**ORIGINAL ARTICLE**

# Analysis of non-compliance with smoke-free legislation in Russia

Liudmila Zasimova[1] (ID)

## Abstract

**Objectives** The study examined the smokers' non-compliance rates in indoor public places in Russia and the sociodemographic factors associated with non-compliance.

**Methods** Univariate analysis and logistic regression models were performed using cross-sectional data from a representative sample of Russian adults ($N = 4006$).

**Results** 27.2% of Russian smokers did not comply with smoke-free bans. Non-compliance was attributed to sociodemographic characteristics of smokers, mainly to the number of cigarettes smoked per day, regular alcohol consumption, being aged between 15 and 34 years, being in the highest income group and living in an urban area. Neither the sex, nor the family status of smokers exerted a statistically significant affiliation with non-compliance. Higher rates of non-compliance were observed in restaurants, cafes, bars and nightclubs, common domestic premises of apartment buildings and indoor workplaces. Violations on public transport, in governmental buildings, health and sport facilities, colleges and universities were less common.

**Conclusions** There is a need to revise the methods of enforcement with respect to sociodemographic characteristics of smokers associated with non-compliance in public places where violations are widespread.

**Keywords** Smoking · Second-hand smoke · Bans · Non-compliance · Smoke-free legislation · Russia

## Introduction

Globally, the burden of second-hand smoke has been declining over the last three decades. Yet, it remains substantial, with almost 0.9 million deaths worldwide attributed to second-hand smoke in 2016 (GBD Risk Factors Collaborators 2017). There is strong evidence that comprehensive smoke-free policies in public places are associated with decreased smoking behaviour and second-hand smoke exposure, thus resulting in a reduction in adverse health outcomes (Hoffman and Tan 2015; Jones et al. 2014; Hyland et al. 2012).

✉ Liudmila Zasimova
Lzasimova@hse.ru

[1] Department of Applied Economics, Faculty of Economic Sciences, National Research University Higher School of Economics (HSE), 28/2, Room 2214 Shabolovka Str., Moscow, Russian Federation 119049

As of the end of 2017, 181 countries have joined the World Health Organization's Framework Convention on Tobacco Control—FCTC (2003). However, the progress combatting the second-hand smoke is highly heterogeneous across countries: less wealthy countries have experienced fewer gains (Perkins and Neumayer 2014); one of the possible reasons for this was the fact that they have only recently become the FCTC members. Moreover, the implementation of the adopted smoking bans varied widely in terms of compliance with the smoke-free legislation. At the political economy level, the failure is explained by the lack of governmental resources to enforce the law and low political will to protect population health (Perkins and Neumayer 2014; Drope 2010; Feldman and Bayer 2011). The enforcement and degree of compliance are therefore viewed at least as important as the adoption of the smoke-free policies, especially in less developed nations (Perkins and Neumayer 2014).

A growing body of quantitative literature on non-compliance relies mostly on data from high-income countries that have quite a long history of combatting tobacco and developed political institutes. Evidence from countries with less developed political institutes is still rare and usually

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focuses on documenting the rates of non-compliance in particular venues rather than on exploring violations from an individual viewpoint. While this strand of research remains rare (Zhou et al. 2016; Lazuras et al. 2012), Russia with its high prevalence of smokers recently introduced anti-smoking measures and weak enforcement mechanisms provided an interesting example to explore non-compliance with smoking bans in public places.

Since the ratification of the FCTC in 2008, the Russian government has much improved its policies relating to smoke-free environments. The Federal Law "On protecting the health of citizens from the effects of second hand tobacco smoke and the consequences of tobacco consumption" (Federal Law №15 2013) has prohibited smoking in indoor workplaces, indoor public places, public transport and some outdoor places (beaches, playgrounds, entrances to public buildings and public transport). The majority of bans came into force in June 2013. Since June 2014, smoking has also been banned in long-distance trains and ships, in marketplaces and in all types of hospitality venues, including hotels, restaurants, cafes and bars. These measures were accompanied by massive mass media campaigns as well as visual and audio warnings in public places to guarantee a high level of awareness among smokers. Four years after the implementation of the law, there were no publicly available data about its efficiency. To the best of our knowledge, no studies have attempted to examine the degree of compliance with smoking bans in Russia with the exception of a brief summary of the GATS Russia (2016). By addressing this gap in the literature, the study aimed to assess the non-compliance rates in indoor public places and the individual factors associated with self-reported non-compliance with bans in Russia.

## Methods

The quantitative literature investigating non-compliance with smoke-free legislation often relies on direct observations of venues as recommended in the "Assessing compliance with smoke-free law" guide developed jointly by the Campaign for Tobacco-Free Kids, Johns Hopkins Bloomberg School of Public Health and the International Union against Tuberculosis and Lung Disease (2014). Unfortunately, observations do not work equally well in all public venues: it might be costly to observe violations on trains, ships and airplanes, or technically problematic to document violations in workplaces and apartment buildings that are closed to the public. Besides, observational studies are not intended to document the social and demographic characteristics of offenders and respectable citizens, the primary goal of this research. Therefore, this study employed a design, based on a

population survey, which is sometimes used to study violations in smoking (Zhou et al. 2016), but more often in other fields, such as driving violations or illegal downloads (Gao and Zhao 2018; Yagil 1998; Vardaki and Yannis 2013). Despite widespread use and obvious advantages for violation analysis, public opinion surveys based on self-reported data are vulnerable to socially desirable response tendencies. However, Lajunen and Summala (2003) demonstrated that conducting interviews in private settings using an educated interviewer under conditions of anonymity can mitigate this drawback considerably.

Thus, this study relied on cross-sectional data obtained by population survey on health behaviour and medicine in Russia undertaken by the Levada-Center (an independent Russian sociological polling and research organisation) in February 2017. The data were collected through voluntary face-to-face interviews conducted by professional interviewers at the homes of respondents according to the best international practice in ethical protocol. All respondents were assured of confidentiality and verbally consented to be interviewed. The selection of respondents was completed by multistage stratified probability sampling to reduce sampling errors when gathering the primary data from the geographically dispersed population in the Russian Federation. The sample did not include individuals fulfilling military service obligation, prisoners, inpatients and residents of the Far North. (When combined, the aforementioned categories do not exceed 4% of the total Russian adult population.) The sample was comprised of 4006 persons aged 15 years and above and represented population of the Russian Federation by federal districts, size of settlement, sex and age. The subsample of smokers that consisted of 1004 individuals was comparable with GATS Russia (2016) by smoking-related characteristics as given in Table 1.

### Measurements

The survey contained fairly comprehensive data on socio-economic and demographic characteristics and a special block of questions on smoking in public places. Self-reported smokers were asked to select using the list provided all the locations in which they smoked in the 30-day period prior to the interview. To mitigate the possible bias of underreporting, the list of locations included different public and private places without clarification where the ban was in force. The list included: any place in the respondent's home or apartment, any special place in their home (balcony, bathroom, etc.), apartment building lobbies or stairwells, indoor workplaces, smoking rooms in offices, the street, public transport, private transport, restaurants/cafes, bars/nightclubs and everywhere. The list of public places was chosen with respect to Russian anti-

**Table 1** Distribution of respondents aged 15 years and above according to their sociodemographic characteristics in the study sample compared to the whole population of the Russian Federation (%). Survey on Health Behaviour and Medicine, Russia, 2017

| Sociodemographic characteristics | Study sample characteristics | | | Russian Federation characteristics | | |
|---|---|---|---|---|---|---|
| | Male (N = 1390) | Female (N = 2616) | All (N = 4006) | Male (N = 54.9 mln) | Female (N = 66.3 mln) | All (N = 121.2 mln) |
| Age groups, % | | | | | | |
| 15–24 | 11.58 | 7.61 | 8.99 | 13.5 | 10.7 | 12.0 |
| 25–34 | 23.17 | 19.07 | 20.49 | 22.4 | 18.3 | 20.1 |
| 35–44 | 17.48 | 16.7 | 16.97 | 19.1 | 16.7 | 17.8 |
| 45–54 | 15.97 | 15.52 | 15.68 | 16.4 | 15.3 | 15.8 |
| 55–65 | 16.62 | 18.27 | 17.7 | 16.2 | 17.9 | 17.1 |
| 65+ | 15.18 | 22.82 | 20.17 | 12.4 | 21.2 | 17.2 |
| Federal districts, % | | | | | | |
| Central | 27.26 | 27.33 | 27.26 | 26.5 | 26.9 | 26.7 |
| Northwestern | 8.85 | 10.17 | 9.71 | 9.4 | 9.5 | 9.5 |
| Southern + North Caucasian | 17.2 | 16.82 | 17.2 | 18.0 | 17.7 | 17.7 |
| Privolzhsky (Volga) | 20.39 | 20.53 | 20.39 | 20.1 | 20.3 | 20.2 |
| Ural | 8.29 | 8.45 | 8.29 | 8.5 | 8.4 | 8.4 |
| Siberian | 12.93 | 12.5 | 12.93 | 13.2 | 13.1 | 13.1 |
| Far Eastern | 4.24 | 4.2 | 4.22 | 4.4 | 4.1 | 4.2 |
| Urban citizens, % | 75.32 | 74.77 | 74.96 | 73.6 | 75.8 | 74.8 |
| Smoking prevalence (current tobacco smokers), % | 47.14 | 13.59 | 25.24 | 49.5* | 14.4* | 30.3* |
| Average number of cigarettes smoked per day by daily smokers, N | 17 | 11.7 | 15.2 | 17.1* | 13.7* | 16.3* |

Data for the study sample come from the population survey "On health behaviour and medicine in Russia" undertaken by the Levada-Center for NRU HSE in February 2017. Data for the Russian population are taken from Russian Federal State Statistics Service (www.gks.ru) for the year 2017. (*) Data for smoking prevalence and average number of cigarettes smoked by daily smokers in the Russian Federation are taken from the Global Adult Tobacco Survey 2016 (http://www.who.int/tobacco/surveillance/survey/gats/rus/en/) (most recent data available)

smoking legislation (Federal Law №15 2013) and is similar to the list used in GATS Russia (2009). The list of private places was developed after consulting with experts and included most of the popular places in which to smoke in Russia.

The *dependent variable* captured the fact of violation. It was constructed from data on self-reported places used for smoking and equalled 1 if a person reported smoking in at least one place where smoking was banned and 0 if he/she smoked only where permitted.

Turning to the *explanatory variables*, the survey provided a set of standard sociodemographic variables, income- and job-related variables and controls for federal districts and types of settlement, as well as variables capturing smoking and alcohol consumption.

### Sociodemographic variables

Age (measured by six dummy variables according to different age groups), sex (males vs females) and family status were assessed. For family status, four dummies were used:

single, married (or cohabiting), divorced (or separated) and widow/widower.

### Cigarette and alcohol consumption

As addiction makes it harder for heavy smokers to resist the desire to smoke, a higher number of consumed cigarettes might increase the probability of violations. The vast majority of Russian smokers preferred manufactured filtered cigarettes due to their affordable price (Lunze and Migliorini 2013). In this study, smoking consumption was measured with a question borrowed from the individual questionnaire of the Russian Longitudinal Monitoring Survey—HSE (RLMS-HSE): "how many cigarettes, paper mouthpiece, pipes/cigars do you usually smoke in a day?". Water pipes and electronic cigarettes smoking were not included in this measurement as they do not fall under the common state law definition of "tobacco product" and are not that popular in Russia (Gusenko and Fomchenko 2018). Cigarette consumption was treated as a continuous variable in the regression analysis.

For alcohol consumption, there is evidence that smoking and drinking alcohol tend to cluster in Russia (Kislitsyna et al. 2010; Stickley and Carlson 2009). At the same time, excessive drinking is strongly attributed to social harm to others (WHO 2014), leading us to hypothesise that smoking violations are associated with alcohol abuse. The questions relating to alcohol were borrowed from the individual questionnaire of the RLMS-HSE study and contained a number of questions regarding the frequency of drinking different types of beverages, namely wine, beer, strong spirits (including vodka), alcoholic cocktails and samogon (a homemade distilled alcoholic beverage) in the 30-day period prior to the interview taking place. For each type of alcoholic beverages, respondents were asked to choose between six responses reflecting how often they drink. The responses ranged from "never" to "almost every day". The responses were aggregated and then recoded to categorise four main drinking patterns according to the frequency of drinking: (1) non-drinkers (never or several times per year); (2) episodic drinkers (several times per month); (3) moderate drinkers (2–3 times per week); and (4) frequent or everyday drinkers.

### Incomes, education and job type

According to the Federal Law "On protecting population health from exposure to tobacco smoke and consequences of tobacco use" (Federal Law № 274 2013), smokers violating the ban on smoking in public places could be fined up to 3000 roubles (50$) in public playgrounds and up to 1500 roubles (25$) in other public places. Although in practice penalties were rarely imposed, high-income smokers might be less sensitive to the fines. Monthly incomes (in logarithm of roubles per member of household) turned out to be statistically insignificant *at the initial testing phase* and were therefore changed to a set of dummy variables for household income quintile group.

Prosocial behaviour could positively relate to intellectual outcomes. For both this reason and to capture its effect on incomes, a dummy variable for higher education was included in the analysis (coded as 1 if a respondent had less than a bachelor's degree and 0 if a respondent had a bachelor's degree or higher). Similarly, job type dummies were created, reflecting broad groups of occupations: managerial, clerical, skilled workers, unskilled workers, military and police forces, unemployed and others (including retired, non-working students and homemaker).

### Federal district and settlement type

Two types of variables were employed to control for types of residency. Dummies for six federal districts were included to reflect geographic and climatic differences,

assuming that in warmer regions, outdoor smoking is less inconvenient. A dummy for rural areas was included to take into account inequality in access to different public places.

## Estimation technique

In the univariate analysis, the associations were tested with a Pearson's Chi-square test, as the variables were categorical. To control for confounding, a logistic regression analysis was used to identify any associations between non-compliance and the independent variables. A forward selection procedure was employed with (1) a basic model (including sociodemographic characteristics); (2) a model with added cigarette and alcohol consumption variables and (3) a full model with all the aforementioned variables included. In addition, post-estimation analysis was used to calculate predicted probabilities for significant coefficients. Data were analysed in STATA for Windows (version 13).

## Results

### Tobacco consumption and smoking in public places

According to our study sample in 2017, the smoking prevalence rate was 25.5% (with 47.1% for males and 13.6% for females). The share of smokers varied greatly, depending upon sex and age. The highest prevalence rates were observed for those aged 35–44 years: 57.6% of males and 22.6% of females reported being a smoker, while the lowest rates (27.0% for males and 3.7% for females) were seen in the oldest age group (65 and above). In the youngest age group (15–24 years), smoking males (35%) were also much more common compared to smoking females (13.1%). Daily cigarette smokers smoked an average of 15.2 cigarettes per day (17 among men and 11.7 among women).

Almost 95% of Russian smokers preferred filtered cigarettes. Other forms of tobacco products were less popular: 2.7% smoked non-filtered cigarettes, 1.9% preferred paper mouthpieces and less than 1% smoked pipes. Electronic cigarettes and water pipes were common among 1.8% and 2.5% of smokers, respectively.

The survey contained questions about respondents' visits to different public places in the 30 days prior to the interview to observe any potential smoking violations there. Table 2 summarises the violations from respondents' observations. The majority of violations took place in the shared parts of domestic premises (57.9% of respondents having visited apartment buildings observed smoking in entrances, lifts and stairwells). More than half of nightclubs

and bars visitors saw people smoking in those venues. Violations in restaurants and cafes were mentioned by 37.2% of its clients. Smoking in indoor workplaces was reported by 21.8% of respondents attending these venues. Fewer violations occurred on public transport and in healthcare and sports facilities.

Respondents living in rural areas visited the listed public places less often compared to urban citizens. They often lived in private homes, did not use public transport that often, rarely visited governmental buildings and did not spend time in bars and restaurants. Much of their work was in outdoor areas. However, when rural citizens visited any of the venues listed in this study, they had the same chance of observing violations as urban citizens.

## Self-reported non-compliance with smoking bans

According to self-reported data, 27.2% of smokers had violated smoking bans in at least one venue in the 30 days prior to interview. Table 3 summarises the responses given by smokers. Violations were more frequently reported in smoking rooms in offices, in shared domestic premises and in indoor workplaces. Smoking on public transport was witnessed by less than 1% of smokers. Lower self-reported non-compliance rates in restaurants/cafes and bars/night-clubs might be the result of fewer respondents attending these venues (Table 2).

Univariate analysis (Table 4) illustrates that age group, family status, consumption of cigarettes and alcohol, income level, job type and settlement type were associated with self-reported non-compliance ($p < 0.005$). Most of

**Table 2** Smoking violations in public places observed by respondents. Survey on Health Behaviour and Medicine, Russia, 2017

| Public places | Visited public places | | Observed violations | |
|---|---|---|---|---|
| | % | p value | % | p value |
| Common domestic premises (entrances, lifts, stairwells, etc.) | 84.3 | | 57.9 | |
| Urban | 93.1 | < 0.001* | 58.6 | 0.719 |
| Rural | 58.0 | | 57.8 | |
| Public transport | 73.7 | | 6.5 | |
| Urban | 79.1 | < 0.001* | 6.9 | 0.678 |
| Rural | 58.0 | | 6.4 | |
| Indoor workplaces | 50.3 | | 21.8 | |
| Urban | 53.9 | < 0.001* | 22.0 | 0.591 |
| Rural | 39.4 | | 20.8 | |
| Healthcare facilities | 50.1 | | 8 | |
| Urban | 51.4 | 0.005* | 8.4 | 0.227 |
| Rural | 46.3 | | 6.7 | |
| Schools/universities | 27.1 | | 13.5 | |
| Urban | 27.2 | 0.750 | 14.2 | 0.278 |
| Rural | 26.7 | | 11.6 | |
| Sport facilities | 18.3 | | 8 | |
| Urban | 20.0 | < 0.001* | 7.8 | 0.452 |
| Rural | 13.5 | | 9.6 | |
| Restaurants/cafes | 27.7 | | 37.2 | |
| Urban | 31.9 | < 0.001* | 37.6 | 0.449 |
| Rural | 15.1 | | 34.4 | |
| Bars/nightclubs | 8.9 | | 53.2 | |
| Urban | 10.0 | < 0.001* | 54.4 | 0.327 |
| Rural | 6.1 | | 47.5 | |
| Governmental buildings | 37.4 | | 11.7 | |
| Urban | 69.6 | < 0.001* | 11.1 | 0.150 |
| Rural | 30.4 | | 14.1 | |

$N = 4006$; respondents were asked about their visits to different public places and observing violations there in the 30 days prior to interview

*Indicates that there is a significant difference between subgroups ($p$ value $< 0.01$ according to Chi-square test)

**Table 3** Self-reported smoking places in 2017. Survey on Health Behaviour and Medicine, Russia, 2017

| The venue | % of all smokers |
|---|---|
| Any place at home or apartment | 23.4 |
| Special place at home (balcony, bathroom, etc.) | 53.7 |
| Apartment building lobbies or stairwells* | 16 |
| Indoor workplaces* | 8 |
| Smoking rooms in offices | 32.9 |
| Outside/on the street | 54 |
| Public transport* | 0.2 |
| Private transport | 11.4 |
| Restaurant/cafes* | 3.5 |
| Bars/nightclubs* | 2 |
| Everywhere | 2.2 |

$N = 1004$; respondents were asked to name all the places in which they smoked in the 30 days prior to interview

Respondents could choose several answers

*Places where smoking is banned according to the law

these factors were considered to be statistically significant in the multivariate analysis with the exception of family status and job type. Table 5 demonstrates the results of the logistic regression analysis and post-estimation predicted probabilities estimations. We restricted Table 5 to the significant variables only. (The full table with odds ratio for all variables is available in Table 1 of the online supplementary material.)

In all three models, the odds ratio for the younger generations had a significant positive effect, indicating that younger smokers were more prone to violating the law. As such being in the youngest age group (15–24 years) was estimated to increase the probability of violation by between 26 and 28% compared to the reference group of those aged 65 and above; being in the group of 25–34 increased the probability of violations by 17–21%. The coefficients for the 35–44 age group were significant in the first two models only: in models (1) and (2) it was associated with an increase in the probability of smoking by 16–18%, while it was no longer statistically significant after adjusting for income- and job-related variables in model (3).

Neither sex, nor family status exerted a statistically significant affiliation with non-compliance.

A higher level of tobacco consumption had the expected positive effect (OR 1.05; CI 1.03, 1.07). In terms of predicted probabilities, this means that a one unit increase in tobacco consumption per day (cigarettes, pipes or paper mouthpieces) was associated with a 1% increase in the probability of violation. Heavy smokers were likely unable to reach a suitable place in which to smoke every time they

needed to light a cigarette, the result being failure to comply with the law. The univariate analysis showed that almost one-third of smokers consuming more than 10 cigarettes per day reported violations, which was almost twice as high as those who smoked 1–5 cigarettes per day (Table 4).

Another factor that was statistically attributable to non-compliance is alcohol abuse: 46% of frequent and everyday drinkers violated the law compared to 20% of non-drinking smokers having reported non-compliance (Table 4). In the fully adjusted model (3), heavy drinking had a significant positive effect on non-compliance (OR 3.25; CI 1.20, 8.82) and increased the probability of non-compliance by 23% (Table 5).

The multivariate analysis failed to capture any statistically significant association between non-compliance and income level, except for the highest income group (OR 1.95; CI 1.10, 3.45) (Table 5). Smokers attributed to the highest income quantile were 13% more inclined to violate the law (Table 5). Similarly, with the exception of police and army officers who were believed to compel to obedience and discipline, the estimated coefficients of all other job-related variables were statistically indistinguishable from zero. As for the higher education variable, it was statistically insignificant within the univariate analysis. In the fully adjusted model, respondents with educational level of less than a bachelor's degree were associated with an increased risk of non-compliance (OR 1.47; CI 0.95, 2.28) (Table 5). The post-estimation predicted probabilities for higher education and police and army variables were significant at $p < 0.1$ implying that the results for the latter two factors should be interpreted with caution.

Finally, while the federal district variables were insignificant in all models, the settlement type exerts a particularly significant result, attributable to 12–13% increase in the probability of violation for urban smokers (Table 5).

## Discussion

The findings revealed a picture of non-compliance with smoke-free legislation in Russia and difficulties in implementing the smoking ban. While Russia adopted a comprehensive smoke-free legislation in 2013, the risk of second-hand smoke in public places was still very high as of 2017. The survey results are in line with the findings of GATS Russia (2016) on exposure to second-hand smoke. Although we are unable to make direct comparisons because the wording of the questions was slightly different (observing smoking violations in our survey versus being exposed to second-hand smoke in GATS Russia), the results are noticeably similar, indicating the same public

**Table 4** Distribution of smokers by compliances with bans on smoking in public places. Survey on Health Behaviour and Medicine, Russia, 2017

| | Violated the law, % (N) | Complied with the law, % (N) | p value |
|---|---|---|---|
| **Sex** | | | |
| Male | 26.1 (92) | 73.9 (261) | 0.554 |
| Female | 27.8 (181) | 72.2 (470) | |
| **Age group** | | | |
| 15–24 | 37.0 (30) | 63.0 (51) | < 0.001* |
| 25–34 | 33.6 (87) | 66.4 (172) | |
| 35–44 | 31.9 (76) | 68.1 (162) | |
| 45–54 | 25.0 (44) | 75.0 (132) | |
| 55–64 | 14.6 (25) | 85.4 (146) | |
| 65+ | 13.9 (11) | 81.6 (68) | |
| **Family status** | | | |
| Single | 31.6 (65) | 68.5 (141) | 0.001* |
| Married/living together | 28.9 (165) | 71.2 (407) | |
| Divorced/living separately | 23.7 (36) | 76.3 (116) | |
| Widow/widower | 9.5 (7) | 90.5 (67) | |
| **Cigarette consumption per day** | | | |
| 1–5 | 16.5 (20) | 83.5 (101) | 0.004* |
| 6–10 | 23.0 (70) | 77.0 (234) | |
| 11–15 | 31.0 (39) | 69.1 (87) | |
| 16–20 | 31.0 (118) | 69.0 (263) | |
| 21+ | 36.2 (17) | 63.8 (30) | |
| **Alcohol consumption** | | | |
| Non-drinkers | 20.7 (71) | 79.3 (272) | < 0.001* |
| Episodic drinkers | 25.4 (90) | 74.6 (264) | |
| Moderate drinkers | 35.6 (88) | 64.4 (159) | |
| Frequent/everyday drinkers | 46.4 (13) | 53.5 (15) | |
| **Education** | | | |
| Higher and above | 28.5 (67) | 71.5 (168) | 0.603 |
| Lower than higher | 26.8 (206) | 73.2 (563) | |
| **Income group** | | | |
| 1 (the lowest quintile) | 21.8 (41) | 78.2 (147) | 0.002* |
| 2 | 22.7 (29) | 77.3 (99) | |
| 3 | 25.7 (48) | 74.3 (139) | |
| 4 | 29.8 (51) | 70.2 (120) | |
| 5 (the highest quintile) | 38.9 (70) | 61.1 (110) | |
| **Job type** | | | |
| Managerial | 28.8 (19) | 71.2 (47) | < 0.001* |
| Clerical | 36.0 (111) | 64.0 (197) | |
| Skilled workers | 29.3 (76) | 70.7 (183) | |
| Unskilled workers | 20.7 (11) | 79.3 (42) | |
| Military and police forces | 7.1 (1) | 92.9 (13) | |
| Unemployed | 24.1 (14) | 75.9 (44) | |
| Other | 16.7 (41) | 83.3 (205) | |
| **Type of settlement** | | | |
| Urban | 31.0 (232) | 69.1 (519) | < 0.001* |
| Rural | 16.2 (41) | 83.8 (212) | |

N = 1004; respondents were treated as violating the law if they reported smoking in at least one public place where smoking was banned in the 30 days prior to interview

*Indicates that there is a significant difference between subgroups (p value < 0.01) according to Chi-square test

**Table 5** Logistic regression results for self-reported non-compliance with bans on smoking in public places. Survey on Health Behaviour and Medicine, Russia, 2017

| Variables | Model (1) | | Model (2) | | Model (3) | |
|---|---|---|---|---|---|---|
| | OR (95% CI) | dy/dx (95% CI) | OR (95% CI) | dy/dx (95% CI) | OR (95% CI) | dy/dx (95% CI) |
| *age15_24* | 3.37 (1.46, 7.79) | 0.27 (0.07, 0.48) | 3.59 (1.54, 8.37) | 0.28 (0.08, 0.49) | 3.26 (1.23, 8.62) | 0.26 (0.03, 0.50) |
| *age25_34* | 2.72 (1.34, 5.50) | 0.21 (0.05, 0.36) | 2.62 (1.28, 5.35) | 0.20 (0.04, 0.35) | 2.27 (0.98, 5.27) | 0.17 (− 0.06, 0.35) |
| *age35_44* | 2.47 (1.22, 5.01) | 0.19 (0.03, 0.34) | 2.22 (1.09, 4.53) | 0.16 (0.01, 0.31) | 1.78 (0.77, 4.13) | 0.16 (− 0.06, 0.29) |
| *cigarettes_n* | – | – | 1.05 (1.03, 1.07) | 0.01 (0.005, 0.013) | 1.05 (1.03, 1.08) | 0.01 (0.005. 0.01) |
| *often_alc* | – | – | 1.48 (1.01, 2.18) | 0.08 (0.00, 0.15) | 1.34 (0.88, 2.04) | 0.06 (− 0.03, 0.14) |
| *abuse_alc* | – | – | 2.86 (1.25, 6.56) | 0.23 (0.03, 0.44) | 3.25 (1.20, 8.82) | 0.27 (0.02, 0.51) |
| *no_high_educ* | – | – | – | – | 1.47 (0.95, 2.28) | 0.07 (0.003, 0.14) |
| *income5* | – | – | – | – | 1.95 (1.10, 3.45) | 0.13 (0.01, 0.26) |
| *army* | – | – | – | – | 0.19 (0.03, 1.22) | − 0.19 (− 0.30, − 0.08) |
| *urban* | 2.18 (1.49, 3.19) | 0.13 (0.07, 0.19) | 2.06 (1.39, 3.06) | 0.12 (0.06, 0.18) | 1.98 (1.28, 3.07) | 0.11 (0.05, 0.18) |

$N = 1004$ for model (1); $N = 979$ for model (2); $N = 836$ for model (3)

Model (1) includes basic sociodemographic variables and controls for federal districts and settlement type; model (2) adds cigarette and alcohol consumption variables; model (3) adds job-, income- and education-related variables

OR odds ratio, CI confidence interval, dy/dx post-estimated average marginal effects on probability of non-compliance

places with high levels of violations. Our study documented a high level of diversity in smoking ban violations depending on the venue type: violations were more common for inhabitants of apartment buildings and visitors of restaurants, cafes and bars, while visitors of governmental buildings, health and sport facilities, colleges and universities, and public transport users and adults working in indoor workplaces experienced fewer violations. There are a number of possible reasons for such a diverse selection of results. One is that in Russia, the enforcement mechanisms in different types of venues are not the same, with different agents (owners, managers or even the smokers) being responsible for compliance. For example, in cases of violations in apartment buildings, the smokers are to be prosecuted, while in bars or restaurants, the responsibility lies with the venue's owners. In addition, the observed diversity might reflect the difference in attitudes towards smoking in these venues as shown in many other studies (Zhou et al. 2016). The most recent study on attitudes towards the smoking ban in Russia was conducted in 2011 (Zasimova et al. 2014); it documented a similar diversity in attitudes: both smokers and non-smokers were more inclined to support bans in medical and sport facilities, universities/schools and indoor workplaces compared to bans in bars/nightclubs and cafes/restaurants. (Smoking in public transport, governmental buildings and shared parts of domestic premises was not considered in that study.) In this context, non-compliance rates were likely to be lower in public venues where smokers and non-smokers strongly supported the ban.

Drawing on the self-reported data on violations, the study illustrates that more than a quarter of Russian smokers ignored bans on smoking in public places. The violations were associated with the sociodemographic characteristics of smokers; five factors were attributed to a particular increase in the probability of violations, namely the number of cigarettes smoked per day, regularly consuming alcohol, being aged 15–34 years, being in the highest income group and living in an urban area. While the first four factors were predictable due to previous studies conducted in other countries (Zhou et al. 2016; Lazuras et al. 2012; Nagelhout et al. 2011; Borland et al. 2006), the results for the settlement type variable may be unexpected. The literature on non-compliance documents that individuals living in deprived communities are associated with a higher risk of violations compared to more developed areas due to the higher prevalence of smoking and therefore of negative attitudes towards smoking bans (Eadie et al. 2008). In Russia, less developed rural areas were characterised by a relatively low number of citizens who visited public places (especially bars and restaurants), due to its financial or physical unaffordability; thus, fewer violations in rural areas were the result of their low attendance.

We did not find a significant difference in male and female violations, or between respondents with different family statuses and job types. Although other papers outlined education and academic achievements to be an important predictor of compliance (Zhou et al. 2016; Galan et al. 2012), we did not find enough evidence to support

this notion. It is likely that higher education itself is not a good proxy for knowledge about the harms of passive smoking and awareness of the anti-smoking policy in Russia. Consequently, including variables that measure respondents' awareness of tobacco-related harm might help in future studies.

In line with other literature (Perkins and Neumayer 2014; Drope 2010), the study outlines that the adoption of the ban alone might not vastly improve the second-hand smoke problem that exists in society, especially in less developed countries. Our study indicates that not enough efforts have been made in Russia to enforce the law. Although compliance in certain public places is high, more effort is needed to enforce the law in apartment buildings, cafes/restaurants, bars/clubs and indoor workplaces. In order to strengthen the enforcement mechanisms, further studies are needed to explore the best practice examples and reasons for compliance and non-compliance with the law in different venues and within different social groups.

The study has some limitations. One is that it relied on cross-sectional data, which limited its ability to draw valid conclusions about possible causality. Thus, the study produced consistent results only for associations between the sociodemographic factors of smokers and non-compliance outcomes, but causation should be confirmed by more rigorous studies, for instance longitudinal. Another limitation of the study arises from its relatively small sample size that has limited us to assessing only overall non-compliance rates; however, studying the risk of violations in different venues separately might produce additional evidence for understanding venue-specific violators. Finally, due to financial constraints, we were unable to include questions about attitudes towards smoking bans that have proved to be a good predictor of non-compliance in other countries.

The strengths of the data used in this study include the representative study sample and the design of the questions on the self-reported non-compliance that mitigated the problem of socially desirable responses. The other strong point is that the study covered a number of diverse public places, revealing a picture of general compliance with new smoke-free legislation in Russia. Finally, the study is the first to document sociodemographic characteristics of non-compliance with recently introduced smoking ban in Russia.

## Compliance with ethical standards

**Conflict of interest** The author declares no conflict of interest.

**Ethical approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

**Human and animal right statement** This article does not contain any studies with animals performed by any of the authors.

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