

**PREVALENCE OF SMOKING IN EIGHT COUNTRIES OF THE FORMER  
SOVIET UNION: RESULTS FROM THE LIVING CONDITIONS,  
LIFESTYLES AND HEALTH STUDY**

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**SUMMARY**

**Objectives**

To provide comparative data on smoking habits in countries of the former Soviet Union.

**Methods**

Cross-sectional surveys conducted during 2001 in eight former Soviet countries provided representative national samples of the population aged 18 plus.

**Results**

Male smoking rates vary among countries from 43.3-61.8%. Female smoking remains uncommon in Armenia, Georgia, Kyrgyzstan and Moldova (x to x) but in Belarus, Ukraine, Kazakhstan and Russia rates are higher (x-15.5%). Smoking is significantly more common among younger compared to older women. Men start smoking significantly younger than women, smoke more per day and are more likely to be nicotine dependent.

**Conclusions**

Male smoking rates in the selected countries are amongst the highest in the world and show no evidence of decline. Female smoking appears to have increased from previous years and reflect the activity of transnational tobacco companies.

## BACKGROUND

In 1990, based on lung cancer mortality, it was estimated that a 35 year old man in the former Soviet Union (FSU), would have twice the risk (20%) of dying from tobacco-related causes before the age of 70 as a man in the European Union (EU; 10%).<sup>1</sup> In women the risks are much lower at 2% versus 1%. 56% of male cancer deaths and 40% of all deaths in region are attributed to tobacco compared with 47% and 35% respectively in the EU. Moreover tobacco related mortality continues to increase in the FSU while stabilising or declining in the EU as a whole.

Despite these deplorably high levels of tobacco-related mortality, relatively little is known about smoking prevalence in the region. Virtually no recent or reliable data exist for the countries of central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan).<sup>Fehler! Textmarke nicht definiert.</sup><sup>2</sup> Although recent surveys have been conducted in Georgia they are limited to the capital Tbilisi,<sup>3,4</sup> data from elsewhere in the Caucasus (Armenia, Azerbaijan) are scarce<sup>5</sup> and historical figures<sup>6</sup> are inconsistent with later findings, leading authors to rely on anecdotal reports of smoking rates<sup>7</sup>.

Historical<sup>2</sup> and more recent data, which come largely from Russia,<sup>8</sup> Ukraine,<sup>9</sup> Belarus<sup>10</sup> and the Baltic States<sup>11</sup> show, as might be expected given the mortality figures described above, that smoking rates in men are high at between 45% and 60%; rates are far lower in women and range from 1% and 20%.<sup>Fehler! Textmarke nicht definiert.</sup> The higher rates previously seen in Estonian women are now being matched by those in the other Baltic States<sup>Fehler! Textmarke nicht definiert.,11,12</sup> and by women in urban areas elsewhere.<sup>8,9</sup> Unfortunately however, other than the Baltic states, few countries collect data using similar data collection tools thereby precluding accurate comparisons.

These issues underlie the need in the FSU for comparable and accurate data on smoking prevalence, which have been widely recognised as pre-requisites for the development of effective public health policies and programmes.<sup>13,14,15</sup> The need for accurate and timely data is made more urgent in the FSU by the profound changes experienced in the region's recent economic transition and more specifically by the changes to its tobacco industry.<sup>16</sup> The latter were first felt as soon as these formerly closed markets opened, with the rapid influx of cigarette imports and advertising, which was previously unknown in the region.<sup>17, 18,19</sup> Later, as part of the rapid and large scale privatisation of state assets, most of the newly independent states

privatised their tobacco industries and the transnational tobacco companies (TTCs) established a local manufacturing presence. We estimate that between 1991 and the end of 2000, the TTCs invested over US\$2.7 billion in 10 countries of the FSU and tripled cigarette production capacity in their newly acquired factories.<sup>20</sup> Evidence from the industry's previous entry to Asia shows that these changes are likely to have a significant upward impact on cigarette consumption.<sup>21,22</sup>

In response to these and other major health and social issues faced in the region, a major study on living conditions, lifestyle and health (LLH) was commissioned as part of the European Union's Copernicus programme. This involved surveys in eight of the fifteen newly independent states - Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia and Ukraine.<sup>23</sup> Here we present the data on smoking prevalence. We aim to assess age and gender specific prevalence for each of the eight countries surveyed. Given the negative health impact of starting early we examine the age of first smoking. The number of cigarettes smoked per day and time to first cigarette are measured as indicators of dependence and used to assess the proportion of smokers with moderate to severe nicotine dependency, an indication of their ability to quit.

## **METHODS**

### Study population and sampling procedures

In the autumn of 2001 quantitative cross-sectional surveys were conducted in each country, by organisations with expertise in survey research.<sup>24</sup> The methods have been described in detail elsewhere.<sup>25</sup> In brief, standardised methods of sampling and data collection were used across countries. The questionnaire was administered by trained interviewers using face-to-face interviews conducted in the respondents' homes.

Each survey sought to include representative samples of the national adult population aged 18 years and over, but three small regions had to be excluded from sampling: the regions of Abkhazhia and Osetia in Georgia and the Trans-Dniester region and municipality of Bender in Moldova and the Chechen and Ingush Republics and the autonomous districts located in the far north of the Russian Federation because of geographic inaccessibility, the socio-political situation or prevailing military actions.

Samples were selected using multi-stage random sampling with stratification (except in Kyrgyzstan) by region and area . Within each primary sampling unit, households were selected using standardised random route procedures, except in Armenia where systematic random sampling of households from household lists was done. Within each household the adult with the nearest birthday was selected for the interview. It was decided to include at least 2000 respondents in each country, but to boost this number to 4000 in the Russian Federation and to 2500 in Ukraine to reflect the larger and more regionally diverse populations in those countries.

### Questionnaire design

The first draft of the questionnaire was developed in consultation with representatives of all countries from pre-existing surveys conducted in other countries in transition<sup>8,9,11</sup> and from the New Russia Barometer surveys<sup>26</sup> adjusted to the national context. It was developed in English, translated into appropriate national languages, back translated to check consistency, and piloted in each country..

### Statistical analyses

Surveys were coded into SPSS (SPSS Inc.). Data were merged and converted into STATA version 6 (Stata Corporation) for statistical analysis. The continuous variables age of first smoking and smoking duration were transformed before analyses using log normal transformations to reduce the level of skewness of their distribution but returned to their original units in the tables of results.

Current smokers were defined as respondents reporting currently smoking at least one cigarette per day. We calculated age and sex-specific smoking prevalence for each country. Among current smokers, we examined the age of first smoking and number of cigarettes smoked. We assessed levels of nicotine dependence by identifying the proportion of current smokers who consume more than 20 cigarettes per day and smoke within an hour of waking. This is equivalent to a score of 3 or more on the abbreviated Fagerstrom dependency scale<sup>27,28</sup> and indicates moderate (score 3-4) to severe dependency (score  $\geq 5$ ) (due to the way in which data were collected we were unable to break the score down further than this). Within each country, gender differences in smoking habits were assessed using chi-squared tests and two-sample t-tests; variations by age group were estimated using logistic regression analyses taking 18-29 year olds as the reference category. Between country comparisons in the

likelihood of smoking were made using logistic regression taking Russia as the baseline, while comparisons in the geometric mean age of first smoking were made using ANOVA combined with Bonferroni multiple comparison tests. To allow for the large number of comparisons made we used 99% confidence intervals and took significance as  $<0.01$ .

## **RESULTS**

### **Response Rates**

In total, 18,428 individuals were surveyed. Response rates varied between 71% and 88% among countries (calculated on the basis of the total number of households for which an eligible person could be identified). Item non-response rates were generally very low, for example 0.03% for current smoking, 0.05% for frequency of alcohol consumption, 0.5% for education level and 0.1% for self-perceived health.

### **Sample characteristics and representativeness**

The samples clearly reflect the diversity of the region and are broadly representative of the populations they denote (**Table 1**) although there is a slight under-representation of men in Armenia and Ukraine, of the urban population in Armenia and of the rural population in Kyrgyzstan. However there is a need for caution because official population data in some countries have not fully captured post-transition migration and other factors.<sup>29</sup> Age group comparisons for those in the sample aged 20 plus suggest there is a tendency for the oldest age group to be over-represented at the expense of the youngest age group particularly in Armenia, Moldova and Ukraine.

### **Smoking prevalence**

Rates of male smoking are high. In many of the countries surveyed almost 80% of men have ever smoked, the average for the eight countries surveyed reaching 68.9% (**Table 2, Figure 1**). The prevalence of current smoking is lowest in Moldova (43.3%) and Kyrgyzstan (51.0%) and highest in Kazakhstan (65.3%), Armenia (61.8%) and Russia (60.4%). Current smoking rates in Russia could not be distinguished from those in Kazakhstan, Armenia or Belarus but were significantly higher than in Moldova, Kyrgyzstan, Ukraine and Georgia ( $p<0.01$ , data not shown).

Rates in women are far lower (p-value for gender comparisons <0.001 in all countries) and somewhat more variable, ranging from 2.4% to 15.5% with the lowest rates seen in Armenia, Moldova and Kyrgyzstan and the highest in Russia, Belarus and Ukraine. Logistic regression analysis showed that current smoking among women in Russia was significantly more prevalent than in all other countries (p<0.01) although adjusting for age removed the difference between Russia and Belarus (data not shown).

The relationship between smoking and age varies by gender. In men, with the exception of Moldova, current smoking prevalence varies little between the ages of 18 and 59 but then declines more markedly in the over 60s (**Table 2, Figure 2a**). The decline with age is accounted for by an increase in the proportion of ex- and never-smokers. In women, the overall trend is for both current and ex-smoking to decrease with increasing age with very low smoking rates observed in the oldest age group (ever smoking rates vary from 0.8-3.9%). However, closer inspection suggests that the countries can be divided into two groups. In the first (Russia, Belarus, Ukraine, Kazakhstan), rates of current and ever smoking imply that initiation of smoking has increased rapidly between generations and especially in the youngest age group (**Table 2, Figure 2b**). In the second group (Armenia, Georgia, Kyrgyzstan and Moldova) the trends with age are less obvious and do not reach significance (except when comparing the oldest and youngest age groups in Moldova).

### **Age of uptake**

The majority of male smokers start under the age of 20 and, on average, a quarter start in childhood (**Table 3**). Far fewer women start in childhood and a sizeable portion start over the age of 20 – as high as 86% in Armenia and over 40% in Georgia, Kyrgyzstan and Moldova. These gender differences are significant in all countries.

Differences are also observed between countries - in Belarus, Kazakhstan, Russia and Ukraine the mean age of first smoking in men is under 18 and in women under 20 compared with older ages elsewhere. Overall between country differences are significant in both genders (p<0.001) yet Bonferroni multiple comparisons show that significant differences in women exist only when comparing Armenia with countries other than Georgia and Moldova (p<0.01, data not shown). In men, a significantly younger age of starting is seen in Russia and Ukraine compared with Armenia,



Georgia, Kyrgyzstan and Moldova, in Belarus compared with Armenia and Kyrgyzstan, and in Kazakhstan compared with Kyrgyzstan (all  $p < 0.01$ , data not shown).

### **Amount smoked and nicotine dependence**

Men tend to smoke more cigarettes than women, with the majority smoking 10 or more cigarettes per day while most women smoke under 10. Between-gender differences in the proportion of respondents smoking more than 20 cigarettes per day reached significance only in Belarus, Kazakhstan, Russia and Ukraine ( $p < 0.001$ ).

The majority of smokers smoke their first cigarette within an hour of waking although in all countries bar Georgia a far higher proportion of men than women do so ( $p < 0.01$ ). Men are therefore more likely to be moderately to severely nicotine dependent although gender differences only reaches significance in Belarus, Kazakhstan, Russia and Ukraine.

## **DISCUSSION**

These surveys of over 18,000 individuals provide important new data on the prevalence of smoking in eight countries that represent more than four-fifths of the population of the former Soviet Union. For some of these countries they provide the first accurate, country-wide data on smoking prevalence. Importantly they provide some of the first truly comparative data for countries of the FSU other than the Baltic states.<sup>30, 31</sup> Response rates were relatively high and the samples were broadly representative of their study populations, indicating the generalisability of the findings. However, a few issues should be noted in this regard. Male under-representation in Armenia and Ukraine will not affect gender specific rates and although the urban/rural differences may overestimate prevalence rates in Kyrgyzstan where urban areas were over-represented with the opposite in Armenia this is likely only to affect female data<sup>8,9,10</sup> Any differences in age group disparities were minor but will tend to underestimate smoking prevalence, although the caveat about the accuracy of the population data stated earlier should be noted. In addition the surveys were based on self-reported smoking status with no independent biochemical validation and may thus have been affected by reporting bias. Although there is some concern that self reported smoking status may under-estimate the true level of smoking and the amount smoked,

studies in the west suggest it is a sensitive and specific measure and that interviewer-administered questionnaires provide more accurate responses than self-completed questionnaires.<sup>32</sup> The only study in the FSU that addresses this issue found that among those claiming to be non-smokers, 13% (48/368) of women and 17% (12/375) of men in rural north west Russia were, according to blood cotinine levels, likely to be smokers compared with only 2% of each gender in Finland<sup>33</sup>. Given the far lower prevalence of smoking among women this had a disproportionately large impact on the reported female smoking prevalence. Although this suggests that prevalence may be underestimated in women in areas where smoking is still culturally unacceptable, our questionnaires were administered by interviewers in the respondents' homes rather than self-completed as in this survey, thus making it harder for respondents to deny smoking.

Finally our surveys did not measure use of tobacco other than cigarettes. Although the use of smokeless tobacco is fairly common place in some parts of Azerbaijan, Tajikistan and Turkmenistan, and chewing tobacco used in some southern parts of Kyrgyzstan, cigarettes are the main form of tobacco use here and in all the other countries surveyed.<sup>34 35</sup>

The study confirms that male smoking rates in this region are among the highest in the world with rates over 50% seen in all countries surveyed except Moldova and reaching 60% or more in Armenia, Kazakhstan and Russia. Elsewhere in Europe rates over 50% are only seen in Turkey (51%) and Slovakia (56%) and worldwide less than 20 countries are reported as having rates over 60%. In men the lower prevalence of current smokers and higher prevalence of never and ex-smokers in those over 60 is likely to reflect the disproportionate number of premature deaths among current smokers compared with never and ex-smokers, although there is also known to be a cohort effect in the FSU with those who were teenagers between 1945 and 1953 carrying forward a lower rate of smoking as cigarettes, like other consumer goods, were in short supply in the period of post-war austerity under Stalin<sup>36</sup>, with long-lasting consequences for mortality.<sup>37</sup>

Compared with male smoking patterns, smoking in women is far less common, varies more between countries and has a different age-specific pattern. Although ever smoking rates are under 4% in the over 60s in all eight countries, in the four countries with the highest female smoking rates (Belarus, Kazakhstan, Russia and Ukraine), smoking is now significantly more common in the younger generations with risk

ratios between the youngest and oldest age-groups of 12.2 to 37.3 compared with 1 to 5.5 in the other four countries.

Findings from this survey are comparable with those from previous surveys for all countries except Kyrgyzstan where the only recent source quotes a 60% male and 12% female smoking prevalence in adults aged 15-64 in 1997<sup>Fehler! Textmarke nicht definiert.</sup> but this was a casual sample of clinic attendees in the capital Bishkek (personal correspondence Chinara Bekbasarova) and is therefore likely to overestimate prevalence particularly in women. In Georgia, previous reports come from small surveys in Tbilisi which cannot be directly compared with our results.<sup>3,4</sup> The limited comparative data for Armenia and Moldova are dated between 1998 and 2001 and suggest there have been little if any changes in smoking prevalence.<sup>Fehler! Textmarke nicht definiert.</sup> Previous data for Kazakhstan are also limited but suggest a small increase from the 60% and 7% current prevalence rates recorded in men and women respectively in 1996.<sup>Fehler! Textmarke nicht definiert.</sup> More data are available for the remaining three countries. In Belarus rates in men have been hovering around 52% to 55% for some time,<sup>Fehler! Textmarke nicht definiert.,10</sup> while rates in women have climbed steadily from under 5% in the mid 1990s to a maximum of 12% in this survey.<sup>Fehler! Textmarke nicht definiert.,10</sup> Data for Russia as whole suggest that prevalence in men has risen from approximately 40% to 50% in the 1970s and 1980s<sup>Fehler! Textmarke nicht definiert.,2,6</sup> to around 60% in the 1990s with little change since, whilst in women rates have risen from around 10% in the early 1990s to 15% now. Pre-transition data on women are confined to Moscow or other areas and whilst not directly comparable suggest that rates have been rising since the 1970s but most notably through the 1990s.<sup>2,6,8,38</sup> Similarly in Ukraine historical data for Kiev show a steady rise in smoking among women from the mid 1970s to 1990s while male smoking rates barely changed, hovering around 50%. More recent national data suggest male smoking then rose slightly to reach approximately 57% by the turn of the century,<sup>9,39</sup> suggesting that our rate of 52.5% could represent a downturn although further data will be needed to confirm this. In women, the only nationally comparative data is our previous survey which found a rate of 10% in 2000. Although other surveys found rates of 14% in 2000 and 2001, the difference is likely to be accounted for by their slightly younger age sample.

Between gender and inter-country differences in smoking prevalence are reflected in other smoking habits. Men are more likely than women to start smoking when young, smoke more heavily and be nicotine dependent. Two groupings of countries appear to emerge from the between country comparisons - Belarus, Kazakhstan, Russia and Ukraine on one hand and Armenia, Georgia, Kyrgyzstan and Moldova on the other. In addition to having higher female smoking rates and more pronounced age specific trends, the former group tend to have lower ages of smoking uptake (particularly when compared with Armenia, Georgia and Moldova) and more marked gender differences in the number of cigarettes smoked per day and levels of nicotine dependency.

The between country differences observed in this study suggest that smoking patterns in Armenia, Georgia, Moldova and Kyrgyzstan are more traditional than those in Belarus, Kazakhstan, Russia and Ukraine. This could be explained by the differing degree of TTC penetration in these countries.<sup>20,40</sup> The Moldovan industry remains a state owned monopoly and although the Georgian and Armenian industries were privatised, this occurred late (post 1997) and none of the major TTCs invested directly. Kazakhstan, Russia and Ukraine by contrast saw major investments from most of the major tobacco companies in the early 1990s onwards. Belarus which remains a state owned monopoly and Kyrgyzstan, where the German manufacturer Reemtsma invested would therefore appear to be exceptions. In Belarus however, the state manufacturer has only a 40% market share, with the rest made up largely of illegal imports. The importance the TTCs attach to this illegal market is illustrated in the fact that, despite having little official market share,<sup>40</sup> British American Tobacco (BAT) and Philip Morris have the highest outdoor advertising expenditure and the ninth and tenth highest television advertising expenditures of all companies in Belarus. As in Ukraine and Russia, tobacco is the product most heavily advertised outdoors and in Belarus the fourth most advertised product on television (there are now restrictions on television advertising in Ukraine and Russia).<sup>41</sup> It is clear therefore that with continuing (if so far fruitless) discussion of a possible reunification with Russia, the TTCs treat Belarus as an important extension of the Russian market. In addition Kyrgyzstan also differs from the other countries with TTC investments in a number of respects – the investment came later (1998) and gave Reemtsma a manufacturing monopoly. However, Kyrgyzstan also differs from Belarus,

Kazakhstan, Ukraine and Russia in a number of other respects – its lower level of development and industrialisation and its larger rural and Muslim populations. Further work is therefore needed to explore potential explanations for these between country differences. But whatever reasons emerge, the rising rates of female smoking and lower age of uptake with its implications for higher levels of dependency are cause for concern in all these countries.

Meanwhile the survey findings, combined with data on disease burden,<sup>1,37</sup> confirm that the long-standing high smoking rates in men continue unabated. Amongst women, smoking in Armenia, Georgia, Kyrgyzstan and Moldova remains relatively uncommon and does not appear to have increased significantly as judged by rates in younger compared with older generations or by comparisons with previous data. By contrast female smoking in Belarus, Ukraine, Kazakhstan and Russia are higher, have increased from previous surveys and the age specific rates suggest an ongoing rise in younger generations. It is unlikely to be a coincidence that the higher rates are observed in countries with the most active TTC presence. Concerted and urgent efforts to improve tobacco control must be made throughout the FSU to curtail current smoking patterns and prevent the rise in female smoking where it has not already been seen.

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Figure 1: Levels of current and ever smoking by gender

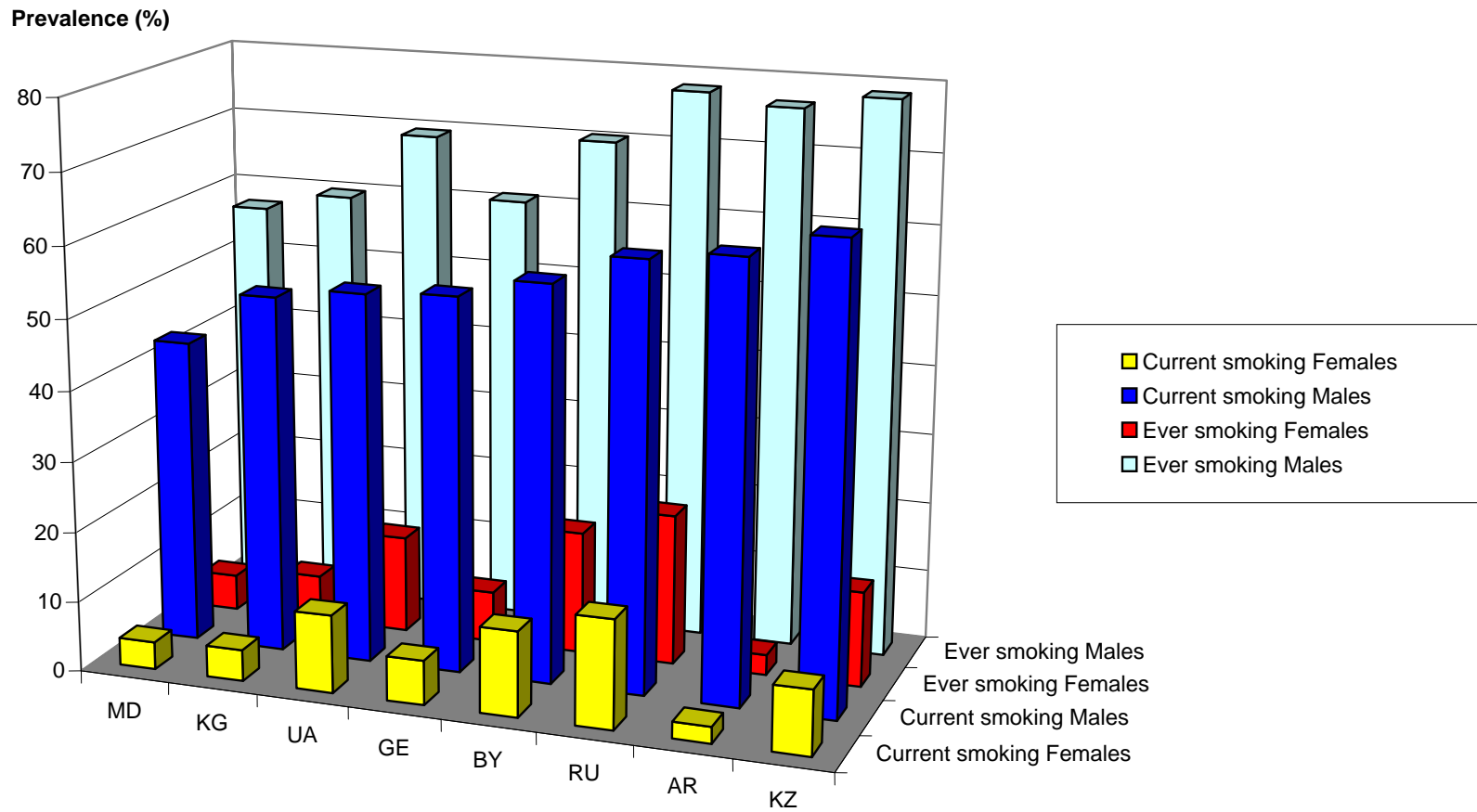


Figure 2a: Current male smoking prevalence by age group

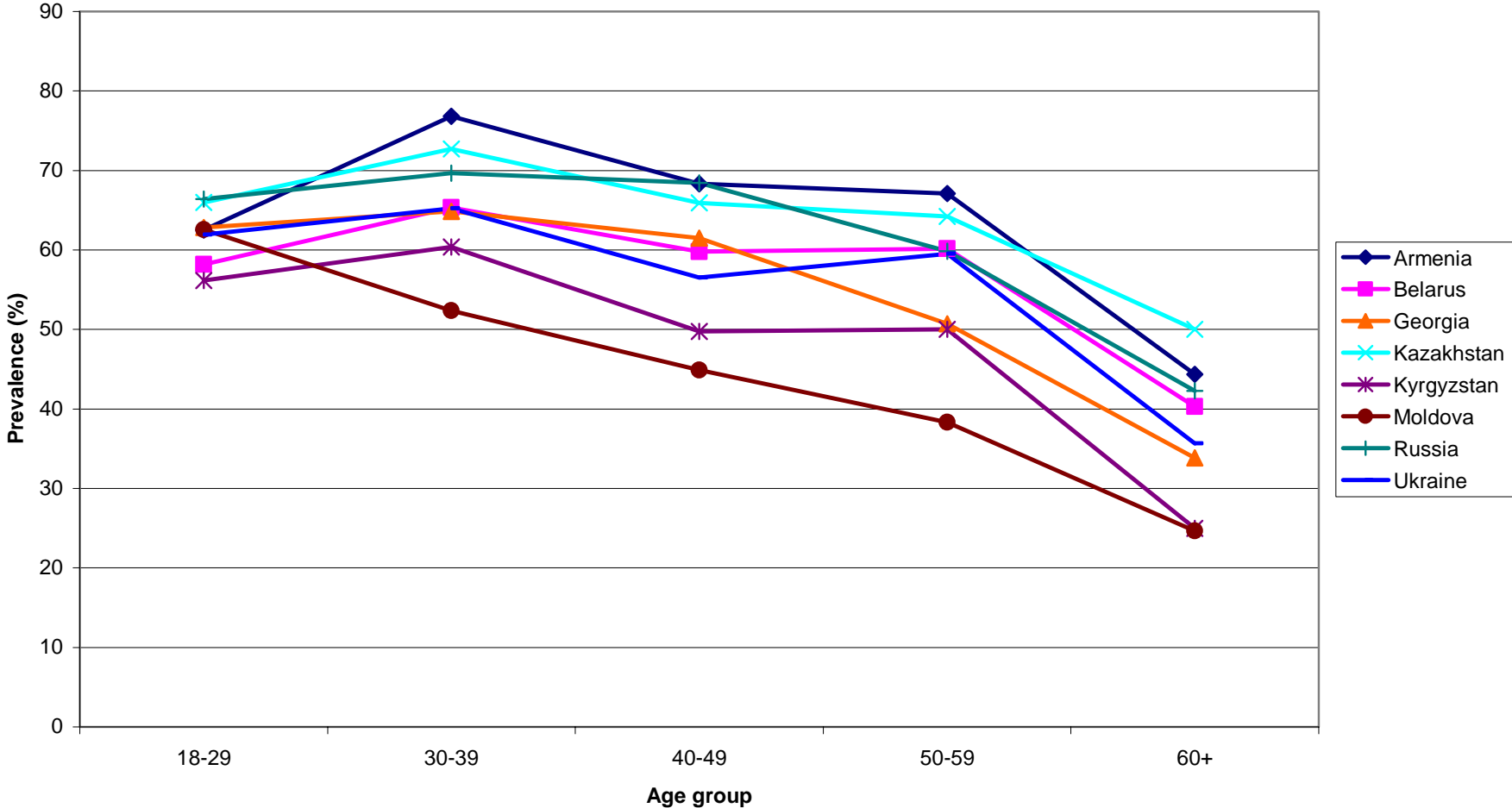
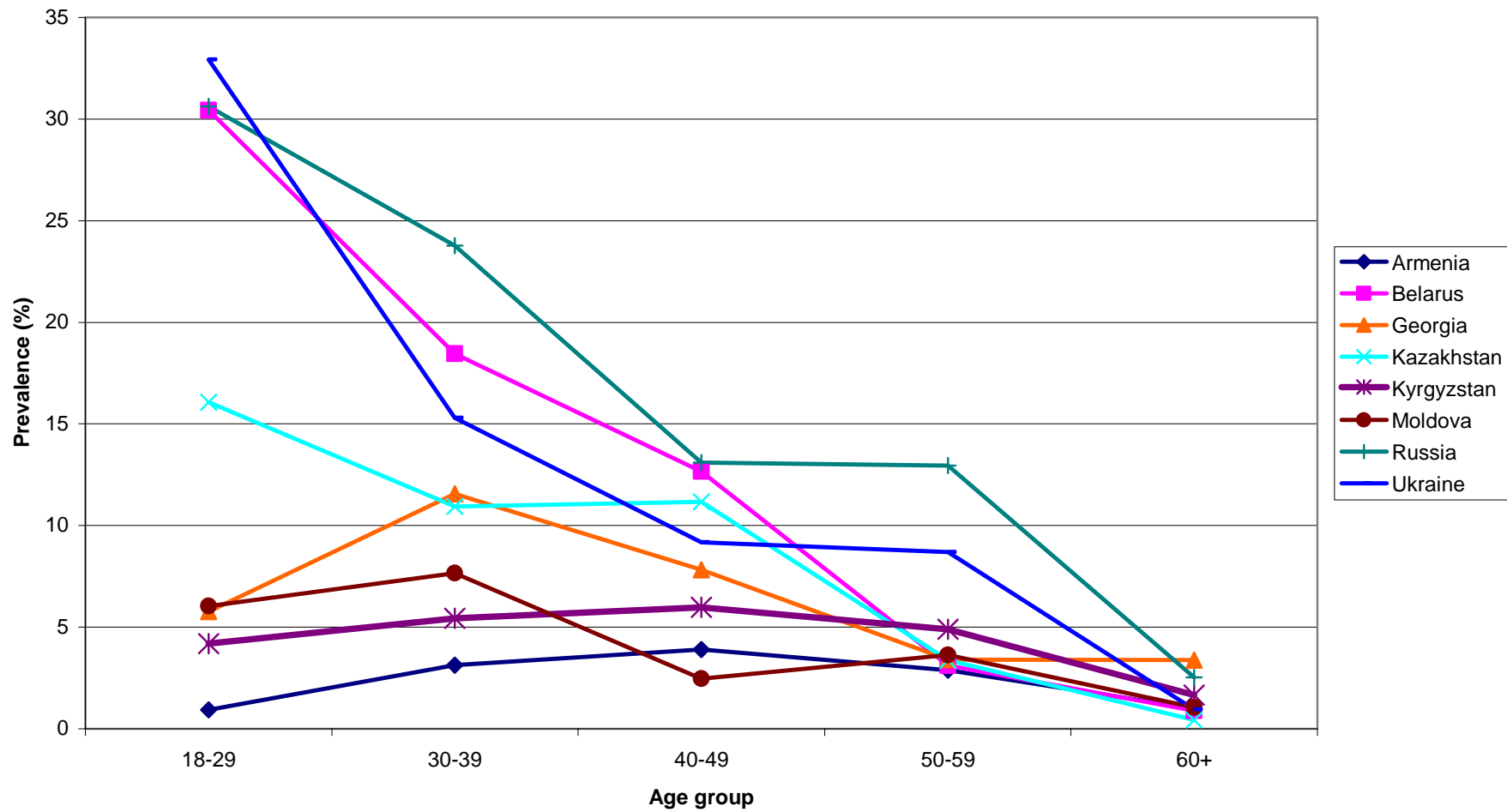


Figure 2b: Current female smoking prevalence by age group







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