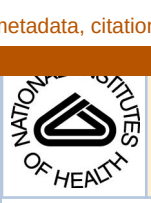

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ILLICIT CIGARETTES AND HAND-ROLLED TOBACCO IN 18 EUROPEAN COUNTRIES: A CROSS-SECTIONAL SURVEY

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Abstract

Objective—Little evidence, other than that commissioned by the tobacco industry, exists on the size of the illicit tobacco trade. This study addresses this gap by examining the level and nature of illicit cigarettes and hand-rolled tobacco in 18 European countries.

Design—Face-to-face cross-sectional survey on smoking.

Setting—18 European countries.

Participants—For each country, around 1000 subjects representative of the population aged 15 and over were enrolled. Current cigarette smokers were asked to show their latest purchased pack of cigarettes or hand-rolled tobacco.

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Conflict of interest statement

The authors of the present report declare that there are no conflicts of interest.

Contributors

SG had the original idea for the study; LJ and SG wrote the article; AL conducted the statistical analysis; LJ, CLV, ABG, and LC gave substantial contributions to conception, design and interpretation of data; SG gave contributions to conception and design of the study and provided data from the survey; all the authors approved the final version of the manuscript.

Ethical approval

The study protocol was approved by the Institutional Review Board of the Istituto di Ricerche Farmacologiche Mario Negri. The procedures for recruitment of subjects, informed consent, data collection, storage and protection (based on anonymous identification code) were all in accordance with the current country specific legislation.

Main outcome measure—A comprehensive measure called Identification of an Illicit Pack (IIP) was used to study the extent of illicit trade, defining a pack as illicit if it had at least one of the following tax evasion indicators: 1) it was bought from illicit sources, as reported by smokers, 2) it had an inappropriate tax stamp, 3) it had an inappropriate health warning, 4) its price was substantially below the known price in their market.

Results—Overall, the proportion of illicit packs was 6.5%. The highest prevalence of IIP was observed in Latvia (37.8%). Illicit packs were more frequent among less educated smokers and among those living in a country, which shared a land or sea border with Ukraine, Russia, Moldova or Belarus. No significant association was found with price of cigarettes.

Conclusion—this study indicates that IIP is less than 7% in Europe, and suggests that the supply of illicit tobacco, rather than its price, is a key factor contributing to tax evasion.

Keywords

illicit cigarette trade; tax evasion; smuggling; population survey; Europe

INTRODUCTION

Tobacco taxation is considered an effective means of reducing tobacco consumption and smoking prevalence [1]. Tobacco tax avoidance and tax evasion undermine the effectiveness of tobacco tax policies, result in cheaper prices for smokers and thus increased tobacco use [2,3]. Tobacco tax avoidance and evasion are activities to pay less or no taxes (Box 1). Tax avoidance occurs, for instance, when individual tobacco users residing in high tax jurisdictions purchase products in duty-free shops or in lower tax jurisdictions for their own consumption within customs constraints [1,4]. Tax evasion includes the purchase of smuggled and illicitly manufactured tobacco products.

Box 1

Definitions

Term	Definition
Tax avoidance	Legal activities to pay less tax or no taxes
Tax evasion	Illegal activities to pay less tax or no taxes
Smuggling	The illegal trading of products across borders
Illicit manufacturing	The production of tobacco products contrary to law
Illicit trade	Any practice or conduct prohibited by law and which relates to production, shipment, receipt, possession, distribution, sale or purchase including any practice or conduct intended to facilitate such activity

Transparent, public data on tax evasion are limited and, in many countries, non-existent. The rare available data are often based on information provided by the tobacco industry, who might have an incentive to exaggerate the size of smuggling in order to lobby against tobacco tax increases or other tobacco control policies [5]. Currently in Europe much reliance is being placed on reports on the illicit tobacco trade being compiled by Klynveld Peat Marwick Goerdeler (KPMG). Those reports are commissioned by Philip Morris

International and rely on empty pack surveys and industry data. The KPMG report, estimated that in 2010 the illicit cigarette trade comprised 9.9% of the total market in the EU [6].

Measuring the illicit tobacco trade is methodologically challenging for many reasons. It is an illegal activity and illegal traders are unlikely to record their activity. For security reasons, law enforcement agencies often prefer not to publicize the scope of their activity. All methods to estimate illicit trade have their limitations and not all studies clearly describe their methodology or limitations.

The International Agency for Research on Cancer (IARC) handbooks on methods for evaluating tobacco control policies [7] and on tobacco taxation for the Pricing Policies and Control of Tobacco in Europe (PPACTE) project [1] describe the different methods to measure illicit trade, identifying the three most used ones: 1) comparison of tax paid sales and individually reported consumption measures: the difference in consumption estimates between data from official legal sales and data from representative surveys may reflect the extent of overall tax avoidance and evasion [8,9]. This method however is influenced by under-reporting of smoking [10,11], reducing the validity of measures based on this approach [7]; 2) survey of tobacco users' purchase behaviours: representative surveys of tobacco users collecting self-reported data on purchase source and price can help assess the extent of various forms of individual tax avoidance, including cross-border shopping, direct purchases, and duty-free purchases [12]; these surveys provide figures based on self-reporting, and consequently likely to be under-estimates; 3) observational data collection: in representative surveys or empty packs collections, tobacco products can be examined through tax stamps, local warning labels and other pack markings, and product constituents to identify products that do not bear the appropriate stamps/labels/markings or that include constituents that differ from those contained in locally duty-paid sold products [1,13].

Within the PPACTE project, we collected data in 18 European countries in order to estimate the size of illicit trade in those countries, validating self reported information on illicit trade with observational pack data. In so doing we address an important gap in knowledge. To our knowledge this is the largest independent survey on the illicit trade undertaken in Europe to date.

METHODS

Data were derived from a face-to-face survey conducted between January and July 2010 in 18 European countries using standardized methods [14]. The survey included a total of 18,056 subjects (8653 men and 9403 women), representative, for each of the 18 European countries, of the general population aged 15 years and older in terms of age, sex, habitat and socio-economic characteristics (working status, occupation and income). The sample size was around 1000 participants for each country. Assuming a normal distribution and a probability of type I error (α) of 0.05, such a sample size is able for each country to estimate a frequency with a maximum Standard Error (SE) lower than ± 1.6%. The 18 countries were Albania, Austria, Bulgaria, Czech Republic, Croatia, England, Finland, France, Greece, Hungary, Ireland, Italy, Latvia, Poland, Portugal, Romania, Spain and Sweden. In Croatia,

England, Finland, Greece, Hungary and Poland information was collected only for subjects aged 18 years or more. Full details of the survey methodology and response rates are reported elsewhere [14]; brief details are presented below.

Sampling methods

Several countries (Albania, Croatia, Hungary, Italy, Poland and Romania) defined the sample through a multi-stage method. In the first stage, the primary unit of selection was a geographic area or voting centre. In the second stage, households or municipalities were selected. In the last stage, respondents were chosen randomly with different methodologies in order to be representative of the country specific population in terms of age, sex, habitat and socio-economic characteristics. In those countries where adult respondents had been selected from electoral rolls, the quota method had been used to select respondents 15 to 17 years old. Other countries (Austria, England, Finland, France and Ireland) used a quota method for the selection of the entire sample, stratifying the population according to selected variables including age, sex, and alternatively geographic area and/or profession, in order to obtain a representative sample of the country population. Some countries used other sampling methodologies, including a stratified random method (Bulgaria, Czech Republic and Latvia), or a simple random method (Greece). Most of the countries used statistical weights to assure the representativeness of the sample according to age, sex, geographic area and socio-economic characteristics.

Data collection

Individual-level data were collected by trained interviewers in the context of a computer assisted personal interview (CAPI). Besides socio-demographic characteristics, information on smoking status and number of cigarettes smoked per day was collected. Ever smokers were participants who have smoked 100 or more cigarettes in their lifetime. Current smokers were participants who smoked 100 or more cigarettes in their lifetime, and continue to smoke at the time our survey took place.

Current smokers were asked to show to the interviewer their latest purchased pack of manufactured cigarettes, hand-rolled tobacco or other types of cigarette pack, providing information on its provenance, health warnings, tax stamp (banderole) and price. According to the provenance, a pack could be bought from seven sources: 1) from national legal tobacco shops; 2) from vending machines; 3) over the internet; 4) from shops in other countries; 5) from duty-free shops; 6) from “individuals selling cigarettes independently at local markets, delivery service, door-to-door, just in the street, or, for UK and Spain, cheap cigarettes sold from legitimate retailers”; 7) offered by peers. For the purposes of this study, sources falling under 6) were deemed “illicit sources”.

Health warnings could be 1) in local language(s); 2) in a foreign language; 3) absent. The tax stamp (banderole) could be 1) a local tax stamp; 2) a foreign stamp; 3) removed or destroyed; 4) absent or of a duty-free shop. Smokers, who did not show the cigarette pack, gave self-reported information on the latest pack bought.

The country-specific price of one pack of Marlboro (in €, July 2010) was derived from the report “The Tobacco Control Scale 2010 in Europe” [15] and the World Health Organisation

Tobacco control country profiles [16]. We further standardized the price of one pack of Marlboro for Gross Domestic Product (GDP) in 2010 Power Purchasing Standards (PPS) [17,18] to take account of the real purchasing power in different countries. We defined as "bordering countries" those countries having a land or sea border with Ukraine (UA), Russia (RU), Moldova (MD) or Belarus (BY). These countries were: Bulgaria, Finland, Hungary, Latvia, Poland, Romania and Sweden.

Identification of an Illicit Pack (IIP)

In order to validate the direct questions on illicit packs and to produce a more comprehensive measure of the extent of illicit trade than the "illicit sources" measure outlined above, we validated the illicit nature of the latest packs on the basis of at least one of the following characteristics: 1) packs bought from an illicit source (i.e., source 6 above); 2) packs without the appropriate health warnings (i.e., a pack with health warnings in a foreign language or without health warnings, unless the pack had been bought over the internet, in other countries or in duty-free shops); 3) packs without the appropriate tax stamp (i.e., a pack with a foreign stamp or absent tax stamp unless the pack had been bought over the internet, in another country or duty-free shop; according to the European Commission [19], in March 2010, in Spain for hand-rolled tobacco packs, and in Austria, Finland, France, Sweden and England for manufactured cigarette and hand-rolled tobacco packs, no banderole was present; thus, we did not consider as tax evaders smokers from these countries reporting no tax stamp on their packs of tobacco products); 4) pack not bought over the internet, in other countries or in duty-free shops or offered, with a price lower than the 70% of the lowest price of cigarettes in their country in 2010 as listed in the country profiles of the World Health Organization [16]. Packs with at least one of the four characteristics were classified as Identification of an Illicit Packs (IIP). Our research methodology on illicit packs is similar to that already applied in another study from Poland [7]. Although the questionnaire allowed us to distinguish whether the banderole was absent or removed-destroyed, it was not possible for the interviewers to verify whether the tax stamps were counterfeit or not. However, a pack with a counterfeit tax stamp whose owner claimed that he bought his latest pack from an illegal source (characteristic 1) or paid a very low price (characteristic 4), was still classified as illicit. Packs with destroyed or removed tax stamps were not classified as illicit, as the removal could have taken place when the pack was opened.

Population

In our survey, we found 5268 current smokers (27.2% of the total population, after standardization for statistical weight and country population) [14]. We excluded 145 smokers who showed "other types" of cigarette packs (i.e., other than 20-cigarette pack, 10-cigarette pack or hand-rolled tobacco pack), and a further 9 smokers with no information available on their latest pack. Our analyses are therefore based on 5114 current cigarette smokers (2857 males and 2257 females).

Statistical methods

In order to detect sub-populations at higher risk of evading cigarette taxes, the odds ratios (OR) for IIP, and the corresponding 95% confidence intervals (CI), were estimated using

two-level logistic random effects model (random intercept) in order to take into account the heterogeneity between the 18 European countries. We fitted the logistic models considering country as random effects and sex, age (categorical: <25/25–44/45–64/≥65), level of education (categorical: low/medium/high) and smoking intensity (categorical: <15/15–24/≥25 cigarettes per day) as adjusting variables, using the GLIMMIX procedure in SAS 9.2 (SAS Institute). Only a few subjects had missing values on various covariates and were therefore excluded by the model.

For those countries whose representativeness was not assured by the sampling design, statistical weights were used. In order to show findings for the overall sample, we applied a weighting factor, with each country contributing in proportion to its population aged 15 years or over.

RESULTS

Among 5114 current smokers with information on their latest pack, 73.9% showed the interviewer the latest purchased pack of cigarettes or hand-rolled tobacco. Smokers who did not show it, provided self-reported information on the latest pack bought.

Of all current smokers, 85.1% bought the latest pack of cigarettes from legal tobacco shops, 5.7% from vending machines, 4.1% from illicit sources, 2.5% from shops in other countries, 1.1% from duty-free shops, 0.0% over the internet and 1.5% were offered/gifted by peers.

Table 1 shows the number and share of packs according to four different components of IIP. Out of 296 packs bought from illicit sources as reported by smokers, 65.5% had inappropriate health warning, 50.7% inappropriate tax stamp and 27.0% an extremely low price; 62.2% of packs with inappropriate health warning had also inappropriate tax stamp; 80.4% of packs with inappropriate tax stamp had inappropriate health warning; 81.6% of packs with an extremely low price were bought from illicit sources, as reported by smokers. Self-reported purchase from an illicit trade detected 64.6% of all IIPs, inappropriate health warning 68.1%, inappropriate tax stamp 50.2% and an extremely low price 21.4%.

Table 2 shows the distribution of current smokers according to IIP and its components. Overall, 4.1% self-reported purchase from illicit sources, 4.5% showed - or reported - inappropriate health warning, 3.4% inappropriate tax stamp and 1.5% an extremely low price of the latest pack bought. The overall proportion of IIP was 6.5%. The prevalence of IIP was similar in current smokers showing the pack, and in those who did not. According to the type of pack, the prevalence of IIP was 5.9% in smokers of manufactured cigarettes (20- or 10-cigarette pack) and 11.7% in smokers of hand-rolled tobacco. The highest prevalence of IIP was observed in Latvia (37.8%), followed by Sweden (18.8%) and Bulgaria (18.3%). The countries with the lowest prevalence of IIP were Greece (1.0%), Austria (0.8%) and Portugal (0.0%) (Table 2, Figure 1). Appendix 1 shows the proportion of IIP overall and by country in strata of type of pack (manufactured/hand-rolled) and exhibition (shown/not shown pack).

Table 3 shows the multivariate ORs for IIP according to selected individual-level and country specific characteristics. With reference to IIP, no significant difference was

observed according to sex (OR for women *vs* men: 1.06, 95% CI: 0.83–1.36). No significant difference in IIP has been observed according to age (as compared to <25 years, ORs were 1.10, 95% CI: 0.74–1.64, for 25–44, 1.29, 95% CI: 0.86–1.92, for 45–64 and 1.29, 95% CI: 0.76–2.17, for ≥65 years; p for trend=0.156). Less educated subjects had a significantly higher frequency of IIP (as compared to more educated smokers, ORs were 1.60, 95% CI 1.03–2.50, in intermediate and 2.57, 95% CI: 1.64–4.02, in lower educated subjects; p for trend <0.001). Cigarette consumption had no significant impact on IIP (as compared to <15 cig/day, ORs were 0.95, 95% CI: 0.72–1.23, for 15–24 cig/day and 1.24, 95% CI: 0.85–1.79, for ≥25 cig/day; p for trend=0.471). No significant difference in IIP was observed between subjects who did not accept to show their pack, as compared to those who did (OR: 1.13, 95% CI: 0.86–1.49). Illicit packs were more frequent among hand-rolled tobacco packs than manufactured cigarettes ones (OR: 2.67, 95% CI: 1.86–3.84). Packs of smokers living in countries with a land or sea border with Ukraine, Russia, Moldova and Belarus were significantly more frequently illicit than those of smokers living in other countries (OR: 4.22, 95% CI: 1.58–11.3). The frequency of IIP was higher in countries where a 20-cigarette pack of Marlboro costs less, although in the multilevel analysis ORs did not reach statistical significance: OR for price <3.0€ (US$ 4) *vs* ≥ 4.5€ (US$ 6) was 3.27 (95% CI: 0.92–11.6; p for trend=0.076). No specific association was found between IIP and the price of a 20-cigarette pack of Marlboro standardized by GDP in PPS (OR for the cheapest *vs* the most expensive tertile of price:0.96, 95% CI: 0.20–4.52; data not shown in table).

DISCUSSION

Transparent, public data on illicit tobacco are limited and, in many countries, non-existent [5,20]. This is the first independently financed study providing estimates on illicit trade in 18 European countries, using for the first time an *ad hoc* description IIP in multiple European countries.

The methodology used in the present study has possible limitations. First, the sample size in this study is limited to some 300 smokers per country. Second, the data are self-reported and rely on answers provided by smokers on a sensitive issue. Third, one quarter of smokers, including those who did not have a pack with them, did not show their package. Fourth, not all countries used the same sampling methodology, thus various surveys had different response rates according to the sampling methodology used [14]. Some measures were however introduced in the research design to counter those limitations. First, we asked the provenance of the latest pack of cigarettes, avoiding the use of words such as “smuggling” or “illicit trade” in order to decrease the perceived sensitivity of the issue. Second, we did not observe substantial difference according to IIP between those who showed the pack and those who did not. Third, we cross-validated the different measures used to estimate tax evasion and showed a high degree of consistency. Other strengths of the present study include the representativeness of country specific samples, the CAPI design of the survey, and the use of a single questionnaire, which permits comparability among different countries. As a result of various limitations, it is difficult to speculate on whether IIPs are under-estimates or over-estimates of the real extent of tax evasion. It is possible that some false positive IIPs are present. On the other hand the fact for example that interviews were conducted in participants’ homes may represent an underreporting among smokers,

particularly younger smokers willing to hide an engagement on illicit habits in front of family members. However, IIPs represent the most accurate available estimates of the illicit trade, since they are validated using objective information.

The tobacco industry has claimed that high cigarette taxes drive smuggling and has argued to governments, sometimes successfully, that they should not increase tobacco tax because this will increase the level of illicit trade [21], with a tendency to exaggerate the scope of it [22]. Our estimates on illicit trade are lower in eleven countries and higher in five countries than the 2010 estimates by KPMG, commissioned by Philip Morris International. Our critique of the KPMG estimates includes, among others, that the methodology for the collection of the empty packs in the report is insufficiently explained to judge its validity and that the report relies heavily on expertise and data provided by the tobacco industry, which cannot be considered as a neutral stakeholder on this issue. Even in 2011, a major tobacco company has been accused for being involved in smuggling operations ([23]. The KPMG estimate of tax evasion for France is 13.7% [6], the official government estimate is 5% [24] and our estimate is only 2.1%. Yet in France we observe the highest frequency of smokers reporting they bought their latest pack of cigarettes abroad (almost 10%). As such our findings are in broad agreement with those from a study showing that in France cross-border tobacco shopping (tax avoidance) is comparatively high, whereas contraband market for tobacco (tax evasion) remains modest [9].

More importantly, our data show that illicit trade is not directly related to tobacco prices. Smokers from countries where a 20-cigarette pack of Marlboro costs less than € 3 (USD 4) are more frequently cigarette tax evaders, but multi-level analysis failed to find statistically significant differences. Even once price is standardized by GDP per PPS (thus obtaining a proxy of cigarette affordability), no significant relation has been shown with IIP. This suggests that factors other than price influence illicit trade. These include the ease and cost of operating in a country, industry participation, how well crime networks are organized, the likelihood of being caught, the punishment if caught, and corruption levels [25]. Our data also show that illicit trade is more frequent in countries with a land or sea border with Ukraine, Russia, Moldova or Belarus, which are major suppliers of cheap and illicit cigarettes [26–28]. These findings provide support to the 2011 European Commission action plan to fight smuggling of cigarettes and alcohol along EU Eastern border [29]. This action plan reports that Eastern Partnership countries, in particular Moldova, Ukraine and increasingly Belarus and Russia are major sources of illicit cigarettes and alcohol in the European Union, and this trend appears to have increased in 2010 [29]. Our findings suggest therefore that the supply of illicit cigarettes is an important factor, which contributes to tax evasion.

Tax evasion is not limited to manufactured cigarettes. We observed, in fact, a higher proportion of tax evasion among smokers showing packs of hand-rolled tobacco rather than manufactured cigarettes. However, this is mainly a characteristic for the UK market, where the percentage of illicit buyers is 4 to 5 times higher for hand rolled tobacco smokers than for cigarette smokers [8].

The study design, based on individual-level data, allowed us to analyse tax evasion among selected sub-populations. No significant difference in IIP was observed according to sex. Middle-aged and less educated subjects were more frequently tax evaders than younger and more educated smokers, respectively. No statistically significant pattern was observed with smoking intensity. This may be due to the relatively small sample size, since it is in apparent contrast with the general impression that heavy smokers may be more likely to engage in tax avoiding and tax evading behaviours than individuals who smoke fewer cigarettes. Accordingly, a study conducted on 3602 US smokers found that those engaging in a price avoidance strategy were associated with a higher cigarette consumption [30]. Moreover, a survey conducted between 2005 and 2008 in Italy -a country however where smuggling accounted for a negligible portion of total tobacco trades-, showing that the proportion of smuggled tobacco consumption appeared to be greater in heavy smokers [12].

Finally, our findings underline the need for the independent monitoring of the illicit trade on a regular basis using a clearly defined methodology and publicly available results.

In conclusion, IIP is an attempt to estimate, as accurately as possible, the proportion of illicit cigarettes and hand-rolled tobacco in several European countries. In our study, illicit trade is below 7% in 18 European countries, more frequently affects smokers with low socio-economic characteristics and varies considerably among countries, occurring more in countries with a land or sea border with Ukraine, Russia, Moldova or Belarus.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Appendix

Appendix 1

Number of tobacco product packs overall and by type (manufactured/hand-rolled) and exhibition (shown/not shown pack), overall and by country. Corresponding proportion (%) of Identification of an Illicit Pack (IIP). PPACTE, 2010.

	Total Number of packs (N), proportion of IIP (%)									
	Type of pack				Exhibition of pack					
	Manufactured		Hand-rolled		YES		NO		Total	
	N	%	N	%	N	%	N	%	N	%
Total*	**4728**	**5.9**	**381**	**11.7**	**4022**	**6.3**	**1092**	**7.2**	**5114**	**6.5**
Country										
Albania (AL)	247	4.5	14	71.4	237	8.0	24	8.3	261	8.1
Austria (AT)	310	0.8	9	0.0	251	0.9	68	0.6	319	0.8
Bulgaria (BG)	417	17.8	3	100.0	330	14.6	90	32.2	420	18.3
Croatia (HR)	237	7.6	20	54.9	199	10.2	63	13.5	262	11.0
Czech Republic (CZ)	282	10.3	8	0.0	234	12.0	56	1.8	290	10.0
England (UK)	172	3.7	79	20.9	167	9.9	84	7.9	251	9.2
Finland (FI)	173	2.3	44	0.0	180	2.3	37	0.0	217	1.9
France (FR)	197	2.6	51	0.0	181	2.4	67	1.2	248	2.1
Greece (GR)	280	0.7	47	2.4	308	0.7	19	5.3	327	1.0
Hungary (HU)	345	4.9	11	72.7	356	7.0	0	0.0	356	7.0
Ireland (IE)	343	4.9	26	0.0	242	3.7	127	6.3	369	4.6
Italy (IT)	212	0.9	2	54.1	181	1.1	33	3.8	214	1.5
Latvia (LV)	292	38.5	5	0.0	209	38.0	88	37.4	297	37.8
Poland (PL)	235	15.2	15	17.8	191	14.1	59	19.3	250	15.3
Portugal (PT)	314	0.0	7	0.0	319	0.0	2	0.0	321	0.0
Romania (RO)	265	10.7	0	0.0	170	12.0	95	8.3	265	10.7
Spain (ES)	250	3.6	37	2.6	148	3.4	139	3.5	287	3.4
Sweden (SE)	157	18.5	3	33.3	119	17.7	41	22.0	160	18.8

*Computed weighting each country in proportion to the country specific population aged 15 years or over.

What this paper adds" box

What is already known on this subject

A high tax margin may provide the initial incentive to tax evasion but this is one of many factors influencing illicit trade. Important factors include the ease and cost of operating in a country, industry participation, how well organized crime networks are, the likelihood of being caught, the punishment if caught and corruption levels.

What this study adds

This is the first independently financed study providing estimates on illicit tobacco trade in 18 European countries with methodology and results which are publicly accessible.

This study suggests that the supply of illicit tobacco, rather than its price, is a key factor contributing to it.

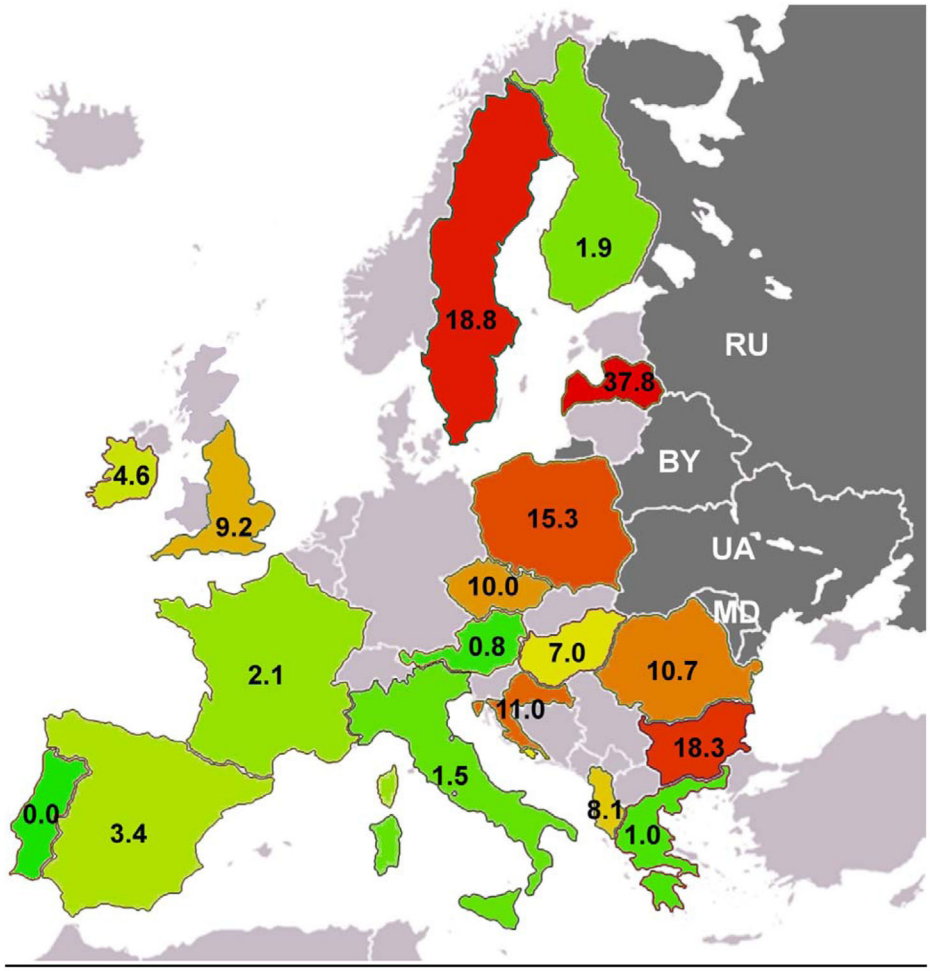

Figure 1. Prevalence (%) of Identification of an Illicit Pack (IIP) for cigarettes and hand-rolled tobacco in 18 European countries. Countries are colored according to the relative ranking of illicit tobacco packs (IIP: red=high IIP, yellow=intermediate and green=low IIP). PPACTE, 2010

Numbers represent the percent frequency of IIP smokers among all smokers in each country, computed weighting each country in proportion to the country specific population aged 15 years or over. BY: Belarus; MD: Moldova; RU: Russia; UA: Ukraine.

Table 1

Number and share of packs with concordant characteristics of individual components of the Identification of an Illicit Pack (IIP)*. PPACTE, 2010.

	Total 458	1: Self-reported purchase from illicit sources	2: Inappropriate health warning	3: Inappropriate tax stamp	4: Extremely low price	Packs with one single characteristic
1: Self-reported purchase from illicit sources	296 (100.0%)		194 (65.5%)	150 (50.7%)	80 (27.0%)	76 (25,7%)
2: Inappropriate health warning	312 (100.0%)	194 (62.2%)		185 (59.3%)	72 (23.1%)	67 (21,5%)
3: Inappropriate tax stamp	230 (100.0%)	150 (65.2%)	185 (80.4%)		60 (26.1%)	30 (13,0%)
4: Extremely low price	98 (100.0%)	80 (81.6%)	72 (73.5%)	60 (61.2%)		14 (14,3%)

* IIPs are those packs with at least one of the following characteristics: 1) self reported purchase from illicit sources: (purchase sources: illicit sources); 2) inappropriate health warning: (health warning: foreign/absent) & (purchase sources: legal shops/vending machines/offered/illicit sources/missing); 3) inappropriate tax stamp: (tax stamp: foreign/absent) & (purchase sources: legal shops/vending machines/offered/illicit sources/missing); 4) extremely low price: (purchase sources: legal shops/vending machines/illicit sources/missing) & (price of the latest pack of manufactured cigarettes lower than 70% of the lowest price of cigarettes in each country)

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Table 2

Distribution of 5114 European current smokers according to the its components, overall and by country and other selected characteristics. PPACTE, 2010.

	N of smokers	1: Self-reported purchase from illicit sources (%)	2: Inappropriate health warning (%)	3: Inappropriate tax stamp (%)	4: Extremely low price (%)	IIP (1 OR 2 OR 3 OR 4) (%)
Total*	**5114**	**4.1**	**4.5**	**3.4**	**1.5**	**6.5**
Pack shown*						
Yes	4022	3.9	4.2	3.4	1.4	6.3
No	1092	4.5	5.2	3.1	1.8	7.2
Type of pack*						
Manufactured	4728	4.0	3.8	3.1	1.5	5.9
Hand-rolled	381	4.6	9.6	5.4	0.0	11.7
Country						
Albania (AL)	261	2.3	6.5	2.8	1.3	8.1
Austria (AT)	319	0.4	0.6	0.7	0.0	0.8
Bulgaria (BG)	420	14.5	13.1	7.0	2.3	18.3
Croatia (HR)	262	6.4	9.1	7.0	0.0	11.0
Czech Republic (CZ)	290	8.6	1.4	0.7	0.0	10.0
England (UK)	251	4.5	7.4	3.3	1.0	9.2
Finland (FI)	217	1.8	1.9	1.2	1.3	1.9
France (FR)	248	0.5	1.9	1.8	1.8	2.1
Greece (GR)	327	0.6	1.0	0.7	0.8	1.0
Hungary (HU)	356	0.0	3.4	5.3	0.0	7.0
Ireland (IE)	369	1.8	3.8	3.0	1.6	4.6
Italy (IT)	214	0.3	0.8	1.3	0.4	1.5
Latvia (LV)	297	30.7	31.2	26.9	19.9	37.8
Poland (PL)	250	12.3	12.0	9.2	5.3	15.3
Portugal (PT)	321	0.0	0.0	0.0	0.0	0.0
Romania (RO)	265	9.8	7.0	6.1	2.3	10.7
Spain (ES)	287	1.3	1.8	1.2	0.4	3.4
Sweden (SE)	160	10.0	5.0	7.6	0.0	18.8

* Computed weighting each country in proportion to the country specific population aged 15 years or over.

IIPs are those packs with at least one of the following characteristics: 1) self reported purchase from illicit sources: (purchase sources: illicit sources); 2) inappropriate health warning: (health warning: foreign/absent) & (purchase sources: legal shops/vending machines/offered/illicit sources/missing); 3) inappropriate tax stamp: (tax stamp: foreign/ absent) & (purchase sources: legal shops/vending machines/offered/illicit sources/missing); 4) extremely low price: (purchase sources: legal shops/vending machines/illicit sources/missing) & (price of the latest pack of manufactured cigarettes lower than 70% of the lowest price of cigarettes in each country)

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Table 3

Odds ratios (OR)* for Identification of an Illicit Pack (IIP) *vs* non-IIP and corresponding 95% confidence intervals (CI) according to selected individual-level and country specific characteristics among current smokers of manufactured or hand-rolled cigarettes. PPACTE, 2010.

	N	% IIP°	Odds ratios (OR)
Total	5114	6.5	
Individual-level characteristics			
Sex			
Men	2857	6.7	1†
Women	2257	6.3	1.06 (0.83–1.36)
Age			
<25	823	5.5	1†
25–44	2274	5.6	1.10 (0.74–1.64)
45–64	1623	7.9	1.29 (0.86–1.92)
≥65	394	8.1	1.29 (0.76–2.17)
P for trend			0.156
Education‡			
High	1031	3.5	1†
Intermediate	2573	5.7	1.60 (1.03–2.50)
Low	1508	8.8	2.57 (1.64–4.02)
P for trend			<0.001
Smoking consumption (cig/day)‡			
<15	2032	6.3	1†
15–24	2298	6.5	0.95 (0.72–1.23)
≥25	682	7.9	1.24 (0.85–1.79)
P for trend			0.471
Show the latest pack			
Yes	4022	6.3	1†
No	1092	7.2	1.13 (0.86–1.49)
Type of the latest pack ‡			
20-cigarette pack	4587	6.0	1†
10-cigarette pack	141	3.2	0.51 (0.22–1.18)
Hand-rolled tobacco pack	381	11.7	2.67 (1.86–3.84)
Country specific characteristics			
Countries bordering with UA, RU, MD or BY			
No	3149	3.9	1†
Yes	1965	13.7	4.22 (1.58–11.3)
Price of Marlboro (crude price)			
Most expensive tertile (4.50€)	1459	4.5	1†
Middle tertile (3.00–4.49€)	1806	3.5	0.62 (0.17–2.32)

	N	% IIP°	Odds ratios (OR)
Cheapest tertile (<3.00€)	1849	13.8	3.27 (0.92–11.6)
P for trend			0.076

*ORs were estimated using a multilevel logistic regression model with random effects after adjustment for sex, age, level of education and smoking intensity, and with country as random effect. Estimates were weighted for statistical weights that consider country specific population.

°Computed weighting each country in proportion to the country specific population aged 15 years or over.

†Reference category.

‡The sum does not add up to the total because of a few missing values.