

Review

Associations between characteristics of large national regions and individual smoking: A scoping review

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Abstract: *Objective* — to systematize scientific knowledge on the effect of living conditions in large national regions on tobacco consumption at the individual level.

Material and Methods — The goals and methodology of the systematic review were previously specified and recorded in the protocol PROSPERO CRD42021234874. We conducted a search for publications on the topic of our study in *PubMed*, *Google Scholar*, *OpenGrey*, *CrossRef* and *eLibrary* databases through December 31, 2021. Article search, selection and analysis were carried out by two trained researchers, with the participation of a third researcher whenever necessary. After removing duplicates, ineligible articles, and full-text screening, 204 publications were included in this review from the initial pool of 9,717 publications.

Results — Published articles on the topic under consideration varied significantly in terms of the sample size, study design, regional characteristics, and considered outcomes (smoking). The most convincing were the dependences of individual tobacco consumption on the legislative characteristics and tobacco environment in the regions. Regional characteristics unrelated to tobacco use were not often analyzed in reviewed studies. As shown in our review, to date, they did not confirm any impact whatsoever.

Conclusion — We examined the features of research on the topic under consideration and highlighted the best evidence-based predictors of the regional environment in relation to smoking. We also identified poorly studied areas of research requiring further attention.

Keywords: smoking; environment; regional characteristics; health geography.

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Introduction

Despite close attention from the World Health Organization and national governments in many countries, smoking remains among the most important health risk factors. After high systolic blood pressure, smoking is the second largest contributor to the global health burden [1]. In this respect, in high-income countries, smoking generally ranks first for both men and women. Although global smoking prevalence decreased significantly since 1990, an increase in prevalence has been reported in 20 countries among men and in 12 countries among women [2]. Furthermore, the authors of the global review noted that, despite these advances, there were troublesome patterns of lacking progress in terms of smoking prevalence reduction in several countries with large populations (e.g., China and Indonesia), as well as a slowdown in the global decline in prevalence since 2015. In addition, the authors noted that in most countries, the rate of decline in smoking prevalence lagged behind demographic growth leading to an increase in the number of smokers over time. Of even greater concern is the fact that among youths, the prevalence of use of other tobacco products remained unchanged or even increased in

most countries over the past two decades despite a global decline in the prevalence of cigarette smoking [3].

Both the above publications and numerous other studies [4] indicated significant differences in the prevalence of smoking across regions of the planet and in individual countries. Such global geographical (territorial) differences can be explained by national traditions and historical attitudes towards smoking as a cultural phenomenon [5, 6]. However, the prevalence of smoking at the regional level of individual countries can also vary substantially. Since regions of countries are often rather uniform from a national, historical and cultural standpoints, other territorial characteristics of the living conditions of the population may also be predictors of smoking. Scientific interest regarding territorial differences in smoking prevalence and regarding the search for individual and environmental causes of such differences is continually increasing [7, 8]. This is due to the awareness of the fact that the problem of smoking is multifaceted, thereby requiring a multifactorial solution including the use of scientifically based data on environmental predictors. Within the framework of the socioecological model, human behavior is determined by complex and dynamic relationships between individual, social and physical factors of the environment and, accordingly, the latter shape the

lifestyle and health quality in the context of their specificity [9]. The significant body of research accumulated to date on the impact of regional living conditions on the individual likelihood of smoking requires systematization and generalization.

At the protocol development stage of this review, our goal was to systematize studies reflecting the influence of living conditions in large national regions on the consumption of alcohol and smoking at the individual level [10]. However, in the process of analyzing the revealed publications on the research topic, we concluded that it was difficult to provide a qualitative systematization of the characteristics regarding both alcohol consumption and smoking within the framework of a single review. Hence, we decided to present alcohol consumption and smoking separately in two surveys. The first survey was already published [11]. This scoping review involves the articles examining the impact of living conditions in large national regions on individual smoking behavior.

Material and Methods

Inclusion and exclusion criteria

For selecting potential publications for forthcoming review, we considered a range of exposure and outcome conditions as inclusion criteria. For the exposure perceived as regional living conditions, we put forward the following requirements:

1) Living conditions must be characterized by various aspects of residential environment at the regional level, such as socioeconomic, medical infrastructure, industrial, legislative, informational, ethnic, etc. We excluded from the review those studies in which regions were designated solely geographically (for example, *southern* or *northern* regions), or no regional characteristics were presented whatsoever (e.g., only the names of the regions).

2) The study area must be represented by large national regions, which, as a rule, correspond to higher-hierarchy administrative units. For example, a state in the USA, a canton in Switzerland, a province in Canada, etc. The choice of administrative units of such level was justified by the fact that within individual countries, the most obvious and variable characteristics of living conditions are determined by regional governance and legislation in these territorial units.

A number of conditions were also imposed on the outcomes. The outcome must characterize any aspect of individual tobacco use, such as the likelihood of tobacco consumption, quantity and frequency of consumption, smoking initiation and cessation including cessation attempts. Both quantitative and qualitative outcomes reported by study participants or their parents (in studies of children and youths) were considered. There were no restrictions regarding the type of tobacco products.

To form a pool of the most convincing and evidence-based articles, we introduced a restriction on the publication status, viz., only original studies published in peer-reviewed journals were included, while documentation, conference proceedings and dissertations were excluded. There were no other restrictions, including on study participants (gender, age, socioeconomic status, and health status) and language of publications.

Search and selection strategy for studies in the review

This scoping review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology for systematic reviews of etiology and risk [12]. The review complied with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [13]. In accordance with the review protocol, the entire search and selection strategy for articles was initially designed and conducted for two outcomes: alcohol consumption and smoking. The pool of publications for this scoping review (exclusively on tobacco consumption) was formed after the final selection of all studies. The employed search strategy is presented in the review protocol [10], as well as in the previously published part of the review regarding alcohol consumption [11].

We explored the following databases/search engines from the very beginning through December 31, 2020: *PubMed*, *Google Scholar*, *OpenGrey*, *CrossRef*, and *eLibrary*. Due to the fact that the search and analysis of publications continued until 2022, at the beginning of 2022, using the same algorithms, we carried out an additional search for publications in the same databases/search engines from January 1 through December 31, 2021. This decision to increase the search time was justified, among other things, by the fact that in recent years the number of publications on the review topic has been growing, and each additional included year would yield a significant increase in the total number of reviewed papers.

Additional searches for articles suitable for this review were carried out in:

- Reference lists and in-text citations in articles included in the review;
- Reference lists and in-text citations in analytical and systematic reviews on the topic under study;
- Lists of articles generated by the *Similar Articles* tool in the *PubMed* database;
- Additional published sources (at our discretion) proposed by the authors of the articles included in the review;
- Full review of the *International Journal of Health Geographics* (BioMed Central Ltd.) and *Health and Place* (Elsevier Ltd.).

All search results were imported into Systematic Review Data Repository-Plus (SRDR+) followed by the removal of duplicate references. In the first stage of screening, titles and abstracts of articles were independently reviewed by two staff members. The algorithm for selecting publications based on inclusion criteria is presented in the review protocol [10]. Further on, using the same algorithm, a full-text analysis of publications was performed with the exclusion of articles that did not meet the inclusion criteria. Key data were extracted from the articles included in the review in accordance with the developed standard form [10]. Extraction was performed independently by two trained researchers. Any disagreements were discussed jointly with a third researcher.

Assessment of methodological quality

Using the JBI SUMARI Critical Appraisal Checklist, two independent reviewers assessed the quality of studies included in the review [14]. Any disagreements between them were resolved through discussion or mediation by a third reviewer. Regardless of methodological quality, all identified publications were included in the review.

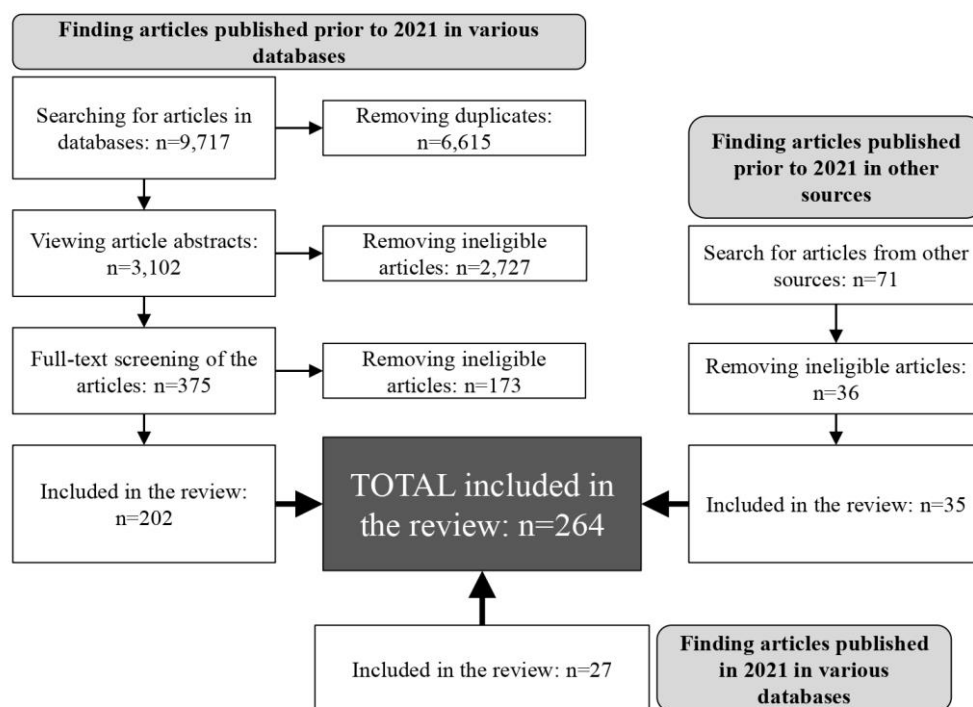


Figure 1. Algorithm for selecting articles for review on alcohol consumption and smoking.

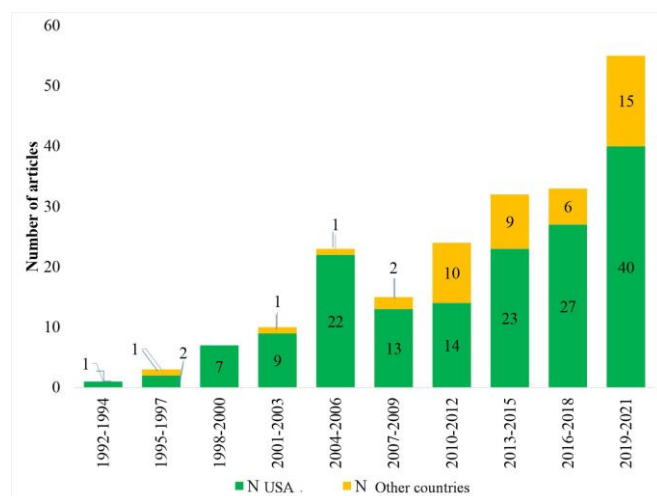


Figure 2. Dynamics of publications by year and country.

Synthesis of published study results

During the development of the review protocol [10], we planned to conduct a meta-analysis. Because the studies included in the review varied widely in the analyzed regional characteristics and outcomes, such meta-analysis was not performed. Instead, a descriptive synthesis of research findings was conducted.

Results

Identification of publications for review

The search algorithms identified 9,717 articles published prior to 2021 (Figure 1). After removing duplicates (n=6,615) and

ineligible articles (n=2,727), 375 publications remained. After full-text screening, more ineligible articles (173) were excluded from the review due to their inconsistency in terms of the criteria of exposure (regional characteristics) and outcome (smoking), and the remaining 202 publications were included in the present review. After identifying articles from other sources, 35 additional publications were included in the review. After identifying papers for 2021 using the same algorithms, another 27 papers were added. Thus, a total of 264 publications on both behavioral habits were included in the review. Of these, 60 publications were devoted to alcohol consumption, 183 to smoking, and 21 to both alcohol consumption and smoking. Consequently, the present scoping review examines 204 publications on the effect of regional characteristics on individual tobacco consumption. A complete list of articles with sample characteristics, study design and main results are presented in Appendix [15-218] (Supplementary table 1).

General characteristics of the articles included in the review

General characteristics, scope and design of studies. The dynamics of the publication activity by year, presented in Figure 2, demonstrated a consistently increasing interest in the subject of this review. Since the late 1990s, the average annual number of articles analyzing regional effects on smoking has been steadily increasing. The last three years of the period under review (2019-2021) were characterized by a rather sharp increase in the number of published articles. Until 2010, 90% of articles were published by the USA and 10% by Canada; later, research began to be carried out in other countries worldwide, and the share of articles outside the USA reached 28%. Overall, 159 articles (78%) from the total review pool represent the United States; 20 articles (10%) are from Canada; 4 articles each are from Australia and Switzerland; 2 articles each are from Vietnam, China, India and Indonesia; while

Germany, Mexico, Colombia, Russia, Spain, Italy, England, Ireland, and Argentina are represented by 1 article each. The predominance of American articles on this topic is explained, on the one hand, by the high level of development of epidemiology, public health and preventive medicine in the United States, and on the other hand, by the rather significant legislative independence of regions (states). As a result, the regional characteristics of greatest interest to public health care and epidemiology (smoking regulations, prices, and excise taxes on tobacco products) vary across regions of the United States, which potentiates their analysis. In many other countries around the world, tobacco legislation and pricing/excise tax policies are nationwide. Accordingly, research on these characteristics in countries other than the USA and Canada is physically impossible, and the increase in publication activity in these countries coincides with growing interest in regional living conditions unrelated to tobacco and smoking (see below)

The studies included in the review every so often examined the general sample of the adult population (101 articles), children/school students (56 articles), and youth aged 18 to 35 years (25 articles). Besides, 5 articles examined samples of the population 50 years of age and older [65, 138, 186, 189, 216], 11 articles considered samples of pregnant and/or postpartum women [23, 30, 35, 57, 92, 100, 116, 117, 173, 174, 181], and 2 articles explored samples of homosexuals [120, 198]. Also, workers in the construction industry [97], military personnel [203], individuals receiving treatment for drug addiction [195], and those with medical intervention for intermittent claudication [209] were considered in 1 article each. The sample size was usually quite large: in only 4 articles, the sample size was less than 1,000; it ranged from 1 to 10 thousand in 29 papers, from 10 to 50 thousand in 71 publications, from 50 to 500 thousand in 61

published sources, and from 500 thousand and more in 35 papers. In addition, 4 articles did not specify the sample size.

Most studies used a cross-sectional design (144 articles), while 26 articles were based on studies using a prospective design. Also, 34 publications used a Difference-in-Differences (DID) approach measuring differences in outcome between control and treatment groups that occurred over time.

Regional characteristics. In terms of the number of regions included in the analysis, studies from the US covered more than 20 states, most often 49-51 states and District of Columbia. In accordance with the number of top-hierarchy regions, researchers from Canada and Australia considered 10 and 8 regions, respectively, in the vast majority of cases. A small number of regions was used in the studies based on England (9 regions), China and India (4 regions each), and Switzerland (3 regions). Overall, in most publications, the analysis was presented using the example of more than 10 regions (181 articles). Another 12 studies did not specify the number of regions, but since these studies were all from the United States, it can be assumed that these articles also considered more than 10 regions.

Of the 204 articles included in our review, 168 examined regional characteristics directly or indirectly associated with tobacco (Figure 3). Specifically, 91 articles examined regional legislative aspects (the presence and severity of smoking bans in public places, coverage of the population by age restrictions on the sale and/or access to tobacco, and other laws), 136 articles dealt with prices and/or excise taxes on tobacco products, while 40 articles explored other characteristics (e.g., anti-tobacco programs and financing, prevalence of smoking in the population). Regional characteristics not associated with tobacco, such as health insurance conditions, socioeconomic living conditions, etc., were considered in 56 articles.

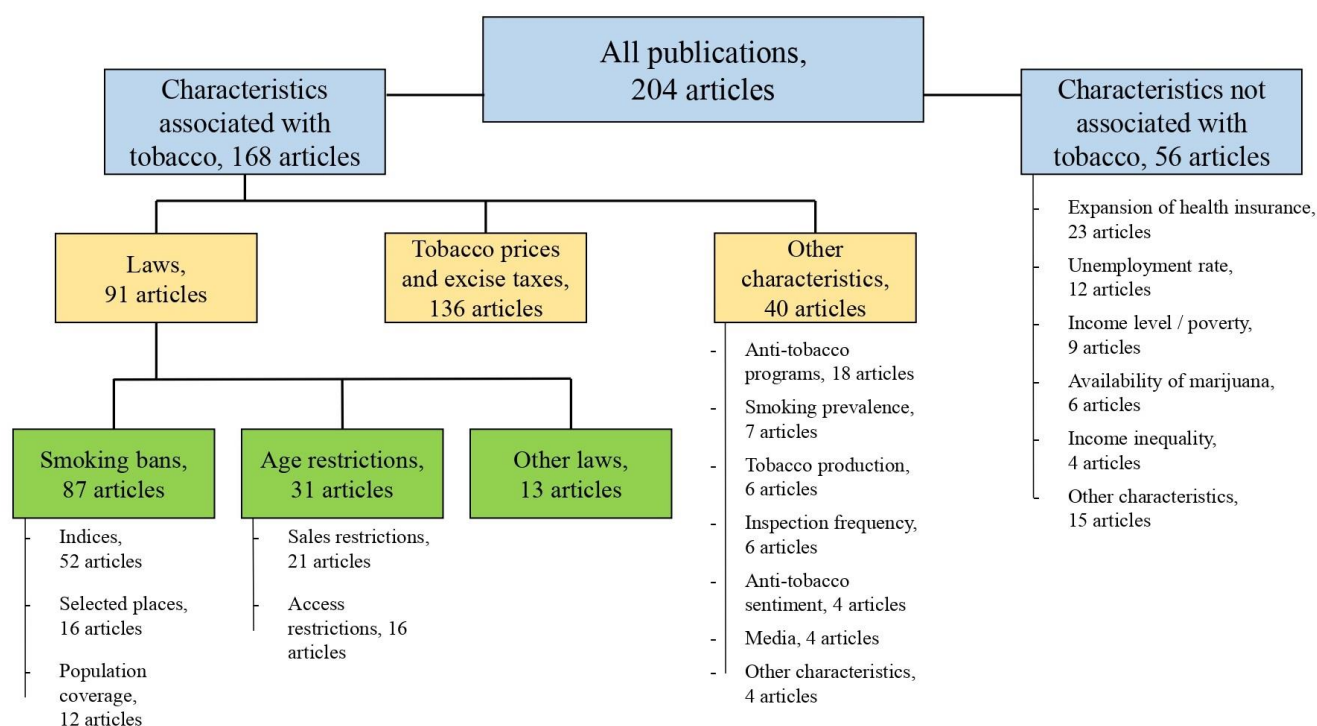


Figure 3. Regional characteristics considered in the studies.

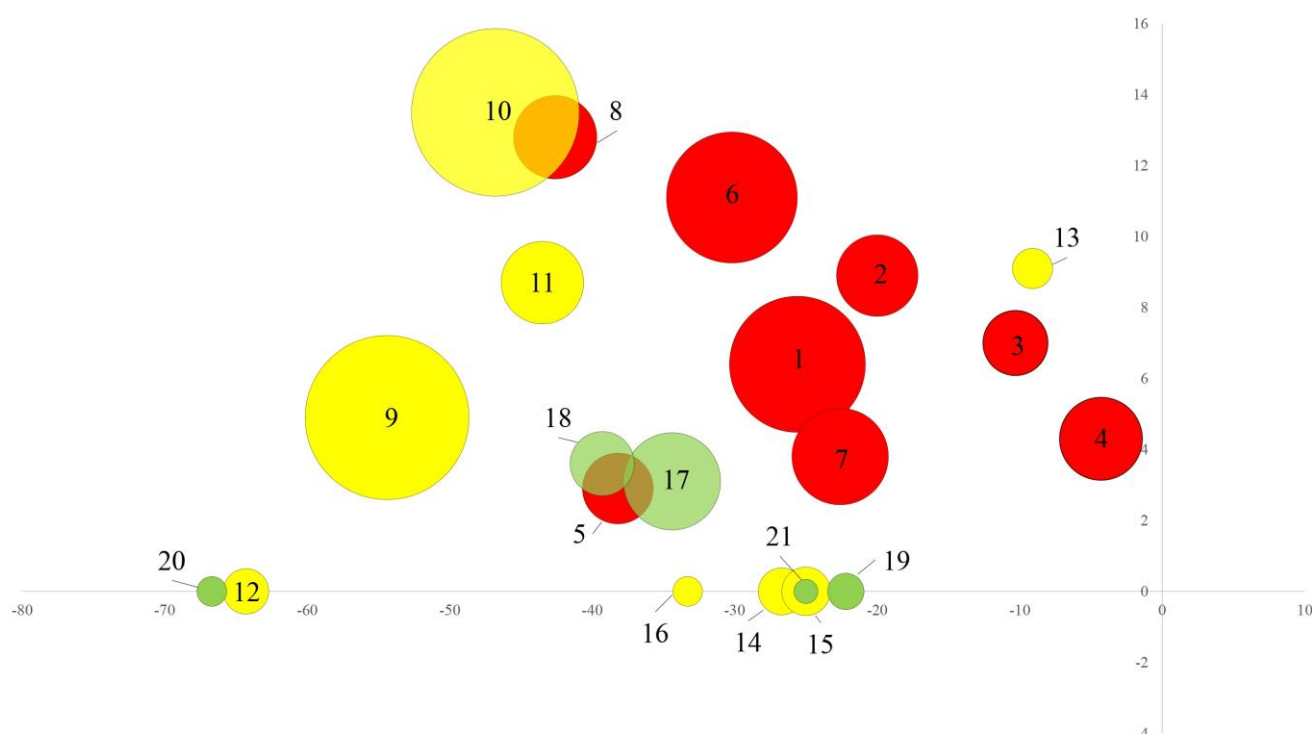


Figure 4. The ratio of logical and illogical associations, and of the total number of associations by various regional characteristics.

X-axis, % of logically explained (as a rule, inverse) associations from the total number of associations; Y-axis, % of the total number of associations that have no logical explanation (usually direct associations); circle size, total number of associations; 1, smoking ban indices; 2, smoking bans in restaurants and bars; 3, smoking bans in the workplace; 4, smoking bans in other places; 5, coverage of the population with smoking bans; 6, age restrictions for tobacco sale; 7, age-based access restrictions; 8, other laws related to smoking; 9, tobacco price; 10, tobacco excise tax; 11, financing of tobacco control programs; 12, prevalence of smoking; 13, tobacco production; 14, inspection frequency; 15, anti-tobacco sentiment; 16, media; 17, expansion of health insurance; 18, unemployment; 19, income/poverty; 20, availability of marijuana; 21, income inequality.

The majority of articles (129 publications) assessed the multifactorial impact of regional characteristics of different categories (legislative, prices of tobacco products, social characteristics, etc.), while 75 publications assessed the influence of any one category of regional characteristics. Quite often, integral indices were employed. The latter characterized any one category of regional features (e.g., 52 articles used indices of smoking bans in public places). However, we found only 3 studies that used an integral assessment of regional characteristics belonging to different categories. One article analyzed a state that included a number of law enforcement characteristics (statewide enforcement, random inspections, differential penalties) and a number of specific tobacco control provisions (photo ID, free distribution, minimum age, packaging, vending machines and employee intervention) [54]. Another study used an integral indicator of the so-called tobacco environment, which included excise taxes, funding of anti-smoking programs, laws against tobacco smoke, and prevalence of smoking [140]. One more study investigated the effect of a wide range of characteristics of living conditions (climatic and geographical, social, economic, demographic, industrial aspects of living conditions) integrated into five indices using exploratory factor analysis [210].

Outcome characteristics. As for the tobacco product type, the vast majority of studies (198 articles) evaluated cigarette smoking or smoking in general. An increase in interest specifically regarding the consumption of electronic cigarettes (e-cigarettes) has been

typical for research mainly since 2015 (13 articles). Another 12 articles examined tobacco use in other forms: cigars, cigarillos, chewing tobacco, and bidis.

By the type of outcome, the most commonly assessed were the likelihood of smoking/tobacco consumption (164 articles) and/or indicators of smoking intensity, such as number of cigarettes, frequency of smoking, and nicotine level (96 articles). Also, 47 articles studied various aspects of smoking cessation and/or cessation attempts, and 28 publications explored various aspects of smoking initiation, such as learning to smoke ('trial' smoking), age of smoking initiation, etc.

Quality of reviewed studies. The quality of studies was most often characterized by 7 and 6 points (30.0% and 23.5%, respectively). The highest quality value (8 points), as well as quality of 5 points, was characteristic for 38 publications each (18.6%). Low-quality scores of 4 and 3 points were typical for 11 articles (5.4%) and 8 articles (3.9%), respectively.

Sampling issues were revealed in 33 articles: non-random sampling or lack of the description of sample formation method; redundant sampling in terms of some parameters without taking this issue into account when conducting statistical analysis; forming a sample from several cohorts that differed significantly from each other.

Required detailed description of the study subjects and settings were revealed in 89 publications. As a rule, there was no

description of the individual characteristics of study participants or the territorial characteristics of the regions, including the number of studied regions. Some studies indicated the use of regional characteristics as covariates; however, their full description was not provided (data source, time of data collection, quantitative or qualitative characteristics).

The outcome (smoking) was not clearly defined in 33 articles. In addition, 3 publications used very different questionnaires regarding smoking at different stages of the study or for different parts of the total sample without subsequently resolving these issues when analyzing the data.

In 19 publications, adjustment was not performed for important individual covariates that could potentially influence tobacco use. At the same time, taking into account the literature on the possible effects of individual characteristics on tobacco consumption, we considered it mandatory to adjust for gender and age, as well as for at least any two of such indicators as race (in case of U.S. studies), education, income, or family status.

Problems in using regional characteristics were identified in 82 articles. Essentially, as mentioned above, this meant using only one category of regional variables, or the absence of a regional dummy variable as a covariate in the regression model (75 published studies). Some publications identified the problem of using regional characteristics, such as a possible change of exposure (for example, moving to another region) in panel studies. In 2 articles, the regional characteristics only roughly corresponded to the years of individual data collection.

In 76 publications, errors were identified in the used methods of statistical analysis. Because a feature of the studies included in our review was the analysis of the effects of regional variables on individual outcomes grouped by region, it was important to adjust standard errors to prevent correlations originating from having multiple observations in the same region. This can be most often achieved by calculating robust standard errors or via clustering standard errors at the regional level. Failure to take these features into account in statistical analysis was observed in 75 publications. Also, 1 article used a small sample without calculating the required power of analysis and with incorrect use of multivariate analysis.

General comments regarding main results of reviewed studies. When describing the main results, we assessed the total number of associations examined in publications, as well as the number (proportion) of statistically significant associations ([Figure 4](#)). At the same time, we identified logically explainable and illogical associations. By logical we meant associations that reasonably explain the impact of regional characteristics on the outcome. For example, for pricing policy, it is logical to reduce tobacco consumption when the price/excise tax on tobacco increases. On the contrary, an increase in tobacco consumption with an increase in the price/excise tax on tobacco is illogical in our opinion. It is important to note that this classification is very arbitrary and, in some cases, seemingly illogical relationships have a fairly substantial justification. Besides this, for a number of regional characteristics, it is virtually impossible to assess the logical/illogical nature of associations. First of all, this concerns a number of regional characteristics unrelated to tobacco, e.g., the share of Republicans or Conservatives in the population structure of the region or the industrial development of the region. In such cases, we merely noted the number of direct and inverse associations. Despite the conventionality of such approach, we

found it useful for describing the main results obtained in studies on the topic under consideration.

Legislative framework of tobacco control

Legislative environment in the regions. Among the legislative aspects, integral indices of the smoking bans in public places were most often used as regional characteristics. Of the 52 articles of the matter, 26 identified statistically significant associations [15, 20, 34, 48, 49, 51, 67, 75, 82, 90, 98, 101, 107, 118, 124, 125, 131, 137, 138, 175, 176, 184, 185, 192, 193, 199]. Of the 125 relationships examined in these articles, 32 (25.6%) were statistically significant inverse associations (i.e., the mere presence or severity of the smoking ban index diminished the likelihood and severity of smoking) and only 8 associations were direct in their nature (6.4%).

Sixteen studies examined the impact of smoking bans in specific public places, either in parallel with integral indices or independently of those. The most frequently considered bans were in places such as restaurants/bars and public or private workplaces. Of the 14 articles that examined the impact of smoking bans in restaurants and bars, 6 articles found statistically significant associations [41, 100, 121, 127, 134, 156]. In total, these 14 articles assessed 45 associations, 9 (20.0%) of which were statistically significant inverse relationships and 4 (8.9%) were direct associations.

Of the 10 articles that examined the impact of the smoking ban in the workplace, 4 articles revealed statistically significant associations [41, 49, 92, 121]: a total of 29 associations, 3 of them (10.3%) were significant inverse relationships and 2 (7.0 %) represented significant direct associations.

Four other articles assessed the impact of smoking bans in other public places (sports venues, medical and government institutions, public transport, stores and shops, etc.). In 2 articles [59, 101], statistically significant associations were identified; a total of 47 associations were assessed, of which significant inverse and direct associations were represented by 2 relationships (4.3%) each.

It should be noted that the significance and direction of the relationships significantly depended on the coincidence of what specific tobacco product was targeted by the restrictive law and what type of tobacco product was analyzed (that is, on the individual outcome). When the direction of laws and smoking outcomes coincided (258 associations), 22.8% of those were statistically significant inverse relationships and only 4.3% were significant direct relationships. However, albeit infrequently, some studies were examining disparate laws and outcomes: e.g., they were assessing the impact of cigarette smoking bans in public places on the individual likelihood of using e-cigarettes. Of the 22 such associations, no statistically significant inverse relationships were identified, but 27.3% were significant direct associations. This suggested that the regional restrictive environment regarding some types of tobacco products intensified the consumption of other tobacco product types.

Twelve studies did not consider the presence of smoking bans or integral ban indices, but rather dealt with the proportion of the population in the region covered by such bans. This was a slightly different indicator; hence, we considered appropriate to present it separately. Eight studies found statistically significant associations [19, 59, 103, 110, 111, 153, 170, 214]. Of the 34 examined associations, 13 (38.2%) were significant inverse in their nature,

that is, increase in the coverage of the population with smoking bans in public places reduced the likelihood and severity of smoking, while only 1 relationship (2.9%) was a significant direct one.

Age restrictions in the regions were considered in 31 articles: the vast majority of publications considered samples of the underage population (children/youths), while only 2 articles examined the adult population. Twenty-one articles assessed the impact of regional legal age restrictions for the sale, possession and use of tobacco products on the likelihood of smoking. Of these, 14 articles demonstrated statistically significant associations [20, 32, 34, 47, 51, 132, 139, 141, 168, 182, 185, 191, 208, 211]. At the same time, 19 (30.2%) of the examined 63 associations were statistically significant inverse relationships, i.e., age-restrictive legislation in the regions as reducing the individual likelihood of consuming tobacco products. Solely 7 (11.1%) associations were direct.

Sixteen articles examined the impact of regional laws that in one way or another restricted access of youths to tobacco products; as a rule, this was an integral index assessment or the presence of individual laws on tobacco marketing in relation to children/youth. Ten articles revealed statistically significant relationships [17, 39, 45, 46, 48, 67, 81, 93, 105, 132]. Of the 53 examined associations, 12 (22.6%) were statistically significant inverse and 2 (3.8%) were direct associations.

Thirteen other articles addressed a range of other tobacco laws, such as licensing of sellers, smoker protection, and tobacco marketing. In 8 of these articles, statistically significant associations were identified [17, 32, 36, 41, 90, 182, 185, 208], and of the 47 examined associations, 20 (42.6%) were statistically significant inverse relationships, while 6 (12.8%) represented direct relationships.

Regional tobacco excise taxes and prices. The effect of regional prices and excise taxes on tobacco products was considered in 136 articles; however, due to the fact that these predictors were considered by some authors as competitive indicators, we examined them separately. The impact of regional prices of tobacco products on smoking was studied in 73 articles, of which 59 papers revealed statistically significant associations [19, 21, 22, 24, 26, 27, 28, 29, 34, 36, 37, 38, 40, 41, 43, 44, 45, 47, 48, 49, 51, 52, 55, 58, 59, 62, 66, 68, 69, 70, 74, 76, 78, 81, 88, 89, 90, 92, 96, 100, 103, 106, 107, 109, 110, 113, 123, 136, 144, 148, 163, 164, 167, 177, 186, 188, 189, 204, 205, 212, 214, 218]. Most of the examined associations were statistically significant inverse relationships: i.e., an increase in the price of tobacco products in a region diminished the likelihood and frequency of smoking. E.g., of the 182 associations considered in these articles, 99 (54.4%) were statistically significant inverse and only 9 (4.9%) were direct relationships.

Regional excise taxes exhibited a similar trend, albeit a little less conclusive. For instance, the impact of regional excise taxes on tobacco products on smoking was considered in 72 articles, of which 57 articles revealed statistically significant associations [17, 18, 21, 23, 30, 32, 33, 35, 42, 50, 60, 61, 65, 75, 79, 80, 83, 87, 89, 92, 93, 94, 95, 98, 106, 108, 116, 121, 118, 127, 128, 131, 132, 134, 138, 139, 142, 146, 156, 160, 162, 170, 172, 173, 174, 175, 183, 184, 185, 187, 197, 200, 203, 209, 198, 204, 216]. Of the 190 examined associations in these articles, 89 (46.8%) represented statistically significant inverse relationships and 12 (13.5%) showed direct associations of the kind.

Similarly to the legislative environment, the relationship of prices and excise taxes with individual smoking depended significantly on the coincidence of what specific tobacco product was targeted by the price/excise tax and what type of tobacco product was analyzed. Of the 338 examined associations of the influence of prices/excise taxes in regions on matching smoking outcomes, 182 (53.8%) associations were statistically significant inverse, and only 15 associations (4.4%) were direct. When there was an inconsistency (for example, assessing the effect of the price of e-cigarettes on the likelihood of smoking conventional cigarettes), the proportions of inverse associations and direct associations were 21.8% (7 out of 32) and 18.7% (6 out of 32), correspondingly. Therefore, similar to the legislative environment, this finding suggested that increases in regional prices/excise taxes on a certain type of tobacco could to a certain extent promote the use of other types of tobacco products.

Other (non-legislative) regional characteristics related to tobacco

Forty publications did not consider tobacco laws but rather, they examined regional characteristics in one way or another related to tobacco. Eighteen articles assessed the level of funding (or spending on) anti-tobacco programs and activities in the region. Eleven of these articles revealed statistically significant associations, that is, increased funding reduced individual smoking [22, 31, 34, 48, 90, 98, 103, 110, 111, 119, 170]. In addition, a single study [86] discovered opposite relationships: increases in current funding increased the likelihood of smoking in general, as well as the reduction in the consumption of pipe tobacco and cigars; while increases in last year's funding were associated with a decrease in the likelihood of both smoking in general and cigar smoking. Overall, of the 46 examined associations, 20 (43.5%) were statistically significant inverse relationships and 4 (8.7%) were direct.

Four articles assessed the presence or level of anti-tobacco media campaigns in the region: 2 of these publications disclosed that higher-level media campaign reduced individual smoking [44, 55]. Overall, of the 6 examined associations, 2 (33.3%) were statistically significant inverse relationships.

Of the 6 articles that examined the impact of the presence or level of tobacco production in a region, 2 revealed statistically significant relationships. E.g., in a Chinese study, an increase in the ratio of cigarette production to regional GDP increased frequency of individual smoking [130]. In an American study [132], an increase in the area under tobacco cultivation in a state reduced the likelihood of smokeless tobacco consumption. A total of 11 associations were considered, of which 1 association (9.1%) each represented statistically significant direct or inverse relationship.

Six articles examined the effect of inspection frequency and/or compliance with existing tobacco sale regulations on smoking among children. Three out of 6 articles [69, 141, 164] revealed 4 (26.7%) statistically significant inverse associations (out of 15 detected).

Seven articles assessed the impact of the regional population prevalence of tobacco smoking on individual smoking. Six of these articles [85, 103, 104, 110, 111, 115] demonstrated statistically significant direct associations, i.e., increasing prevalence increased individual smoking. Of the examined 14 associations, 9 were direct (64.3%).

Four articles assessed the effect of anti-tobacco sentiment in the regional population, 3 of them [63, 64, 189] revealed statistically significant inverse associations. Of the 16 examined associations, 4 (25.0%) were inverses.

In addition, 4 articles examined other regional non-legislative characteristics related to tobacco. In 1 American article [61], the presence of a state agency for controlling tobacco sales to minors increased the frequency of smokeless tobacco consumption. In another U.S. article [73], increasing the effectiveness index of smoking control programs in the state yielded an increased likelihood of light smoking. Two other articles [54, 140] used an integral assessment of various regional characteristics associated with tobacco. One of these studies [54] found that intensification of tobacco control measures reduced the likelihood of smoking initiation and progression into unfavorable smoking categories among children. The results of another study [140] showed that reducing the restrictions of the tobacco environment increased the likelihood of smoking and heavy smoking. A favorable tobacco environment most strongly stimulated smoking among individuals who experienced childhood abuse and parental problems.

Regional non-tobacco characteristics

A total of 56 articles examined non-tobacco characteristics as regional predictors. Most often (23 articles) the researchers examined the impact of regional features of health insurance in terms of empowering the insured. Fifteen of these articles revealed inverse associations: expanding insurance coverage in a region reduced individual smoking [57, 72, 77, 100, 112, 117, 129, 133, 143, 159, 165, 180, 190, 195, 207]. In total, out of 64 examined relationships, 22 (34.4%) statistically significant inverse associations were identified. Besides, 1 Canadian article [215] detected a statistically significant direct relationship: the availability of regional insurance coverage for the treatment of tobacco dependence increased the likelihood of smoking cigarettes and cigarillos.

Twelve articles examined the impact of regional unemployment rate. Of these publications, 7 found statistically significant inverse relationships [118, 131, 152, 155, 157, 171, 181]: the smoking situation improved with the increase of the unemployment rate. In addition, in 1 Spanish study [196], unemployment rate was directly associated with smoking prevalence. A total of 28 associations were considered, of which 11 were statistically significant inverse relationships (39.3%), while 1 was direct association (3.6%).

Nine articles assessed the impact of population income/poverty levels. Two articles noted unidirectional changes of the decrease in the likelihood of smoking with a decrease in poverty levels [131] and an increase in the level of average household income [126]. Of 9 examined associations, 2 were statistically significant (22.2%).

In 4 articles, population inequality (based on the Gini index) was considered as a regional characteristic, while 1 article showed a statistically significant association [115], that is, elevated population inequality increased prevalence of smoking.

Six articles evaluated the impact of increased availability (legalization) of marijuana on the individual likelihood of smoking. Four articles found statistically significant inverse associations, that is, increasing the availability of marijuana resulted in reduced prevalence of smoking [150, 151, 153, 200]. A total of 6

associations were considered, 4 of them represented statistically significant inverse relationships (66.7%).

Fifteen articles considered other regional characteristics unrelated to tobacco. The obtained results were multidirectional. E.g., in an American article, increasing alcohol excise taxes in a region increased the likelihood of cigarette smoking but reduced the likelihood of using smokeless tobacco [18]. In an American article, increasing taxes on beer reduced the likelihood of smoking [52]. In another American article, an increase in the regional demand for construction workers in the labor market reduced the individual number of smoked cigarettes [97]. In a Swiss article, living in an Italian-speaking canton compared with a German-speaking one for men, as well as living in a French-speaking canton vs. a German-speaking one for women increased the likelihood of smoking [99]. In a Mexican paper, higher proportion of urban residents in a region resulted in the increased likelihood of smoking [101]. American article showed that the regional introduction of a new design of the driver's license and ID card for people under 21 years of age reduced the likelihood of chewing tobacco consumption in a sample of 16-18-year-olds [102]. In the U.S. article, an increase in the index of unfavorability of the environment towards homosexuals, as well as an increase in the population density of the region, resulted in higher likelihood of smoking in homosexual men studying in college [120]. Another American article stated that the predominance of Republicans and Conservatives in the population structure of the region increased the likelihood of smoking [158]. A Russian article showed that deteriorating social living conditions and increasing industrial development of the region increased the likelihood of smoking [210]. A total of 30 associations were analyzed in these 15 articles, of which 14 (46.7%) were statistically significant direct and inverse relationships.

Conclusion

Systematization of studies of the impact of regional living conditions on the individual likelihood of smoking allowed assessing the main trends in publication activity, methodological features, and also provide a vivid description of the main results. Overall, we noted an increased interest in this topic not only in the USA, but in other countries of the world as well. Published articles varied significantly in terms of the sample size, sample characteristics, study design, regional characteristics, and considered outcomes (smoking). The most often studied issue was the effect of regional characteristics directly or indirectly related to tobacco use. Usually, these were legislative aspects or prices/excise taxes on tobacco products.

In terms of the number of considered associations, as well as logical and illogical associations among them, the most convincing of those were represented by the dependence of individual tobacco consumption on regional indices of smoking bans in public places, on age restrictions for the sale and/or access to tobacco products, on prices/excise taxes on tobacco, and on health insurance features. Quite convincing associations were demonstrated for individual smoking with population prevalence of smoking and availability of marijuana. However, there are not enough such studies to date.

In general, the desire of researchers to obtain a logically explainable and objectively useful for practical health care dependence of tobacco smoking on legislative initiatives is understandable. However, since individual tobacco consumption

depends on a large number of environmental factors of various nature, the main drawback of the conducted studies was the insufficient number of regional characteristics included in the analysis (usually legislative). From our prospective, a potential strengthening of the results on the considered topic could result from conducting comprehensive studies considering regional living conditions from different aspects: legislative and price-related issues (for tobacco products), the tobacco environment (prevalence of smoking, anti-tobacco programs and attitudes), socioeconomic and medical conditions (health insurance). Such studies would contribute to a better understanding of the environmental component of smoking and, therefore, to a more targeted approach to the development of preventive measures aimed at reducing the prevalence of smoking.

Conflict of interest

None declared by the authors.

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Appendix

Supplementary table 1. Features of reviewed studies on the impact of regional characteristics on smoking

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
Chaloupka, 1992 [15]	USA, NHANES2, 1976-1980, 14,305	Both sexes, 18 years and older	1. The presence of a nominal ban on smoking in public places. 2. Availability of a basic smoking ban in public places. 3. The presence of a moderate smoking ban in public places. 4. The presence of extensive smoking bans in public places.	1. Number of cigarettes.	In men, expanding smoking restrictions from nominal to basic reduces the number of consumed cigarettes.
Douglas, 1994 [16]	USA, NHIS, 1978-1979, 10,219	Both sexes, 25-40 years	1. Price of cigarettes.	1. Smoking. 2. Smoking initiation age.	No relationship.
Chaloupka, 1997 [17]	USA, ISR, 1992-1994, 19,581	Men, school students of grades 8, 10, 12	1. Excise taxes on smokeless tobacco. 2. Availability of age restrictions for smokeless tobacco sales. 3. Availability of age restrictions for tobacco sales. 4. Availability of a law on licensing tobacco sellers. 5. Availability of a requirement to indicate a minimum age when purchasing tobacco.	1. Smokeless tobacco consumption. 2. Frequency of smokeless tobacco consumption.	Increase in excise tax, along with the presence of licensing laws and minimum age requirements, reduce the likelihood of using smokeless tobacco. Among smokeless tobacco users, age restrictions and licensing laws reduce the frequency of its consumption.
Ohsfeldt, 1997 [18]	USA, CPS, 1985, over 100,000	Men, 16-64 years	1. Excise tax on cigarettes. 2. Excise tax on chewing tobacco. 3. Excise tax on snuff. 4. Excise taxes on smokeless tobacco (chewing and snuff). 5. Excise taxes on alcoholic beverages. 6. Index of smoking bans in public places.	1. Smoking. 2. Use of snuff. 3. Use of chewing tobacco. 4. Use of any smokeless tobacco.	Increase in cigarette excise tax reduces the likelihood of smoking but increases the likelihood of using snuff and smokeless tobacco. Increasing alcohol taxes increases the likelihood of smoking but decreases the likelihood of snuff use. Increasing taxes on snuff, as well as on chewing and smokeless tobacco, reduces the likelihood of consuming these tobacco products.
Stephens, 1997 [19]	Canada, GSS, 1991, 11,652	Both sexes, adult population	1. Price of cigarettes. 2. An increase in the price of cigarettes over the past year. 3. An increase in the price of cigarettes over the past 10 years. 4. Proportion of population covered by smoking bans in public places.	1. Smoking.	Increase in the price and proportion of the population reduces the likelihood of smoking.
	Canada, HPS, 1990, 14,000	Both sexes, adult population	1. Price of cigarettes. 2. An increase in the price of cigarettes over the past year. 3. An increase in the price of cigarettes over the past 10 years. 4. Proportion of population covered by smoking bans in public places.	1. Smoking.	Increase in the price and proportion of the population reduces the likelihood of smoking.
Douglas, 1998 [20]	USA, NHIS, 1987, 8,754	Both sexes, over 26 years of age	1. Price of cigarettes. 2. Index of smoking bans in public places.	1. Smoking initiation. 2. Smoking cessation.	Increasing restrictions in public places reduces the likelihood of smoking initiation and increases the likelihood of quitting smoking.
Evans, 1998 [21]	USA, NHIS, 1979 and 1987, 46,135	Both sexes, 18 years and older	1. Excise tax on cigarettes. 2. Price of cigarettes.	1. Smoking. 2. Number of cigarettes. 3. Average length of cigarettes. 4. Millimeters of cigarettes smoked per day. 5. Tar content in cigarettes. 6. Nicotine content in cigarettes. 7. The total amount of tar in cigarettes per day. 8. The total amount of nicotine in cigarettes per day.	Increasing taxes increases the mean length of consumed cigarettes. An increase in price increases the tar and nicotine content of consumed cigarettes.
Chaloupka, 1999 [22]	USA, MTF, 1992-1994, 198,359	Both sexes, school students of grades 8, 9, 12	1. Price of cigarettes. 2. Availability of using part of tobacco tax revenues for anti-tobacco measures. 3. Availability of laws to protect smokers.	1. Smoking.	Increasing the price and using tax revenue for anti-tobacco campaigns reduces the likelihood of smoking.
Evans, 1999 [23]	USA, NDF, 1989-1992, 10,571,642	Pregnant women, 15-44 years	1. Excise tax on cigarettes.	1. Smoking. 2. Number of cigarettes.	Increasing taxes reduces the likelihood of smoking during pregnancy.
DeCicca, 2000 [24]	USA, NELS, 1988-1992, 29,410 person-years	Both sexes, high school students	1. Price of cigarettes.	1. Smoking.	Increasing the price reduces the likelihood of smoking among Hispanics.
Diez-Roux, 2000 [25]	USA, BRFSS, 1990, 70,534	Both sexes, 18 years and older	1. Robin Hood index (a measure of income inequality).	1. Smoking.	No relationship.
Hersch,	USA, CPS,	Both sexes,	1. Price of cigarettes.	1. Smoking. 2.	Increasing the price reduces the

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
2000 [26]	1992-1993, 54,425	18-65 years		Number of cigarettes.	likelihood of smoking and the number of cigarettes.
Czart, 2001 [27]	USA, HCAS, 1997, 15,148	Both sexes, college students	1. Price of cigarettes.	1. Smoking. 2. Frequency of smoking. 3. Number of cigarettes.	Increasing the price reduces the frequency of smoking and the number of cigarettes.
Emery, 2001 [28]	USA, NHIS, 1993, 2,073	Both sexes, 14-22 years	1. Price of cigarettes. 2. Anti-smoking laws index.	1. Learning to smoke ('trial' smoking). 2. Light smoking. 3. Heavy smoking. 4. Number of cigarettes.	Increasing the price reduces the likelihood of heavy smoking and the number of cigarettes.
Farrelly, 2001 [29]	USA, NHIS, 1976-1993, 354,228	Both sexes, 18 years and older	1. Price of cigarettes.	1. Smoking. 2. Number of cigarettes.	Increasing the price reduces the likelihood of smoking and the number of cigarettes.
Ringel, 2001 [30]	USA, NDF, 1989-1995, about 20 million,	Pregnant women	1. Excise tax on cigarettes.	1. Smoking.	Increasing excise taxes reduces the likelihood of smoking.
Stephens, 2001 [31]	Canada, NPHS, 1994-1995, 14,355	Both sexes, 25 years and older	1. Tobacco control expenditures, per capita.	1. Smoking. 2. Number of cigarettes.	In men, increased spending reduces the likelihood of smoking and the number of cigarettes.
DeCicca, 2002 [32]	USA, NELS, 1988-1992, 16,489	Both sexes, school students of grades 8, 10, 12	1. Excise tax on cigarettes. 2. Index of age restriction laws for access to cigarettes. 3. Index of smoking bans in workplaces and in restaurants. 4. Availability of laws to protect smokers.	1. Smoking. 2. Smoking initiation. 3. Number of cigarettes.	Increasing taxes reduces the likelihood of smoking, while increasing the severity of restrictions on youth access increases the likelihood of smoking. Availability of a smoker protection law increases the likelihood of smoking, initiation of smoking, and frequency of smoking.
Glied, 2002 [33]	USA NLSY, 1979-1994, 21,848 person-years	Both sexes, 14-37 years	1. Excise tax on cigarettes in childhood (at the age of 14 years).	1. Smoking. 2. Smoking cessation.	In men, higher taxes during their childhood reduce the likelihood of their subsequent smoking.
Liang, 2002 [34]	USA, MTF, 1992-1994, 110,717	Both sexes, school students of grades 8, 10, 12	1. Mean price of cigarettes in a region vs. regions with low prices. 2. High price of cigarettes in a region vs. regions with low prices. 3. Availability of using part of tobacco tax revenues for anti-tobacco measures. 4. Availability of laws to protect smokers. 5. Index of smoking bans in public places. 6. Index of age restriction laws for access to cigarettes. 7. Differences in the price of cigarettes between regions.	1. Frequency of smoking.	Moderate or high price of cigarettes in the region vs. regions with low prices, use of tax revenues for anti-tobacco measures, as well as the increase in the index of smoking bans and age restrictions on access to tobacco, reduce the frequency of smoking.
Colman, 2003 [35]	USA, PRAMS, 1993-1999, 96,895	Postpartum women	1. Excise tax on cigarettes.	1. Smoking. 2. Smoking cessation.	An increase in excise taxes reduces the likelihood of smoking, including at three months before childbirth, overall and during pregnancy, and also increases the likelihood of quitting smoking overall, before pregnancy, during pregnancy and after childbirth.
Ross, 2003 [36]	USA, SSTUAYP, 1996, 16,514	Both sexes, school students of grades 9-12	1. Price of cigarettes. 2. Excise tax on cigarettes. 3. Index of smoking bans in public places. 4. Presence of priority of local smoking ban laws over federal laws. 5. Index of age restriction laws for access to cigarettes.	1. Smoking. 2. Number of cigarettes.	Increasing the price and age restriction index reduces the likelihood of smoking. Priority of local laws increases the likelihood of smoking.
Cawley, 2004 [37]	USA, NLSY, 1997-2000, 12,282	Both sexes, 12-21 years	1. Price of cigarettes. 2. Index of laws on age restrictions for purchasing, storing, and consuming tobacco. 3. Index of smoking bans in public places. 4. Index of age restriction laws for access to cigarettes. 5. Presence of tobacco production in the region.	1. Smoking.	In men, increasing the price reduces the likelihood of smoking.
Farrelly, 2004 [38]	USA, COMMIT, 1988 and 1993, 9,087	Both sexes, 25-64 years, smokers	1. Price of cigarettes.	1. Number of cigarettes. 2. Average amount of tar per cigarette. 3. Average amount of nicotine per cigarette.	Increasing the price reduces the number of cigarettes, but increases the amount of tar and nicotine per cigarette.
Kandel, 2004 [39]	USA, Add Health, 1995-1996, 5,374	Both sexes, school students of grades 7-12	1. Excise tax on cigarettes. 2. Ban on cigarette vending machines in places accessible to young people. 3. Ban on tobacco marketing.	1. Smoking initiation. 2. Smoking.	Banning vending machines reduces the likelihood of smoking initiation.
Tauras, 2004 [40]	USA, MTF, 1976-1993	Both sexes, smoking school students of grade 12	1. Price of cigarettes. 2. Smoking ban in private workplaces. 3. Smoking ban in restaurants. 4. Smoking ban in other public places.	1. Smoking cessation.	Increasing the price increases the likelihood of quitting smoking.

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
Tauras, 2004 [41]	USA, NHIS, 1991-1994	Both sexes, 18-64 years	1. Price of cigarettes. 2. Index of smoking bans in public places. 3. The presence of a smoking ban in children's hospitals. 4. The presence of a smoking ban in public workplaces. 5. The presence of a smoking ban in sports facilities. 6. The presence of a smoking ban in medical institutions. 7. The presence of a smoking ban in hotels. 8. The presence of a smoking ban in private workplaces. 9. The presence of a smoking ban on public transport. 10. Smoking ban in restaurants. 11. Smoking ban in stores. 12. The presence of a smoking ban in shopping malls. 13. The presence of stricter smoking ban laws in the region than nationwide.	1. Smoking. 2. Reduced smoking. 3. Number of cigarettes.	An increase in price reduces the likelihood of smoking and the number of cigarettes, but increases the likelihood of reduced smoking. The presence of a smoking ban in public workplaces and stricter smoking laws in the region than nationwide increase the likelihood of smoking. Ban on smoking in restaurants reduces the likelihood of smoking.
Thomson, 2004 [42]	USA, GUTS, 1999, 10,981	Both sexes, 9-14 years	1. Excise tax on cigarettes.	1. Smoking. 2. Learning to smoke ('trial' smoking).	Increasing taxes reduces the likelihood of 'trial' smoking.
Auld, 2005 [43]	Canada, YSS, 1994, 9,139	Both sexes, 15-19 years	1. Price of cigarettes at the age of 14 years. 2. Price of cigarettes at the age of 15-19 years.	1. Early smoking initiation (before 15 years of age). 2. Late smoking initiation (at 15-19 years of age).	Increasing the price at the age of 14 years reduces the likelihood of early initiation of smoking.
Levy, 2005 [44]	USA, CPS, 1998-1999, 27,115	Both sexes, smokers, 25 years and older	1. Price of cigarettes. 2. Presence of an anti-smoking media campaign in the region.	1. Trying to quit smoking. 2. Smoking cessation.	Increasing the price increases the likelihood of attempting to quit smoking. The presence of a media campaign in the region increases the likelihood of smoking cessation.
Powell, 2005 [45]	USA, SSTUAYP, 1996, 12,705	Both sexes, high school students	1. Price of cigarettes. 2. Index of age restriction laws for access to cigarettes.	1. Smoking.	Increasing the price and severity of age restrictions on access to tobacco reduces the likelihood of smoking.
Powell, 2005 [46]	USA, SSTUAYP, 1996, 11,237	Both sexes, 13-19 years	1. Price of cigarettes. 2. Index of age restriction laws for access to cigarettes.	1. Smoking.	Increasing the severity of age-restriction laws reduces the likelihood of smoking.
Ringel, 2005 [47]	USA, NYTS, 1999-2000, 33,632	Both sexes, school students of grades 6-12	1. Price of cigarettes. 2. Price of cigars. 3. Price of smokeless tobacco. 4. Presence of an anti-tobacco campaign in the media. 5. Availability of age restrictions for tobacco sales. 6. Presence of an age ban on tobacco possession. 7. Indoor smoking ban.	1. Smoking cigars.	An increase in the price of cigars reduces (and the presence of an age restriction for purchasing increases) the likelihood of smoking cigars.
Tauras, 2005 [48]	USA, MTF, 1991-2000	Both sexes, school students of grades 8, 10, 12	1. Tobacco control expenditures, per capita. 2. Price of cigarettes. 3. Index of laws on indoor smoking ban. 4. Index of age restriction laws for access to cigarettes. 5. Index of laws on age restrictions for purchasing, storing, and consuming tobacco.	1. Smoking. 2. Frequency of smoking.	Increasing the price, tobacco control expenditures, and the severity of indoor smoking bans reduces both the likelihood of smoking and frequency of smoking. Increasing the severity of age restrictions on access to tobacco increases both the likelihood of smoking and frequency of smoking.
Tauras, 2005 [49]	USA, MTF, 1976-1995, 7,489	Both sexes, adult population, smokers	1. Price of cigarettes. 2. Smoking ban in private workplaces. 3. Smoking ban in restaurants. 4. Availability of a smoking ban in public institutions. 5. Availability of a smoking ban in medical institutions. 6. Smoking ban in any other public places.	1. Transition from non-daily to daily smoking. 2. Transition from light to moderate smoking. 3. Transition from moderate to heavy smoking.	Increasing the price reduces the likelihood of switching to daily and moderate smoking. In addition, the presence of smoking bans in private workplaces and other places reduces the likelihood of transition to moderate smoking.
Adda, 2006 [50]	USA, NHANES III, 1988-1994, 20,050	Both sexes, 18 years and older	1. Excise tax on cigarettes.	1. Number of cigarettes. 2. Mean cotinine content. 3. Cotinine level per cigarette.	Increasing taxes increases cotinine level per cigarette.
Cawley, 2006 [51]	USA, NLSY, 1988-2000, 8,455	Both sexes, 10-21 years	1. Price of cigarettes. 2. Index of laws on age restrictions for purchasing, storing, and consuming tobacco. 3. Index of smoking bans in public places. 4. Index of age restriction laws for access to cigarettes.	1. Smoking ever. 2. Reduced smoking. 3. Frequent smoking.	Increasing the price makes people less likely to ever smoke. Increasing the severity of laws on restricting tobacco purchases and banning smoking in public places decrease the likelihood of reduced smoking.
Cowell, 2006 [52]	USA, NLSY, 1979-1994, 70,682 person-years	Men, 14-37 years	1. Price of cigarettes. 2. Excise duty on beer.	1. Smoking.	Increasing the price reduces the likelihood of smoking.
Datta, 2006 [53]	USA, BWHS, 1995, 41,726	Women, African Americans, 21-70 years	1. Proportion of population living below the poverty threshold.	1. Smoking.	No relationship.
Kim, 2006	USA, Add	Women,	1. Anti-smoking laws index. 2. Excise tax on cigarettes.	1. Smoking initiation.	Increasing the severity of laws reduces

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
[54]	Health, 1994-1995 and 2001-2002, 2,697	school students of grades 7-12		2. Moving to a more unfavorable smoking category.	the likelihood of smoking initiation and moving into a more unfavorable smoking category.
Levy, 2006 [55]	USA, CPS, 1992–2002, 498,544	Both sexes, 18 years and older	1. Price of cigarettes. 2. Index of smoking bans in public places. 3. Presence of tobacco control media campaigns in the region.	1. Smoking.	Increase in prices and presence of media campaigns in the region reduce the likelihood of smoking.
Osypuk, 2006 [56]	USA, CPS, 1995–1996, 245,868	Both sexes, 15 years and older	1. Excise tax on cigarettes. 2. Availability of more than \$10 million in regional revenue from the tobacco industry.	1. Smoking.	The study demonstrated multidirectional associations of excise taxes and revenues with smoking by gender and race.
Petersen, 2006 [57]	USA, PRAMS, 1998-2000, 7,513	Postpartum women, smokers at the beginning of pregnancy	1. Availability of extensive expansion of Medicaid coverage for smoking cessation treatment and counseling. 2. Availability of limited Medicaid expansion: either counseling or treatment.	1. Trying to quit smoking. 2. Smoking cessation.	Availability of extensive insurance increases the likelihood of attempts of smoking cessation and the probability of quitting smoking after childbirth. Presence of a limited insurance increases the likelihood of attempting to quit smoking.
Ross, 2006 [58]	USA, SSTUAYP, 1996, 16,558	Both sexes, school students of grades 9-12	1. Price of cigarettes.	1. Moving to a more unfavorable smoking category.	Increasing the price reduces the likelihood of switching to a more unfavorable smoking category.
Tauras, 2006 [59]	USA, CPS, 1992-1999, 545,603	Both sexes, 18 years and older	1. Price of cigarettes. 2. Smoking ban in private workplaces. 3. Smoking ban in restaurants. 4. Presence of smoking bans in shopping malls. 5. Availability of a smoking ban in medical institutions. 6. Smoking ban on public transport. 7. Amount of smoking bans in public places. 8. Weighted sum of smoking bans in public places.	1. Smoking. 2. Number of cigarettes.	Increasing the price reduces the likelihood of smoking and the number of cigarettes. The presence of a ban in medical institutions increases (and an increase in the amount and weighted sum of bans reduces) the number of cigarettes.
Stehr, 2007 [60]	USA, BRFSS, 1985-2000, 1,339,458	Both sexes, 18 years and older	1. Excise tax on cigarettes.	1. Smoking. 2. Number of cigarettes.	Increasing excise taxes reduces the likelihood of smoking and the number of cigarettes.
Tauras, 2007 [61]	USA, YRBS, 1995-2001, 25,155	Men, school students of grades 9-12	1. Excise taxes on smokeless tobacco. 2. Price of cigarettes. 3. Ban on the sale of tobacco through self-service. 4. Presence of a law on conducting random checks of tobacco purchases by minors. 5. The presence in the region of an authority to fight tobacco sales to minors. 6. The presence of a smoking ban in schools. 7. Index of laws on age restrictions for purchasing, storing, and consuming tobacco.	1. Use of smokeless tobacco. 2. Frequency of smokeless tobacco consumption.	Increasing excise taxes reduces the likelihood of using smokeless tobacco. The presence of a tobacco control authority in a region increases the frequency of tobacco consumption.
Carpenter, 2008 [62]	USA, YRBS, 1991-2005, 101,633	Both sexes, school students of grades 9-12	1. Price of cigarettes.	1. Smoking. 2. Frequency of smoking.	Increase in the price of cigarettes reduces the likelihood and frequency of smoking.
DeCicca, 2008 [63]	USA, NELS, 1992 and 2000, 28,220	Both sexes, school students of grade 8	1. Price of cigarettes. 2. Index of age restriction laws for access to cigarettes. 3. Anti-tobacco sentiments of the population.	1. Smoking. 2. Frequency of smoking	Increased anti-tobacco sentiments reduce the likelihood and frequency of smoking.
DeCicca, 2008 [64]	USA, NELS, 1992 and 2000, 10,706	Both sexes, up to 30 the age of years	1. Excise tax on cigarettes. 2. Anti-tobacco sentiments of the population.	1. Smoking initiation. 2. Smoking cessation. 3. Smoking.	Increased anti-tobacco sentiment reduces the likelihood of smoking.
DeCicca, 2008 [65]	USA, BRFSS, 2000-2005, 543,384	Both sexes, 45-64 years	1. Excise tax on cigarettes.	1. Smoking. 2. Any smoking.	Increasing taxes reduces the likelihood of smoking and any smoking.
Franz, 2008 [66]	USA, BRFSS, 1993-2000, 1,000,013	Both sexes, 18 years and older	1. Price of cigarettes.	1. Smoking. 2. Smoking cessation. 3. Number of cigarettes.	Increasing the price reduces the likelihood of smoking and the number of cigarettes but increases the likelihood of smoking cessation.
Botello-Harbaum, 2009 [67]	USA, HBSC, 2001-2002, 14,818	Both sexes, school students of grades 6-10	1. Loyalty of laws on age restrictions on access to cigarettes. 2. Loyalty of laws banning smoking in public places.	1. Smoking. 2. Learning to smoke ('trial' smoking).	Increasing the loyalty of laws increases the likelihood of smoking and 'trial' smoking.
Boudarbat, 2009 [68]	Canada, CTUMS, 2002, 22,396	Both sexes, 15 years and older	1. Price of cigarettes.	1. Not smoking.	Increasing the price increases the likelihood of not smoking.
DiFranza, 2009 [69]	USA, MTF, 2003, 16,244	Both sexes, school students of grade 10	1. Share of sellers complying with restrictions on sales of tobacco to minors. 2. Price of cigarettes. 3. Smoking ban in restaurants. 4. Expenditures on anti-tobacco media campaigns in the region.	1. Any smoking. 2. Smoking.	Increasing the price and the proportion of sellers complying with restrictions reduces the likelihood of smoking.
Dinno, 2009 [70]	USA, CPS, 2002, 52,024	Both sexes, 18 years	1. Price of cigarettes.	1. Smoking. 2. Number of cigarettes.	Increasing the price reduces the likelihood of smoking and the number

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
		and older			of cigarettes.
Gospodinov, 2009 [71]	Canada, CTUMS, 2000-2005, 90,850	Both sexes, 20 years and older	1. Price of cigarettes.	1. Smoking. 2. Number of cigarettes.	No relationship.
Liu, 2009 [72]	USA, CPS, 1992-2003, 14,586	Both sexes, 18 years and older	1. Index of coverage of nicotine replacement therapy by Medicaid insurance in the region.	1. Smoking cessation. 2. Smoking initiation.	In women, increasing insurance coverage of medical treatment increases the likelihood of smoking cessation and reduces the likelihood of smoking initiation.
Pierce, 2009 [73]	USA, CPS, 1992-2002	Both sexes, 18-29 years	1. Index of the effectiveness of regional anti-smoking programs.	1. Light smoking.	Increasing the effectiveness of programs increases the likelihood of light smoking.
Tekin, 2009 [74]	USA, Add Health, 1994-1995, 20,745	Both sexes, school students of grades 7-12	1. Price of cigarettes.	1. Smoking. 2. Number of cigarettes.	In individuals with emotional and/or behavioral problems, increasing the price reduces the likelihood of smoking. In individuals without emotional and/or behavioral problems, increasing the price reduces the number of cigarettes.
Ahijevych, 2010 [75]	USA, CPS, 2006, 2,929	Both sexes, 18-24 years, smokers	1. Excise tax on cigarettes. 2. Index of age restriction laws for access to cigarettes. 3. Index of smoking bans in public places. 4. Prevalence of smoking in the region.	1. Smoking one cigarette a day within 30 minutes after waking up. 2. Number of cigarettes.	In daily smokers, increasing excise tax does not reduce the number of consumed cigarettes. In non-daily smokers, increasing the severity of smoking bans increases the likelihood of smoking one cigarette per day first thing in the morning.
Liu, 2010 [76]	USA, CPS, 1992-2003, 895,668	Both sexes, 15 years and older	1. Price of cigarettes.	1. Smoking. 2. Smoking initiation. 3. Smoking relapse. 4. Smoking cessation.	In a number of age groups, an increase in price increases the likelihood of smoking and smoking cessation.
Liu, 2010 [77]	USA, CPS, 1996-2007, 6,585	Both sexes, 15 years and older, smokers	1. Medicaid coverage of smoking cessation without copayments. 2. Medicaid coverage for smoking cessation with copayments. 3. Excise tax on cigarettes.	1. Trying to quit smoking. 2. Planning to quit smoking. 3. Desire to quit smoking.	Availability of a smoking cessation coverage by health insurance without additional copays increases the likelihood of desire to quit smoking.
Ong, 2010 [78]	USA, HFC, 2000-2001, 7,909	Both sexes, adult population	1. Price of cigarettes.	1. Smoking.	In individuals with alcohol, drug, or psychological disorders, an increase in price reduces the likelihood of smoking.
Sen, 2010 [79]	Canada, CCHS, 2003-2005, 156,737	Both sexes, 15-59 years	1. Excise tax on cigarettes.	1. Smoking.	Increasing excise taxes reduces the likelihood of smoking
Sen, 2010 [80]	Canada, WSPP, 1992-1996, GSS, 1991, YSS, 1994, NPHS, 1996-1999, CTUMS, 1999, 32,683	Both sexes, 15-19 years	1. Excise tax on cigarettes.	1. Smoking. 2. Number of cigarettes.	Increasing excise taxes reduces the likelihood of smoking and the number of cigarettes.
Tworek, 2010 [81]	USA, MTF, 1991-2006, 68,584	Both sexes, school students of grades 10-12, smokers	1. Price of cigarettes. 2. Index of smoking bans in public places. 3. Index of age restriction laws for access to cigarettes. 4. Presence of a law on cigarette possession by youths.	1. Trying to quit smoking. 2. Desire to quit smoking. 3. Temporary smoking cessation. 4. Sustained smoking cessation.	Increasing the price increases the likelihood of desire to quit smoking, along with both temporary and sustained smoking cessation. Increasing the severity of restriction laws increases the likelihood of sustained smoking cessation.
Anger, 2011 [82]	Germany, GSOEP, 2002-2008, 85,695	Both sexes, adult population	1. Smoking ban in restaurants, bars, dance clubs.	1. Any smoking. 2. Smoking. 3. Number of cigarettes.	In individuals highly inclined to regularly attend social events, the presence of a ban reduces the likelihood of smoking and the number of cigarettes.
Azagba, 2011 [83]	Canada, NPHS, 1998-2008, 56,770	Both sexes, 12-65 years	1. Excise tax on cigarettes.	1. Smoking.	Increasing excise tax reduces the likelihood of smoking.
Buddelmeyer, 2011 [84]	Australia, HILDA, 2001-2003, approximately 14,000	Both sexes, adult population	1. Availability of stricter smoking regulations in public places.	1. Smoking cessation. 2. Smoking initiation.	No relationship.
Chahine,	USA, CPS,	Both sexes,	1. Excise tax on cigarettes. 2. Prevalence of smoking in the	1. Smoking.	Increase in prevalence of smoking in a

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
2011 [85]	2006–2007, 227,428	15 years and older	region. 3. Availability of stricter smoking bans in public places.		region increases the likelihood of smoking. The effects of territorial characteristics on smoking at the district level are higher than at the regional level.
Ciecierski, 2011 [86]	USA, CAS, 1997-2001, 37,273	Both sexes, 18-25 years, college students	1. Current tobacco control expenditures, per capita. 2. Last-year tobacco control expenditures, per capita.	1. Smoking for a year. 2. Smoking for a month. 3. Daily smoking. 4. Use of smokeless tobacco. 5. Smoking cigars. 6. Trying to quit smoking. 7. Frequency of attempts to quit smoking.	An increase in current expenditures increases the likelihood of smoking for a year, smoking for a month, use of smokeless tobacco, and smoking cigars. An increase in last-year tobacco control expenditures reduces the likelihood of daily smoking and cigar smoking.
Sen, 2011 [87]	Canada, GSS, 1991, NPHS, 1994-1999, 65,743 person-years	Both sexes, 14-54 years	1. Excise tax on cigarettes.	1. Smoking.	In women, increased excise tax increases the likelihood of smoking.
Nonnemaker, 2011 [88]	USA, NLSY, 1997-2006, 8984	Both sexes, 12-26 years	1. Excise tax on cigarettes. 2. Price of cigarettes.	1. Smoking initiation. 1. Transition from the smoking cessation stage to the planning stage of smoking cessation and to the stage of sustained smoking cessation. 2. Smoking cessation.	Increasing the price reduces the likelihood of smoking initiation. Increasing prices and taxes increases the likelihood of stage transitions. Increasing the price increases the likelihood of smoking cessation.
Ross, 2011 [89]	USA, Canada, ITCPEs, 2002-2004, 2,000	Both sexes, adult population, smokers	1. Price of cigarettes. 2. Excise tax on cigarettes.		
White, 2011 [90]	Australia, cross-sectional surveys of representative samples in 1990-2005, 140,018	Both sexes, 12-17 years	1. Increase in the price of cigarettes. 2. Increasing spending on tobacco control, per capita. 3. Stricter control at places of sale and advertising of cigarettes. 4. Stricter age restrictions on access to cigarettes. 5. Stricter smoking bans in public places.	1. Smoking.	Increase in the price of cigarettes, tobacco control expenditures and smoking bans reduces the likelihood of smoking. Stricter control increases the likelihood of smoking.
Buddelmeyer, 2011 [91]	Australia, HILDA, 2001-2003, 22,747 person-years	Both sexes, adult population	1. Availability of stricter smoking regulations in public places.	1. Smoking cessation. 2. Smoking initiation.	No relationship.
Adams, 2012 [92]	USA, PRAMS, 2000-2005, 225,445	Postpartum women	1. Price of cigarettes. 2. Excise tax on cigarettes. 3. Tobacco control spending in the region. 4. A complete ban on smoking in the workplace. 5. A partial ban on smoking in the workplace.	1. Smoking before pregnancy. 2. Smoking cessation by the third trimester of pregnancy. 3. Sustained smoking cessation.	Increasing prices and excise taxes increases the likelihood of smoking cessation by the third trimester of pregnancy and sustained smoking cessation. A complete ban on smoking increases the likelihood of smoking cessation by the third trimester of pregnancy.
Ali, 2012 [93]	USA, Add Health, 1994, 19,988	Both sexes, 11-20 years	1. Excise tax on cigarettes. 2. Index of laws on smoking age restrictions.	1. Not smoking. 2. Learning to smoke ('trial' smoking). 3. Occasional smoking. 4. Regular smoking.	Increasing excise taxes and increasing the age restriction increases the likelihood of not smoking but reduces the likelihood of regular smoking.
Corsi, 2012 [94]	Canada, CCHS, 2001-2008, 461,709	Both sexes, 18 years and older	1. Excise tax on cigarettes.	1. Smoking.	Increasing excise taxes reduces the likelihood of smoking.
Fletcher, 2012 [95]	USA, NHANES III, 1991-1994, 7,178	Both sexes, 17-90 years	1. Excise tax on cigarettes.	1. Smoking. 2. Number of cigarettes. 3. Cotinine blood content.	In individuals with a protective (G/G) genotype, increasing excise taxes reduces the likelihood of smoking.
McLellan, 2012 [96]	USA, BRFSS, 2001-2006, 1,323,758	Both sexes, 18 years and older	1. Price of cigarettes.	1. Smoking.	Increasing the price reduces the likelihood of smoking in middle age (30-64 years), but increases it in older age (65 years and older).
Okechukwu, 2012 [97]	USA, CPS, 1992-2007, 52,418	Both sexes, 18-65 years, construction workers	1. Demand for construction workers in the labor market. 2. Price of cigarettes.	1. Smoking. 2. Number of cigarettes.	Increased demand for construction workers reduces the number of cigarettes.

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
Rhoads, 2012 [98]	USA, BRFSS, 1991-2006, 2,491,805	Both sexes, 18 years and older	1. Excise tax on cigarettes. 2. Tobacco control costs. 3. Index of smoking bans in public places. 4. Presence of tobacco production in the region.	1. Smoking. 2. Number of cigarettes.	Increasing excise taxes reduces the likelihood of smoking and the number of cigarettes. Increasing tobacco control costs reduces the likelihood of smoking. Increasing smoking bans reduces the number of cigarettes.
Abel, 2013 [99]	Switzerland, Die Eidgenössischen Jugendbefragungen (ch-x), 2010-2011, 32,891	18–25-year-old men, 18–21-year-old women	1. Predominant language of the regional population (German, French, Italian).	1. Smoking.	In men, living in an Italian-speaking area vs. a German-speaking area increases the likelihood of smoking. In women, similar pattern was observed in a French-speaking area vs. a German-speaking area.
Adams, 2013 [100]	USA, PRAMS, 1998-2008, 178,937	Postpartum women	1. Broad Medicaid coverage for smoking cessation: treatment and counseling. 2. Limited Medicaid coverage for smoking cessation: treatment but not counseling. 3. Partial expansion of Medicaid coverage for smoking cessation. 4. Per capita income. 5. Price of cigarettes. 6. Smoking ban in restaurants.	1. Smoking before pregnancy. 2. Smoking during pregnancy. 3. Smoking after childbirth.	Availability of limited and partial Medicaid coverage reduces the likelihood of smoking before pregnancy. Increasing the price reduces the likelihood of smoking during pregnancy and after childbirth. Presence of a ban in restaurants reduces the likelihood of smoking after childbirth.
Andalón, 2013 [101]	Mexico, NHNS, 2006, 31,452	Both sexes, adult population	1. Index of smoking bans in public places. 2. The severity of penalties for smoking in public places. 3. Level of monitoring of the implementation of laws banning smoking in public places. 4. Presence of tobacco production in the region. 5. Unemployment rate. 6. Proportion of urban population. 7. Price of cigarettes. 8. Smoking ban in public and private workplaces. 9. Smoking ban in educational institutions. 10. Smoking ban in premises used as work areas. 11. Smoking ban on public transport. 12. Smoking ban in restaurants. 13. Smoking ban in stores. 14. Smoking ban in medical institutions. 15. Smoking ban in places of recreation and sports. 16. Smoking ban in cultural institutions. 17. Smoking ban at home.	1. Smoking. 2. Number of cigarettes.	In men, an increase in the total index of bans and in the level of punishment, along with the presence of a ban in restaurants and institutions of health care and culture, reduces the number of cigarettes. In women, the presence of a ban in health care institutions, the level of punishment and the proportion of the urban population increase the likelihood of smoking.
Bellou, 2013 [102]	USA, YRBS, 1991-2009, 69,710	Both sexes, 16-18 years	1. Introduction of a new design of driver's licenses and identity cards for persons under 21 years of age.	1. Smoking ever. 2. Regular smoking. 3. Chewing tobacco use.	The introduction of a new design of a driver's license reduces the likelihood of chewing tobacco consumption.
Farrelly, 2013 [103]	USA, NSDUH, 2002-2008, 158,941	Both sexes, 12-17 years	1. Proportion of population covered by smoking bans in public places. 2. Expenditures on tobacco control programs, per capita. 3. Price of cigarettes. 4. Number of violations in retail trade in regards to tobacco age restrictions. 5. Prevalence of smoking in the region among adult population.	1. May start smoking. 2. Learning to smoke ('trial' smoking). 3. Occasional smoking. 4. Regular smoking.	Inverse associations were observed for the proportion of the population covered by laws (may start smoking/occasional smoking/regular smoking), program expenditures ('trial' smoking /occasional smoking /regular smoking), and the price of cigarettes (occasional smoking). In contrast, an increase in smoking prevalence in a region increased the likelihood of occasional and regular smoking.
Fuemmeler, 2013 [104]	USA, Add Health, 1995-2009, 11,639	Both sexes, 13-32 years	1. Availability of restrictions on cigarette marketing (at 13 years of age). 2. Prevalence of smoking among adolescents in the region (at 13 years of age). 3. Excise tax on cigarettes (at 13 years of age).	1. Smoking. 2. Number of cigarettes.	Longitudinal study revealed no relationship whatsoever. Cross-sectional study (at 13 years of age) confirmed that increasing prevalence of smoking among adolescents increases the likelihood of smoking and the number of cigarettes.
Grucza, 2013 [105]	USA, CPS, 1998-2007, 105,519	Both sexes, 18-34 years	Regional availability of the following (at 18 years of age): 1. Requirements for signs indicating the minimum age for the sale of tobacco and penalties for their absence. 2. Restrictions for minors regarding vending machines. 3. Requirements for random checks of sellers in terms of their compliance with age restrictions on access to tobacco. 4. Punishments for sellers who violate age restrictions on access to tobacco. 5. Laws requiring age identification when purchasing tobacco. 6. Provisions on the sale of cigarettes only in sealed packaging. 7. Law enforcement agency regarding the sale of tobacco. 8. Restrictions on free distribution of cigarettes. 9. Requirements for the sale of tobacco only through store sellers.	1. Smoking ever. 2. Smoking. 3. Heavy smoking.	Regional restrictions on vending machines reduce the likelihood of smoking and heavy smoking. Availability of identification requirements in a region reduces the likelihood of ever smoking and current smoking.
Lillard, 2013 [106]	USA, NLSY, 1997-2006, 51,619 person-	Both sexes, 13-27 years	1. Price of cigarettes. 2. Excise tax on cigarettes.	1. Smoking initiation. 2. Smoking.	Increasing the price and excise taxes reduces the likelihood of smoking and smoking initiation.

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
	years				
	USA, CPS, 1992-2007, 4,096,369	Both sexes, 13-27 years	1. Price of cigarettes. 2. Excise tax on cigarettes.	1. Smoking.	Increasing the price and excise taxes reduces the likelihood of smoking and smoking initiation.
	person-years				
	USA, PSID, 1986-2007, 113,005 person-years	Both sexes, 13-27 years	1. Price of cigarettes. 2. Excise tax on cigarettes.	1. Smoking.	Increasing the price and excise taxes reduces the likelihood of smoking and smoking initiation.
Tauras, 2013 [107]	USA, MTF, 1991-2010, 916,496	Both sexes, school students of grades 8, 10 и 12	1. Price of cigarettes. 2. Index of smoking bans in workplaces, restaurants and bars.	1. Smoking. 2. Number of cigarettes.	Increase in the price reduces the likelihood of smoking and the number of cigarettes. Increased bans diminish the likelihood of smoking.
Callison, 2014 [108]	USA, CPS, 1995-2007, 1,058,480	Both sexes, 18-74 years	1. Excise tax on cigarettes.	1. Smoking. 2. Number of cigarettes.	Increasing taxes reduces the likelihood of smoking and the number of cigarettes.
Cavazos-Rehg, 2014 [109]	USA, NESARC, 2001-2005, 7068	Both sexes, 18 years and older, smokers	1. Change in the price of cigarettes. 2. Change in the index of severity of bans on smoking in public places.	1. Change in the number of cigarettes.	No relationship.
Farrelly, 2014 [110]	USA, NYTS, 1999-2006, 106,529	Both sexes, 12-17 years	1. The presence of a decrease in the prevalence of smoking among adults over a two-year period. 2. Price of cigarettes. 3. Tobacco control expenditures, per capita. 4. Proportion of population covered by smoking bans in public places. 5. Proportion of violations of age restrictions on access to tobacco.	1. Smoking.	Increasing the price reduces the likelihood of smoking. In addition, the presence of a decrease in smoking prevalence during middle school years, as well as an increase in the proportion of population coverage by tobacco control laws and expenditures in high school years, reduces the likelihood of smoking.
Farrelly, 2014 [111]	USA, NSDUH, 2002-2009, 181,120	Both sexes, 18-25 years	1. Proportion of population covered by smoking bans in public places. 2. Tobacco control expenditures, per capita. 3. Price of cigarettes. 4. Prevalence of smoking among adults.	1. Smoking initiation. 2. Smoking. 3. Heavy smoking.	Increase in the proportion of population covered by laws, as well as tobacco control expenditures, reduce the likelihood of smoking and heavy smoking. Increasing smoking prevalence increases the likelihood of smoking and heavy smoking.
Greene, 2014 [112]	USA, CPS, 2001-2011, 3,071	Both sexes, 18 years and older, smokers	Medicaid coverage of smoking cessation costs: 1. No coverage whatsoever. 2. Coverage of treatment with copayment, no coverage of counseling. 3. Coverage of treatment without copayment, without coverage of consultation. 4. Coverage of treatment and counseling with copayment. 5. Coverage of treatment with copayment and of counseling without copayment.	1. Smoking cessation. 2. Trying to quit smoking.	Lack of insurance coverage, compared with treatment coverage with a copay and counseling coverage without a copay, reduces the likelihood of smoking cessation.
Guindon, 2014 [113]	Vietnam, SAVY, 2003, 1,809	Men, 14-21 years	1. Price index of tobacco products. 2. Price of hookah tobacco.	1. Smoking.	An increase in the price index reduces the likelihood of smoking.
Hatzenbuehler, 2014 [114]	USA, NESARC, 2004-2005, 34,175	Both sexes, 18 years and older	1. Empirical index of the tobacco environment severity based on factor analysis (price and excise tax, financing, laws).	1. Smoking ever. 2. Smoking. 3. Number of cigarettes.	Increasing the severity of the tobacco environment reduces the likelihood of ever smoking (heterosexuals only) and smoking (both heterosexuals and homosexuals).
Hatzenbuehler, 2014 [115]	USA, GUTS, 2000-2005, 13,430	Both sexes, 13-23 years	1. Index of favorable environment towards homosexuals. 2. Income inequality in the population. 3. Mean household income. 4. Prevalence of smoking in the region.	1. Smoking.	In heterosexuals, elevated income inequality and smoking prevalence in the region results in increased likelihood of smoking.
Hawkins, 2014 [116]	USA, PUMDF, 2000-2010, 17,699,534	Postpartum women	1. Excise tax on cigarettes. 2. Smoking ban in restaurants.	1. Smoking. 2. Number of cigarettes.	Increasing excise taxes reduces the likelihood of smoking and the number of cigarettes.
Jarlenski, 2014 [117]	USA, PRAMS, 2004-2010, 24,544	Low-income postpartum women, 19-44 years, smokers prior to conception	1. Medicaid coverage entitles low-income pregnant women to receive medical care even if their application for the program is pending. 2. Medicaid coverage entitles low-income pregnant women to prenatal care and delivery, even if they cannot provide the documentation required to qualify for coverage. 3. The presence of any of options 1 and 2.	1. Smoking cessation.	Availability of the right to medical assistance while documents are under consideration, as well as any of the two options, increases the likelihood of smoking cessation.
Maclean, 2014 [118]	USA, CPS, 1992-2011, 1,612,116	Both sexes, 18 years and older, smokers	1. Excise tax on cigarettes. 2. Index of smoking bans in public places. 3. Unemployment rate.	1. Smoking. 2. Number of cigarettes.	Increasing excise taxes and index of smoking bans reduces the likelihood of smoking. The number of cigarettes declines when the excise tax increases

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
					among moderate smokers, as well as when the unemployment rate increases among heavy smokers.
Marti, 2014 [119]	Switzerland, SHS, 2007, 18,760	Both sexes, 15 years and older	1. Tobacco control costs.	1. Smoking initiation. 2. Smoking cessation.	Increased expenditures reduce the likelihood of smoking initiation and increase the likelihood of smoking cessation.
Pachankis, 2014 [120]	USA, 2009, 119	Homosexual men, 18-25 years	1. Index of adverse environment for homosexuals while studying at secondary school. 2. Index of adverse environment for homosexuals in college. 3. Mean household income while studying at school. 4. Population density while studying at school. 5. Mean household income while studying in college. 6. Population density while studying in college.	1. Smoking.	Increase in population density and in index of adverse environment during college years increases the likelihood of smoking.
Smith, 2014 [121]	USA, NESARC, 2001-2005, 7,317	Both sexes, adult population, smokers	1. Smoking ban in restaurants and bars. 2. Excise tax on cigarettes. 3. Ban on smoking in the workplace.	1. Smoking cessation. 2. Number of cigarettes.	Ban on smoking in the workplace reduces the likelihood of smoking cessation. In men, a ban on smoking in restaurants, bars, and workplaces, along with an increase in excise taxes reduces the number of cigarettes.
Yörük, 2014 [122]	USA, NLSY, 1998-2005, 40,315 person-years	Both sexes, 12-20 years	1. Availability of a law regarding verification of ID and prohibition of false ID when purchasing alcohol.	1. Smoking. 2. Frequency of smoking.	No relationship.
Auld, 2015 [123]	Canada, CCHS, 2001-2005, 95,408	Both sexes, 19-40 years	1. Price of cigarettes at 14 years of age. 2. Price of cigarettes at 14-16 years of age. 3. Price of cigarettes at 12-18 years of age. 4. Price of cigarettes at the time of the survey.	1. Smoking initiation at older age in the price range (e.g., for the age group of 12-18 years, this is 18 years). 2. Smoking. 3. Number of cigarettes.	Increase in the price of cigarettes at 14 years of age reduces the likelihood of smoking initiation in men. Increase in the price of cigarettes at 14-16 years of age reduces the likelihood of smoking initiation in women. In men, the increase in the price of cigarettes at 12-18 years of age, as well as at the time of the survey, reduces the number of cigarettes.
Boes, 2015 [124]	Switzerland, SHP, 2005-2011, 36,792 person-years	Both sexes, adult population	1. Ban on smoking in indoor public places.	1. Smoking.	A ban on smoking in indoor public places reduces the likelihood of smoking.
Persoskie, 2015 [125]	USA, HINTS, 2013, 932	Both sexes, 18 years and older, smokers	1. Index of laws banning smoking in public places.	1. Attempts to quit smoking. 2. Intention to quit smoking. 3. Frequency of smoking.	No relationship revealed in the overall sample. In smokers with high levels of self-affirmation, increasing the index of laws banning smoking in public places increased the likelihood of attempting and intending to quit smoking.
Quon, 2015 [126]	Canada, CNLSCY, 2000-2007, 11,899	Both sexes, 12-17 years	1. Gini index. 2. Mean household income.	1. Frequency of smoking.	Increasing mean household income in a region reduces frequency of smoking.
Shang, 2015 [127]	USA, NLSY, 1997-2009, 8,984	Both sexes, 12-30 years	1. Availability of a partial ban on smoking in bars. 2. Availability of a complete ban on smoking in bars. 3. Excise tax on cigarettes.	1. Start of non-daily smoking. 2. Start of light smoking. 3. Start of heavy smoking. 4. Relapse into non-daily smoking. 5. Relapse into daily smoking. 6. Relapse into light smoking. 7. Relapse into heavy smoking.	Presence of a partial ban on smoking in bars reduces the likelihood of both light and heavy smoking. Availability of a complete ban of the kind reduces the likelihood of relapse into both daily and heavy smoking. Increasing the excise tax on cigarettes reduces the likelihood of light smoking.
Song, 2015 [128]	USA, NLSY, 1997-2011, 4,098	Both sexes, 12-31 years	1. Excise tax on cigarettes.	1. Smoking initiation. 2. Smoking. 3. Frequency of smoking.	Increasing excise tax on cigarettes reduces the likelihood of smoking initiation.
White, 2015 [129]	Canada, CTUMS, 2004-2012, 26,094	Both sexes, 18 years and older, smokers	1. Availability of partial government-sponsored reimbursement for the purchase of smoking cessation medications. 2. Availability of full government-sponsored reimbursement for the purchase of smoking cessation medications.	1. Smoking cessation.	Full reimbursement in a region vs. regions with partial and/or no reimbursement whatsoever increases the likelihood of smoking cessation.
Yang, 2015 [130]	China, 2011, 20,601	Both sexes, urban residents, 16-85 years	1. Area of tobacco crops in the region. 2. Ratio of cigarette production (quantity) to regional GDP.	1. Frequency of smoking.	Increased tobacco production increases the frequency of smoking.

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
Carton, 2016 [131]	USA, BRFSS, 1996-2010, 4,049,706	Both sexes, 18 years and older	1. A complete ban on smoking in workplaces, restaurants and bars. 2. The presence of a partial ban on smoking in workplaces, restaurants and bars. 3. Excise tax on cigarettes. 4. Unemployment rate. 5. Poverty level.	1. Smoking.	Presence of a complete ban, increased excise taxes and unemployment, and reduced poverty diminishes the likelihood of smoking.
Cavazos-Rehg, 2016 [132]	USA, MTF, 2000-2006, 153,648	Both sexes, school students of grades 8, 10 и 12	1. Excise tax on cigarettes. 2. Index of laws banning indoor smoking. 3. Index of laws on penalties for the possession, use and purchase of tobacco by young people. 4. Index of laws restricting access of youths to tobacco. 5. Proportion of violations by tobacco retailers. 6. Area of tobacco crops in the region.	1. Any smoking. 2. Smokeless tobacco use. 3. Daily smoking.	Increasing excise tax on cigarettes reduces the likelihood of smokeless tobacco use, and of both any and daily smoking. In addition, the likelihood of smokeless tobacco consumption increases with higher severity of restriction laws and larger area under tobacco cultivation.
Friedman, 2016 [133]	USA, BRFSS, 2011-2014, 48,942	Both sexes, 25-64 years, smokers	1. Increased health insurance cost of up to 10% for smokers. 2. Increased health insurance cost from 10% to 30% for smokers. 3. Increased health insurance cost of more than 30% for smokers.	1. Smoking cessation.	Increased health insurance cost of up to 10% for smokers reduces the likelihood of quitting smoking.
Hawkins, 2016 [134]	USA, YRBS, 1999-2013, 717,543	Both sexes, school students of grades 9-12	1. Excise tax on cigarettes. 2. Availability of a law banning smoking in restaurants.	1. Smoking. 2. Frequency of smoking.	Among 14-15-year-old school students, an increase in excise taxes and the presence of a law banning smoking in restaurants reduces the likelihood and frequency of smoking.
Huang, 2016 [135]	USA, 2013, 17,522	Both sexes, 18 years and older	1. Price of cigarettes. 2. Index of laws banning smoking in private workplaces, restaurants and bars.	1. Any smoking of e-cigarettes. 2. Daily smoking of e-cigarettes.	No relationship.
Kostova, 2016 [136]	China, GATS, 2010, 4,449	Men, 15 years and older	1. Price of cigarettes.	1. Smoking initiation. 2. Smoking cessation.	Increasing the price reduces the likelihood of smoking initiation.
Larson, 2016 [137]	USA, BRFSS, 2001-2010, 3,153,138	Both sexes, 18 years and older	1. Availability of a law banning smoking in restaurants and in workplace.	1. Smoking.	Availability of a law of the kind reduces the likelihood of smoking.
MacLean, 2016 [138]	USA, HRS, 1992-2008, 119,935 person-years	Both sexes, over 50 years of age	1. Excise tax on cigarettes. 2. Index of severity of smoking laws.	1. Smoking. 2. Number of cigarettes.	Increasing excise tax reduces the number of cigarettes. Increasing the severity of laws increases the likelihood of smoking and the number of cigarettes.
Nesson, 2016 [139]	USA, NHANES, 1988-2012, 10,062	Both sexes, 12-17 years	1. Excise tax on cigarettes. 2. Anti-tobacco sentiments of the population. 3. Index of the severity of laws on the availability, use, and purchase of cigarettes by youths.	1. Smoking according to a survey. 2. Number of cigarettes. 3. Amount of cotinine among smokers. 4. The amount of cotinine per cigarette. 5. Smoking based on cotinine. 6. Amount of cotinine in the total sample. 7. Presence of cotinine 3 or more ng/mL. 8. Amount of cotinine among individuals with 3 or more ng/mL. 9. Smoking according to a survey among persons with 3 or more ng/mL.	Increasing excise tax reduces the likelihood of surveyed smoking and cotinine content of 3 and more ng/mL, as well as the amount of cotinine among smokers and in the overall sample. Increasing the index of the severity of laws on the availability, use, and purchase of cigarettes by youths increases the likelihood of cotinine content of 3 or more ng/mL, and also reduces the likelihood of surveyed smoking among those with 3 or more ng/mL.
Shmulewitz, 2016 [140]	USA, NESARC, 2004-2005, 34,638	Both sexes, 18 years and older	1. Index of tobacco environment: favored, moderately favored, moderately restricted, strongly restricted.		Reducing tobacco restrictions increases the likelihood of smoking and heavy smoking. Presence of favored tobacco environment is most likely to promote smoking among individuals with childhood abuse and parenting problems.
Abouk, 2017 [141]	USA, MTF, 2007-2014, 49,817	Both sexes, school students of grade 12	1. Availability of age restrictions for sale of e-cigarettes. 2. Unemployment rate. 3. Excise tax on cigarettes. 4. Costs of tobacco control policies. 5. Proportion of the population covered by a smoking ban in public places. 6. Proportion of the population covered by the ban on the use of e-cigarettes in public places. 7. Number of inspections of tobacco retailers, per capita.	1. Smoking. 2. Number of cigarettes. 3. E-cigarette use.	A ban on the sale of e-cigarettes to minors reduces the likelihood of smoking and consumption of e-cigarettes. Increasing the number of inspections of tobacco retailers reduces the number of cigarettes.

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Conway, 2017 [142]	USA, BRFSS, 1994-2000, 464,203	Both sexes, 18-69 years	1. Excise tax on cigarettes.	1. Daily smoking. 2. Occasional smoking. 3. Smoking cessation. 4. Number of cigarettes.	Increasing excise tax reduces the likelihood of both daily and occasional smoking, and increases the likelihood of smoking cessation.
	USA, BRFSS, 2001-2012, 3,023,128	Both sexes, 18-69 years	1. Excise tax on cigarettes.	1. Daily smoking. 2. Occasional smoking.	Increasing excise tax reduces the likelihood of both daily and occasional smoking.
Koma, 2017 [143]	USA, BRFSS, 2011-2015, 36,083	Both sexes, 18 years and older, smokers	1. Availability of expanded Medicaid coverage for low-income people in the region.	1. Smoking cessation.	In individuals aged 18-64 years, the presence of expanded insurance in the region increases the likelihood of smoking cessation.
Ma, 2017 [144]	USA, BRFSS, 1984-2004, 2,307,665	Both sexes, 18 years and older	1. Price of cigarettes.	1. Smoking.	Increase in the price of cigarettes reduces the likelihood of smoking.
Manivong, 2017 [145]	Canada, CTUMS, 2002-2012, 49,172	Both sexes, 15-18 years	1. Excise tax on cigarettes.	1. Smoking. 2. Number of cigarettes.	No relationship.
Nesson, 2017 [146]	USA, NHANES, 1988-2012, 45,760	Both sexes, 21 years and older, smokers	1. Excise tax on cigarettes. 2. Ban on smoking in workplace. 3. Smoking ban in restaurants bars.	1. Smoking according to survey. 2. Number of cigarettes. 3. Amount of cotinine among smokers according to survey.	Increasing excise tax reduces the likelihood of smoking, the number of cigarettes, and the amount of cotinine.
Simon, 2017 [147]	USA, BRFSS, 2010-2015, 144,646	Both sexes, 19-64 years	1. Availability of expanded Medicaid coverage for low-income people in the region.	1. Smoking.	No relationship.
Stevens, 2017 [148]	USA, CPS, 1997-2013, 9,446	Both sexes, 50 years and older, smokers	1. Increase in the price of cigarettes. 2. Mean price of cigarettes during the smoking cessation interval.	1. Smoking cessation.	Increase in the price of cigarettes, as well as in the mean price, increases the likelihood of quitting smoking.
Zhu, 2017 [149]	Australia, HILDA, 2002-2014, 138,116 person-years	Both sexes, 18 years and older	1. Ban on smoking in public places.	1. Smoking. 2. Number of cigarettes.	No relationship.
Cerdá, 2018 [150]	USA, MTF, 1991-2015, 1,088,923	Both sexes, school students of grades 8, 10, 12	1. Presence of a law legalizing marijuana for medical purposes.	1. Smoking.	The presence of a law legalizing marijuana for medical purposes reduces the likelihood of smoking.
Choi, 2018 [151]	USA, BRFSS, 1990-2015, 6,970,691	Both sexes, 18 years and older	1. Presence of a law legalizing marijuana for medical and/or recreational purposes.	1. Any smoking. 2. Regular smoking.	The presence of such law reduces the likelihood of any smoking.
	USA, CPS, 1992-2015, 2,044,577	Both sexes, 18 years and older	1. Presence of a law legalizing marijuana for medical and/or recreational purposes.	1. Smoking. 2. Number of cigarettes. 3. Frequency of smoking.	The presence of such law reduces the likelihood of smoking and the number of cigarettes.
Di Pietro, 2018 [152]	Italy, MHSELI, 2005-2012, 145,665	Both sexes, 25-54 years	1. Total unemployment rate. 2. Unemployment rate adjusted by gender and age of study participants.	1. Smoking. 2. Smoking 10 and more cigarettes per day. 3. Smoking 20 and more cigarettes per day.	An increase in the total unemployment rate reduces the likelihood of smoking. An increase in the adjusted unemployment rate reduces the likelihood of smoking, smoking 10 or more cigarettes, and smoking 20 or more cigarettes.
Dutra, 2018 [153]	USA, NYTS, 2009-2014, 83,026	Both sexes, 12-17 years	1. Availability of age restrictions for the sale of e-cigarettes. 2. Presence of a law on access to medical marijuana. 3. Proportion of the population covered by the ban on smoking in the workplace. 4. Excise tax on cigarettes. 5. Mean household income. 6. Unemployment rate. 7. Proportion of population covered by bans on smoking in bars.	1. Smoking.	Presence of a law on access to medical marijuana and increase in the proportion of the population with smoke-free workplaces reduce the likelihood of smoking. Increasing the proportion of the population covered by the bar smoking ban increases the likelihood of smoking.
Ferrer, 2018 [154]	USA, MidLife, 1995-2013, 725	Both sexes, 24 years and older, smokers	1. Excise tax on cigarettes.	1. Smoking cessation.	No relationship.
Granados, 2018 [155]	USA, CARDIA, 1987-2011, 23,228	Both sexes, 18-55 years	1. Unemployment rate.	1. Smoking.	An increase in the unemployment rate reduces the likelihood of smoking.

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
Hawkins, 2018 [156]	USA, YRBS, 1999-2013, 499,381	Both sexes, school students of grades 9-12	1. Excise tax on chewing tobacco and cigars. 2. Excise tax on cigarettes. 3. Smoking ban in restaurants.	1. Smokeless tobacco consumption. 2. Frequency of smokeless tobacco use. 3. Smoking cigars. 4. Frequency of smoking cigars.	Across gender-based groups, increase in excise tax on cigarettes, as well as the presence of a smoking ban, increases the likelihood of using smokeless tobacco and cigars, and also elevates the frequency of using smokeless tobacco and cigars.
Jofre-Bonet, 2018 [157]	England, HSE, 2001-2013, 105,995	Both sexes, 17 years and older	1. Unemployment rate.	1. Smoking. 2. Light smoking. 3. Moderate smoking. 4. Heavy smoking.	An increase in the unemployment rate increases the likelihood of moderate smoking but decreases the likelihood of heavy smoking.
Kannan, 2018 [158]	USA, ANHCS, 2005-2012, 29,094	Both sexes, adult population	1. Predominance of Republicans in the party environment of the region. 2. The predominance of conservatives in the ideological environment of the region.	1. Smoking.	The predominance of Republicans and conservatives increases the likelihood of smoking.
Kostova, 2018 [159]	USA, NHIS, 2009-2014, 11,170	Both sexes, 19-64 years, smokers	1. Availability of expanded Medicaid coverage for smoking cessation treatment. 2. Availability of Medicaid expansion for smoking cessation counseling. 3. Availability of expanded Medicaid coverage for smoking cessation treatment and counseling.	1. Smoking cessation.	Availability of expanded Medicaid coverage of treatment and counseling increases the likelihood of smoking cessation.
Naavaal, 2018 [160]	USA, BRFSS, 2014, 48,961	Both sexes, 18-64 years, smokers	1. Excise tax on cigarettes. 2. Government funding for tobacco control. 3. Proportion of population covered by smoking ban laws. 4. Availability of Medicaid expansion.	1. Trying to quit smoking.	Increasing excise tax increases the likelihood of attempting to quit smoking.
Rhubart, 2018 [161]	USA, BRFSS, 2016, 179,265	Both sexes, 25 years and older	1. No Medicaid expansion for the poor.	1. Smoking.	No relationship.
Shang, 2018 [162]	India, GATS, 2009-2010, 64,929	Both sexes, 15 years and older	1. Excise tax on cigarettes. 2. Excise tax on bidis.	1. Smoking cigarettes. 2. Smoking bidis. 3. Smoking cigarettes and bidis.	Increasing excise tax on cigarettes reduces the likelihood of cigarette smoking, as well as of smoking of cigarettes and bidis combined.
	India, TCP India, 2010-2013, 20,950	Both sexes, 15 years and older	1. Excise tax on cigarettes. 2. Excise tax on bidis.	1. Smoking cigarettes. 2. Smoking bidis. 3. Smoking cigarettes and bidis.	Increasing excise tax on cigarettes reduces the likelihood of smoking cigarettes and bidis combined.
Yao, 2018 [163]	USA, CPS 2006-2011, 339,921	Both sexes, 18 years and older	1. Price of cigarettes.	1. Smoking. 2. Number of cigarettes.	Increase in the price of cigarettes reduces the likelihood of smoking and the number of cigarettes.
Ahmed, 2019 [164]	Canada, CTUMS, 1999-2005, 29,514	Both sexes, 15-18 years	1. Price of cigarettes. 2. The proportion of refusals to sell cigarettes to youths within the framework of sellers' compliance with retail trade rules.	1. Smoking. 2. Number of cigarettes.	Increase in the price of cigarettes reduces the likelihood of smoking. An increase in the proportion of refusals to sell cigarettes to youths reduces the likelihood of smoking and the number of cigarettes.
Brantley, 2019 [165]	USA, NHIS, 2010 and 2015, 5,282	Both sexes, 19-64 years	1. Availability of expanded Medicaid coverage for smoking cessation treatment and counseling. 2. Availability of expanded Medicaid coverage for smoking cessation treatment. 3. Availability of Medicaid expansion for smoking cessation counseling. 4. Required pay for smoking cessation services under Medicaid. 5. Required prior authorization for smoking cessation services under Medicaid. 6. Required counseling to obtain smoking cessation medications through Medicaid. 7. Number of smoking cessation medications covered by Medicaid. 8. Availability of Medicaid expansion. 9. Index of smoking bans in restaurants, bars and in the workplace. 10. Excise tax on cigarettes.	1. Smoking. 2. Trying to quit smoking.	Requirement to pay for services increases the likelihood of smoking. The need for consultations to obtain medications and availability of Medicaid expansion reduces the likelihood of smoking. The number of smoking cessation medications available on Medicaid increases the likelihood of attempting to quit smoking.
Cohen, 2019 [166]	USA, BRFSS, 2012, 152,541	Both sexes, 65-99 years	1. Gini index.	1. Smoking.	No relationship.
Cui, 2019 [167]	Canada, YSS, 2012-2013, 47,203	Both sexes, school students of grades 7-12	1. Price of cigarettes.	1. Smoking. 2. Number of cigarettes.	Increase in the price of cigarettes reduces the likelihood of smoking and the number of cigarettes.
Dave, 2019 [168]	USA, YRBS, 2005-2015, 752,332	Both sexes, school students of grades 9-12	1. Availability of age restriction for the sale of e-cigarettes.	1. Any smoking. 2. Smoking initiation. 3. Smoking at least 20 times per month. 4. Daily smoking. 5. Smoking electronic cigarettes ever. 6.	Availability of age restriction for the sale of e-cigarettes increases the likelihood of any smoking, smoking initiation, smoking at least 20 times per month and daily smoking, but reduces the likelihood of ever smoking e-cigarettes.

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
Donahoe, 2019 [169]	USA, CPS, 2010-2015, 8,523	Both sexes, 25-64 years, smokers	1. Availability of Medicaid expansion for smoking cessation treatment.	Current smoking of e-cigarettes. 1. Trying to quit smoking. 2. Smoking cessation. 3. Sustained smoking cessation.	No relationship.
Dutra, 2019 [170]	USA, CPS, 1985-2015, 2,014,811	Both sexes, 18 years and older	1. Proportion of the population covered by smoking bans in the workplace and restaurants. 2. Proportion of the population covered by a smoking ban in the workplace. 3. Proportion of population covered by smoking bans in restaurants. 4. Excise tax on cigarettes. 5. Tobacco control expenditures, per capita.	1. Smoking.	Increasing the proportion of the population covered by smoking bans in workplaces and restaurants, as well as solely in restaurants, and increasing taxes and anti-smoking expenditure reduce the likelihood of smoking.
Fu, 2019 [171]	USA, CPS, 1995-2011, 37,204	Both sexes, 21-54 years, unemployed	1. Amount of unemployment benefit.	1. Smoking. 2. Smoking cessation.	Increasing unemployment benefits reduces the likelihood of smoking but increases the likelihood of smoking cessation.
Hao, 2019 [172]	USA, BRFSS, 1995-2009, 3,778,107	Both sexes, 18 years and older	1. Excise tax on cigarettes. 2. Severity index for indoor smoking laws. 3. Tobacco control expenditures, per capita.	1. Smoking.	Increasing excise tax reduces the likelihood of smoking.
Hawkins, 2019 [173]	USA, NCHS, 2005-2015, 26,334,854	Postpartum women, 16-49 years	1. Excise tax on cigarettes. 2. Smoking ban in restaurants.	1. Smoking in the first trimester of pregnancy.	Increasing excise tax reduces the likelihood of smoking.
Hawkins, 2019 [174]	USA, NCHS, 2005-2015, 26,436,541	Postpartum women	1. Excise tax on cigarettes. 2. Ban on smoking in the workplace and restaurants.	1. Smoking. 2. Smoking cessation in the third trimester of pregnancy.	In individuals with up to 12 years of education, an increase in excise tax on cigarettes reduces the likelihood of their smoking. In persons with 12 years of education, it increases the likelihood of smoking. In people with 13-15 years of education, it increases the likelihood of smoking cessation.
Hawkins, 2019 [175]	USA, YRBS, 2015, 155,131	Both sexes, school students of grades 9-12	1. Presence of age-based restriction of the access to e-cigarettes. 2. Excise tax on cigarettes. 3. Ban on smoking in the workplace and restaurants.	1. Smoking e-cigarettes. 2. Smoking e-cigarettes only. 3. Smoking cigarettes.	Increasing excise tax reduces the likelihood of smoking cigarettes. The presence of a smoking ban increases the likelihood of smoking e-cigarettes and of e-cigarettes only, but reduces the likelihood of smoking cigarettes.
Lee, 2019 [176]	USA, BRFSS, 2016, 240,849	Both sexes, 18-59 years	1. The presence of a ban on smoking e-cigarettes in workplaces, restaurants, bars.	1. Smoking e-cigarettes.	The presence of such ban reduces the likelihood of smoking e-cigarettes.
Shang, 2019 [177]	India, TCP India, 1998-2011, 113,566 person-years	Both sexes, 15 years and older	1. Price of cigarettes. 2. Price of bidis.	1. Smoking cigarettes. 2. Smoking bidis. 3. Any smoking.	In urban residents, an increase in the price of cigarettes reduces the likelihood of smoking cigarettes, while a reduction in the price of bidis reduces the likelihood of smoking bidis. In rural residents, an increase in the price of cigarettes increases the likelihood of smoking cigarettes and of any smoking.
Valvi, 2019 [178]	USA, BRFSS, 2003-2017, 5,311,799	Both sexes, 18 years and older	1. Availability of Medicaid expansion.	1. Smoking. 2. Trying to quit smoking.	No relationship.
Alley, 2020 [179]	USA, NCHA, 2008-2018, 867,502	Both sexes, 18-26 years, college students	1. Availability of legalization of marijuana use for recreational purposes.	1. Smoking.	No relationship.
Bailey, 2020 [180]	USA, ADVANCE and CDRN, 2013, 55,340	Both sexes, 19-64 years, smokers	1. Availability of Medicaid expansion.	1. Smoking cessation.	Availability of expanded insurance plan increases the likelihood of smoking cessation.
Briody, 2020 [181]	Ireland, ILCS, 2002-2011, 681	Women who were pregnant in 2001	1. Unemployment rate.	1. Any smoking. 2. Smoking more cigarettes per day than the national average. 3. Daily smoking.	An increase in the unemployment rate reduces the likelihood of any smoking.
Cantrell, 2020 [182]	USA, TLC, 2014-2016, 44,771 person-years	Both sexes, 15-23 years	1. Tobacco control expenditures, per capita. 2. Proportion of population covered by smoking bans in public places. 3. Presence of the age restrictions for the sale of e-cigarettes. 4. Availability of a law on licensing e-cigarette vendors.	1. Smoking e-cigarettes. 2. Smoking cigarettes.	Availability of age restrictions on sales reduces the likelihood of smoking e-cigarettes. Presence of a vendor licensing law reduces the likelihood of

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
					smoking cigarettes.
Cho, 2020 [183]	USA, BRFSS, 2011-2016, 2,259,014	Both sexes, 18 years and older	1. Excise tax on cigarettes. 2. Severity index for smoking bans in public places.	1. Smoking.	Increasing excise taxes reduces the likelihood of smoking.
Dahne, 2020 [184]	USA, CPS, 2014-2015, 19,459	Both sexes, 15 years and older, smokers	1. Smoking ban in restaurants, bars, workplaces. 2. Excise tax on cigarettes. 3. Tobacco control expenditures, per capita.	1. Smoking cessation. 2. Unsuccessful attempt to quit smoking.	Increasing excise taxes and presence of a ban increases the likelihood of smoking cessation.
Du, 2020 [185]	USA, BRFSS, 2016-2017, 894,997	Both sexes, 18 years and older	1. The presence of a ban on smoking e-cigarettes in public places. 2. The presence of a law on licensing e-cigarette sellers. 3. The presence of a ban on the sale of e-cigarettes through self-service. 4. Presence of the age limit for the sale of e-cigarettes. 5. Excise tax on e-cigarettes.	1. Smoking e-cigarettes.	Ban on smoking in public places, licensing laws, age restrictions, and increased excise taxes reduce the likelihood of smoking e-cigarettes.
Kalousová, 2020 [186]	USA, HRS, 1992-2014, 4,452	Both sexes, 51 years and older, smokers	1. Price of cigarettes.	1. Smoking cessation. 2. Number of cigarettes.	In individuals 65 years of age and older, the increase in the price of cigarettes reduces the number of consumed cigarettes.
Kalousova, 2020 [187]	USA, CPS, 2010-2011, 559,544	Both sexes, 25 years and older	1. Excise tax on cigarettes. 2. Price of cigarettes.	1. Smoking.	In people aged 25-39 years, increasing excise tax reduces the likelihood of smoking.
Keeler, 2020 [188]	USA, CPS, 2006-2011, 42,458	Both sexes, 18 years and older, smokers	1. Price of cigarettes.	1. Planning to quit smoking. 2. Trying to quit smoking. 3. Smoking cessation.	Increase in the price of cigarettes increases the likelihood of planning to quit smoking. In addition, among the white race, an increase in the price of cigarettes increases the likelihood of trying to quit smoking.
Lahiri, 2020 [189]	USA, HRS, 1992-2010, 98,770 person-years	Both sexes, 51 years and older	1. Price of cigarettes. 2. Anti-tobacco sentiments of the population. 3. Ban on smoking in public places.	1. Smoking. 2. Number of cigarettes.	Increasing the price reduces the likelihood of smoking and the number of cigarettes. Increasing anti-tobacco sentiments reduces number of cigarettes.
Nelson, 2020 [190]	USA, ACS and BRFSS, 2011-2017, 737,612	Both sexes, 19-64 years	1. Availability of Medicaid expansion for the poor. 2. Availability of Medicaid expansion with incentives for healthy behavior.	1. Smoking.	Availability of Medicaid expansion for low-income people, along with incentives for healthy behavior, reduces the likelihood of smoking.
Nguyen, 2020 [191]	Canada, CTADS, 2013-2017, 20,934	Both sexes, 15-25 years	1. Presence of the age restriction for the sale of e-cigarettes.	1. Smoking e-cigarettes.	Availability of an age restriction for the sale of e-cigarettes reduces the likelihood of smoking e-cigarettes.
Septiono, 2020 [192]	Indonesia, RISKESDAS, 2007 and 2013, 1,052,611	Both sexes, 25 years and older	Index of smoking bans in public places: 1. The presence of a moderate index level in 2007. 2. The presence of a change in the index level from weak to moderate, in dynamics. 3. The presence of a change to high index level, in dynamics.	1. Any smoking. 2. Smoking. 3. Heavy smoking.	The presence of a change in the index level from weak to moderate reduces the likelihood of any smoking. The presence of a change in the index level to strong reduces the likelihood of both any smoking and heavy smoking, but increases the likelihood of current smoking. Interaction between the regional level and the district level is contradictory.
Septiono, 2020 [193]	Indonesia, RISKESDAS, 2007 and 2013, 239,170	Both sexes, 12-17 years	Index of smoking bans in public places: 1. The presence of a moderate index level in 2007. 2. The presence of a change in the index level from weak to moderate over time. 3. The presence of a change to high index level over time.	1. Daily smoking. 2. Occasional smoking.	The presence of a change in the index level from weak to moderate increases the likelihood of daily smoking and reduces the likelihood of occasional smoking. The influence of the index at the district level is more pronounced than at the regional level.
Soni, 2020 [194]	USA, BRFSS, 2010-2018, 99,494	Both sexes, 19-64 years	1. Availability of Medicaid expansion for the poor.	1. Smoking.	No relationship.
Yip, 2020 [195]	USA, 2015-2016, 1,321	Both sexes, smokers, undergoing drug addiction treatment	1. Availability of Medicaid expansion.	1. Number of cigarettes. 2. Trying to quit smoking. 3. Smoking cessation.	Presence of expanded insurance program reduces the likelihood of trying to quit smoking but increases the likelihood of smoking cessation.
Zozaya, 2020 [196]	Spain, HBSC, 2002-2014, 56,359	Both sexes, 9-21 years	1. Unemployment rate.	1. Frequency of smoking.	Increasing unemployment rate increases frequency of smoking.
Apollonio, 2021 [197]	USA, NLSY, 1997-2011, 4192	Both sexes, 12-32 years	1. Excise tax on cigarettes.	1. Not smoking. 2. Occasional smoking. 3. Smoking	Increasing excise taxes reduces the likelihood of not smoking, occasional smoking, and early smoking initiation.

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
				cessation. 4. Early initiation and heavy smoking. 5. Late initiation and heavy smoking.	but increases the likelihood of smoking cessation and late smoking initiation.
Carpenter, 2021 [198]	USA, BRFSS, 1996-2018, 198,324	Both sexes, homosexual s, 25 years and older	1. Excise tax on cigarettes.	1. Any smoking. 2. Daily smoking.	In men, increasing taxes reduces the likelihood of any smoking and daily smoking.
Catalano, 2021 [199]	Argentina, NRFS, 2005-2013, 108,489	Both sexes, 18 years and older	1. The presence of a complete ban on smoking in public places. 2. The presence of a partial ban on smoking in public places.	1. Any smoking. 2. Occasional smoking. 3. Daily smoking. 4. Number of cigarettes.	Presence of a partial ban reduces the number of cigarettes.
Coley, 2021 [200]	USA, YRBS, 1999-2017, 1,077,938	Both sexes, 14-18 years	1. The presence of legalization of marijuana for recreational purposes. 2. The presence of legalization of marijuana for medical purposes. 3. The presence of any law legalizing the use of marijuana. 4. Excise duty on beer. 5. Excise tax on cigarettes. 6. Smoking ban in restaurants. 7. Unemployment rate.	1. Absence of smoking cigarettes. 2. Absence of smoking e-cigarettes. 3. Frequency of smoking cigarettes. 4. Frequency of smoking e-cigarettes.	Increasing excise taxes increases the likelihood of not smoking cigarettes. The presence of marijuana legalization for recreational purposes reduces (whereas legalization for medical or any purposes increases) the likelihood of not smoking e-cigarettes.
Daley, 2021 [201]	USA, BRFSS, 2002-2014, 202,652	Both sexes, 18 years and older, smokers	1. Ban on smoking in public places.	1. Daily smoking. 2. Occasional smoking.	No relationship.
De, 2021 [202]	USA, NHIS, 2011-2016, approximately 30,000	Both sexes, 19-64 years	1. Availability of Medicaid expansion for the poor.	1. Smoking.	No relationship.
Dunbar, 2021 [203]	USA, HRBS, 2011, 14,950	Both sexes, military personnel, 18-65 years	1. Excise tax on cigarettes.	1. Smoking. 2. Daily smoking. 3. Any use of tobacco. 4. Frequency of smoking. 5. Number of cigarettes. 6. Smoking cessation.	Increasing excise taxes reduces the likelihood of smoking, daily smoking, any tobacco use, and frequency of smoking, but increases the likelihood of smoking cessation.
Fleischer, 2021 [204]	USA, MTF, 2005-2016, 550,535	Both sexes, school students of grades 8, 10, 12	1. Excise tax on cigarettes. 2. Price of cigarettes.	1. Smoking. 2. Number of cigarettes. 3. Smoking initiation. 4. Start of daily smoking.	Increasing excise taxes and prices across different age groups reduces the likelihood of their smoking, initiation of smoking, initiation of daily smoking, and the number of cigarettes. The largest number of associations was found among students of grades 8 and 10.
Gallego, 2021 [205]	Colombia, NPSCS, 2008 and 2013, 42,706	Both sexes, 12-65 years, urban residents	1. Change in the price of cigarettes over time.	1. Smoking.	Increasing the price change reduces the likelihood of smoking.
Han, 2021 [206]	USA, CPS, 2014-2109, 17,896	Both sexes, 18-24 years	1. Availability of a tax on e-cigarettes. 2. Restrictions on vaping in bars, restaurants, and workplaces. 3. Availability of age restrictions for the sale of e-cigarettes. 4. Excise tax on cigarettes. 5. Availability of a smoking ban in bars, restaurants, workplaces. 6. The presence of marijuana legalization.	1. Smoking e-cigarettes.	No relationship.
Hilts, 2021 [207]	USA, BRFSS, 2011-2019, 180,894	Both sexes, 18-64 years	1. Availability of Medicaid expansion for smoking cessation treatment.	1. Smoking. 2. Trying to quit smoking.	In the first two years after implementation of the Medicaid expansion, the likelihood of smoking decreases.
Jun, 2021 [208]	USA, BRFSS, 2017, 444,023	Both sexes, 18 years and older	1. Availability of a law that includes e-cigarettes in existing tobacco laws. 2. Availability of excise tax on e-cigarettes. 3. Availability of laws regulating the packaging of e-cigarettes. 4. There is a restriction on the sale of e-cigarettes from 18 years of age. 5. Availability of a law on licensing e-cigarette sellers. 6. There is a restriction on the sale of e-cigarettes from 21 years of age. 7. There is a restriction on the sale of e-cigarettes from 19 years of age.	1. Any smoking of e-cigarettes. 2. Current smoking e-cigarettes. 3. Smoking cigarettes. 4. Smoking cessation.	The presence of all listed legislative norms, as well as increasing the age limit to 21 years, reduces the likelihood of any smoking and current smoking of e-cigarettes, and of cigarette smoking, and also increases the likelihood of quitting smoking.
Levin, 2021 [209]	USA, VQI, 2011-2019, 59,847	Both sexes, intervention for intermittent claudication	1. Excise tax on cigarettes. 2. Ban on smoking in workplace.	1. Smoking.	Increasing excise taxes reduces the likelihood of smoking.

Author, article year	Country, study code, years, n	Sample	Regional characteristics	Study outcomes	Main results
Maksimov, 2021 [210]	Russia, ECDR-RF, 2013-2014, 20,303	Both sexes, 25-64 years	1. Index of social living conditions. 2. Index of demographic depression in the region. 3. Index of industrial development index. 4. Mixed index. 5. Index of economic development.	1. Smoking.	Aggravation of social conditions and higher industrial development increase the likelihood of smoking.
Meier, 2021 [211]	Switzerland, TAM, 2001-2016, 28,704	Both sexes, 14-20 years	1. Availability of age restrictions for the sale of tobacco products.	1. Smoking.	In children with fathers with low education level, presence of age restrictions reduces the likelihood of smoking.
	Switzerland, HBSC, 2002-2014, 56,335	Both sexes, 11-15 years	1. Availability of an age limit for the sale of tobacco products.	1. Smoking. 2. Occasional smoking.	No relationship.
Nguyen, 2021 [212]	Vietnam, GATS, 2010 and 2015, 93,662 person-years	Men, 15 years and older	1. Price of cigarettes. 2. Tobacco Consumer Price Index. 3. Population density. 4. Per capita income.	1. Smoking cigarettes. 2. Consumption of any tobacco.	Increasing the price and the value of the Tobacco Consumer Price Index reduces the likelihood of smoking cigarettes and using any tobacco.
Nguyen, 2021 [213]	Canada, CTUMS, 2013-2017, 36,562, CTUMS/CTADS, 2004-2017, 178,654	Both sexes, 19 years and older	1. A complete ban on smoking e-cigarettes in public places.	1. Smoking e-cigarettes. 2. Smoking cigarettes. 3. Number of cigarettes. 4. Trying to quit smoking.	No relationship.
Parks, 2021 [214]	USA, MTF, 2001-2017, 15,141	Both sexes, 16-32 years	1. Price of cigarettes. 2. Proportion of the population covered by a smoking ban in the workplace. 3. Proportion of population covered by smoking bans in restaurants. 4. The share of African Americans in the population structure. 5. Share of Hispanic Americans in the population structure. 6. Proportion of the population living below the poverty line.	1. Smoking initiation. 2. Start of daily smoking.	Increasing the price reduces the likelihood of smoking initiation and daily smoking initiation. Increasing the share of the population covered by smoking bans in restaurants reduces the likelihood of initiating daily smoking.
Shen, 2021 [215]	Canada, CTUMS, 2008-2012, 81,173	Both sexes, 15 years and older	1. Availability of the reimbursement for the treatment of tobacco addiction cost in regional health insurance.	1. Smoking cigarettes. 2. Daily smoking of cigarettes. 3. Smoking cigars. 4. Smoking cigarillos. 5. Smoking a pipe. 6. Chewing tobacco consumption.	Availability of the reimbursement for the treatment of tobacco addiction cost increases the likelihood of smoking cigarettes and cigarillos.
Slob, 2021 [216]	USA, HRS, 1992-2016, 105,959 person-years	Both sexes, 50-74 years, Caucasians	1. Excise tax on cigarettes.	1. Smoking. 2. Number of cigarettes. 3. Smoking cessation.	In individuals with a high genetic predisposition to smoking, increasing excise tax reduces the likelihood of smoking and the number of cigarettes.
Titus, 2021 [217]	USA, NATS, 2012-2014, 108,977	Both sexes, 25 years and older	1. Index of hostile environment for homosexuals (politics, demography, public opinion).	1. Smoking.	No relationship.
Wang, 2021 [218]	USA, NATS, 2009-2014, 208,727	Both sexes, 18 years and older	1. Price of cigarettes. 2. Proportion of the population covered by smoking bans in workplaces, restaurants and bars.	1. Any smoking. 2. Daily smoking. 3. Number of cigarettes.	In African Americans, an increase in price reduces the number of cigarettes, while in Caucasians, it reduces the likelihood of any smoking.

ACS, American Community Survey; *ADVANCE*, Accelerating Data Value Across a National Community Health Center Network; *ANHCS*, Annenberg National Health Communication Survey; *BRFSS*, Behavioral Risk Factor Surveillance System; *BWHS*, Black Women's Health Study; *CARDIA*, Coronary Artery Risk Development in Young Adults; *CAS*, College Alcohol Study; *CCHS*, Canadian Community Health Surveys; *CDRN*, Clinical Data Research Network; *CNLSCY*, Canadian National Longitudinal Survey of Children and Youth; *COMMIT*, Community Intervention Trial; *CPS*, Current Population Survey; *CTADS*, Canadian Tobacco, Alcohol and Drugs Survey; *CTUMS*, Canadian Tobacco Use Monitoring Survey; *ECDR-RF*, Epidemiology of Cardiovascular Diseases in the Regions of the Russian Federation; *GATS*, Global Adult Tobacco Survey; *GSOEP*, German Socio-Economic Panel; *GSS*, General Social Survey; *GUTS*, Growing Up Today Study; *HBSC*, Health Behavior in School-Aged Children; *HCAS*, Health College Alcohol Study; *HILDA*, Household, Income and Labor Dynamics in Australia; *HINTS*, Health Information National Trends Survey; *HFC*, Healthcare for Communities; *HPS*, Health Promotion Survey; *HRBS*, Health-Related Behaviors Survey; *HRS*, Health and Retirement Study; *HSE*, Health Survey for England; *ILCS*, Irish Lifeways Cohort Study; *ISR*, Institution for Social Research; *ITCPES*, International Tobacco Control Policy Evaluation Survey; *MHSELI*, Multipurpose Household Survey on Everyday Life Issues; *MTF*, Monitoring the Future; *NATS*, National Adult Tobacco Survey; *NCHA*, National College Health Assessment; *NCHS*, National Center for Health Statistics; *NDF*, Natality Detail File; *NELS*, National Education Longitudinal Study; *NESARC*, National Epidemiologic Survey on Alcohol and Related Conditions; *NHANES*, National Health and Nutrition Examination Survey; *NHIS*, National Health Interview Survey; *NHNS*, National Health and Nutrition Survey; *NLSY*, National Educational Longitudinal Study; *NPHS*, National Population Health Survey; *NPSCS*, National Psychoactive Substances Consumption Survey; *NRFS*, National Risk Factor Survey; *NSDUH*, National Surveys on Drug Use and Health; *NYTS*, National Youth Tobacco Survey; *PRAMS*, Pregnancy Risk Assessment Monitoring System; *PSID*, Panel Study of Income Dynamics; *PUMDF*, Public Use Micro-Data Files; *RISKESDAS*, Riset Kesehatan Dasar; *SAVY*, Survey Assessment of Vietnamese Youth; *SHP*, Swiss Household Panel; *SHS*, Swiss Health Survey; *SSTUAYP*, Study of Smoking and Tobacco Use Among Young People; *TCP India*, Tobacco Control Policy India Survey; *TAM*, Tobacco and Addiction Monitoring; *TLC*, Truth Longitudinal Cohort; *VQI*, US Vascular Quality Initiative database; *YRBS*, Youth Risk Behavior Surveys; *YSS*, Youth Smoking Survey; *WSPP*, Waterloo Smoking Prevention Project.

Outcomes: *Smoking / use of tobacco product* are binary indicators, in different definitions, as a rule, it means any current smoking (tobacco use), regardless of frequency and quantity; *Not smoking* is a binary indicator inverse to smoking; *Number of cigarettes* is a quantitative indicator characterizing the mean number of cigarettes smoked per day/week/month; *Frequency of smoking / (use of tobacco product)* is a quantitative indicator characterizing the frequency of use; *Smoking initiation* is a binary indicator characterizing, depending on the study, the first cigarette smoked or the start of regular smoking during a certain time period; *Smoking cessation* is a binary indicator characterizing absence of smoking, provided that the individual previously smoked; *Smoking relapse* is a binary indicator characterizing the return to smoking of an individual who previously quit smoking; *Trying to quit smoking* is a binary indicator characterizing one or more successful and/or unsuccessful attempts to quit smoking over a certain period of time; *Desire to quit smoking* is a binary indicator characterizing the intention to quit smoking; *Planning to quit smoking* is a binary indicator characterizing whether the respondent has not only a desire, but also a definite plan to quit smoking; *Learning to smoke ('trial' smoking)* is a binary indicator characterizing the first cigarette smoked; *Light / moderate / heavy / occasional / regular / reduced / frequent / daily smoking* are binary indicators in a number of studies, characterizing different frequency and intensity of smoking; *Smoking ever* is a binary indicator characterizing respondents who smoked at least once in their life; *Any smoking* is a binary indicator in a number of studies, implying smoking with any frequency and intensity (it is usually used as a comparative indicator with current regular smoking).