

## LETTERS

## Tobacco control and the epidemiological framework

We recently categorised the body of tobacco research<sup>1</sup> according to the epidemiological framework of agent, host, environment and vector.<sup>2–4</sup> We found that tobacco research to date has focused predominantly on tobacco products themselves and the people who use them.

The purpose of this research letter is to delve deeper and examine whether the types of articles published in the two leading tobacco-focused journals—*Tobacco Control* and *Nicotine & Tobacco Research*—differ from each other and from those published in other journals.

Tobacco articles were randomly selected from searches of the Medline and Web of Science databases from 2000 to 2008. Applying our inclusion criteria, the number of articles eligible for coding was 2050. Articles were coded based on their title and, if necessary, their abstract. Each article was coded according to the epidemiological framework component: agent—for example, the cigarette, cigarettes as a cause of disease; host—for example, smoking behaviours, characteristics of smokers, treatment for smoking; environment—for example, regulations, community interventions; and vector—for example, the tobacco industry. Frequencies and cross-tabulations were performed using SAS. Standard two-tailed, two sample tests of proportions were conducted to determine differences in proportions. Further details on the methodology and inter-rater reliability are available elsewhere.<sup>1</sup>

We found a number of differences when we compared the distribution of articles across the epidemiological framework concepts for all journals in the 2000s to the distributions for *Tobacco Control* and *Nicotine & Tobacco Research* (table 1). Both tobacco journals published a significantly lower proportion of articles pertaining to the agent than all journals combined ( $p<0.01$ ), and *Tobacco Control* published relatively fewer agent articles than *Nicotine & Tobacco Research* ( $p<0.01$ ). Whereas *Tobacco Control* published the same proportion of host papers as all journals combined ( $p=0.01$ ), and *Nicotine & Tobacco Research* published a significantly higher proportion of host papers ( $p=0.01$ ), *Nicotine & Tobacco Research* published the same proportion of environment papers as all journal combined ( $p=0.70$ ), with *Tobacco Control* publishing a significantly higher proportion of papers focusing on the environment ( $p<0.01$ ). *Tobacco Control* published a significantly higher proportion of papers focusing on the vector compared to both *Nicotine & Tobacco Research* and all journals combined ( $p<0.01$ ).

**Table 1** Tobacco articles according to epidemiological framework concept, by journal

	<i>Tobacco Control</i> *	<i>Nicotine &amp; Tobacco Research</i> *	All other journals (2000s only)
Agent	13% (n=11)	36% (n=25)	57% (n=1074)
Host	32% (n=27)	59% (n=41)	33% (n=630)
Environment	38% (n=32)	6% (n=4)	8% (n=155)
Vector	18% (n=15)	0% (n=0)	2% (n=36)
Total No	85	70	1895

\*Percentages do not add up to 100% owing to rounding.

*Tobacco Control* has filled a niche, publishing a greater proportion of papers, compared to other journals, focused on the contextual factors that influence smoking behaviours and on the vector of the tobacco pandemic (the tobacco industry). This focus on very applied research might help explain *Tobacco Control*'s relatively high impact factor for a single issue journal (3.852 in 2010 and 4.438 in 2009). That said, our findings suggest that both leading tobacco-focused journals, as well as all other journals, could increase the proportion of papers they publish that describe and explore ways of reducing the effectiveness of the tobacco industry in maintaining and expanding tobacco use globally.

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## Lost revenue estimates from the illicit trade of cigarettes: a 12-country analysis

The illicit trade of tobacco products, including domestic tax evasion and avoidance and cross-border smuggling, poses a complex and pressing challenge for the health of the global population. This complexity lies in part with the many avenues for the illegal movement of tobacco across borders.<sup>1</sup> The complexity of this challenge is heightened by porous borders in a globalised world.<sup>2,3</sup> Unconventional means of tobacco sales, such as the internet, have challenged governments to enhance mechanisms for the monitoring and control of the cross-border movement of these products.<sup>4,5</sup> Illicit trade not only undermines health protective measures such as taxation,<sup>6</sup> which are proven to reduce tobacco consumption and dissuade individuals from becoming consumers, but also undermines the revenue gained by governments from tobacco taxation.

The Protocol on the Illicit Trade of Tobacco Products is the first to be negotiated within the Framework Convention on Tobacco Control.<sup>7</sup> There are two points worth noting about this Protocol. First, the cost of developing a system for tracking and tracing tobacco products is substantially borne by the tobacco industry itself.<sup>8</sup> Second, a point which is the focus of our study is that the national health and economic gains of supporting and implementing a strong protocol for the control of illicit trade are great.

The greatest benefit of such a protocol is the ability of governments to leverage tobacco taxation as a health protection strategy, whereby the number of new smokers will decrease along with a corresponding increase in tobacco cessation. Subsequently, the stronger the system of regulation and enforcement for illicit trade, the greater the ability of governments to leverage taxation as a tobacco control measure. The primary purpose of this study is to inform countries of the short-term economic consequences of the illicit trade of

tobacco products. We chose 12 diverse countries to provide a broad picture of the global challenge of illicit trade.

It is important to note that the number of illicit trade data sources is limited and often the methodology is unclear.<sup>9</sup> Our primary source of data for the illicit trade estimates is Euromonitor International. This data set has recently been criticised for its lack of methodological transparency, its overestimation of the illicit trade of cigarettes and a tendency to suggest that illicit trade is increasing from year to year.<sup>9 10</sup> We are cognisant of these limitations. It is well established that 'the net impact of the tax increases is overwhelmingly positive.'<sup>9</sup> The paucity of illicit trade estimates should not hinder a global dialogue on this important issue. However, within this dialogue we must remain conscious of the data limitations.

We conducted an analysis of existing data in order to calculate the estimated loss of revenue per country per year.<sup>11</sup> We conducted a simple calculation to, first, determine the price of one individual cigarette in each country in order to then calculate the tax revenue per cigarette per country. Cigarette price was calculated based on the Tobacco Atlas data set.<sup>12</sup> We then calculated the number of cigarettes traded illicitly per year per country based on the proportion of illicit trade per country, which in turn is based on Euromonitor International data.<sup>11</sup> We calculated the excise tax from the total tax as provided by the Tobacco Atlas.<sup>12</sup> This calculation involved subtracting the actual value-added tax<sup>13</sup> (eg, 12/112=10.7% for Ecuador) from the total tax. Once the excise tax revenue per cigarette was calculated, we calculated the estimated loss of revenue per year by multiplying the number of illicitly traded cigarettes with the tax revenue generated per cigarette. This information provides an estimate of lost revenue for each country. We also calculated the estimated revenue lost for the cheapest and most sold brand in each country based on cost estimates provided in the 2009 WHO report. All estimates are calculated in US dollars (see table 1).

The range of excise tax as a proportion of the cigarette price as of 2007 or later was 35.8% in Vietnam to 80% in Bulgaria. The average estimates for the illicit trade of cigarettes between 2003 and 2008 ranged from 4.4% in the Czech Republic to 27% in the UK. Of the 12 countries analysed, 5 demonstrated an increase in illicit trade between 2003 and 2008. Two of them demonstrated a decrease in illicit trade and the remainder demonstrated patterns of fluctuation between 2003 and 2008. The average number of cigarettes traded illegally ranged from 389.55 million in Ecuador to over 20 billion in India. Lost excise tax revenue as an average of the 6-year period for the most sold brand ranged from over \$23 million per year in Ecuador to almost \$5 billion per year in the UK (see table 1).

**Table 1** Lost revenue due to the illicit trade of cigarettes

Country	Price per cigarette*			Actual value-added tax	Total tax as a proportion of cigarette price, or latest available data* tax§		Excise tax revenue per cigarette			Illicit trade estimate(%): 6-year average (2003–2008)†	Change over 6 years	No. (million) of cigarettes traded illicitly/year†	Estimated loss of revenue (excise tax)			Government investment in tobacco control
	Cheapest brand	Most sold brand	Marlboro		Cheapest brand	Excise tax\$	Cheapest brand	Most sold brand	Marlboro				Cheapest brand‡	Most sold brand	Marlboro	
Belgium	0.28	0.29	0.29	17.4	77.43	60.0	0.17	0.17	0.17	6.0	↓	780.60	132 702 000	132 702 000	132 702 000	4 394 478
Bulgaria	0.07	0.10	0.13	16.7	86.98	80.0	0.06	0.08	0.10	8.9	↑	2020.35	121 221 000	161 628 000	202 035 000	12 400
Czech Republic	0.14	0.15	0.17	16.7	79.48	62.8	0.11	0.12	0.14	4.4	↑	1075.83	118 341 300	129 099 600	150 616 200	NA
Ecuador	0.05	0.11	0.085	10.7	64.29	53.6	0.03	0.06	0.05	9.3	↑	389.55	11 685 000	23 373 000	19 477 500	200 000
Estonia	0.12	0.14	0.11	16.7	77.50	60.8	0.07	0.09	0.07	22.6	↔	635.98	44 518 600	57 238 200	44 518 600	55 575
Hungary	0.12	0.15	0.15	20	74.05	54.0	0.06	0.08	0.08	18.6	↓	3737.83	224 269 800	299 026 400	299 026 400	244 026
India	0.07	0.08	0.10	11.9	55.09	43.2	0.03	0.03	0.04	17.3	↑	20 202.33	606 069 900	606 069 900	808 093 200	3 869 548
Indonesia	0.07	0.06	0.045	9.1	52.64	43.5	0.03	0.02	0.02	7.8	↔	12 800.62	384 018 600	256 012 400	256 012 400	30 931
Malaysia	0.08	0.13	0.18	0	48.32	48.3	0.04	0.06	0.09	17.0	↔	3644.93	145 797 200	218 695 800	328 043 700	NA
Philippines	0.03	0.03	0.03	10.7	54.23	43.5	0.01	0.01	0.01	19.1	↑	18 057.78	180 577 800	180 577 800	180 577 800	91 633
Romania	0.07	0.11	0.10	19.4	73.68	54.3	0.04	0.06	0.05	10.3	↔	3933.50	157 340 000	236 010 000	196 675 000	28 306 338
UK	0.31	0.38	0.54	14.9	79.82	64.9	0.20	0.25	0.35	27.0	↔	19 101.17	3 820 234 000	4 775 292 500	6 685 409 500	137 317 368
Vietnam	0.01	0.03	0.05	9.1	44.90	35.8	0.004	0.01	0.02	12.3	↔	11 519.30	46 077 200	115 193 000	230 386 000	30 000 000

\*Based on Tobacco Atlas data.<sup>12</sup>

†Based on Euromonitor International data.<sup>11</sup>

‡Based on the WHO report.<sup>17</sup>

§Calculated using the international value-added tax rates for each country for 2010.<sup>13</sup>

The price elasticity of demand is estimated to be between  $-0.4$  and  $-0.6$ .<sup>14</sup> As such the estimated revenue lost may be lower than our calculated estimates over time as consumption decreases. In conducting this analysis, we recognise that the actual amount of additional tax revenues collected as a result of successfully controlling illicit trade is influenced by both the share of illicit trade (supply) and the size of the market (demand) and would decrease over time. However, the immediate economic gains upon controlling illicit trade are substantial.

Illicit trade compromises health outcomes to the extent that it undermines price strategies, labelling requirements or other policies aimed at reducing the demand for tobacco products. Illicit trade also compromises all government programs to the extent that it deprives communities of revenues that could be put to public purposes. For example, the annual revenue loss to the illicit tobacco market in the 12 countries that we analysed is more than 3 times the entire budget of the WHO<sup>15</sup> and almost 4,000 times as large as the cost of convening a session of an Inter-governmental Negotiating Body to develop a multinational response.<sup>16</sup> For the countries we studied, lost revenue due to the illicit trade of cigarettes is higher than government investments in tobacco control.<sup>17</sup> Despite the data limitations, the lost revenue due to the illicit trade of cigarettes is predictably high. The cost of supporting the development and implementation of protocols to curb the illicit trade of tobacco products is relatively

small when compared with the health and economic gains.

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