

## ORIGINAL RESEARCH

## WHO FCTC-inspired tobacco control policies reversed the trends of smoking initiation among young people in Europe

Tatiana I. Andreeva<sup>1</sup><sup>1</sup> Independent researcher, Kiev, Ukraine

Corresponding author: (email: tatianandreeva@gmail.com)

## ABSTRACT

**Background:** Tobacco control measures reduce tobacco-related diseases and deaths by helping people in stopping and not starting tobacco use. This study assessed changes in daily smoking initiation before and after the WHO FCTC came into force.

**Methods:** GATS data from Greece, Kazakhstan, Poland, Romania, the Russian Federation, Turkey and Ukraine were analysed. The risk of self-reported daily smoking initiation by the age of 20 (DSI-20) was analysed by birth cohort and gender.

**Results:** Among men, DSI-20 peaked in 2000 at 65–70% in Greece, the Russian Federation and Ukraine and at 40% in Kazakhstan; in Poland,

Romania and Turkey, it peaked before that, at about 50–55%. Among women, the increase in DSI-20 from 1950 to the 1990s was steeper and first occurred in Poland and then Greece, Romania, Turkey, the Russian Federation, Ukraine and Kazakhstan. The trend reversed in the early 2000s in Kazakhstan, Romania, Turkey and Ukraine, which implemented WHO FCTC policies in the 2000s; however, in Greece and the Russian Federation, which did not implement WHO FCTC policies until 2010, the upward trend continued in the 2000s.

**Conclusions:** Upward trends of smoking initiation reverse after a country undertakes tobacco control measures, as shown in countries which implemented WHO FCTC policies in the 2000s.

**Keywords:** SMOKING INITIATION, WHO FRAMEWORK CONVENTION ON TOBACCO CONTROL, GLOBAL ADULT TOBACCO SURVEY

## INTRODUCTION

Tobacco control measures seek to reduce the burden of tobacco-related diseases and deaths by both helping people to stop tobacco use and preventing the initiation of smoking. The process of smoking initiation is usually reflected in tobacco use surveillance as the prevalence of ever or current (last month) smoking among adolescents, and the average age of smoking onset. As smoking among adolescents and smoking among adults is usually measured with different scales, the progression from adolescent experimentation to adult daily smoking is not always clearly shown.

When considering changes in the tobacco use situation in Ukraine, we noticed that the main effect of tobacco control measures was the decreased level of smoking among youth (1–3). Comparison of data in two Global Adult Tobacco Survey (GATS) surveys (4, 5) showed that the decline in smoking prevalence was larger in younger age groups than it was among older age groups. Similarly, in New York, tobacco

control policies undertaken since 2002 led to a greater decline in smoking rates among young people (52%) than among the adult population in general (28%) (6).

Research on smoking initiation is not abundant. Considering young adults, Freedman et al. (7) found that few studies are focused on the onset of smoking, compared to other behaviours related to smoking.

Analysis of smoking initiation usually considered the outcome measure to be either the mean age of smoking initiation (8–10) or the proportions of those who initiated smoking in/by a particular age (8) or within specified time spans (11, 12). When considering determinants of smoking initiation, authors often report demographic characteristics (9, 13), associated behaviours, including alcohol and drug use (7), or subjectively perceived reasons to start smoking, including boredom or stress (7, 8). Some studies also point to a causal association between the tobacco industry marketing exposure and initiation of smoking (7), as well as exposure to tobacco control

measures (7), including exposure to counter-marketing, denormalization campaigns, taxation (14) and the presence of smoke-free policies.

In multivariate analysis, some authors use linear regression with age of smoking initiation as a continuous variable (8); however, this is hardly applicable, because the outcome is not determined for those who have not initiated smoking. The majority of researchers apply logistic regression with a binary outcome variable showing whether a person started smoking in a particular age span (9, 12, 13, 15). The results can be affected by the choice of cut-off points. Another problem arises when age or an alternative measurement of age, such as, for instance, level of education, is included in a multivariate model; as a result, other associations cannot be properly estimated (13). As initiation happening in a particular age belongs to time-to-event variables, studies using various modalities of survival analysis (10, 14, 16–18), including life tables (10, 17) are most appropriate for such data.

Most studies were cross-sectional; some considered initiation of smoking over time within cohorts (11, 12), but those which considered changes over time across birth cohorts (10, 17, 19, 20) were most appropriate for documenting the impact of policies. However, the latter group of studies was from countries with developed surveillance systems, in particular, from Canada, Germany, Italy and the Netherlands.

Still, most countries, especially low–middle-income countries, can only rely on the international tools of tobacco surveillance. So, this study aimed to explore the changes in daily smoking initiation using GATS data before and after the WHO Framework Convention on Tobacco Control (FCTC) came into force in those European countries where GATS was conducted and data sets are publicly available. Another objective was to assess the initiation of daily smoking as the indicator of tobacco control success.

## METHODS

GATS data collected in the countries of the WHO European Region (Greece, Kazakhstan, Poland, Romania, Russian Federation, Turkey and Ukraine) and accessible at the Centers for Disease Control website were analysed. Self-reported daily smoking initiation at or before the age of 20 was analysed by year of birth and stratified by gender. The cut-off point was selected to be age 20 because, in most data sets, the percentage of those who initiated daily smoking after 20 years old was very small. Respondents younger than 20 years old, those born

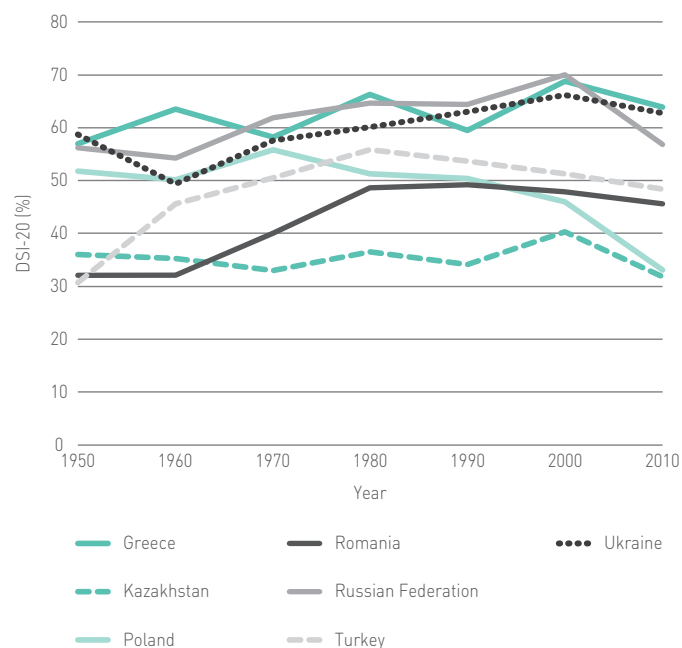
before 1930 and those with inconsistent data on age and year of birth were excluded from the analysis. The proportion of those who started smoking daily before reaching the age of 20 (DSI-20) was determined for the year when respondents were aged 20. Results were averaged for ten-year birth cohorts.

## RESULTS

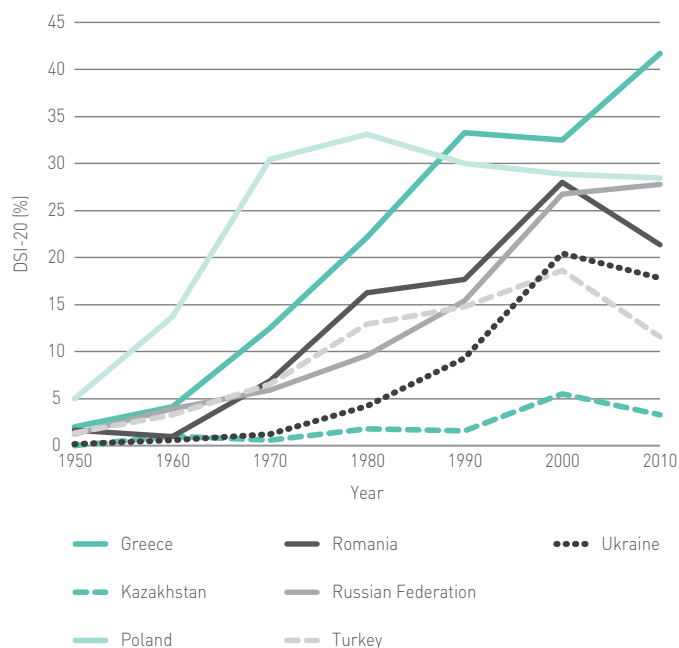
Among men (see Fig. 1), in Kazakhstan, Greece, the Russian Federation and Ukraine, DSI-20 went up slightly overall across birth cohorts and reached its maximum in around 2000 (i.e. among those born around 1980), at the level of 65–70% in Greece, the Russian Federation and Ukraine and at the level of 40% in Kazakhstan. However, the maximum was reached earlier in Poland, Romania and Turkey; in Poland, DSI-20 peaked in the 1970s (i.e. among those born in the 1950s), at about 55%; in Turkey, it peaked in 1980 (i.e. among those born in 1960), at 55%; and, in Romania, it peaked in 1990 (i.e. among those born in 1970), at about 50%. The decline in DSI-20 among men started after the early 2000s in Greece, Kazakhstan, the Russian Federation and Ukraine but earlier than that in Poland, Turkey and Romania.

Among women (see Fig. 2), the increase in DSI-20 from 1950 to the 1990s was steeper than that among men and first occurred in Poland, then Greece, Romania, Turkey, the Russian Federation,

FIG. 1. PERCENTAGE OF MEN WHO INITIATED DAILY SMOKING BY THE AGE OF 20 IN EUROPEAN GATS-PARTICIPATING COUNTRIES.



**FIG. 2. PERCENTAGE OF WOMEN WHO INITIATED DAILY SMOKING BY THE AGE OF 20 IN EUROPEAN GATS-PARTICIPATING COUNTRIES.**



Ukraine and, finally, Kazakhstan. This trend peaked in 2000 (i.e. among women born in the 1980s) in Kazakhstan, Romania, Turkey and Ukraine and was reversed after the early 2000s. In contrast, in Greece and the Russian Federation, DSI-20 among women continued to increase in the 2000s.

## DISCUSSION

GATS data, which is a known tool for monitoring the implementation of tobacco control measures (21), as well as their effects, were used to analyse the trends in daily smoking initiation in European GATS-participating countries. The analysis shows that, in countries that undertook tobacco control measures, the upward trend in smoking initiation was reversed.

This turning point occurred earliest in Poland, among both men and women. As shown in an earlier study (22), in Poland, the “prevalence of smoking” among men was highest (64%) in 1974; among women, it was highest (33%) in 1986. The later decline happened as in the late 1990s, after the fall of the communist system, Poland passed new tobacco control legislation that was the toughest in any of the former communist countries of eastern Europe (22).

In Romania, where some decline in smoking initiation was found in the 1990s among men, some regulatory measures were undertaken at an earlier point than in many other eastern

European countries: for example, a “health tax” on tobacco products was introduced in the fiscal law in 1994, a ban on TV advertising of tobacco products was adopted in 1999 and, in 2002, smoking in public places was banned. It was Romania’s obligation to align national legislation with European directives as part of the process of joining the European Union that was the real trigger for tobacco control (23).

In countries that implemented WHO FCTC policies in the 2000s (Kazakhstan (24), Turkey (25) and Ukraine (4)), DSI-20 declined after its peak in 2000. In contrast, in countries such as Greece (26) and the Russian Federation (27), which adopted comprehensive tobacco control measures only in 2010, there was no decline in DSI-20 before 2010. However, as other evidence shows (28), declines most likely occurred at a later stage.

The overall positive impact of implemented tobacco control measures is consistent with earlier research. For example, adolescent smoking was observed to have decreased in European countries participating in the European School Survey Project on Alcohol and Drugs (15).

For most of the countries in this study, the turning point in DSI-20 levels was observed to occur earlier among men than among women, which is consistent with the descriptive model of the tobacco epidemic (29).

Two crucial issues are whether tobacco control measures work differently in various countries and whether countries need to emphasize different measures of tobacco control. Some researchers favour such differences. For instance, a 2012 article published in *Morbidity and mortality weekly report* (30) suggested that strategies promoting cessation should be a priority in countries with a high prevalence of smoking, whereas countries with a low prevalence should focus on preventing smoking initiation. Analysis of tobacco taxation measures (14) suggested that increased tobacco prices influenced the prevalence of smoking, predominantly by deterring initiation in low–middle-income countries while, in upper–middle-income countries, they promoted cessation. As was shown in the study conducted in Italy (17), although the adopted policies were mainly aimed at preventing smoking initiation, they had a greater effect in increasing early quitting. While this change in the processes of quitting might be an issue for further consideration, the impact on smoking initiation appears to be a universal one, as it was observed in all the countries where WHO FCTC measures were implemented.

Although many authors emphasize the importance of youth smoking prevention and specify “vulnerable” groups where

efforts should be targeted (7), and some suggest that youth smoking prevention programs might decrease smoking initiation in adolescence (19, 20), our analysis shows that smoking initiation declines as a common and unspecific result of the whole range of tobacco control measures recommended by the WHO FCTC.

As smoking initiation is still measured differently in various surveys and for various age groups, developing a standardized measure of initiation that indicates progression to regular established smoking was recommended in an earlier analysis of the literature on smoking initiation (7). Thanks to GATS methodology, which applied the same data collection tools in many countries, a universal approach to this issue can be adopted, and an example of this was suggested in this paper.

One of the study limitations might be related to the arbitrary choice of the cut-off point at the age of 20, as several authors either find or hypothesize that, over recent years, smoking initiation has shifted from adolescence to young adulthood (18–20). This can be a question for further analysis, although great bias is not likely here, as the preliminary analysis of the presented data showed that most smoking initiation was complete by the age of 20.

Another limitation frequently cited with regard to GATS data is related to the recall of initiation, which is only considered reliable in young people. However, as the graphs in this article reveal, the trends in reported smoking initiation were very consistent, even among older participants. Respondents born before 1930 were excluded only because they were not numerous enough to allow stable estimates of smoking initiation among them.

As the study considered smoking initiation by birth cohorts, some features of ecological fallacy can be pertinent. Another limitation is related to various factors which can affect the trends of smoking initiation and which could not be controlled in this analysis. Although we emphasize the impact of the WHO FCTC in those countries which only started to massively adopt tobacco control legislations after the WHO FCTC ratification, obviously, other policies could have an influence, as seen in Poland.

## CONCLUSION

Adoption of tobacco control legislation according to WHO FCTC requirements in the early 2000s resulted in the reversal of trends of smoking initiation among young men and women

in European countries where population data on tobacco use are available. Monitoring the proportion of young adults who have initiated daily smoking before the age 20, by using data from the GATS questionnaire, can indicate the success of tobacco control policies undertaken in a country.

**Acknowledgements:** None.

**Sources of Funding:** None.

**Conflicts of Interest:** None declared.

**Disclaimer:** The authors alone are responsible for the views expressed in this publication and they do not necessarily represent the decisions or policies of the World Health Organization.

## REFERENCES<sup>1</sup>

1. Webber L, Andreeva T, Sotomayor R, Jaccard A, Retat L, Marquez P. Modeling the long-term health and cost impacts of reducing smoking prevalence through tobacco taxation in Ukraine. Washington, DC: World Bank Group; 2017 (<http://documents.worldbank.org/curated/en/417831489985759573/pdf/113601-WP-R4-TT-Ukraine-20170312-PUBLIC.pdf>).
2. Andreeva TI, Krasovsky KS. Simulation modeling of the tobacco epidemic in Ukraine in 2005–2010. In: Proceedings. European Conference on Tobacco or Health, Amsterdam, the Netherlands, 28–30. Brussels: Association of European Cancer Leagues; 2011:245.
3. Andreeva T. Monitoring initiation of daily smoking as an indicator of tobacco control success: example of Ukraine. *Tob Induc Dis*. 2018;16:A588. doi:10.18332/tid/84299.
4. Global Adult Tobacco Survey (GATS). Report: Ukraine 2010. Geneva: World Health Organization Tobacco Free Initiative; 2010 ([http://www.who.int/tobacco/surveillance/en\\_tfi\\_gats\\_ukraine\\_report\\_2010.pdf?ua=1](http://www.who.int/tobacco/surveillance/en_tfi_gats_ukraine_report_2010.pdf?ua=1)).
5. Global Adult Tobacco Survey. Report: Ukraine 2017. Geneva: World Health Organization Tobacco Free Initiative; 2017 ([http://kiis.com.ua/materials/pr/20180214\\_GATS/Full%20Report%20GATS%20Ukraine%202017%20ENG.pdf](http://kiis.com.ua/materials/pr/20180214_GATS/Full%20Report%20GATS%20Ukraine%202017%20ENG.pdf)).
6. Kilgore EA, Mandel-Ricci J, Johns M, Coady MH, Perl SB, Goodman A et al. Making it harder to smoke and easier to quit: the effect of 10 years of tobacco control in New York City. *Am J Public Health*. 2014;104:e5–8. doi:10.2105/AJPH.2014.301940.

<sup>1</sup> All references were accessed on 16 July 2018.

7. Freedman KS, Nelson NM, Feldman LL. Smoking initiation among young adults in the United States and Canada, 1998–2010: a systematic review. *Prev Chronic Dis.* 2012;9:E05. pmcid:PMC3277388.
8. Oh DL, Heck JE, Dresler C, Allwright S, Haglund M, Del Mazo SS et al. Determinants of smoking initiation among women in five European countries: a cross-sectional survey. *BMC Public Health.* 2010;10:74. doi:10.1186/1471-2458-10-74.
9. Kaleta D, Usidame B, Dzikowska-Zaborszczyk E, Makowiec-Dąbrowska T. Socioeconomic disparities in age of initiation and ever tobacco smoking: findings from Romania. *Cent Eur J Public Health.* 2015;23:299–305. doi:10.21101/cejph.a4067.
10. Schneider S, Mohnen SM, Pust S. The average age of smoking onset in Germany: trends and correlates. *Int J Public Health.* 2008;53:160–4. PMID:19127889.
11. Edwards R, Carter K, Peace J, Blakely T. An examination of smoking initiation rates by age: results from a large longitudinal study in New Zealand. *Aust N Z J Public Health.* 2013;37:516–19. PMID:24892149.
12. O’Loughlin JL, Dugas EN, O’Loughlin EK, Karp I, Sylvestre MP. Incidence and determinants of cigarette smoking initiation in young adults. *J Adolesc Health.* 2014;54:26–32.e4. doi:10.1016/j.jadohealth.2013.07.009.
13. Kaleta D, Makowiec-Dąbrowska T, Dzikowska-Zaborszczyk E, Fronczak A. Predictors of smoking initiation: results from the Global Adult Tobacco Survey (GATS) in Poland 2009–2010. *Ann Agric Environ Med.* 2013;20:756–66. PMID:24364449.
14. Kostova D, Chaloupka FJ, Shang C. A duration analysis of the role of cigarette prices on smoking initiation and cessation in developing countries. *Eur J Health Econ.* 2015;16:279–88. doi:10.1007/s10198-014-0573-9.
15. Kuipers MA, Monshouwer K, van Laar M, Kunst AE. Tobacco control and socioeconomic inequalities in adolescent smoking in Europe. *Am J Prev Med.* 2015;49:e64–72. doi: 10.1016/j.amepre.2015.04.032.
16. Andreeva TI, Krasovsky KS, Semenova DS. Correlates of smoking initiation among young adults in Ukraine: a cross-sectional study. *BMC Public Health.* 2007;7:106. doi: 10.1186/1471-2458-7-106.
17. Sardu C, Mereu A, Minerba L, Contu P. The Italian national trends in smoking initiation and cessation according to gender and education. *J Prev Med Hyg.* 2009;50:191–5. pmid:20411654.
18. Terry-McElrath YM, O’Malley PM. Trends and timing of cigarette smoking uptake among U.S. young adults: survival analysis using annual national cohorts from 1976–2005. *Addiction.* 2015;110:1171–81. doi:10.1111/add.12926.
19. Nuyts PAW, Kuipers MAG, Willemsen MC, Kunst AE. Trends in age of smoking initiation in the Netherlands: a shift towards older ages? *Addiction.* 2018;113:524–32. doi:10.1111/add.14057.
20. Gagne T, Veenstra G. Trends in smoking initiation in Canada: does non-inclusion of young adults in tobacco control strategies represent a missed opportunity? *Can J Public Health.* 2017;108:e14–20. doi: 10.17269/cjph.108.5839.
21. Song Y, Zhao L, Palipudi KM, Asma S, Morton J, Talley B et al. Tracking MPOWER in 14 countries: results from the Global Adult Tobacco Survey, 2008–2010. *Glob Health Promot.* 2016;23(2 Suppl):24–37. doi: 10.1177/1757975913501911.
22. Jassem J, Przewozniak K, Zatonski W. Tobacco control in Poland: successes and challenges. *Transl Lung Cancer Res.* 2014;3:280–5. doi: 10.3978/j.issn.2218-6751.2014.09.12.
23. Romania 2011 Global Adult Tobacco Survey report. 2011. Bucharest: Ministry of Health Romania; 2011 ([http://www.who.int/tobacco/surveillance/survey/gats/gats\\_romania\\_report\\_2011.pdf](http://www.who.int/tobacco/surveillance/survey/gats/gats_romania_report_2011.pdf)).
24. Global Adult Tobacco Survey (GATS). The Republic of Kazakhstan, 2014: country report. Astana: Ministry of Healthcare and Social Development of the Republic of Kazakhstan; 2014 ([http://www.who.int/tobacco/surveillance/survey/gats/gats\\_kazakhstan\\_country\\_report\\_2014.pdf](http://www.who.int/tobacco/surveillance/survey/gats/gats_kazakhstan_country_report_2014.pdf)).
25. Global Adult Tobacco Survey: Turkey 2012. Ankara: Republic of Turkey Ministry of Health; 2014 ([http://www.who.int/tobacco/surveillance/survey/gats/report\\_tur\\_2012.pdf](http://www.who.int/tobacco/surveillance/survey/gats/report_tur_2012.pdf)).
26. Global Adult Tobacco Survey: Greece 2013. Geneva: World Health Organization Tobacco Free Initiative; 2013 ([http://www.who.int/tobacco/surveillance/survey/gats/grc\\_country\\_report.pdf](http://www.who.int/tobacco/surveillance/survey/gats/grc_country_report.pdf)).
27. Global Adult Tobacco Survey (GATS): Russian Federation 2009: country report. Geneva: World Health Organization Tobacco Free Initiative; 2010 ([http://www.who.int/tobacco/surveillance/en\\_tfi\\_gats\\_russian\\_countryreport.pdf?ua=1](http://www.who.int/tobacco/surveillance/en_tfi_gats_russian_countryreport.pdf?ua=1)).
28. Global Adult Tobacco Survey (GATS): Russian Federation 2009 and 2016. Comparison fact sheet. Copenhagen: World Health Organization Regional Office for Europe; 2017 ([http://www.who.int/tobacco/surveillance/survey/gats/rus\\_comparison\\_factsheet\\_2016.pdf](http://www.who.int/tobacco/surveillance/survey/gats/rus_comparison_factsheet_2016.pdf)).
29. Thun M, Peto R, Boreham J, Lopez AD. Stages of the cigarette epidemic on entering its second century. *Tob Control.* 2012;21:96–101. doi:10.1136/tobaccocontrol-2011-050294.
30. Centers for Disease Control and Prevention. Current tobacco use and secondhand smoke exposure among women of reproductive age: 14 countries, 2008–2010. *MMWR Morb Mortal Wkly Rep.* 2012;61:877–82. pmid: 23114255. ■