease.

The comparative study by GTSS Collaborative group presents findings from Global Youth Tobacco Survey (GYTS) (2005) and it indicates that in Russia 55.3% of students are exposed

[13] The official retirement age in Russia is 60 years for men and 55 for women. In practice, people tend to retire as early as possible, and then continue to work, as they can receive pension and salary at the same time. So, in effect the real time when people quit the workforce is later. (The age group chosen is specific to data available on SAD). We have assumed that all men of this age that did not die were working.

[14] This requires another assumption that the smoking prevalence rate for ages 35-69 is the same as for all men in total. It is a plausible assumption (see analysis earlier)

to smoke at home and 72.5% outside home. Unfortunately this does not give much of information for health and therefore associated economic effects.

A recent report by the Smoke Free Partnership[15] has estimated risks to non-smokers from passive-smoking based on WHO database for year 2002. They find that in the current member countries of EU (EU-25) in 2002 19 242 of non-smokers (adults) deaths were caused by ETS – majority of them were exposed to smoke at home (16443), others at work places (table 4.4). Corresponding calculations do not exist for Russia, but assuming that the relationship between the number of smokers and deaths of non-smokers is the same in Russia as in as in Europe, we may conclude that nearly 8000 Russian non-smokers die yearly from breathing smoke exhaled by smokers. In fact, this figure can be even higher, since in Russia the non-smoking regulations are not as strong as in Europe, and more people could be affected by ETS.

Table 4.4. Estimated number of deaths attributable to passive smoking in selected countries of Europe in 2002 and estimated number for Russia

	Total deaths of non-smokers from ETS	Total # of smokers in population	# of deaths of non-smokers per 10 000 smokers
EU-25	19242	129307382	1.49
Russia	*7656**	51382199	1.49 (assuming EU-25 proportion)

* Estimate derived from EU-25 average

Although this is a very rough and ready estimate, and probably does not look too big in relation to the overall direct effects of smoking, it is an important consequence of smoking because it represents the impact of smoking on 'innocent' people. In contrast to smokers they involuntary inhale the smoke, whereas smokers do it voluntary thereby presumably increasing their utility[16].

4.5 Summary – costs of smoking in Russia

The total benefits from reducing smoking in Russia to the levels observed in Sweden are summarized in Table 4.4.

Table 4.5. Summary of yearly smoking attributable costs in Russia

Type of costs	**Total costs implied by smoking, billion USD**	**Costs that would be saved / would not occur at Swedish smoking prevalence rates, billion USD**	**Comments**
Direct costs (medical)	3.442	1.877	0.32% of GDP (2004), 2.29% of total health expenditure (2004)
Indirect costs (absence from work)	**	**	
Indirect costs (life-years lost)	1.40	0.693	0.12% of GDP (2004)
Indirect costs (passive smoking)	**	**	
Total	**4.842**	**2.570**	**0.43% of GDP**

** >0, but a reliable estimate has not been possible

[15] Lifting the smokescreen: 10 reasons for a smoke free Europe by Cancer Research UK, European Respiratory Society, Institut National du Cancer and the European Heart Network.

[16] It is debatable whether an addiction is truly voluntary and that addicts regard themselves as 'better off' as a consequence of pursuing their addiction.

Even with the most conservative estimates the total costs generated by smoking in Russian society are at least 4.842 billion USD yearly and the country would save *at least* 2.57 billion USD or 0.43% of GDP yearly if male smoking prevalence rates in Russia were reduced to the levels observed in Sweden in 2000.

5. Discussion and conclusions

Adjustment effects

The estimates of the economic effects of smoking in Russia in this report are based on the assumption of two long term equilibrium situations or equilibrium tobacco consumption patterns: thus the current (2000) smoking prevalence rates and associated mortality are assumed to represent a long term equilibrium and the comparison is with what would happen if the Swedish prevalence rate could be introduced at once and so that overnight all Russian smoking rates were at the lower Swedish rate and had been so forever. These assumptions are not entirely realistic as on the one hand smoking patterns continue to evolve quite rapidly and on the other, measures to change smoking habits do not work instantaneously. Moreover, the 'health benefits' do not accrue at once. So the figures should be interpreted as representing the gain from reduced smoking in the long run when all adjustments had been made.

In practice the adjustment path to a 'new' tobacco consumption pattern could be quite complex and is certainly difficult to calculate.

Thus a person who quits smoking would feel some health improvement effects immediately. The immediate effects would be improved blood circulation, reduced carbon monoxide, normalisation of pulse rate and blood pressure, returned taste and smell senses and easier breathing.

However, depending on the smoking experience and intensity it may take 10 to 15 years before the previous tobacco user's risk of premature death approaches that of a person who has never smoked, but already after 3-4 years there are measurable risk reductions regarding tobacco related cancers. About 10 years after quitting, an ex-smoker's risk of dying from lung cancer is 30 percent to 50 percent less than the risk for those who continue to smoke (US National Cancer institute). The particular benefits, of course, depend also on person's physiology and effort to return to a healthy way of life.

In the short term a policy of smoking cessation could potentially create even additional costs like information campaigns and assistance to people quitting smoking, some temporary substitutes containing nicotine for those heavily addicted, 'rehabilitation', continuous reminding of harm of smoking etc.

Conservative approach and limitations

Using the American survey of 1985 as a reference population may not reproduce exactly the mortality experience of European countries in 2000, including Russia and Sweden, but it remains the best available approximation to attain comparable and reliable results.

Also, for the following reasons, the methodology adopted here is aimed to generate the most conservative estimates of the economic gains from smoking reduction:

First and most important – passive smoking is not included in the monetary estimates, although there is reliable evidence for the health risks it creates. Just – the actual amount is very unclear;
Absenteeism from work of smoking employees may be some 10% higher than for non-smokers and it has not been possible to include this effect in the calculations;
A series of other difficult-to-measure but clearly relevant effects such as death before the age of 35, forest fires caused by dropped cigarettes and matches, careless smoking at home etc. have not been measured;
Smoking prevalence data are based on survey results where respondents have to confess if and how much they smoke. In fact, people have a tendency to hide the habit leading to underestimation of true smoking prevalence in society.

In the light of the above the true costs smoking are surely larger than those estimated in this report – perhaps much larger – and the benefits of reducing prevalence are surely also correspondingly higher.

Who bears the cost and who benefits?
We have adopted a utilitarian measure of social welfare in this report – the more individuals there are in the economy each enjoying a given level of income, the more welfare it has. In the report we have not particularly addressed the issue of who actually bears the cost of smoking, and who may particularly benefit from reduced levels of smoking prevalence or for that matter who may bear the costs. In the latter context a particularly controversial issue, of course, is the tobacco industry. It creates substantial value added, employs thousands of people and creates income to the producing country. Consequently reduced demand for tobacco products appears to generate losses to the economy. But this is a misleading way of looking at the issue. A reduction in the demand for cigarettes is just like any other sectoral shock and if we assume that the government follows a policy of full employment in the long term the cigarette industry would be replaced by other activities.

Looking at Russian society as a whole, reduction of male smoking in Russia to Swedish levels would release resources of nearly 2.6 billion USD a year that could be used for other purposes. Moreover, recent Russian experience shows that substantial reductions in smoking are achievable ie in Moscow smoking prevalence fell by 15 percentage points between 1996 and 2004. Only a little bit more over the next 10 years would lead to Swedish rates.

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