WORLD BANK GROUP

WORKING NOTE

E-CIGARETTES: USE AND TAXATION

WBG Global Tobacco Control Program Team

TOBACCO TAXES ARE RECOGNIZED AS AN EFFECTIVE POLICY TOOL TO REDUCE TOBACCO CONSUMPTION AND IMPROVE HEALTH OUTCOMES. HOWEVER, POLICY MAKERS OFTEN

WORKING NOTE

E-CIGARETTES: USE AND TAXATION

WBG Global Tobacco Control Program Team

CONTENTS

LIST OF TABLES

Working Note[1]

E-cigarettes:

Use and Taxation

1. Introduction

Regulating tobacco use using excise taxation, restrictions on smoking in public places, and restrictions on youth access and sale of tobacco products is now a widely-accepted policy action to prevent its harmful health effects. The ruling by the United States Federal District Court that ordered the country's four largest cigarette makers to make "corrective statements" to inform the public about the harms of cigarettes, including light and low-tar cigarettes, which began on November 26, 2017 for one year, using prime-time television commercials and full-page ads in newspapers [1], only confirms what is already known on the basis of accumulated evidence over the past half century: the manipulation of cigarette design and composition to ensure optimum nicotine delivery have led to addiction, ill health, and premature mortality and disability among smokers and among those exposed to secondhand smoke [2, 3]. And the recent decision by the Vatican to ban duty-free cigarette sales is a good example of how societal attitude towards tobacco use has changed: a sovereign state is willing to forego revenue from products that clearly harm people's health [4].

In recent years, policy discussions at the global level on whether e-cigarettes and other smoke-free nicotine delivery systems should be classified as tobacco products, and hence be regulated in the same way as cigarettes, have acquired great importance. This, because their production is at the core of new diversified business plans of tobacco companies, alongside the production and marketing of cigarettes. While the e-cigarette, a battery-powered device that heats a liquid containing nicotine into a vapor that is inhaled like a cigarette, is being touted as a harm reduction technological innovation to protect smokers from the ill effects of cigarettes, which continue to be marketed globally, we must ask: Is there strong scientific evidence that justifies this claim and exempts e-cigarettes from being regulated as another tobacco product?

A review published in the New England Journal of Medicine [5] concluded that "At present, it is not possible to reach a consensus on the safety of e-cigarettes except perhaps to say that they may be safer than conventional cigarettes but are also likely to pose risks to health that are not present when neither product is used." The results of a comprehensive review of available evidence done by United States Surgeon General in 2016 [6] went further by concluding that tobacco use among youth and young adults in any form, including e-cigarettes, is not safe, and that in recent years, e-cigarette use by youth and young adults has increased at an alarming rate, becoming the most commonly used tobacco product among youth in the United States. The report also warned that since e-cigarettes are tobacco products that deliver nicotine, which is a highly addictive and toxic substance, they may pose the risk that many of today's youth who are using e-cigarettes could become tomorrow's cigarette smokers to continue to feed their nicotine addiction. Moreover, nicotine

[1] This working note was prepared by a World Bank Group Global Tobacco Control Program team led by Patricio V. Marquez. April 11, 2019.

exposure can harm brain development in ways that may affect the neurological development and mental health of children and adolescents.

The regulatory response to e-cigarettes in the United States (U.S.) and the European Union (EU) is clear in signaling the potential health risks of e-cigarettes. E-cigarettes, as other cigarette products, now fall under the regulatory jurisdiction of the U.S. Food and Drug Administration [7]. This is in accordance with the U.S. Surgeon General Report recommendations that comprehensive tobacco control and prevention strategies for youth and young adults should address all tobacco products, including e-cigarettes, and that further reductions in tobacco use and initiation among youth and young adults are achievable by regulating the manufacturing, distribution, marketing, and sales of all tobacco products—including e-cigarettes. In May 2017, the EU's Court of Justice cleared new legislation that also puts e-cigarettes under similar regulatory pressures as traditional cigarettes, including a broad ban on advertising and other promotional activity. The EU's updated Tobacco Products Directive, which brings e-cigarettes under this strict regulatory umbrella for the first time, was drafted a couple of years ago, but it was challenged by several important players in the tobacco industry [8].

The World Health Organization (WHO) and the Secretariat of the Framework Convention on Tobacco Control (FCTC) have been clear in recommending that countries treat and regulate e-cigarettes no differently than other tobacco products [9]. The World Bank Group (WBG) has had an unambiguous global policy on tobacco since the 1990s that precludes lending, provision of grants, or guarantee investments, loans, or credits for tobacco production, processing, and marketing [10]. As an original supporter of the FCTC, the WBG also provides technical assistance to governments to increase taxes on tobacco products as a win-win policy measure for both public health and domestic resource mobilization.

This discussion brief presents a summary of available literature on e-cigarette use and taxation in different countries to expand knowledge and understanding about this subject. We believe that all of us working to advance the great cause of global health should not waiver in our commitment to support the development of healthy societies. In doing so, we should keep in mind that tobacco use is the world's leading preventable cause of death, killing more than 7 million people per year. Moving forward, we should be guided by the lessons from history and available scientific evidence and redouble our efforts to support globally the full implementation of the FCTC's demand and supply reduction measures to control tobacco use in all its forms, including e-cigarettes.

2. What are e-cigarettes?

Electronic cigarettes (e-cigarettes) are electronic devices that heat a liquid - usually comprising propylene glycol and glycerol, with or without nicotine and flavors, stored in disposable or refillable cartridges or a reservoir - into an aerosol for inhalation. Since e-cigarettes appeared on the market in 2006, there has been a steady growth in sales [11].

Advances in technology and consumer choice have accompanied the popularity of e-cigarettes [12]. The first-generation e-cigarettes (known as cigalikes) look like traditional cigarettes, consisting of a battery, a compartment for the liquid product (e-liquid/e-juice), and an atomizer to aerosolize the liquid for inhalation. Depending on the brand, additional liquid could be added by purchasing a new e-liquid cartridge or disposing of the entire device and purchasing a new one. Second generation product (tank systems) have the advantage

of not having to buy new cartridges or new devices since they can be refilled with the user's preferred e-liquid. Third generation mods came with improved atomizers that allowed for user alteration. Accompanying the changes in devices was an increased variety in e-liquid flavors. Some e-cigarettes are made to look like regular cigarettes, cigars, or pipes. Some resemble pens, USB sticks, and other everyday items. Larger devices such as tank systems, or "mods," do not resemble other tobacco products. E-cigarettes can be used to deliver marijuana and other drugs (CDC, 2018[2]). Electronic nicotine delivery systems (ENDS) is another term used along with such terms as personal vaporizers (PVs) or vape pens.

3. Health risks of e-cigarettes

A systematic review [13] of studies investigating content of fluid/vapor of e-cigarettes concluded that e-cigarettes are a source of fine/ultrafine particles, harmful metals, carcinogenic tobacco-specific nitrosamines, volatile organic compounds, carcinogenic carbonyls (some in high but most in low/trace concentrations), which can render cytotoxicity and changed gene expression. Of special concern are compounds not found in conventional cigarettes.

Formaldehyde, which is an International Agency for Research on Cancer group 1 carcinogen, is a known degradation product of propylene glycol. This happens when propylene glycol and glycerol are heated in the presence of oxygen to temperatures reached by commercially available e-cigarettes. An e-cigarette user vaping at a rate of 3 ml per day would inhale 14.4±3.3 mg of formaldehyde per day while tobacco cigarettes produce 3 mg per pack of 20 cigarettes [14]

The e-liquid in e-cigarettes often contains flavorants. Currently, more than 7,700 unique e-cigarette flavorants are present on the market. Some flavorants contain a chemical called diacetyl, which when inhaled, can cause bronchiolitis obliterans – frequently referred to as "popcorn lung". A Harvard study found that 39 of 51 e-cigarette brands contained diacetyl [15]. In addition, two similarly harmful chemicals, pentanedione, and acetoin were found in 23 and 46 of the 51 flavorants that were tested.

E-cigarette aerosols contain a mixture of elements, including heavy metals, with concentrations higher than in conventional cigarette smoke. The elements appeared to come from the filament (nickel, chromium), thick wire (copper coated with silver), brass clamp (copper, zinc), solder joints (tin, lead), and wick and sheath (silicon, oxygen, calcium, magnesium, aluminum). The lead was identified in two brands [16].

Daily e-cigarette use was independently associated with increased odds of having had a myocardial infarction (OR=1.79) as was daily conventional cigarette smoking (OR=2.72) [17].

Experiments in cell cultures and animal studies show that e-cigarettes can have multiple negative effects. The long-term effects of e-cigarette use are unknown, and there is, therefore, no evidence that e-cigarettes are safer than tobacco in the long term [18].

E-cigarettes also affect non-users [19]. In many of the e-liquid products, there is a potentially lethal dose of nicotine. Poison control calls regarding exposure to the liquids of e-cigarettes have increased in the USA. Most of these calls were on behalf of children, who more likely to orally consume liquid nicotine resulting in harmful

[2] https://www.cdc.gov/tobacco/basic_information/e-cigarettes/about-e-cigarettes.html

consequences. The fact that e-liquid products are available in a variety of candy or fruit flavors with attractive packaging potentially increases the risk for children to be exposed.

The 2016 Surgeon General's Report [6] explored the short-term and potential long-term health effects on youth and young adults related to the initiation and continued use of e-cigarettes. Specifically, the Report states: The potential adverse health effects for youth who inhale e-cigarette aerosol include those on the body from acute administration of nicotine, flavorants, chemicals, other particulates, and additional effects, such as the following: 1) nicotine addiction, 2) developmental effects on the brain from nicotine exposure, which may have implications for cognition, attention, and mood, 3) e-cigarette influence initiating or supporting the use of conventional cigarettes and dual use of conventional cigarettes and e-cigarettes, 4) e-cigarette influence on subsequent illicit drug use, 5) e-cigarette effects on psychosocial health, particularly among youth with one or more comorbid mental health disorders, and 6) battery explosion and accidental overdose of nicotine.

In January 2018, the US National Academies of Science, Engineering, and Medicine released a consensus study report that reviewed over 800 different studies[3]. This report clearly stated: *using e-cigarettes causes health risks. It concluded that e-cigarettes both contain and emit a number of potentially toxic substances.*

4. Quitting smoking

Although some people are quitting conventional cigarettes using e-cigarettes, there is no conclusive evidence that shows e-cigarettes to be an effective means for a long-term cessation of cigarette smoking [20]. The Federal Drug Administration has not approved e-cigarettes as a quit smoking aid. Preliminary studies have shown the extent and pattern of dual-use (use of conventional cigarettes and e-cigarettes). Most adult e-cigarette users do not stop smoking cigarettes, but instead utilize both products [4].

The study [21] of the effect of "real world" ENDS use on the population quit rates among 1284 U.S. adult smokers showed that the adjusted odds of quitting smoking were lower for those that used ENDS at baseline (9.4%) compared to smokers who did not use ENDS (18.9%). Smokers who used ENDS daily at some point during the study period were also less likely to quit smoking than nonusers (AOR = 0.17).

Among Italian e-cigarette users, those (re)starting smoking after using e-cigarettes outnumber those who stop smoking after using e-cigarettes. From a public health point of view, e-cigarettes may have an unfavorable net effect [22].

5. Initiation of smoking among youth

There has been a rapid growth in ever and current e-cigarette use over the recent years. Almost a third of current users are nonsmokers, suggesting that e-cigarettes contribute to primary nicotine addiction and to renormalization of tobacco use [23]. The study based on the 2014 Tobacco Products and Risk Perceptions Survey among 5717 USA adults concluded that 10% of adult ENDS usage is among never smokers [24].

The study in Canada [25] shows that the prevalence of e-cigarette use was the highest among youth aged 15-19 years and young adults aged 20-24 years. Among youth, most e-cigarette users were never-smokers

[3] https://www.nap.edu/resource/24952/012318ecigaretteConclusionsbyEvidence.pdf
[4] https://www.cdc.gov/tobacco/basic_information/e-cigarettes/about-e-cigarettes.html

of tobacco cigarettes. As shown in a systematic review and meta-analysis of studies conducted among adolescents and young adults, e-cigarette use was associated with greater risk for both subsequent cigarette smoking initiation and past 30-day cigarette smoking [26].

6. Prevalence of e-cigarette use

In the EU, 1.5% of the population were regular e-cigarette users in 2014, which had risen to 1.8% in 2017 [27]. In 2017, 63 million Europeans aged 15 or older had ever used e-cigarettes, and 7.6 million were regular e-cigarette users. Among young people aged 15-24 years, 25% have at least tried e-cigarettes[5]. By comparison, 6% of respondents aged 55 or over have done so. Among e-cigarette users aged over 40 years old, more than 60% prefer e-cigarette with tobacco flavor, while among users aged 15-24 years old, 77% prefer non-tobacco flavor (fruit, candy, alcohol or mint).

E-cigarettes are now the most commonly used tobacco product among youth in the USA. In 2018, more than 3.6 million U.S. youth, including 1 in 5 (20.8%) high school students and 1 in 20 (4.9%) middle school students, were current users of e-cigarettes [28]. In 2015, among adult e-cigarette users overall, 58.8% also were current regular cigarette smokers, 29.8% were former smokers, and 11.4% had never been regular cigarette smokers [29]. Among current e-cigarette users aged 45 years and older in 2015, most were either current or former regular cigarette smokers, and 1.3% had never been cigarette smokers. In contrast, among current e-cigarette users aged 18–24 years, 40.0% had never been regular cigarette smokers.

7. Regulation of e-cigarettes

In 2016, 68 countries regulated e-cigarettes at the national level using a range of regulatory mechanisms including laws (new or amended), alerts, circulars, decisions, decrees, notifications, orders, ordinances, rulings and statements [30]. Among these, 22 countries regulated e-cigarettes using existing regulations; 25 countries enacted new policies to regulate e-cigarettes; 7 countries made amendments to existing legislation and 14 countries used a combination of new/amended regulations with existing regulation.

In 2018, there were 98 countries that have national/federal laws regulating e-cigarettes. These include laws related to the sale (including minimum age), advertising, promotion, sponsorship, packaging (child safety packaging, health warning labeling), product regulation (nicotine volume/concentration, safety/hygiene, ingredients/flavors), reporting/notification, taxation, use (vape-free) and classification of e-cigarettes[6].

FCTC Conference of Parties in 2016 [31] recommended that Parties that have not banned the importation, sale, and distribution of ENDS (*currently, e-cigarettes are banned in Japan, Singapore, Thailand, Uruguay and some other counties)* may consider the several regulatory options, including: (1) Banning the sale and distribution of ENDS to minors; (2) Banning the possession of ENDS by minors; (3) Banning or restricting advertising, promotion and sponsorship of ENDS; (4) Taxing ENDS at a level that makes the devices and e-liquids unaffordable to minors in order to deter their use in this age group; (5) Banning or restricting the use of flavors that appeal to minors; (6) Prohibiting by law the use of ENDS in indoor spaces or at least where smoking is not permitted; (7) Reducing the risk of accidental acute nicotine intoxication by requiring tamper-

[5] http://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/Survey/getSurveyDetail/instruments/SPECIAL/surveyKy/2146
[6] https://www.globaltobaccocontrol.org/e-cigarette_policyscan

evident/child resistant packaging for e-liquids and leak-proof containers for devices and e-liquids and limiting the nicotine concentration and total nicotine amount in devices and e-liquids; (8) Testing heated and inhaled flavourants used in the e-liquids for safety, and banning or restricting the amount of those found to be of serious toxicological concern.

8. Taxation of e-cigarettes

Imposing a tax on e-cigarette products is one strategy that could be used to limit youth access to e-cigarettes. It is expected that increasing the price of these products will dissuade a portion of youth use since they are disproportionately affected by this price increase because of their lower purchasing power. It is well established that this strategy has worked with traditional tobacco products and we can reasonably expect that it would be effective for e-cigarettes as well. Taxation not only could reduce e-cigarette use among youth but also generate revenue for the government. Taxes on tobacco have been shown to do this.

Several studies have estimated the price elasticity of e-cigarettes. Pesko et al. revealed that higher prices for e-cigarette disposable appear to be associated with reduced e-cigarette use among adolescents in the US [32, 33]. Huang et al [34] estimated own price elasticities for disposable e-cigarettes centered around −1.2, while those for reusable e-cigarettes were approximately −1.9. Research [35] conducted for six EU markets (Estonia, Ireland, Latvia, Lithuania, Sweden, and the United Kingdom) used 2011–2014 pooled time-series data on e-cigarette sales and prices. Based on static models, every 10% increase in e-cigarette prices was associated with a drop in the e-cigarettes sales of approximately 8.2%, while based on dynamic models, the drop was 2.7% in the short run and 11.5% in the long run. It should be noted that none of these 6 countries had excise taxes for e-cigarettes during the time of research, so the price changes were caused by market.

RTI, a non-profit research group from North Carolina, estimated the possible impact of increased prices of e-cigarette products on youth use rates [12]. RTI found that for every 10 percent increase in e-cigarette price, there may be a 0.8 percent to 9.1 percent decrease in the youth use rate. The range in estimates reflects the extremes in the investigated scenarios. A 0.8 percent decrease is the most conservative estimate based on studies performed among adults, who are much less sensitive to price increases than children. The 9.1 percent estimate is based on the relationship between e-cigarette price and youth use. The actual effects of a price increase will most likely fall somewhere between these two estimates. Such price elasticity means that tax-driven price increase will effectively discourage e-cigarette initiation and consumption among young people while providing the revenue, as adult e-cigarette users are less price sensitive, and most of them will pay a higher price which includes excise tax.

The diversity and continuous development of e-cigarette products (of different origins and designs) and the varied ways in which consumers use these products, make the development of taxation policy for e-cigarettes challenging. There is currently no guidance for e-cigarette taxation [36].

9. Taxation of e-cigarettes in countries and other jurisdictions

The European Commission (EC) has not established a harmonized tax for e-cigarettes among EU countries, but it allows the individual countries to impose excise taxes on e-cigarettes.[7] Information on e-cigarette taxation in the European Union countries is presented in Table 1.

Table 1. Specific excise per 1 ml of the e-cigarette liquid in the European Union countries (as of April 2019)

Country	Excise rate in local currency	*Currency exchange rate*	**Excise rate in Euro**	Comment
Finland	0,3		**0,30**	
Portugal	0,3		**0,30**	
Estonia[8]	0,2		**0,20**	
Sweden	2,0	*10,4*	**0,19**	
Slovenia	0,18		**0,18**	
Hungary	55,0	*320*	**0,17**	
Cyprus	0,12		**0,12**	
Lithuania[9]	0,12		**0,12**	
Romania	0,5	*4,75*	**0,11**	
Greece	0,1		**0,10**	
Italy	0,08		**0,08**	0,04 euro for 1 ml of liquid without nicotine[10]
Latvia[11]	0,01		**0,01**	Plus 0,05 euro per mg of nicotine
Croatia	0		**0**	
Poland	0		**0**	From 1 July 2020 - 0.5 PLN per 1 ml[12]

[7] https://ec.europa.eu/taxation_customs/sites/taxation/files/report_excise_duty_manufactured_tobacco_12012018_en.pdf
[8] https://www.emta.ee/eng/business-client/excise-duties-assets-gambling/about-excise-duties/rates-excise-duty
[9] https://finmin.lrv.lt/en/competence-areas/taxation/main-taxes/excise-duties
[10] https://www.vapingpost.com/2018/11/30/italy-celebrates-huge-reductions-in-excise-tax-on-e-liquids/
[11] https://likumi.lv/doc.php?id=81066
[12] https://vaporproductstax.com/2019/01/14/poland-maintains-products/

Some other European and Central Asian countries also introduced excise taxes for e-cigarettes (Table 2).

Table 2. Specific excise per 1 ml of the e-cigarette liquid in other European and Central Asian countries (as of April 2019)

Country	Excise rate in local currency	*Currency exchange rate*	**Excise rate in Euro**	Comment
Montenegro[13]	0,9		**0,900**	
Russia[14]	12	*73*	**0,164**	Also 48 Rubles (=0.66 euro) per 1 e-cigarette
Albania[15]	10	*125*	**0,080**	
Georgia[16]	0,2	*3,01*	**0,066**	
Serbia[17]	4,24	*118*	**0,036**	
Azerbaijan[18]	0,02	*1,9*	**0,011**	
Kazakhstan[19]	0	*425*		5 tenge (=0.012 Euro) from 1 January 2020

In the USA states, counties and cities, authorities have the right to impose taxes on e-cigarettes. Information on the current levels of taxes in some US jurisdictions is presented in Table 3.

Table 3. E-cigarette taxation in the USA [37] (as of April 2019)

State or other jurisdiction	Specific excise, USD per 1 fluid ml	State or other jurisdiction	Ad valorem excise
New Jersey	0,10	Minnesota	95% wholesale sales price
West Virginia	0,075	California	65.08% wholesale cost
Delaware	0,05	District of Columbia	65% wholesale sales price
Kansas	0,05	Pennsylvania	40% purchase price
Louisiana	0,05	U.S. Virgin Islands	45% cost price
North Carolina	0,05		
		Additional tax	
Puerto Rico	0,05	3 USD per e-cigarette device	
Chicago city[20]	1,20	1,5 USD per e-cigarette device	

[13] http://www.upravacarina.gov.me/ResourceManager/FileDownload.aspx?rid=342700&rType=2&file=Akcizni%20prilog%202019%20(v1).xlsx
[14] http://www.consultant.ru/document/Cons_doc_LAW_28165/22201a65e4f59a582714243c15b655989bd57066/
[15] http://www.qbz.gov.al/Botime/Akteindividuale/Janar%202017/Fletore%20222/LIGJ%20nr.%20108,%20date%2030.11.2017.pdf
[16] Article 188 of the Tax Code https://matsne.gov.ge/ka/document/view/1043717
[17] http://www.duvan.gov.rs/public/files/Dokumenti/Propisi/Zakoni/Zakon_o_akcizama.pdf
[18] https://cabmin.gov.az/az/document/3281/
[19] http://kgd.gov.kz/sites/default/files/UM/VD/zakon_rk_o_vveden._v_deystvie_nalogovyy_kodeks_rus.docx
[20] https://www.illinoispolicy.org/chicago-city-council-passes-e-cigarette-tax-hike/

E-cigarettes are also taxed in:

- Indonesia[21]: excise tax of 57 percent on tobacco essences used for electronic cigarettes.
- South Korea: a combination of several specific excise taxes, in total 1799 KRW (= 1.41 euro) per 1 ml of nicotine liquid and waste tax: 24.4 KRW per 20 cartridges.
- Kenya[22]: 3000 KES (=30USD) per 1 e-cigarette and 2500 KES per cartridge for use in electronic cigarettes.
- Bahrain: ad valorem excise 100% of pre-tax price or 50% of retail selling price.

Some countries (Croatia[23], Poland, and Kazakhstan) have zero tax rates. Taxpayers registered by the tax authorities to trade these products must submit periodic excise tax reports. This requirement puts in place a mechanism to facilitate tax collection and enforcement in the future. It also enables the tax authorities to monitor the developments in the e-cigarette market size, pricing and volume trends.

10. Strategies for e-cigarette taxation

The following e-cigarette products can be taxed: (1) Amount of nicotine in the product; (2) Volume of usable liquid product regardless of nicotine content; (3) E-cigarette devices or disposable e-cigarettes.

The nicotine-based taxation looks reasonable. Nicotine is the addictive ingredient in e-cigarette products, and thus a tax based on nicotine would theoretically discourage the use of the potentially more harmful high nicotine content product. This strategy may also limit switching between e-cigarette products, but not with traditional tobacco because the price difference would be lessened. Politically, therefore, a tax on nicotine, the addictive substance, may be perceived as the most palatable. However, a recent study has shown that a large proportion of adolescents start using e-cigarettes because of the flavors rather than the nicotine content [38, 39]. Also, a tax solely on the nicotine content would be difficult to enforce. Research has shown that the actual nicotine content of e-cigarette products can vary significantly from the stated amount on the container [40]. As such, it would be difficult to place a tax on the amount of nicotine when the actual amount of that ingredient may be unknown.

The nicotine-based approach also means that nicotine-free products would not be taxed, and it could cause problems both for the authorities and the consumers. For example, in South Korea, as part of the 2015 tobacco tax reforms, taxes on e-cigarettes were increased by 117 percent to 1,799 won (=1.6USD) per 1 ml. However, as tobacco excise tax being imposed according to the volume of nicotine liquid solution, this hike prompted the growth of tax avoidance by e-cigarette dealers [41]. Liquid solutions containing flavorings started to be sold separately from the nicotine solution itself, leaving users to mix the two solutions for themselves (liquid solution without nicotine is not taxable). By selling the flavored liquid solution and the nicotine solution separately sellers can avoid 95 percent of tax duties. However, it is not safe for users to perform the mixing for themselves: high nicotine solution can be very dangerous. Sales of e-cigarettes rose

[21] https://www.reuters.com/article/indonesia-tobacco-tax/indonesia-to-impose-excise-tax-on-liquids-for-e-cigarettes-idUSL3N1T71WG
[22] http://kenyalaw.org/lex/actviewbyid.xql?id=KE/LEG/EN/AR/E/NO.%2023%20OF%202015
[23] https://narodne-novine.nn.hr/clanci/sluzbeni/2016_12_115_2529.html

substantially after the 2015 tobacco tax reform as the price of e-cigarettes did not increase much despite the tax increases placed upon them due to the tax-avoiding behavior of e-cigarette dealers.

Conducted studies suggest that (a) even products marketed as nicotine-free often still contain small amounts of nicotine and (b) other constituents of e-cigarette vapor are harmful to health. Therefore, it is desirable to decrease consumption of even nicotine-free products. If they are excluded from taxation, they would be comparably less expensive. By means of encouraging the use of e-cigarettes among young people, cheaper nicotine-free products may serve a stepping stone to nicotine-based products in the future. **As a result, currently, there is a growing consensus to tax all liquids for e-cigarettes (with or without nicotine) [42].**

Taxation of usable liquid product for e-cigarettes, including nicotine-free products is used in most countries and jurisdictions (see Tables 1, 2, 3), which have e-cigarette taxation policy. In most cases, a specific (monetary) tax is applied per milliliters sold, while in Indonesia, Bahrain and some states of the US, ad valorem excise is used for the liquids. E-liquid can be either sealed by the manufacturer inside the device or sold as a separate product to be added to the device by the user. In the US, e-liquid sold by itself comes in containers of 10 ml, 30ml and more. In the European Union, according to the Tobacco Products Directive 2014/40[24]: the nicotine-containing liquid is only placed on the market (1) in dedicated refill containers not exceeding a volume of 10 ml; (2) in disposable electronic cigarettes or in single-use cartridges or tanks which do not exceed a volume of 2 ml; (3) does not contain nicotine in excess of 20 mg/ml; (4) does not contain additives listed in Article 7(6)of the Directive.

A tax on completed e-cigarette devices looks reasonable if the aim is to discourage youth from e-cigarette use as some devices can be rather expensive, and young people are price sensitive.

However, this would be more complicated if the tax is also applied to the individual parts of an e-cigarette; in such a case, the taxable products should be carefully defined. The e-cigarette industry is rapidly changing. Therefore, in designing the language for taxing the products, the legislator must be clear as to what exactly they want to tax. It would be easy to simply state that all e-cigarette products would be taxed. However, there are parts of e-cigarettes that are not exclusive to the device. For instance, many e-cigarettes use disposable and rechargeable batteries, battery chargers, and USB ports and drives. It would be inappropriate for non-exclusive products like these ones to fall under a tax on e-cigarettes. In short, the selected language needs;

• to clearly state what constitutes an e-cigarette product;

• to specifically exclude batteries, battery chargers, and charging cords from the taxation; and

• to include batteries, chargers, and charging cords if they are sold together with an e-cigarette product or if they are packaged together as one saleable item [43].

As devices are bought less frequently than the e-liquid, it may be the case that a tax on devices would have little effect on those already using the product; however, it could be effective to prevent the use initiation.

[24] https://ec.europa.eu/health/sites/health/files/tobacco/docs/dir_201440_en.pdf

Specific excise tax on e-cigarette devices is already paid in the Russian Federation, Kenya, Puerto Rico, and Chicago. In Bahrain and US states California, Minnesota, and Pennsylvania as well as District Columbia and U.S. Virgin Islands, the e-cigarette devices are taxed by ad valorem excise with the same percentage rates as e-cigarette liquids.

11. E-cigarette taxation revenue

Excise tax for cigarettes is a new source of revenues, which can be also considered as a replacement source for declining tobacco tax revenues as tobacco consumption declines in many countries.

Data on revenues in those jurisdictions which introduced excise taxes for e-cigarettes are rather limited. They revealed that e-cigarettes excise revenue is very small compared with excise revenue from traditional tobacco products. For example, in California in the 2017-2018 fiscal year, taxation of e-cigarettes generated 32 million USD out of the total cigarette and other tobacco product revenue of about 2.1 billion USD [36].

However, the dynamic on annual revenues in those jurisdictions, which introduced excise taxes for e-cigarettes, is positive. In Minnesota, such revenue increased from 4 million USD in 2014 to 7 million in 2017. In North Carolina, Vapor Gross Collections in July 2015-June 2016 were 2.95 million USD and in July 2016-June 2017 3.693 million USD and continued to increase in the first months of the next financial year [36].

In the Russian Federation, taxation for e-cigarettes was introduced in January 2017, and in January 2018 the rates were increased by 10%. According to the Russian Treasury reports[25]. The total revenue from taxes on e-cigarettes and liquids for e-cigarettes increased from 85 million rubles in 2017 to 152 million rubles in 2018. Total revenue from the traditional tobacco products was much higher: 588.5 billion rubles in 2018. But in 2017, it was 591.4 billion rubles. So, taxes for e-cigarettes partly compensated the decline of traditional tobacco tax revenues as tobacco consumption in the country continues to decline, and the increase of the excise rate for combustible cigarettes in 2018 in the Russian Federation was rather small.

12. E-cigarette tax administration

When introducing the taxation for e-cigarettes, policymakers should carefully consider [2] the following: 1) the definition of the taxable product and which items will be included under the tax; 2) at what point in the distribution chain will the tax be collected, and how; 3) select a tax rate that maximizes the potential health benefits and additional tax revenue; and 4) how to increase the capacity to ensure tax compliance.

To determine how to tax e-cigarettes, authorities must first determine how to classify them. Most US states classify e-cigarettes as a tobacco product [36]. An argument can be made that an e-cigarette tax would not be a new tax but an extension of the “other tobacco” tax for a new tobacco product.

Definitions separating e-cigarettes from other tobacco products are common. Like past 'Trojan Horse' policies, e-cigarette policies that initially appear to restrict sales (e.g., limit youth access) may undermine regulation if they establish local pre-emption or create definitions that divide e-cigarettes from other tobacco

[25] http://www.roskazna.ru/ispolnenie-byudzhetov/federalnyj-byudzhet/1020/

products. Comparable issues are raised by the European Union Tobacco Products Directive and e-cigarette regulations in other countries. Policymakers should carefully draft legislation with definitions of e-cigarettes that broadly define the products, do not require nicotine or tobacco, do not pre-empt stronger regulations and explicitly include e-cigarettes in smoke-free and taxation laws [44].

Given the evidence to date, e-cigarettes should be classified by the Harmonized System (HS) Code "2403[26] [27] - *Other manufactured tobacco and manufactured tobacco substitutes; "homogenized" or "reconstituted" tobacco; tobacco extracts and essences"*. E-cigarette devices can be classified as "manufactured tobacco substitutes" and liquids for e-cigarettes as "tobacco extracts and essences" because most nicotine contained in e-liquids is extracted from tobacco.

In the European Union, e-cigarettes products are regulated by the Tobacco Products Directive[28]. Estonia, in its legislation, calls liquids for e-cigarettes "Tobacco liquid" and include them into section "Tobacco products"[29]. Azerbaijan included liquids for e-cigarettes into the taxation act with HS code 2403. However, in some countries (Georgia, Kazakhstan and Montenegro), liquids for e-cigarettes are included into the Tax laws with the HS code 3824[30]: *Prepared binders for foundry moulds or cores; chemical products and preparations of the chemical or allied industries (including those consisting of mixtures of natural products), not elsewhere specified or included*.

E-cigarette devices are often included into trade statistics with the HS code 8543[31] *Electrical machines and apparatus, having individual functions, not specified or included elsewhere in this chapter*. For example, in the Harmonized Tariff Schedule of the United States[32], it is written: *For the purposes of statistical reporting numbers 8543.70.9930, 8543.70.9940, 8543.90.8850, and 8543.90.8860, the term "personal electric or electronic vaporizing devices" are devices that electrically heat or atomize liquids or other substances, whether containing nicotine, producing a vapor to be inhaled through the mouthpiece. These devices are commonly known as electronic cigarettes, "e-cigarettes", "e-hookahs", "e-pipes", vaporizers or "vaping" systems."* Such an HS code makes difficult to include e-cigarette devices into the excise taxation law, and it would be better to have a special sub-category "*manufactured tobacco substitutes"* within HS code 2403.

In 2012, the Department of Revenue of Minnesota issued a revenue notice stating that because e-cigarettes are a "product containing, made, or derived from tobacco" and intended for consumption, they fell under the definition of "other tobacco products" [36]. As a result, they are now taxed at the same rate. In California, e-cigarette products were also included in the definition of "other tobacco products".

Every state in the United States but one that currently levies a tax on e-cigarettes. Also, retailers are required to be licensed. Thus considering taxing the benefits and costs of licensing of e-cigarette retailers should be weighted [42].

[26] http://wits.worldbank.org/data/public/HSProducts.xls
[27] https://hts.usitc.gov/view/Chapter%2024?release=2019HTSARev2
[28] https://ec.europa.eu/health/sites/health/files/tobacco/docs/dir_201440_en.pdf
[29] https://www.emta.ee/eng/business-client/excise-duties-assets-gambling/about-excise-duties/rates-excise-duty
[30] https://hts.usitc.gov/view/Chapter%2038?release=2019HTSARev2
[31] https://hts.usitc.gov/view/Chapter%2085?release=2019HTSARev2
[32] https://hts.usitc.gov/current

If e-cigarette devices and liquids are classified as tobacco products with HS code 2403, it makes tax administration much easier in those countries, where a license is required for tobacco production, wholesale and/or retail sale. Those who already have a license for tobacco products will not need to buy another license to sell e-cigarettes. However, those who sell only e-cigarettes should buy tobacco license; otherwise, many producers and sellers can avoid paying e-cigarette tax. To control e-cigarette tax payments, when they are not treated like tobacco products, a special reporting system and tax force should be established with additional personnel. In such a case, costs of enforcement can exceed potential tax payments. The enforcement costs will be much lower if the current tobacco excise enforcement system will be used for e-cigarette taxation as well.

Other basic questions must also be addressed in relation to tax administration. For example, in what element of the supply chain—manufacturer, wholesale, or retail—the tax is levied. For example, in state Louisiana, the tax is due from the dealer who first sells, uses, consumes, handles or distributes the product in the state of Louisiana. For traditional tobacco products, that is usually the wholesaler, but in some instances, it can be the manufacturer or the retail dealer receiving the product who is responsible for remitting the tax. If e-cigarette products are received from someone other than a Louisiana Authorized Tobacco Wholesaler. **In most countries, the excise for traditional tobacco products is usually paid by producers and importers of such products and such practice can be used for licensed producers and importers of e-cigarette products.**, the purchaser is responsible for the tax [36].

However, as e-liquid can be readily manufactured by an individual, a tax could be easily avoided. So compliance checks of retailers, vape shops to determine if taxes have been paid should be conducted with untaxed products subject to seizure [45].

13. Conclusions and recommendations

1. Imposing a tax on e-cigarette products could limit youth access to these harmful products and reduce e-cigarette use initiation and consumption.
2. Taxation should be applied to all e-cigarette products because this strategy would likely have the greatest effect on the youth e-cigarette use. It also has the potential for generating the most revenue. A specific tax could be applied to e-liquids and an ad valorem tax to devices. The mixed taxation could help in maintaining the equality of tax across products and therefore increasing its political palatability.
3. All e-cigarette products should be classified as “tobacco products” and covered by the HS code 2403: e-cigarette devices as “manufactured tobacco substitutes” and liquids for e-cigarettes as tobacco extracts and essences.
4. All kinds of liquids for e-cigarettes should be taxed, regardless of nicotine content, including nicotine-free liquids.
5. It should be noted that high taxes for e-cigarette products could encourage switching to traditional tobacco products. However, this unintended consequence could be reduced by also increasing the tax on all other tobacco products.
6. Effectiveness of taxation policies can be increased by implementing other regulatory policies to e-cigarettes in line with the FCTC COP recommendations.

References

1. Maheshwari, S. The New York Times. “Why Tobacco Companies Are Paying to Tell You Smoking Kills”. Story published on November 24, 2017, https://www.nytimes.com/2017/11/24/business/media/tobacco-companies-ads.html
2. U.S. Department of Health, Education, and Welfare. 1964. Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service. Washington: U.S. Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, 1964. PHS Publication No. 1103.U.S. Department of Health, Education. https://profiles.nlm.nih.gov/ NN/B/C/F/T/_/nnbcft.pdf.
3. U.S. Department of Health and Human Services. 2014. “The Health Consequences of Smoking: 50 Years of Progress. A Report of the Surgeon General.” Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014. Printed with corrections, January. https://www. surgeongeneral.gov/library/reports/50-years-ofprogress/full-report.pdf.
4. BBC. “Holy smoke: Vatican bans duty-free cigarette sales”. Story published online on November 9, 2017, https://www.bbc.com/news/amp/world-europe-41933527.
5. Dinakar, Ch. and O’Connor, G.T. 2016. “The Health Effects of Electronic Cigarettes”. 2016. N Engl J Med 375:1372-1381. DOI: 10.1056/NEJMra1502466.
6. U.S. Department of Health and Human Services. 2016. “E-Cigarette Use Among Youth and Young Adults. A Report of the Surgeon General”. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2016.
7. FDA. “FDA's Deeming Regulations for E-Cigarettes, Cigars, and All Other Tobacco Products”, https://www.fda.gov/tobaccoproducts/labeling/rulesregulationsguidance/ucm394909.htm.
8. Oppel and Geller, M. “EU's highest court upholds restrictive new law on cigarettes”. Reuters story published online on May 4, 2016, https://www.reuters.com/article/us-eu-court-tobacco/eus-highest-court-upholds-restrictive-new-law-on-cigarettes-idUSKCN0XV0MB.
9. Fleck, F. 2014. "Countries vindicate cautious stance on e-cigarettes". Bull World Health Organ 92:856–857| doi: http://dx.doi.org/10.2471/BLT.14.031214.
10. Marquez, P. V., and B. Moreno-Dodson, eds. 2017. Tobacco tax reform at the crossroads of health and development: technical report of the World Bank Group global tobacco control program (Vol. 2): Main report (English). Washington, D.C.: World Bank Group. http://documents.worldbank.org/curated/en/491661505803109617/Main-report

11. McRobbie, H., et al., *Electronic cigarettes for smoking cessation and reduction.* Cochrane Database Syst Rev, 2014(12): p. Cd010216.
12. Utah Department of Health. *E-cigarette Taxation in Utah. A description of options. White Paper. May 2017*. 2017; Available from: http://www.tacenters.emory.edu/documents/netconference_docs/SE2018/0426218_E-Cigarette%20Taxation%20in%20Utah_Webinar.pdf.
13. Pisinger, C. and M. Dossing, *A systematic review of health effects of electronic cigarettes.* Prev Med, 2014. **69**: p. 248-60.
14. Jensen, R.P., et al., *Hidden formaldehyde in e-cigarette aerosols.* N Engl J Med, 2015. **372**(4): p. 392-4.
15. Allen, J.G., et al., *Flavoring Chemicals in E-Cigarettes: Diacetyl, 2,3-Pentanedione, and Acetoin in a Sample of 51 Products, Including Fruit-, Candy-, and Cocktail-Flavored E-Cigarettes.* Environmental Health Perspectives, 2016. **124**(6): p. 733-739.
16. Williams, M., et al., *Elements including metals in the atomizer and aerosol of disposable electronic cigarettes and electronic hookahs.* PLoS One, 2017. **12**(4): p. e0175430.
17. Alzahrani, T., et al., *Association Between Electronic Cigarette Use and Myocardial Infarction.* Am J Prev Med, 2018. **55**(4): p. 455-461.
18. Bals, R., et al., *Electronic cigarettes: a task force report from the European Respiratory Society.* Eur Respir J, 2019. **53**(2).
19. U.S. Department of Health and Human Services. *2016 Surgeon General's Report: E-Cigarette Use Among Youth and Young Adults*. 2016 Available from: https://www.cdc.gov/tobacco/data_statistics/sgr/e-cigarettes/index.htm.
20. Caraballo, R.S., et al., *Quit Methods Used by US Adult Cigarette Smokers, 2014-2016.* Prev Chronic Dis, 2017. **14**: p. E32.
21. Weaver, S.R., et al., *Are electronic nicotine delivery systems helping cigarette smokers quit? Evidence from a prospective cohort study of U.S. adult smokers, 2015-2016.* PLoS One, 2018. **13**(7): p. e0198047.
22. Liu, X., et al., *Electronic cigarettes in Italy: a tool for harm reduction or a gateway to smoking tobacco?* Tob Control, 2019.
23. McMillen, R.C., et al., *Trends in Electronic Cigarette Use Among U.S. Adults: Use is Increasing in Both Smokers and Nonsmokers.* Nicotine Tob Res, 2015. **17**(10): p. 1195-202.
24. Weaver, S.R., et al., *Use of electronic nicotine delivery systems and other tobacco products among USA adults, 2014: results from a national survey.* Int J Public Health, 2016. **61**(2): p. 177-88.
25. Reid, J.L., et al., *Who is using e-cigarettes in Canada? Nationally representative data on the prevalence of e-cigarette use among Canadians.* Prev Med, 2015. **81**: p. 180-3.
26. Soneji, S., et al., *Association Between Initial Use of e-Cigarettes and Subsequent Cigarette Smoking Among Adolescents and Young Adults: A Systematic Review and Meta-analysis.* JAMA Pediatr, 2017. **171**(8): p. 788-797.
27. Laverty, A.A., et al., *E-cigarette use and support for banning e-cigarette use in public places in the European Union.* Prev Med, 2017. **105**: p. 10-14.
28. Cullen, K.A., et al., *Notes from the Field: Use of Electronic Cigarettes and Any Tobacco Product Among Middle and High School Students - United States, 2011-2018.* MMWR Morb Mortal Wkly Rep, 2018. **67**(45): p. 1276-1277.

29. *QuickStats: Cigarette Smoking Status* Among Current Adult E-cigarette Users,(dagger) by Age Group - National Health Interview Survey,(section sign) United States, 2015.* MMWR Morb Mortal Wkly Rep, 2016. **65**(42): p. 1177.
30. Kennedy, R.D., et al., *Global approaches to regulating electronic cigarettes.* Tob Control, 2017. **26**(4): p. 440-445.
31. Conference of the Parties to the WHO Framework Convention on Tobacco Control. *Electronic Nicotine Delivery Systems and Electronic Non-Nicotine Delivery Systems (ENDS/ENNDS)*. 2016; Available from: https://www.who.int/fctc/cop/cop7/FCTC_COP_7_11_EN.pdf.
32. Pesko, M.F., et al., *The effect of potential electronic nicotine delivery system regulations on nicotine product selection.* Addiction, 2016. **111**(4): p. 734-44.
33. Pesko, M.F., et al., *E-cigarette price sensitivity among middle- and high-school students: evidence from monitoring the future.* Addiction, 2018. **113**(5): p. 896-906.
34. Huang, J., J. Tauras, and F.J. Chaloupka, *The impact of price and tobacco control policies on the demand for electronic nicotine delivery systems.* Tob Control, 2014. **23 Suppl 3**: p. iii41-7.
35. Stoklosa, M., J. Drope, and F.J. Chaloupka, *Prices and E-Cigarette Demand: Evidence From the European Union.* Nicotine Tob Res, 2016. **18**(10): p. 1973-1980.
36. Louisiana Department of Health. *Health Impacts and Taxation of Electronic Cigarettes*. 2018; Available from: http://ldh.la.gov/assets/docs/LegisReports/HR155RS2017ecigarettes12018.pdf.
37. Tobacco Control Legal Consortium. *US E-Cigarette Regulation: A 50-State Review*. St. Paul MN: Public health law center 2018; Available from: https://publichealthlawcenter.org/sites/default/files/E-Cigarette-Legal-Landscape-50-State-Review-December-2018.pdf.
38. Zare, S., M. Nemati, and Y. Zheng, *A systematic review of consumer preference for e-cigarette attributes: Flavor, nicotine strength, and type.* PLoS One, 2018. **13**(3): p. e0194145.
39. National Institute on Drug Abuse. *Monitoring the Future Results*. 2016; Available from: http://www.drugabuse.gov/related-topics/trends-statistics/monitoring-future.
40. Cheng, T., *Chemical evaluation of electronic cigarettes.* Tob Control, 2014. **23 Suppl 2**: p. ii11-7.
41. World Bank Group. *Reducing Tobacco Use through Taxation: The Experience of the Republic of Korea*. 2018; Available from: http://documents.worldbank.org/curated/en/150681529071812689/pdf/127248-WP-PUBLIC-ADD-SERIES-WBGTobaccoKoreaFinalweb.pdf.
42. Fruits, E. *Vapor products, harm reduction, and taxation. Principles, evidence, and a research agenda*. 2018; Available from: https://laweconcenter.org/wp-content/uploads/2018/10/Harm-Reduction-White-Paper-v9.1-181001.pdf.
43. Tobacco Control Legal Consortium. *E-cigarette taxation: Frequently asked questions*. St. Paul MN: Public health law center 2015; Available from: http://publichealthlawcenter.org/sites/default/files/resources/tclcfs-ecig-taxation-2015.pdf.
44. Lempert, L.K., R. Grana, and S.A. Glantz, *The importance of product definitions in US e-cigarette laws and regulations.* Tob Control, 2016. **25**(e1): p. e44-51.
45. Chaloupka, F.J. *Taxing E-Cigarettes – Options & Potential Impact*. 2015; Available from: https://knowledgecenter.csg.org/kc/system/files/Chaloupka.pdf.