

# **The Potential Impact of E-Cigarettes on the Death Toll of Smoking in Selected FSU Countries**

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*September 14, 2023*

**Disclosure:**

Study is produced by the team of NGO “Healthy Initiatives” with the help of a grant from the Foundation for a Smoke-Free World, Inc. (FSFW), a U.S. nonprofit 501(c) (3) private foundation. This study is, under the terms of the grant agreement with FSFW, editorially independent of FSFW. The contents, selection, and presentation of facts, as well as any opinions expressed herein are the sole responsibility of the authors and under no circumstances shall be regarded as reflecting the positions of FSFW. FSFW had no role in the planning or execution of this study, data analysis, or publication of results.

# The Potential Impact of E-Cigarettes on the Death Toll of Smoking in Selected FSU Countries



## Objective

- Estimate the life-saving potential of e-cigarettes (vaping)

## Motivation

- **Regulatory framework of HRPs:** Georgia, Ukraine and Russia implement the policy of equally regulating and taxing combustible cigarettes and any other nicotine-containing products without considering health risks degree associated with the use of these products.
- **Prevalence:** Smoking prevalence is high (more than 26%), while use of e-cigarettes and heated tobacco products is low (less than 3%).
- **Attitudes toward HRPs:** Most of the population thinks that e-cigarettes are more harmful than combustible cigarettes. The public opinion is influenced by the official position of policy makers.
- **Novelty:** The unique contribution of the present study is that it is the first attempt to estimate the potential impact of e-cigarettes on the death toll of cigarette smoking in Georgia, Russia and Ukraine.

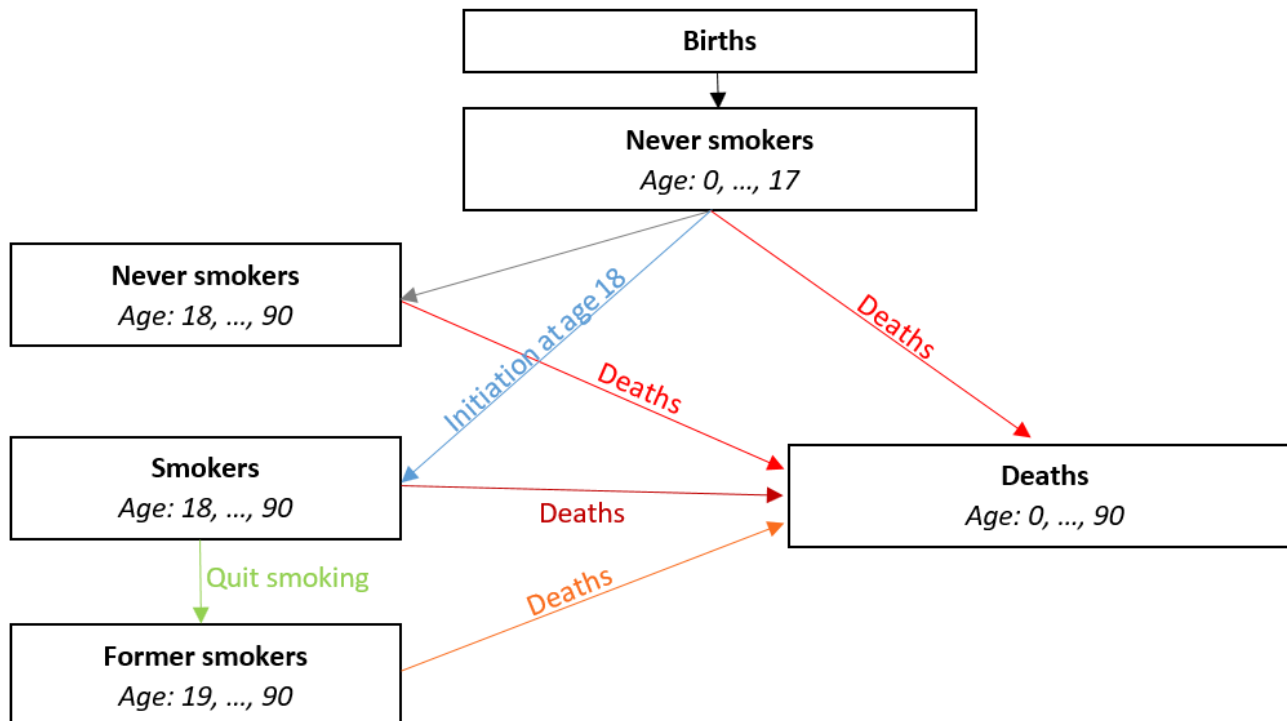
# The Potential Impact of E-Cigarettes on the Death Toll of Smoking in Selected FSU Countries



## Methodology

- **Simulation analysis** (Mendez et al., 1998, Mendez & Warner, 2021).
- For each country we built the **dynamic population simulation model** tailored specifically towards tobacco control policy analysis.

### Schematic representation of the model



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## Methodology

### *Reference scenarios:*

- 1. A status-quo scenario:* no e-cigarette use and maintaining smoking initiation and cessation rates at baseline year's level for following 80 years;
- 2. A never-smoking scenario:* no one ever smoked, no one smoke in the baseline year or will smoke in the future.

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## Methodology

### *E-cigarette scenarios:*

#### *Applied assumptions*

Variable	Values
1. Impact of vaping on smoking <b>initiation</b> rate	Increase background rate by 0% or 10%.
2. Impact of vaping on smoking <b>cessation</b> rate	Increase background rate by 10%, 25%, 50%, 100%, or 200%.
3. <b>Health risk of vaping</b> for former smokers (e-quitters)	E-quitters have an elevated mortality risk (by 0%, 5%, 10%, or 20%) compared to smokers who quit without vaping.
4. Relationship between background smoking cessation rate and age	Rate rises with age by 1%, constant across ages, or falls with age by 1%.

- The combination of these assumptions resulted in 120 e-cigarettes scenarios.
- The difference between these scenarios and status-quo scenario for each year provides that year's estimated LYS or LYL due to vaping.
- Cumulative LYS or LYL for the full 80 years are calculated by adding these annual estimates.

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## Data

The population for the baseline year by age, sex, and smoking status:

- Detailed demographic data obtained from national statistics offices.
- Our estimates of sex- and age-specific smoking prevalence from microdata:
  - *STEPS 2016 for Georgia,*
  - *GATS 2017 for Ukraine,*
  - *RLMS 2019 for Russia.*

Smoking initiation and cessation rates by sex from microdata:

- Smoking initiation rates - the proportion of current smokers in the population aged 18.
- Smoking cessation rates - the proportion of people who stopped smoking within the year and do not currently smoke.

Sex- and age-specific death rates by smoking status:

- Existing estimates of relative risk for adult mortality from smoking-related diseases by smoking status in the US (from Cancer Prevention Study II);
- Sex-, age-, and disease-specific mortality data from national statistics offices

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## Results

- 3,800 people in Georgia, 211,000 - in Russia and 63,000 – in Ukraine die prematurely from smoking annually.
- Out of 120 e-cigarette scenarios only 4 scenarios in the case of Russia showed negative LYS, while all e-cigarette scenarios implied only positive results for Georgia and Ukraine.
- E-cigarettes help to gain the most life-years in Georgia - 30.3% of LYL due to smoking. Considerable reduction in smoking-related LYL is achieved also in Russia (22.3%) and Ukraine (19%).

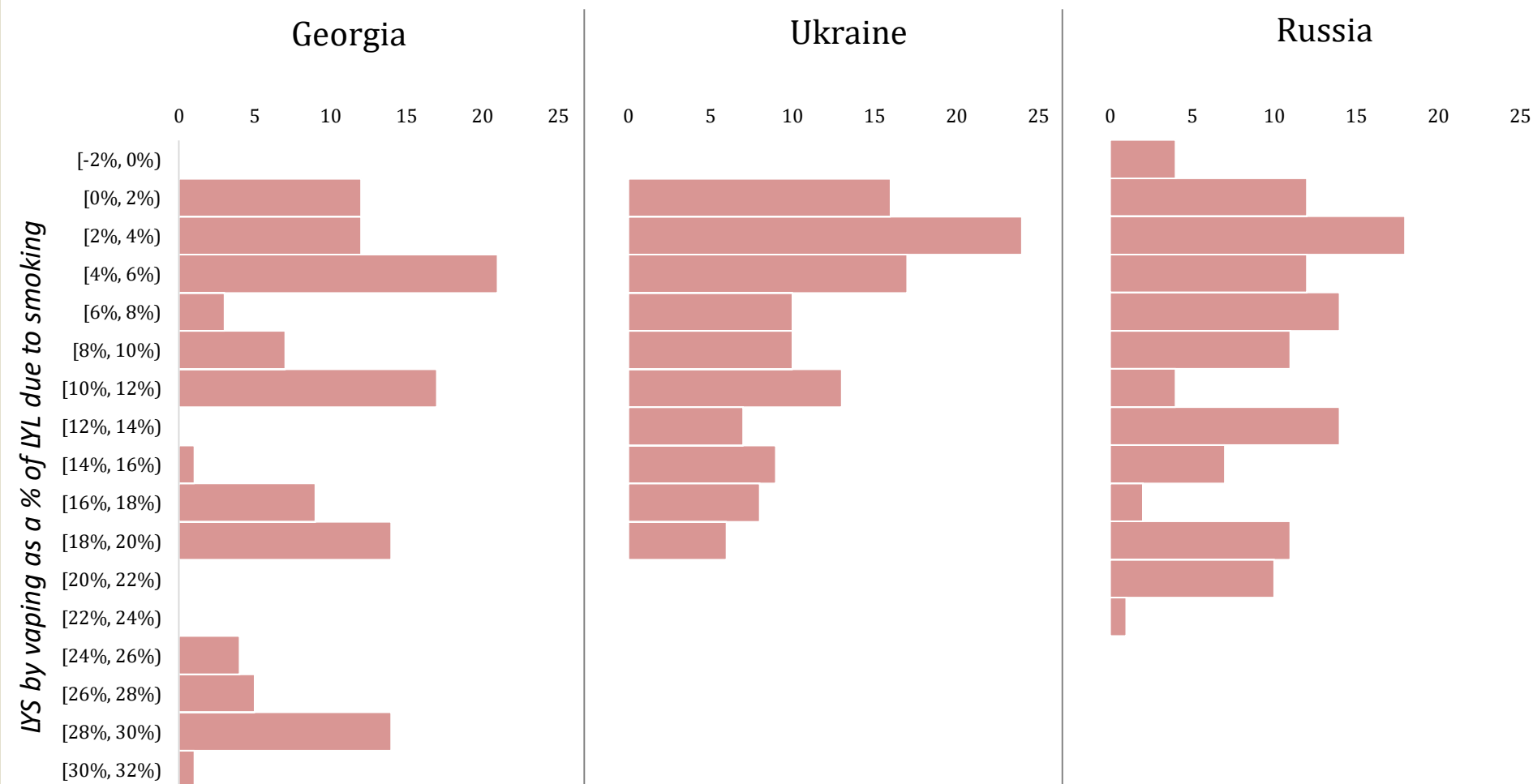
Country	Indicator	Min value	Max value
Georgia	LYS (in millions)	0.044	0.851
	LYS by vaping as a share of LYL due to smoking	<b>1.6%</b>	<b>30.3%</b>
	Number of scenarios with positive LYS	120	
Russia	LYS (in millions)	-0.477	40.767
	LYS by vaping as a share of LYL due to smoking	<b>-0.3%</b>	<b>22.3%</b>
	Number of scenarios with positive LYS	116	
Ukraine	LYS (in millions)	0.222	10.497
	LYS by vaping as a share of LYL due to smoking	<b>0.4%</b>	<b>19.0%</b>
	Number of scenarios with positive LYS	120	



# The Potential Impact of E-Cigarettes on the Death Toll of Smoking in Selected FSU Countries



## Results: Distribution of e-cigarette scenarios by LYS ranges



# Results: most plausible e-cigarette scenarios



## Selected e-cigarette scenarios

Variable	Values
1. Impact of vaping on smoking initiation rate	Increase background rate by <b>0%</b>
2. Impact of vaping on smoking cessation rate	Increase background rate by 10%, <b>25%</b> , or 50%
3. Health risk of vaping for former smokers	E-quitters have an elevated mortality risk by <b>5%</b> or 10%
4. Relationship between background smoking cessation rate and age	<b>Constant</b> across ages

## Results for selected e-cigarette scenarios (cumulative over 80 years)

Vaping risk	Cessation increase due to vaping	Georgia		Ukraine		Russia	
		LYS by vaping as a % of LYL due to smoking	Share of E-quitters in all quitters	LYS by vaping as a % of LYL due to smoking	Share of E-quitters in all quitters	LYS by vaping as a % of LYL due to smoking	Share of E-quitters in all quitters
5%	10%	<b>2.4%</b>	3.0%	<b>1.5%</b>	2.6%	<b>1.9%</b>	3.3%
	25%	<b>5.9%</b>	6.8%	<b>3.7%</b>	6.2%	<b>4.6%</b>	7.7%
	50%	<b>10.9%</b>	12.1%	<b>6.7%</b>	11.4%	<b>8.3%</b>	14.1%
10%	10%	<b>2.3%</b>	2.9%	<b>1.5%</b>	2.6%	<b>1.9%</b>	3.2%
	25%	<b>5.6%</b>	6.7%	<b>3.5%</b>	6.1%	<b>4.5%</b>	7.6%
	50%	<b>10.5%</b>	11.9%	<b>6.5%</b>	11.2%	<b>8.1%</b>	13.9%

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## Conclusions

- Our research demonstrates that vaping has the **significant potential to reduce smoking death** toll in these countries: vaping potentially may save up to 30.3% (in the most optimistic scenario) of the LYL due to smoking.
- Existing policies discourage smokers from using e-cigarettes as an alternative to combustible cigarettes. This reduces the amplitude of possible impacts of vaping on smoking cessation and the chances of achieving the full life-saving potential of e-cigarettes.
- Considering the existing policies towards HRPs, vaping will most probably help to save from **1.5% to 2.4%** of LYL due to cigarette smoking.

# **Illicit Cigarette Market in Georgia: Potential Impacts on Smoking Prevalence and Tax Revenues**

*Author: Giorgi Mzhavanadze*

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# Research objectives



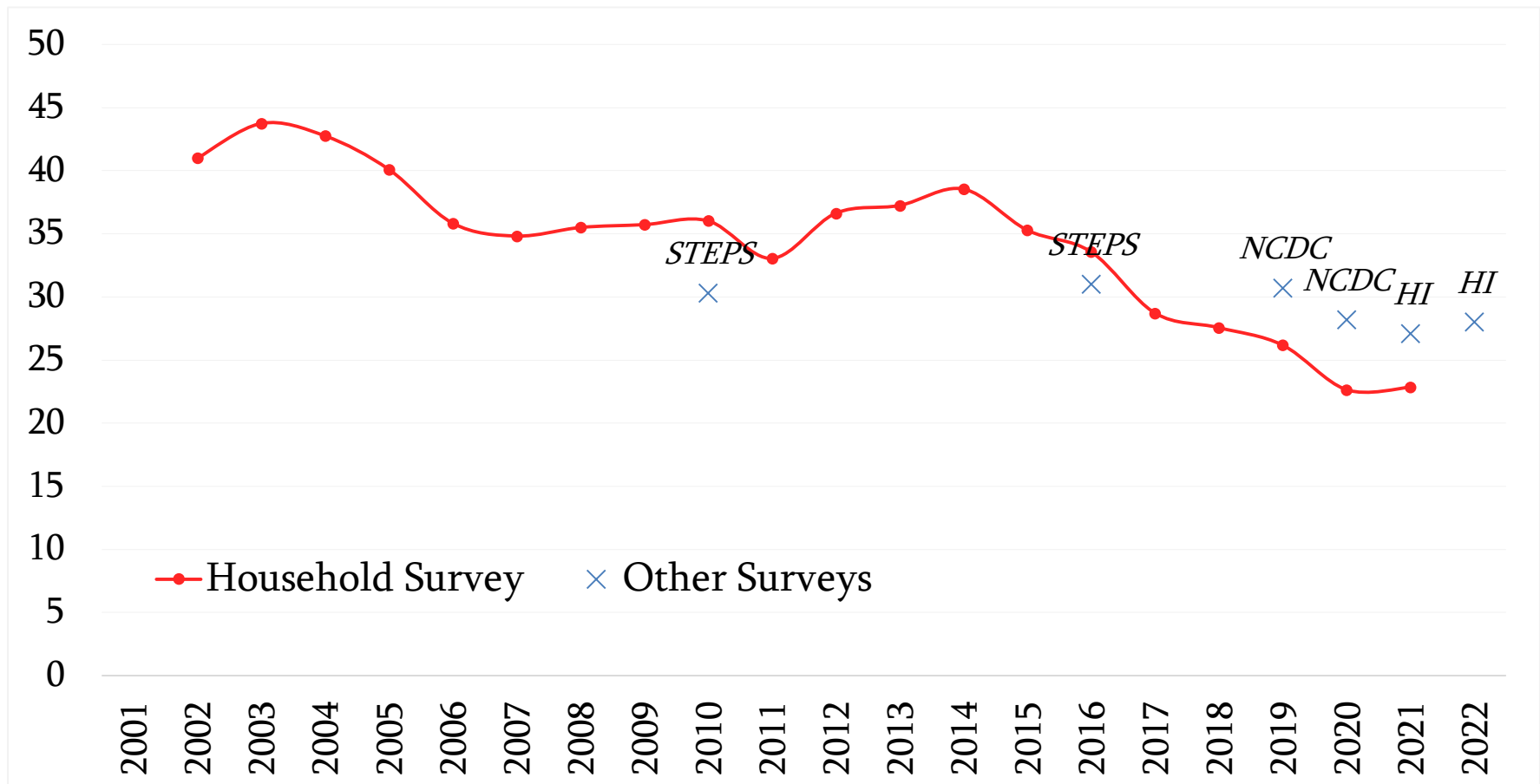
- Estimate the **size of the illicit cigarette market in Georgia**;
- Assess the potential impact of its full elimination on public health, including the **number of smokers and cigarettes consumption**;
- Evaluate the potential impact of its full elimination on **excise tax collection**.

- Smoking prevalence in Georgia is **31%, with 57% of men and 7% of women** reporting smoking (STEPS 2016).
- Smoking imposes a significant number of tobacco-related deaths, with **11,400 people dying annually** from smoking-related illnesses (NCDC Georgia, UNDP, 2018).
- Smoking has a substantial negative economic impact, costing Georgia an estimated **2.4% of the country's annual GDP** (NCDC Georgia, UNDP, 2018).
- To address the issue of high smoking prevalence Georgia has more than **doubled excise taxes** on cigarettes in the period of 2017-2019.
- Consequently, the **price difference** between licit and illicit cigarettes reached 79% in 2019 increasing the incentives for smuggling activities (Little et al., 2023).
- Increased smuggling could blunt the public health benefits of Georgia's tax hikes and create **socially costly illegal cigarette markets**.
- **No research** has been conducted to estimate the impact of these taxation measures on the illicit cigarette market, as well as their effects on smoking rates and tax revenues in the country.

# Background



## Smoking prevalence among adult population in Georgia (in %)



Source: Author's estimations based on IHS, Healthy Initiatives, NCDC Georgia, WHO



# Methodology: Estimation of illicit cigarette market



- To estimate the size of illicit cigarette market in Georgia we used **gap analysis** method (National Research Council and Institute of Medicine, 2015);

$$\textit{Illicit Cigarettes}_t = \textit{Cigarette Consumption}_t - \textit{Legal Sales}_t$$

- Legal cigarette sales are measured based on data on trade and production of cigarettes:

$$\textit{Legal Sales}_t = \textit{Prod}_t - \textit{Ex}_t + \textit{Im}_t$$

- To account for potential forestalling effects, we used a 3-year average of estimated legal sales.

# Methodology: Estimation of illicit cigarette market



- Cigarette consumption is estimated based on data on self-reported consumption from Georgian Integrated Household Surveys (IHS):
  - The IHS is an annual household survey, which comprises a stratified random sample of about 10 thousand households.
  - IHS collects information on more than 400 goods and services consumed by households.
  - Consumption data on three types of tobacco products is collected:
    1. Filtered cigarettes (in GEL, in packs or sticks)
    2. Non-filtered cigarettes (in GEL, in packs or sticks)
    3. RYO tobacco (in GEL, in grams or kilograms)
- The estimated self-reported consumption is then adjusted by an "**uplift factor**" to account for underreporting of cigarette consumption (National Research Council and Institute of Medicine, 2015);
- An uplift factor of **1.22** is used, based on the estimated difference between self-reported and cotinine-detected smoking status among adults in Georgia in 2016 (Williams et al., 2020).

# Methodology: Estimation of impacts on consumption and tax revenues



Smokers may respond to the complete elimination of the illicit cigarette market in different ways (Goodchild et al., 2022):

- **Pathway 1:** Switch to licit factory-made cigarettes and therefore face higher prices

$$\Delta \text{Cigarette Consumption}_t = \text{Illicit Cigarettes}_t * \text{Elasticity} * \frac{(P_{\text{legal}_t} - P_{\text{illegal}_t})}{P_{\text{illegal}_t}}$$

$$\Delta \text{Cigarette smokers}_t = \Delta \text{Smoking intensity}_t = 0.5 * \Delta \text{Cigarette Consumption}_t$$

- **Pathway 2:** Switch to licit products with similar prices or turn to cheaper alternatives (RYO)

$$\Delta \text{Cigarette Consumption}_t = 0$$

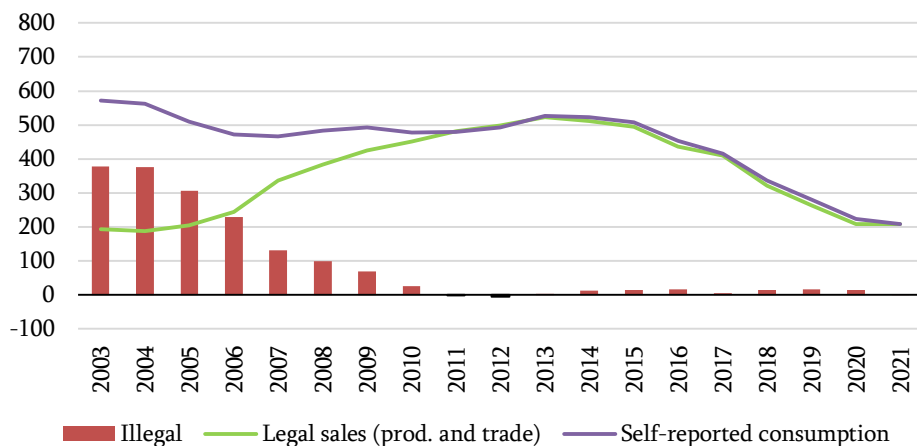
The gain in tax revenues through the increase in legal cigarette consumption:

$$\Delta \text{Excise tax collection}_t = \Delta \text{Legal sales}_t * \text{Excise tax}_t$$

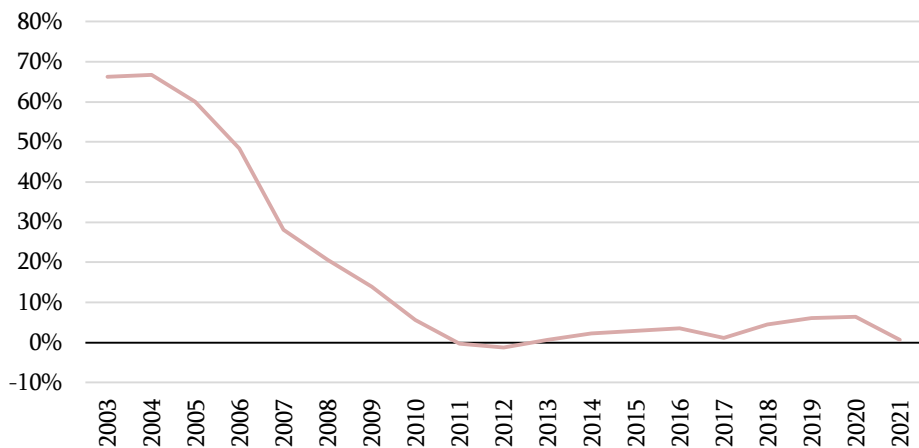
$$\Delta \text{Legal sales}_t = \text{Illicit Cigarettes}_t * \left(1 + \text{Elasticity} * \frac{(P_{\text{legal}_t} - P_{\text{illegal}_t})}{P_{\text{illegal}_t}}\right)$$

# Results: Size of illicit cigarette market

**Illicit cigarette market (in mln packs)**



**Illicit cigarette market (as % of total cigarette market)**

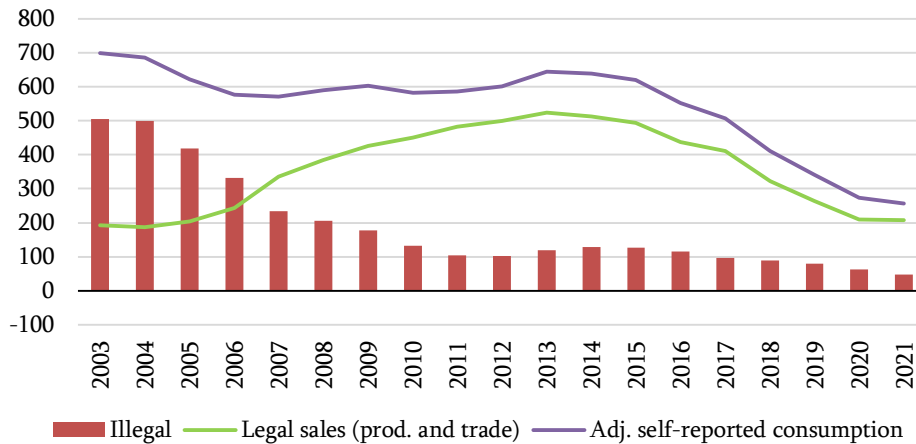


- In 2003-2006 Illicit cigarette market size varied between 48%-67%;
- After 2006 illicit market size started to decline reaching nearly 0% in 2010. In 2010-2016 it varied between 1-7%;
- Estimated illicit cigarette market only slightly elevated after excise tax increases in 2017-2019;
- In 2020 and 2021, illicit cigarette market is estimated at 6% and 1% respectively;
- In some years, estimated illicit market is negative pointing out to underreporting of self-reported consumption or forestalling by industry.

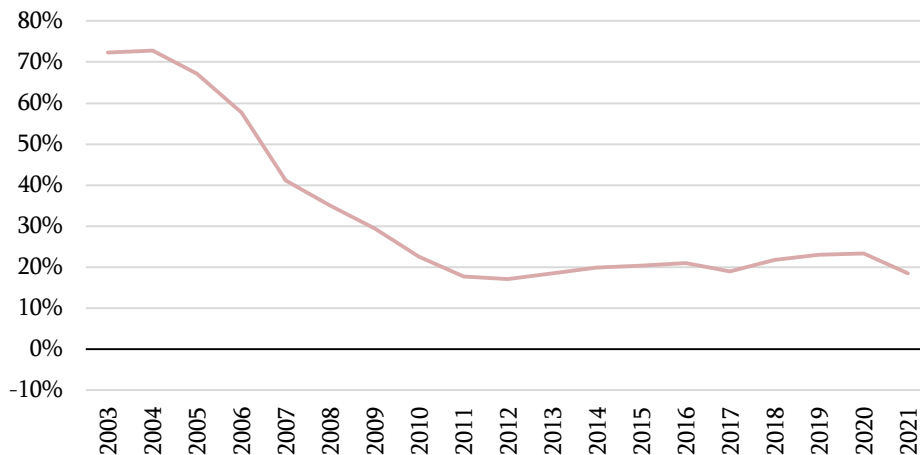
# Results: Size of illicit cigarette market adjusted by uplift factor



*Illicit cigarette market (in mln packs)*



*Illicit cigarette market (as % of total cigarette market)*



- Adjusting self-reported consumption to account for underreporting increased the estimated illicit cigarette market to approximately 20% in the period of 2010-2016;
- In 2020 and 2021, illicit cigarette market is estimated at 23% and 19% respectively;
- No increase in illicit cigarette market size is observed after excise tax increases in 2017-2019;
- Estimates of the illicit cigarette market based on adjusted self-reported consumption are notably higher than those suggested by the literature.

# Results: Potential impacts of elimination of illicit market on consumption and tax revenues

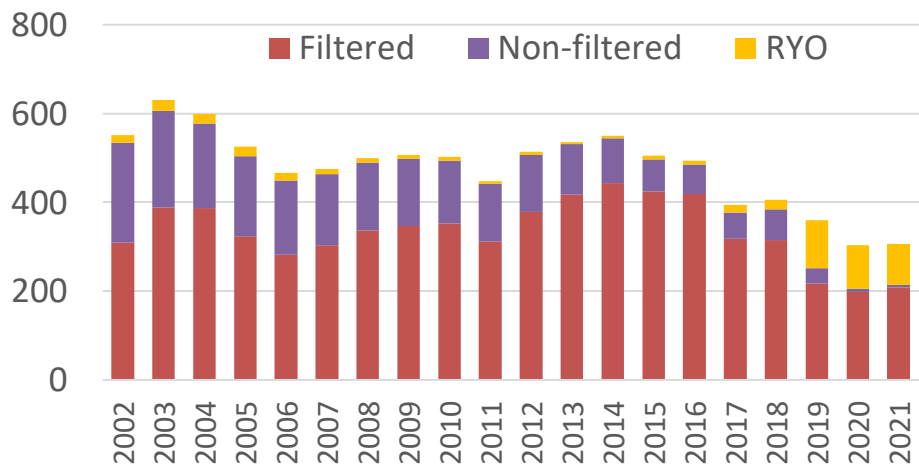


		Unadjusted		Adjusted	
Year		2020	2021	2020	2021
<b>Price increase faced by smokers of illicit cigarettes</b>		<b>89%</b>	<b>96%</b>	<b>89%</b>	<b>96%</b>
<b>Total consumption</b>	<b>All cigarettes</b>	-1.0%	-0.1%	-3.0%	-2.4%
	<i>Factory-made cigarettes</i>	-4.6%	-0.5%	-14.3%	-10.9%
	<i>RYO cigarettes</i>	7.1%	0.7%	22.0%	16.2%
<b>Tax-paid sales</b>	<b>All cigarettes</b>	3.4%	0.3%	10.6%	7.7%
	<i>Factory-made cigarettes</i>	1.8%	0.2%	5.4%	3.8%
	<i>RYO cigarettes</i>	7.1%	0.7%	22.0%	16.2%
<b>Number of smokers</b>		-0.5%	-0.1%	-1.5%	-1.2%
<b>Excise tax revenues</b>		2.8%	0.2%	10.0%	6.3%

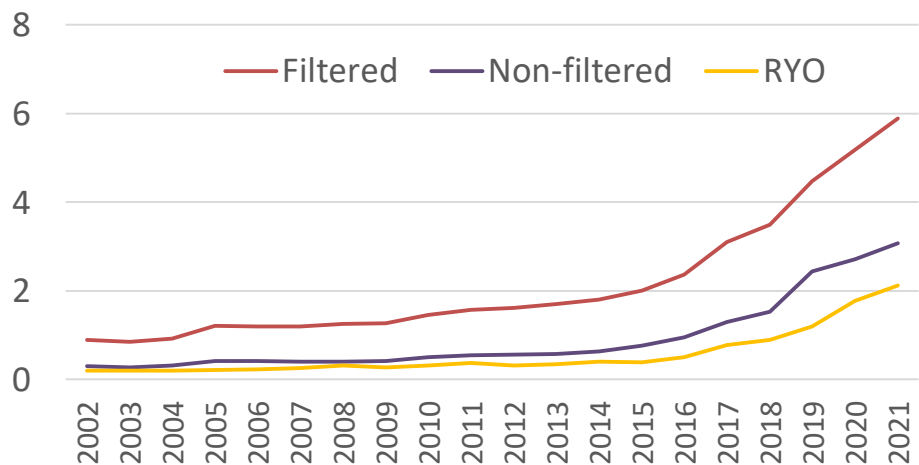
# Discussion: Impact of raising taxes on consumption structure



**Cigarette consumption structure – self reported (mln packs)**



**Cigarette prices – self reported (in GEL)**

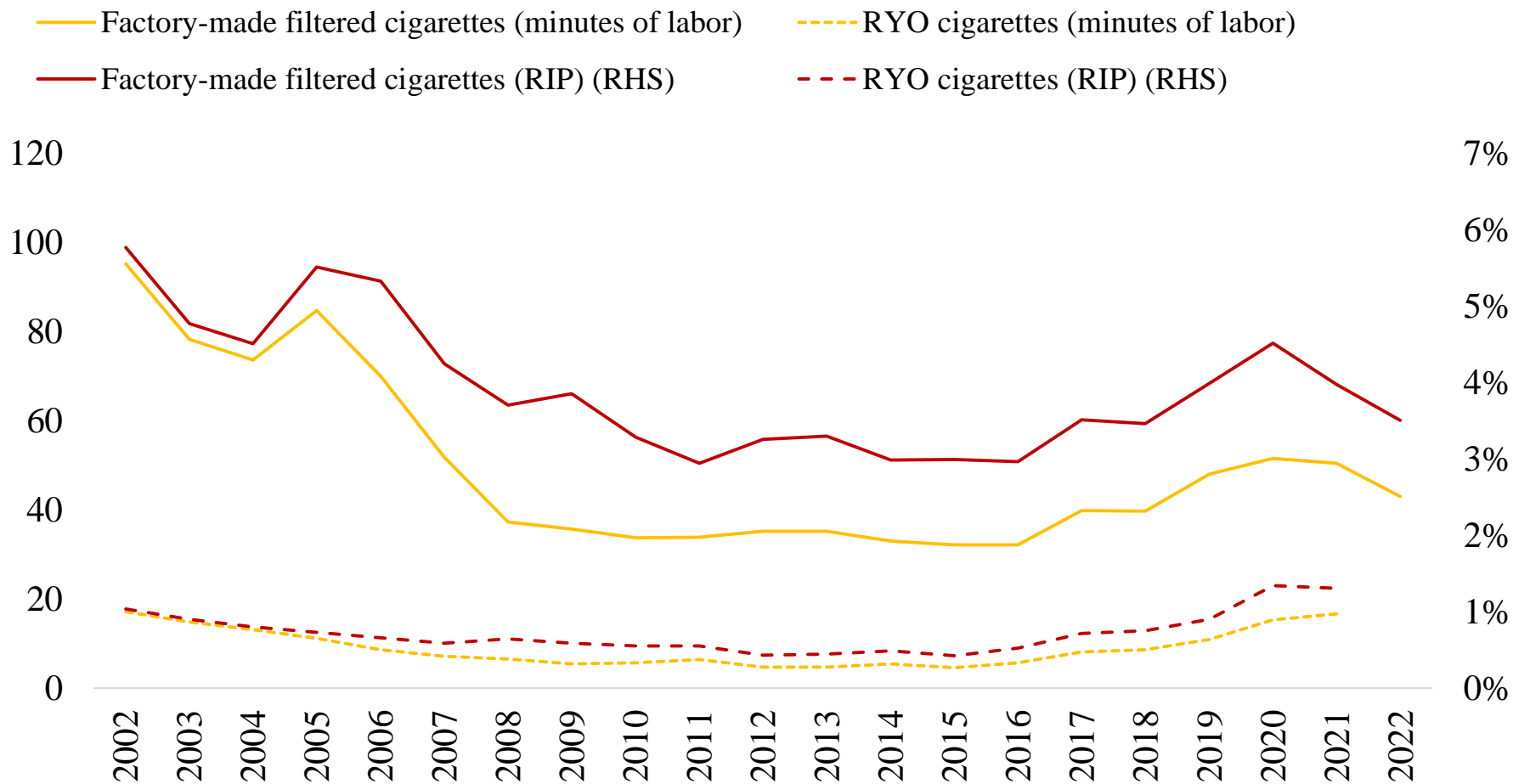


- Prior to 2017 the share of households smoking RYO cigarettes was consistently decreasing but the trend reversed after the changes in excise tax rates.
- As the price difference between filtered and RYO cigarettes widened it pushes smokers for inter-product downward substitution.
- About 30% of households reported RYO cigarettes consumption in 2019-2021.
- This shift in consumer preference may explain why the illicit cigarette market did not expand after the tax increases.
- However, it also diminishes the effectiveness of taxation policies in reducing smoking rates and leads to a decline in excise tax collection.

# Discussion: Cigarette affordability



## Cigarette affordability in Georgia





# Conclusions



- Excise tax increases implemented in Georgia during 2017-2019 did not have a significant impact on illicit cigarette consumption in 2020 and 2021.
- The estimated results suggest a potential decrease in the number of smokers by 0.5% to 1.5% in 2020 and 0.1% to 1.2% in 2021.
- Additionally, such elimination could lead to an increase in excise tax revenues by 2.8% to 10% in 2020 and 0.2% to 6.3% in 2021.
- The shift towards RYO products might explain why illicit market did not increase in Georgia after increasing excise taxes. On other hand it undermines the effectiveness of the tax increases implemented between 2017 and 2019, which were intended to deter smoking.
- Therefore, there is a need for more consistent tax policies on all tobacco products (increase in excise for raw tobacco products). Affordability trends also indicate the need of further increase in excise taxes on cigarettes.